МИНИСТЕРСТВО СЕЛЬСКОГО ХОЗЯЙСТВА
И ПРОДОВОЛЬСТВИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

Учреждение образования
«БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ АГРАРНЫЙ
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АНГЛИЙСКИЙ ЯЗЫК. ПРОФЕССИОНАЛЬНАЯ ЛЕКСИКА ДЛЯ АГРОИНЖЕНЕРОВ

*Допущено Министерством образования Республики Беларусь
в качестве учебного пособия для студентов учреждений
высшего образования по группе специальностей «Агроинженерия»*

PROFESSIONAL ENGLISH FOR AGRICULTURAL ENGINEERS

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Учебное пособие состоит из введения, трех модулей («Agriculture», «Basic Components of Agricultural Engineering», «Job Analysis of an Agricultural Engineer»), словаря и списка использованной литературы. Задания ориентированы на развитие и совершенствование навыков устной речи, формирование коммуникативной компетенции будущих специалистов-аграриев в целом.
Для студентов 1 курса агротехнических специальностей.

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The textbook consists of an introduction, three modules, a basic vocabulary and a list of references. The tasks are focused on the development and improvement of oral speech skills, the creation of the communicative competence of future agrarian specialists in general.
The textbook is addressed to first-year students of agrotechnical specialties.

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CONTENTS

ВВЕДЕНИЕ

Настоящее учебное пособие предназначено для студентов первого курса агротехнических специальностей, продолжающих изучение английского языка после средней школы. Оно написано в соответствии с требованиями учебной программы по дисциплине «Иностранный язык» и является второй частью основной книги учебного комплекса по профессиональному английскому языку.

Целью пособия является формирование системы знаний, умений и навыков профессионального иноязычного общения.

Материалы учебного пособия организованы по тематическому принципу и включают следующие модули: «Agriculture», «Basic components of agricultural engineering», «Job analysis of agricultural engineer».

Модуль 1 «Agriculture» предполагает изучение основных характеристик сельского хозяйства как сферы профессиональной деятельности будущего специалиста, особенности ведения сельского хозяйства в Великобритании.

Модуль 2 «Basic components of agricultural engineering» предусматривает работу с текстами по специальности, содержащими краткие сведения о главных направлениях электрификации и механизации сельского хозяйства, основных типах и назначении сельскохозяйственной техники и электрооборудования, а также способах снижения рисков несчастных случаев и безопасном управлении соответствующей техникой и оборудованием.

Модуль 3 «Job analysis of agricultural engineer» ориентирован на формирование общего представления будущих специалистов агротехнических специальностей о структуре, специфике и условиях профессиональной деятельности.

Структурное построение каждой темы модуля максимально способствует активизации различных видов речевой деятельности в разнообразных коммуникативных условиях.

Основной структурной единицей модуля является лингвометодический комплекс, который представляет собой завершенный блок (Unit). Каждый Unit модуля разбит на следующие разделы: Starting points; Section A. Reading; Section B. Language practice; Section C. Communicating; Section D. Writing, and Section E. Supplementary texts.

Раздел Starting points предназначен для введения в тему блока (Unit) и включает упражнения, основанные на общей эрудиции студентов и не требующие особой подготовки.

Section A. Reading содержит основной текст, включающий определенную тему, и упражнения на проверку общего понимания содержания текста.

Section B. Language practice включает группу упражнений для активизации и расширения тематического словаря, а также для развития навыка выбора и употребления слова в зависимости от контекста.

Группа упражнений в Section C. Communicating предполагает решение студентами комплексных коммуникативных задач с использованием изученного языкового материала.

Section D. Writing предполагает выполнение упражнений на основе печатного текста в форме письменного сообщения.

Section E. Supplementary texts включает в себя профессионально ориентированные тексты, объединенные общей тематикой, для работы на занятиях или самостоятельного изучения.

Basic vocabulary, расположенный в конце пособия, предназначен для повторения и окончательного закрепления тематических лексических единиц и может быть использован в качестве опоры при чтении текстов для снятия языковых трудностей, мешающих пониманию.

Учебное пособие иллюстрировано таблицами, схемами, рисунками, позволяющими усилить ассоциативную базу осмысления и усвоения учебного материала, оказывая влияние на развитие памяти и внимания, повысить мотивацию к изучению предмета.

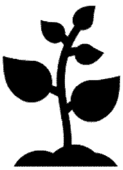
Авторы надеются, что работа с учебным пособием позволит студентам достичь значительных успехов в овладении английским языком.

"Agriculture was the first occupation of man, and as it embraces the whole earth, it is the foundation of all other industries"

E. W. STEWART

MODULE 1

AGRICULTURE



UNIT 1
CROP FARMING

UNIT 2
LIVESTOCK FARMING

UNIT 3
AGRICULTURE IN GREAT BRITAIN

UNIT 4
AGRICULTURE IN THE REPUBLIC OF BELARUS

UNIT 1

CROP FARMING

It is better to plant crops that yield insignificant outcome than to let the land weed covered

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Find five words or word combinations that go with the topic "*Agriculture*". Make up your own sentences with these words.**

3 **Read the text and fill in the missing words from the previous exercise.**

For decades agriculture has been associated with the production of essential food ______. Today processing, marketing, and distribution of crops and ______ products are all acknowledged as part of current agriculture. ______ plays a critical role in the entire life of the economy. Agricultural sector provides ______ for domestic animals. Agriculture is the main source of ______ to major industries. Agricultural sector provides more employment opportunities to the labour force.

4 **Read each sentence and circle *YES* if you agree with the statement and think it is true, or *NO* if you disagree with the statement or think it is wrong.**

YES	NO	1. Agriculture is another word that is used when talking about farming.
YES	NO	2. It is important for farmers to conserve soil and keep it healthy.
YES	NO	3. Spaghetti noodles are mostly made of chili peppers.
YES	NO	4. Half of the earth's land is suitable for growing crops.
YES	NO	5. Bread is mostly made of corn.
YES	NO	6. Grain is the seed of plants like oats, wheat, and rice.
YES	NO	7. Pumpkins like other squash are harvested in the spring.
YES	NO	8. Potatoes grow on trees.
YES	NO	9. Farming is considered a risky business.
YES	NO	10. Most of us could survive without farmers.

5

Choose the best answer.

1. What does agriculture provide people with?
   a. food, fiber, and shelter
   b. entertainment
   c. minerals
   d. automobiles
2. Which of the following farm crops are used in cereals?
   a. wheat
   b. corn
   c. oats
   d. all of the above
3. Which important nutrients are carrots rich in?
   a. calcium
   b. iron
   c. vitamin c
   d. vitamin a
4. Which plant produces fiber for clothing?
   a. soybeans
   b. rice
   c. cotton
   d. corn
5. Which of the following is known as a root crop?
   a. carrots
   b. broccoli
   c. watermelons
   d. tomatoes
6. Which season is the best for apples?
   a. spring
   b. summer
   c. autumn
   d. winter

SECTION A. READING

EXERCISES

1 **Read the text and find the information that supports these statements.**

1. Agriculture is the art and science of cultivating the soil, growing crops and raising livestock.
2. Crop production is a common agricultural practice followed by worldwide farmers to grow and produce crops to use as food and fiber.
3. Agricultural equipment is any kind of machinery used on a farm to help with crop farming.

CROP FARMING

Agriculture is the process of producing food, feed, fiber and many other desired products by the cultivation of certain plants including all techniques for raising and processing livestock. The practice of agriculture is also known as “farming”. The term *agriculture* may also refer to the study of agricultural practice, more formally known as agricultural science. Scientists, inventors and other specialists devoted to improving ***farming methods*** and techniques are also said to be engaged in agriculture.

The word *agriculture* was derived from two words: *ager* (Latin) or *agros* (Greek) means “land” or “field” and *cultura* (Latin) means “cultivation”. In modern usage, the word “agriculture” covers all activities essential to food, feed, and fiber production.

Agriculture has been an important aspect of economics. The main branches of agriculture are crop farming, livestock breeding and agricultural engineering. Livestock breeding is concerned with breeding farm animals to provide population with food products and light industry with raw materials. Agricultural engineering includes appropriate areas of mechanical, electrical, environmental engineering, and soil mechanics.

Crop farming is a branch of agriculture that deals with growing crops for use as food and fiber. A variety of techniques including organic production methods can be used to manage crops. The types of crops can depend on environmental conditions and market demands. Some crops have a limited growth range dependent on temperatures, available water supply, pests, and other factors. Others may be cultivated in a wider range of conditions. Crop farmers test the soil and assess their land to determine what kinds of products they can make commercially viable.

In agriculture plants are divided into two types: crops and weeds. Crops are those which man intentionally grows because they have benefits to him such as food, shelter, clothing, tools, medicines, as source of any product that can be marketed, etc. *Weed* is a general term for any plant growing where it is not wanted. Weed control is vital to agriculture, because weeds decrease yields, increase production costs, interfere with harvest, and lower product quality.

The plants classified as agricultural crops are further grouped into two main divisions: agronomic crops and horticultural crops. ***Agronomic crops*** include cereal or grain crops, legume seed crops or pulses, oil seed crops, fiber crops, forage crops, etc. The chief grains are barley, corn, millet, oats, rice, rye, buckwheat and wheat. The main legumes grown for their seeds are field beans, chick pea, lentil and other crops. Forage crops include grasses, alfalfa, clover and other crops. The fiber crops include cotton, flax, nettle, hemp and ramie. The oil crops include peanut, soybeans, sunflower, rape, the seeds of which contain useful oils. On the other hand, the ***horticultural crops*** include vegetables, fruits, nuts, seeds, herbs, flowers and other ornamental crops. The most famous ***vegetable crops*** are tomatoes, cabbages, carrots, cucumbers, onions, sweet pepper, potatoes, beets, radishes, rutabagas. The most important ***fruit crops*** are apples, pears, plums, oranges, apricots, peaches, cherries, strawberries, and raspberries.

Agricultural production presents many engineering opportunities. Agricultural operations such as soil conservation and preparation; crop cultivation and harvesting; animal production; and commodities transportation, processing, packaging, and storage are precision operations involving large tonnages, heavy power, and critical factors of time and place. Facilities designed to aid farm operations help farm workers to minimize the time and energy requirements of routine jobs.

Crop farming is a large scale production with massive machines over thousands of hectares such as tractors, field machinery, and other mechanical equipment. There are numerous machines for cultivating the soil, such as cultivators, harrows, ploughs, sub-soilers and rollers. Harvesters for crops like cotton, sugarcane, beetroot, potatoes, carrots, etc., are used in crop farming. Rice hullers, mowers and rakes are also used during the harvesting phase. Balers and bale lifters are two of the machines that are used for haymaking purposes. These are normally added as implements to tractors. Most of these kinds of machines have become a necessity in the contemporary ***farm environment***.

2 **Read the text again and explain the words and word combinations in bold.**

READ ONCE AGAIN
IF YOU NEED...

SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Name a vegetable and a fruit. Make use of the text and the Internet sources.**

Prompts	*Vegetable*	*Fruit*
1. beginning with the letter ‘p’	________________	________________
2. beginning with the letter ‘b’	________________	________________
3. beginning with the letter ‘o’	________________	________________
4. beginning with the letter ‘c’	________________	________________
5. beginning with the letter ‘a’	________________	________________

2 **a) Which is the odd word in each group, and why?**

1. apple // carrot // tomato // cucumber
2. corn // onion // millet // oats
3. orange // apricot // potato // peach
4. beets // sweet potatoes // radishes // wheat
5. soybeans // peanuts // sunflower // rutabagas
6. cotton // strawberries // tobacco // sugar beet
7. grasses // alfalfa // cherries // clover

b) Choose any five words to make up sentences.

3 **Complete these sentences with the correct "general" word. Look at the example first.**

Example: Apples, oranges and bananas are all types of ***fruit***.

1. The most famous _____ are tomatoes, cabbages, carrots, cucumbers, onions, sweet pepper, potatoes, beets, radishes, rutabagas.
2. ______ is the general word for wheat, maize, barley, etc.
3. We use the word _____ as a general word for plants which are grown to be eaten.
4. Well-known _____ include vegetables, fruits, nuts, seeds, herbs, flowers and other ornamental crops.
5. _____ include cotton, flax, nettle, hemp and ramie.
6. The leading _____ are grain crops, legume seed crops, oil seed crops, fiber crops, forage crops.
7. The main _____ grown for their seeds are field beans, chick pea, lentil.

4 **a) Read and translate the following sentences. Pay attention to the words and word combinations in italics.**

1. One aspect of our business focuses on *grain production*.
2. Last year we lost a few *crops* to the cold.
3. We'll *harvest* next week if weather conditions are good.
4. It's risky business taking out a credit to *seed* a new field.
5. We use the best *fertilizer* possible on our crops.
6. We grow tomatoes in the *greenhouse*.
7. You should invest in some new *land* for grazing.
8. The nursery grows bushy plants and *fruit trees*.
9. *Pesticides* are very dangerous and should be used with caution.
10. We grow vegetables and fruit on our *farm*.

b) Find synonyms for the words and word combinations in italics. Practise them in your own sentences.

5 **Match the pictures *a-h* to the words. How many other crops can you think of?**

carrots *beets* *wheat* *peach*

raspberry *peas* *flax* *strawberry*

a

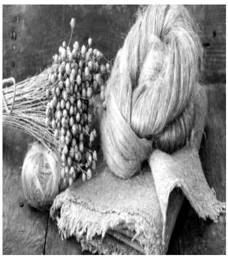
b

c

d

e

f



g

h

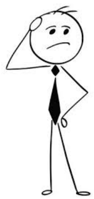
6 **a) Make word combinations using a word or phrase from each box.**

b) Use the word combinations you've made to complete the sentences below.

a)

1. cereal	a. plants
2. raw	b. environment
3. soil	c. supply
4. water	d. control
5. flood	e. conservation
6. farm	f. materials
7. horticultural	g. weeds
8. brushy	h. grains

b)



1. Plant breeding has placed improvement of _____ on a scientific basis.
2. Cereal farming is growing _____ for human food and livestock feed as well as for other uses, including starch and biofuel.
3. Agriculture is the main source of _____ for processing industries.
4. The first consideration in planning an irrigation project is developing a _____.
5. Soil management involves the application of available knowledge of crop production, _____, and economics.
6. Floodplain regulations and _____ structures protect watershed residents from the devastation caused by floods in the past.
7. A _____ plan will ensure that all farm businesses have essential soil and water protection management measures.
8. Like cattle, sheep graze for their food, eating both short, fine grasses and coarse, _____ .

7 Match the words with the definitions.

1. agriculture	a. a plant with blue flowers grown for its stems or seeds, or the thread made from this plant
2. crop	b. a large group of cultivated plant
3. cultivate	c. to put seeds in soil
4. farmland	d. to pick and collect crops
5. domesticate	e. growing plants and raising animals
6. plant	f. land that is used for or is suitable for farming
7. flax	g. the practice or work of farming
8. harvest	h. to tame an animal

8 Read the sentence pair. Choose where the words best fit the blanks.

food / feed

A. Seaweed meal is also used in animal and fish _____.
B. _____ for humans is mostly made through farming or gardening.

crops / plants

A. _____ are plants that are grown from seeds to be harvested for the purpose of profit, food, or gifting.
B. Most _____ grow in the ground, with stems in the air and roots below the surface.

grains / legumes

A. Common edible _____ legumes include lentils, peas, chickpeas, beans, soybeans, and peanuts.

B. After being harvested, dry _____ are more durable than other staple foods, such as starchy fruits and tubers.

harvest / cultivate

A. When we invented agriculture, we had to take care and sow our seeds and _____ our crops at just the right season.
B. Most of the land there is too poor to _____.

soil / land

A**.** In largely agrarian economies arable _____ is the most valued form of property and productive resource.
B. The farmers are tilling the _____.

9 **Choose the right word to complete the sentences.**

1. Crop farming is a branch of agriculture that deals with growing *lands // crops // fields* for use as food and fiber.
2. Researchers are using sensors to match the crops to different *weeds // soils // woods* and weather conditions.
3. A short growing season, the lack of fertile soils and other factors make *farming // cultivating // haymaking* difficult.
4. Grain is grown on half the world's cropland and supplies much of the *nourishment // requirement // environment* in the human diet.
5. They must be skilled in preparing soil and in planting, growing, protecting, *arranging // harvesting // maintaining*, and storing crops.
6. Much of the land can be *generative // productive // agricultural* only with fertilizer application.
7. The next time that field is planted and fertilized, the *accountant // lawyer // farmer* adjusts seeding and fertilizer application rates according to information on the yield map.

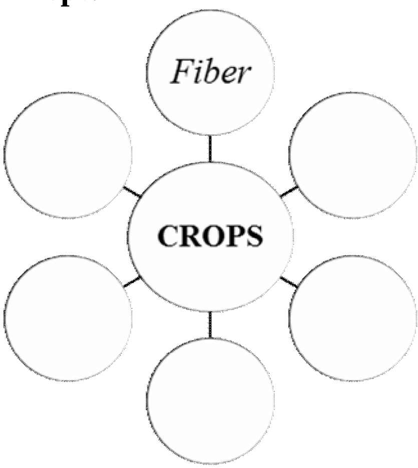
SECTION C. COMMUNICATING

EXERCISES

1 **Answer the questions based on the text *"Crop farming"*.**

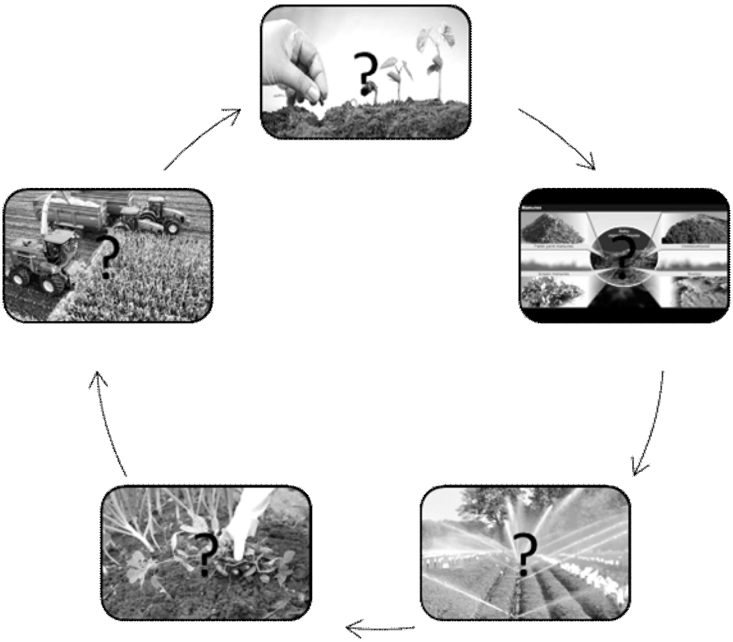
1. How do you understand the term "agriculture"?
2. Is crop farming a branch of agriculture that deals with growing crops or animals?
3. What is the most important farm product?
4. What are the chief grains grown worldwide?
5. What are the leading vegetable crops?
6. Should we eat legumes? Why?
7. What are crops used for?
8. What agricultural operations do you know?
9. What kinds of machines are used in farming?
10. How do machines help in agriculture?

2 **Fill in the diagram. Tell your partner about different types of crops.**



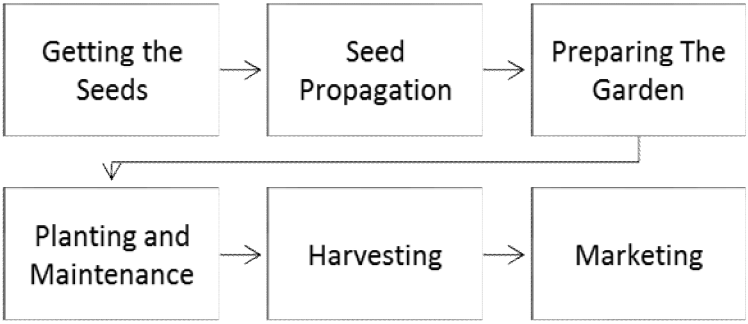
3 **The following activities form the part of agricultural practices. Put agricultural activities in the right place in the diagram. Discuss them in small groups.**

Protection from weeds
Harvesting and storage
Adding manure and fertilizers
Preparation of soil and sowing
Irrigation



4 **Prepare a talk of the main agricultural activities presented in Exercise 3. Think of their direct benefits to modern agriculture.**

5 **Work in groups. Look over the cluster map and discuss the journey from seed to table.**

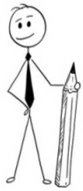


1. **Getting the seeds** (Internet, catalogues, seed companies, saving and storing from last year's harvest).
2. **Seed propagation** (greenhouse growers, classroom fiber packs, Hydroponics).
3. **Preparing the garden** (plowing and rototilling, digging by hand).
4. **Planting** (crop farmers (by large machines), gardeners (by hand) and **Maintenance** (drainage, irrigation, weed and pest control, farm machinery mechanics).
5. **Harvesting** (use, donate or sell)
6. **Marketing** (local paper, posters, university newspapers).

6 **Speak on the following farming problems.**

- Climate change and global warming
- Water availability and droughts
- Poor soil conditions
- Genetically modified seeds
- Natural disasters

SECTION D. WRITING



ADVERTISING FARM CROPS EXERCISES

1 **Read the advertisement. Then, fill in the blanks with the correct items.**

SUPPORT your local FARMERS!

1. Available fruits: ______________________________

2. Available vegetables: ______________________________

3. Industrial crop products: ______________________________

2 **Translate the following text. Make up a vegetation map for the described agricultural crops.**

Growing season, also called Frost-free Season, period of the year during which growing conditions for indigenous vegetation and cultivated crops are most favourable. It usually becomes shorter as distance from the Equator increases. The growing season in equatorial and tropical regions ordinarily lasts all year, whereas in higher latitudes, e.g., the tundra, it may last as little as two months or less. Growing season also varies according to elevation above sea level, with higher elevations tending to have shorter growing seasons.

Length of growing season is measured in two ways. One enumerates the days of the year when average temperature is above the threshold at which crops will germinate and continue to grow (along with native vegetation). This measure varies with kind of crop. For example, wheat and many other plants require an average temperature of at least 40° F (5° C) to germinate. Others, such as corn (maize) have a threshold of germination of 50° F (10° C); rice has an even higher threshold, about 68° F (20° C). Plants require average temperatures to exceed the threshold during most of the season in order to mature rapidly.

Most agriculture requires a frost-free season of at least about 90 days. Some areas of temperate zone countries, such as mountainous areas, have fewer than 90-day frost-free seasons, and this is also true of subarctic regions. Such areas are restricted to crops that can germinate and mature within their shorter seasons. However, in these higher latitudes the greatly increased duration of daylight in summer compensates significantly for shorter frost-free seasons.

3 **Read the text again. Write a short summary of the following text.**

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

1 **Read the text and suggest an appropriate title for it. Identify the difference between a fruit and a vegetable.**

Plants are an important part of our everyday lives. We need them to make oxygen, and they provide food and fabric so that we can have something to eat and something to wear. They also provide shelter and can even be used to make fuel for transportation. We eat the root of some plants, the leaves of other plants, and we eat the fruit. It is seldom that we eat the entire mature plant. Usually when we eat plants, we call them either fruits or vegetables. The botanical definition for a fruit is the part of a plant that develops from the flower. The fruit contains the seeds of the plant. It covers and protects the seeds. A fruit may have fleshy or dry tissue.

The botanical definition of a vegetable is any edible part of a plant that does not contain the seed. Vegetables are usually the roots, stems, or leaves of the plant. Cultural definitions are based upon whether the edible portion of the plant is sweet (fruit) or not sweet (vegetable). What we consider vegetables are vegetative parts of plants. For example, lettuce is leaves, carrots and beets are roots, and broccoli and cauliflower are immature flowers. Other plant parts are more difficult to identify. Potatoes are not roots; rather, they are swollen underground stems (tubers). Onion bulbs are composed of modified stems and swollen leaves. The roots (which are not eaten) are attached at the base of the bulb.

2 **Make up a report describing one of the easiest ways for people to improve their health and well-being.**

TEXT 2

WHAT ARE FARMERS, RANCHERS, AND GARDENERS?

1

a) Read the text and find the information about different reasons for growing crops.
b) What names do people who grow crops have in your country?

Gardeners and farmers may raise the same crops. So why do they have different names? Gardeners usually only grow enough of a crop for their family and friends to eat. They may give some away or sell it at a farm stand or farmers' market. Most gardeners raise crops because they like fresh produce or because they enjoy gardening. They usually have other jobs, and buy a lot of their foods. A farmer is someone who raises a large crop and sells most of it. He or she makes a living being a farmer. He may grow only one crop, like cabbage. No one wants to live on just cabbage even if it was healthy. So, he probably has a garden for other vegetables, and will buy other food at the store. Ranchers are also farmers, but they raise animals to sell. These animals are called livestock. Raising livestock is part of agriculture, too. People all around the world are farmers, ranchers and gardeners. In many countries, people have to farm to feed their families.

Gardening and farming have both been important historically. They are good for different kinds of plants, grains lending themselves to farming, fruits and vegetables to gardening. Gardening is better for the naturalization and breeding of plants, farming for feeding large numbers of people who are not themselves working in agriculture. This in turn means that farming has tended to underpin urban societies and large states.

2

Make up a summary of the text.

TEXT 3

1 **Read the text to explore the role of synthetic fertilizers, modern agricultural machinery, and soil and water conservation techniques.**

Modern agriculture methods play an important role in our society. Agricultural producers utilize the latest research in crop genetics and land management as well as animal production methods to produce safe and abundant food supply.

Most agricultural fertilizers contain nitrogen, phosphorous, and potassium, which are commonly limiting nutrients for plants. Fertilizers vary in the concentration of these nutrients; farmers choose which formulation to use based on the soil content of their fields and what they are growing. Fertilizers provide more vigorous plant growth, which can improve crop yields and help prevent soil erosion. Modern plowing and tilling implements, pulled by tractors, allow farmers to prepare large fields for planting by turning over soil and providing an even seed bed.

Farmers are land stewards who can reduce and reverse the impact of agriculture on the environment by using farming practices that conserve resources. There are some conservation practices:

Crop Rotation: The practice of growing different types of crops on the same plot of land in sequential growing seasons. Different crops use different amounts of nutrients. If the same crop is planted continuously, the soil will become depleted of some nutrients more than others increasing fertilizer use.

Cover Cropping: Cover cropping helps reduce erosion. Instead of leaving bare soil when the main crop is harvested, farmers plant an additional crop and leave it in the field over the winter. For example, a farmer might harvest corn and then plant rye to cover the field.

Conservation Tillage: Soil preparation that leaves crop residue from the previous crop on the field. For example, corn stalks may be left on the field after harvest and soybeans planted directly into the corn residue the next spring. Keeping the soil covered in this manner reduces erosion.

Habitat Preservation: An area of a farm is reserved in or returned to its pre-cultivation state, such as a grassland or wetland. These areas provide food and shelter for wildlife and prevent erosion and runoff. They also provide an alternative to farming marginal land.

Contour Farming: In hilly areas rows of crops are planted perpendicular to the slope rather than parallel to the slope, following the contour of the land. This slows runoff from the land, allowing water to infiltrate the soil and reducing erosion.

Buffer Stripping: An area of vegetation is planted at the edge of the field next to a body of water such as a lake or a river. Filter strips help protect the water quality by trapping and filtering sediment, nutrients, and other pollutants in runoff.

Most farmers employ several of these methods, and many farmers are innovating and doing on-farm research to make the best sustainable choices for their land.

2 **Read the text again and in pairs ask and answer comprehension questions.**

3 **Discuss with your partner:**

1. The environmental impacts of agriculture.
2. The methods farmers use to reduce the environmental impacts of agriculture.
3. The advantages and disadvantages of conservation practices.
4. Fertilizers: for and against.

TEXT 4

HYDROPONICS

1 **Read the text to know more about hydroponics as an advanced technique for vegetable production.**

Hydroponics is also called aquaculture, nutriculture, soilless culture, or tank farming, the cultivation of plants in nutrient-enriched water, with or without the mechanical support of an inert medium such as sand or gravel.

Plants have long been grown with their roots immersed in solutions of water and fertilizer for scientific studies of their nutrition. Because of the difficulties in supporting the plants in a normal upright growing position and aerating the solution, however, this method was supplanted by gravel culture, in which gravel supports the plants in a watertight bed or bench. Various kinds of gravel and other materials have been used successfully, including fused shale and clay and granite chips. Fertilizer solution is pumped through periodically, the frequency and concentration depending on the plant and on ambient conditions such as light and temperature. The solution is composed of different fertilizer-grade chemical compounds containing varying amounts of nitrogen, phosphorus, and potassium, the major elements necessary for plant growth, and various trace, or minor, elements such as sulfur, magnesium, and calcium. The solution can be used indefinitely; periodic tests indicate the need for additional chemicals or water. The chemical ingredients usually may be mixed dry and stored. As the plants grow, concentration of the solution and frequency of pumping are increased.

2 **Work in pairs. Write down 3 true and 3 false statements about aquaculture using the information from the text.**

TEXT 5

1 **Fill in the text with the correct words from the list below. Use the words only once.**

water	*soil*	*leaves*	*roots*
grow	*plants*	*photosynthesis*	*nutrients*

Plants are everywhere around us. There are many important factors for growing healthy 1) _____ such as water, 2) _____, air, water, light, temperature, space, and time.

Like humans and animals, plants need both 3) _____ and nutrients (food) to survive. Plants use water to carry moisture and nutrients back and forth between the roots and 4) _____. Water, as well as nutrients, is normally taken up through the roots from the soil. This is why it's important to water plants when the 5) _____ becomes dry. Healthy soil is extremely vital to plants.

Fertilizer also provides plants with nutrients and is usually given to plants when watering. The most important nutrients for growing plants are nitrogen (N), phosphorus (P), and potassium (K). Nitrogen is necessary for making green leaves, phosphorus is needed for making big flowers and strong 6) _____, and potassium helps the plants fight off disease. Too little or too much water or nutrients can also be harmful. Plants also need sunlight to 7) _____. Light is used as energy for making food, a process called 8) _____. Too little light can make plants weak. Temperature is important too. Most plants prefer cooler nighttime temps and warmer daytime temperatures.

2 **Work in groups. Prepare questions based on the text. Exchange your questions with another group. Which group has the most correct answers?**

UNIT 2

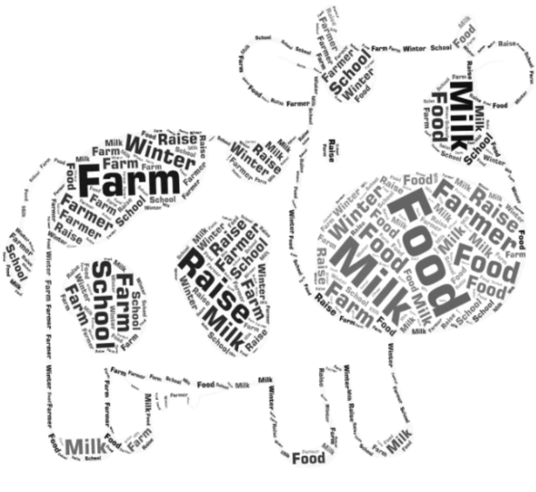
LIVESTOCK FARMING

Look after your sheep and cattle as carefully as you can

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Find five words that go with the topic *“Livestock farming”*. Make your own sentences with these words.**



3 **Read the introduction story and fill in the missing words from exercise 1.**

Do you ever wonder where your _____ comes from? Like the glass of _____ you're drinking, to the plate of vegetables for dinner? A _____ had to _____ a cow for the milk, and to grow crops of carrots and lettuce for your salad. Farmers have a different schedule than city people. They get up very early, just as the sun is rising. There's also a lot of physical work around the _____.

4 **Read the statements 1-3 and the text. Then mark the statements as T (true) or F (false).**

1. Animal breeding ensures a continuous deterioration of farm animals.

2. Breeders provide livestock farmers with a next generation of animals.

3. The reproduction cycle takes approximately 2 years, depending on the specie.

Animal breeding ensures a continuous improvement of farm animals. Different animal traits are measured and the best animals are used as parent-animals. So breeders provide livestock farmers with a next generation of animals. Farm animal breeders have an essential contribution to a healthy and sustainable food supply chain. They also provide people with a choice of affordable, safe and diverse quality animal feed.

Animal breeding consists out of two phases: breeding and reproduction. The reproduction cycle takes approximately 5 years, depending on the specie.

Animal breeding is done for different reasons: production of food products (e.g. dairy, meat, eggs); production of non-food products (e.g. wool, leather); sports; maintaining rural areas; medical applications/research.

SECTION A. READING

EXERCISES

1 **Read the text and find the information that supports these statements.**

1. Animal husbandry is a branch of agriculture concerned with animals that are raised for meat, fibre, milk, eggs, etc.
2. Animal breeding consists of choosing the ideal trait, selecting the breeding stock, and determining the breeding system.
3. Correct know-how and equipment is a key factor to profitable livestock farming.
4. Efficient livestock production requires good management practices.

LIVESTOCK FARMING

An efficient and prosperous livestock farming historically has been the mark of a strong, well-developed nation. Livestock farming (livestock production or ***animal husbandry***) is the controlled production and management of domestic animals, including improvement of breeding.

Livestock production has become highly scientific and efficient because of the high cost of labour, land, feed, and money. Animal breeding is concerned with maximizing desirable genetic traits. Animal geneticists have identified elements within genes that can enhance animal growth, health, and ability to utilize nutrients. These genetic advances can increase production while reducing environmental impacts. Most breeds, which require a minimum of housing and equipment, are managed to reduce costs through pasture improvement. Other aspects of management include performance testing for regular production of offspring, the use of preventive medicine, feed additives, fertility testing of sires, protection against insects and parasites. Scientists conduct many research programs to find the new ways of combating livestock diseases: bacteria, fungi, parasites, and viruses.

Beef and dairy cattle, poultry, goats, hogs (pigs), sheep and other livestock are the main animals raised for food. Farm animals are bred for many purposes. Chickens give us eggs. ***Ruminant animals*** such as cattle, sheep, and goats convert large quantities of pasture forage, harvested roughage into meat, milk, and wool. Pigs provide us with bacon and pork and ducks become a succulent duck roast. Horses are used as working animals, sports and leisure activities. Many farmers also keep bees for honey. Farmers on fish farms raise ***freshwater food fish***, such as carp and trout, and saltwater shellfish, such as mussels and oysters. Animal food products supply protein, minerals and vitamins that people need for good health.

The skins of some livestock provide such valuable by-products as fur, hair, leather. Various organs of livestock supply drugs, animal fat can be processed into the livestock feed and soap, body wastes of livestock are used to fertilize the soil to increases the growth and food production of many plants. These materials are used to produce blankets, brushes, clothing, shoes and other goods. Manufacturers use the hoofs and horns of livestock to make such articles as buttons, comb, glue and knives. Other livestock by-products are used in the preparation of ***livestock feed***. Feed, shelter, and the prevention of disease are the major concerns of livestock raisers.

A balanced ration contains the nutrients that the animal needs for growth and good health: fats, minerals, protein, vitamins, and carbohydrates. Hogs and poultry feed consists of various grains, concentrated plant and animal proteins, and by-products from food processing. Cattle and sheep eat grasses and legumes, grains, hay and stalks of certain plants.

Farming livestock can be highly profitable if every farmer has the correct know-how and equipment. The most important pieces the farmer will need for a successful farm are a feed mixer or grinder-mixer, water tanks, waterers, automatic feeders and a headgate. Having a ***manure spreader*** will allow farmers to use the copious amounts of manure for a worthwhile purpose, while a corral system will help with managing their livestock. Automatic milking systems are the modern incarnation of the milking machine. These systems allow the animal to select when to be milked (voluntary milking). Chicken eggs are collected, either by hand in baskets, or by inclined floors that allow eggs to roll to a centralized collection point. Additional ***egg grading***, cleaning, and packaging equipment is also required. Chickens also may require items such as heat lamps. It is important to research every piece of equipment before purchasing it so every farmer should know exactly how it works.

Modern farm is in the process of acquiring equipment and materials that would allow it in the future to construct a more advanced system of ***livestock production***. Farming is much more than growing crops and keeping livestock. It is about working and living in the outdoor ***environment*** and also about managing your surroundings.

2 **Read the text again and explain the words and word combinations in bold.**

READ ONCE AGAIN
IF YOU NEED...

SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Match the pictures *a-h* to the words. How many other farm animals can you think of?**

turkey, lamb, horse, goat, rabbit, hen, pig, duck			
a 	**b** 	**c** 	**d** 
e 	**f** 	**g** 	**h** 

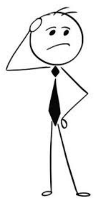
2 **a) Make up word combinations using a word or phrase from each box.**

b) Use the word combinations you've made to complete the sentences below.

a)

1. formulated	a. farming
2. husbandry	b. consumption
3. ruminant	c. breeding
4. regular	d. land
5. grazing	e. food
6. selective	f. animals
7. lamb	g. style
8. turkey	h. diets

b)



1. _____ for meat production is very popular than egg production from turkey.
2. The committee also said a reduction in beef and _____ would lead to a rise in the consumption of plant-based food, as well as chicken and pork.
3. People have used _____ to make bigger horses to do heavy work.
4. Goat farming can be very suited to production with other livestock such as sheep and cattle on low-quality _____.
5. You can feed rabbits by our _____ which is available in our house like mix vegetables, mix fruit, etc.
6. _____ such as cattle, sheep, and goats convert large quantities of pasture forage or harvested roughage into meat, milk, and wool.
7. The activities on a pig farm depend on the _____ of the farmer.
8. Ducks are given specially _____ and are provided with access to drinking water.

3 **Read the sentence pair. Choose where the words best fit the blanks.**

wool / by-products

A _______ are used in many common products.
B Many clothes are made of _______.

protein / leather

A _______ is often used to cover furniture.
B Plant products and meat contain _______.

meat / milk

A Humans have always used animals for _______.
B _______ is an important food source.

fat /oil

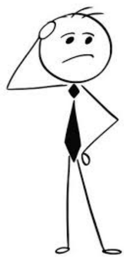
A Foods generally contain one main group of _______.
B The majority of the population use vegetable ____ for cooking.

4 **Match the columns to make sentences about livestock farming.**

A	B	C
animal husbandry	rely on	*bees for honey*
pigs	has been known for	animal power in farming
horses	*keep*	animal production
many farmers	may require	as working animals
chickens	are used	its high nutritive value
meat	deals with	heat lamps
some countries	provide us with	bacon and pork

5 **Fill in the blanks with the correct words and phrases from the word bank.**

WORD BANK			
a) automatic feeders	*b) livestock*	*c) balanced ration*	*d) animal breeding*
e) shelter	*f) beef cattle*	*g) foods*	*h) ruminant*
i) barns		*j) meat*	



1. Most organic livestock standards require that animals have access to adequate space, fresh air, outdoors, daylight, shade, and _______ for inclement weather, suitable to the species and climatic conditions.
2. Cattle, poultry, goats, hogs (pigs), sheep and other _______ are the main animals raised for food.
3. Livestock supply nearly all the world's _______, eggs, and milk.
4. _______ animals such as cattle, sheep, and goats convert large quantities of pasture forage into meat, milk, and wool.
5. Milk is one of the most complete and oldest known animal _______.
6. _______ are bred and fed to produce high quality lean meat, with a minimum of bone or fat waste.
7. Dairy cows live in pastures or _______ called free-stall barns.
8. The most important pieces you will need for a successful farm are a feed mixer, water tanks, waterers, _______ and a head gate.
9. Improving _______, nutrition and health means more food for humans.
10. A ______ contains the nutrients that the animal needs for growth and good health.

6 **Match the words and word combinations (1-10) with the definitions (A-J).**

1 _ livestock	6 _ nutrient
2 _ feed	7 _ milking
3 _ poultry	8 _ manure
4 _ breeding	9 _ dairy cattle
5 _ grinder-mixer	10 _ animal husbandry

A – a substance that provides nourishment essential for growth and the maintenance of life;

B – domesticated birds such as chickens, turkeys, ducks, and geese;

C – cattle cows bred for the ability to produce large quantities of milk, from which dairy products are made;

D – food given to animals;

E – drawing milk from (a cow or other animal), either by hand or mechanically;

F – the branch of agriculture concerned with animals that are raised for meat, fibre, milk, eggs, or other products;

G – a portable mill that combines the mixing and grinding operations;

H – solid waste from animals, especially horses, that is spread on the land in order to make plants grow well;

I – animals and birds that are kept on a farm, such as cows, sheep, or chickens;

J – the keeping of animals or plants in order to breed from them.

7 **Make up your own sentences with the words and word combinations from ex. 6.**

SECTION C. COMMUNICATING

EXERCISES

1 **Work in small groups. Answer the questions based on the text *“Livestock farming”* and share your opinion with other groups.**

1. What is livestock farming?
2. What is animal breeding concerned with?
3. What are the different types of livestock?
4. What does it mean to raise livestock?
5. What is livestock used for?
6. What is another word for livestock?
7. What do animal food products supply?
8. What does a balanced ration for farm animals contain?
9. In what cases can livestock farming be highly profitable?
10. What should every farmer learn before purchasing the equipment?

2 **Read the following sentences, decide if the statements are true, false or not given using the information from *Section A*. Try changing the true sentences into questions and discuss these questions in pairs.**

1. Farmers concentrate on providing healthy, hearty livestock for later processing for consumption in animal husbandry.
2. Livestock production has become highly scientific and efficient because of the high cost of labour, land, feed, and money.
3. Farming livestock can be highly profitable if we have the correct know-how and equipment on our farms.
4. Dairy cattle are susceptible to the same diseases as beef cattle.

5. Animal geneticists have identified elements within genes that can enhance animal growth, health, and ability to utilize nutrients.
6. Pigs are relatively easy to raise indoors or outdoors, and they can be slaughtered with a minimum of equipment because of their moderate size.
7. Manufacturers use the hoofs and horns of livestock to make such articles as buttons, comb, glue and knives.
8. One or two goats supply sufficient milk for a family throughout the year and can be maintained economically in quarters where it would not be practical to keep a cow.
9.The most important pieces the farmer will need for a successful farm are a feed mixer or grinder-mixer, water tanks, waterers, automatic feeders and a headgate.
10. Modern farm is in the process of acquiring equipment and materials that would allow it in the future to construct a more advanced system of livestock production.

3 **Study the Section A again and decide what purposes farm animals are bred. Make up a short oral report of livestock breeding and present your report to your groupmates.**

TYPE OF LIVESTOCK	PURPOSES
Beef cattle	
Dairy cattle	
Poultry	
Goats	
Sheep	
Horses	
Pigs	
Bees	
Fish	

4 **Make up a chart and draw pictures to help the discussions.**

LIFE CYCLE OF PLANTS	LIFE CYCLE OF ANIMALS
Seeds	
Vegetative phase	
Blooming	
Fruitful age (ripening period)	
Seeds again	
Death	

5 **Complete one or more of the following phrases and prepare oral reports describing these ideas.**

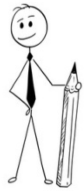
1. Livestock farming is important to me because ...
2. Livestock production is connected to the environment through...
3. Animal husbandry is connected to … because ...
4. The livestock breeding sector is mainly represented by …
5. Animals are bred and raised for … .
6. Dairy animals produce … .
7. We make clothing and furniture with … .
8. Modern farm is … .

6 **Using your active vocabulary discuss with your partner:**

- **How domesticated livestock have been raised in different places all over the world for thousands of years.**
- **Very productive ecosystems can support more animals than less productive ones and livestock types vary based on the biome in which it is located.**

SECTION D. WRITING

EXERCISES



1 **Read and translate the magazine article. Write a catchy title to get people interested.**

Sheep produce a wide variety of items that people use. Like cows, sheep produce milk that is safe for people to drink. This milk can be made into cheese, yogurt and various other dairy products. Sheep provide meat in the form of lamb, which is from an animal less than a year old, or mutton, which is from an animal older than a year. Sheep meat is mainly consumed in Europe and the Mid-East, but sheep are mainly raised in Australia and New Zealand. Other than meat, wool is one of the most commonly known products from sheep. Wool is sheep hair that is shaved off during hot weather. After processing, wool can be made into lots of different things, such as shirts, socks, yarn for knitting and tennis ball covers. Wool is also used as an oil absorbent in oil spills. After slaughter, sheep skins are turned into leather used in car upholstery, clothing and shoes. The bones, hooves and horns of sheep are also used to make products such as gelatin, tape, brushes and pet food ingredients.

2 **Write down reasons why people keep chickens / cows / sheep / pigs / goats?**

Example: *Chicken meat and eggs contain special proteins that:*

1. Allow students' brain to develop so that they will be clever at university.
2. Allow students to be healthy and not to catch cold and coughs.
3. Eggs and meat also contain vitamins and minerals that are essential in your diet.

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

1 **Read the text and discuss the reasons farmers identify their animals.**

Animal identification using a means of marking is a process done to identify and track specific animals. It is done for a variety of reasons including verification of ownership, biosecurity control, and tracking for research or agricultural purposes. Farmers and ranchers use a number of ways to identify their animals. For example, you may have seen cattle that have been branded to show what farm or ranch they belong to or you may have seen numbered, plastic tags in their ears. You could also have seen ear notches in pigs or lip tattoos in horses. Whatever the method or the species of farm animal, identification is an important part to running a successful farm or ranch.

Farm animals need to be identified for several reasons. In earlier times identification was important for being able to claim ownership of the animal. In these times, animals roamed open lands to graze for food and by branding the animal there was no question to which farmer the animal belonged. Today, animal identification plays an important role in everyday farm life. Identification allows farmers the ability to observe each animal very closely when it comes to their growth, weight gain, offspring and even how much feed they are eating.

2 **Make up a list of arguments for and against animal identification. Compare the list with your partner's. Give a two-minute talk defending your arguments.**

3 **Make up a PowerPoint presentation about farm animal identification techniques.**

TEXT 2

WHAT ARE THE BENEFITS OF POULTRY FARMING BUSINESS?

1 **Read the text and give an answer to the question from the title.**

Poultry farming means ‘raising various types of domestic birds commercially for the purpose of meat, eggs and feather production’. The most common and widely raised poultry birds are chicken. The chickens which are raised for eggs are called layer chicken, and the chickens which are raised for their meat production are called broiler chickens.

Chickens, when allowed to live out their natural lives, can reach 15 years of age or more. Broiler chickens are typically slaughtered at 42 days of age. This is because they’re bred to mature more quickly than natural ones, which means that they often suffer from serious health problems during their short lives.

Poultry farming business has numerous benefits.

§ The main benefit of poultry farming is the fact that it doesn’t require high capital for starting. You need just basic capital to start raising poultry. And most of the poultry birds are not costly enough to start raising.

§ Poultry farming doesn’t require a big space unless you are going to start commercially. You can easily raise some birds on your own backyard with one or numerous coops or cages. So, if you are interested in poultry farming, then you can easily do it on your own backyard with several birds.

§ Commercial poultry farming business also ensures high return of investment within a very short period. Some poultry birds like broiler chickens take shorter duration of time to mature and generating profit.

§ Poultry farms do not require high maintenance. You can minimize diseases and illness in poultry by following proper hygiene and care.

§ In most cases, you don't need any license, because almost all types of poultry birds are domestic. Although, if you need license from the relevant authority it is also easy for poultry.

§ Poultry provides fresh and nutritious food and has a huge global demand. Global consumers of poultry products prefer them due to their nutrients and freshness. Poultry products are not much expensive and most of the people can afford them.

§ Poultry marketing is very easy. There is an established market for poultry products in almost all places of the world. So you don't have to think about marketing your products. You can easily sell the products in your nearest local market.

§ Poultry farming creates income and employment opportunities for people. Unemployed educated youth can easily create a great income and employment opportunity for them by raising poultry commercially. Women and students can also do this business along with their daily activities.

§ Almost all banks approve loans for these types of business venture. So, if you want to start this business commercially, then you can apply for loans to your local banks.

§ There are many more benefits of poultry farming along with the above-mentioned benefits.

2 **Give a brief talk about the benefits of poultry farming business.**

3 **Express your attitude towards the information given in the text. Where can you use this information? What university subjects is it related to?**

4 **Make up a summary of the text.**

TEXT 3

CATTLE

1 **Read the text and explain the meaning of the words and word combinations in bold.**

"Beef: It's what for dinner" is a phrase that you might hear in commercials. So what products do beef animals give us? Beef cattle provide different cuts of meat that many of us eat every day. These include ribs, steak and **ground beef**.

Dairy cows are another type of cattle that provide us with nutritional products. There are many different **dairy products** but some you might be most familiar with include milk, cheese, yogurt, butter and ice cream. Other dairy products include sour cream, cottage cheese, whey, cream cheese and **condensed milk**. Dairy products are often used in cooking and baking and contain calcium, which can help to strengthen your bones.

When dairy animals can no longer produce milk, they are often used for meat, primarily in the form of ground beef. It is possible to get the same cuts of meat from a dairy cow that you do a beef animal. Male dairy **calves**, called bull calves, that are not used for beef are often used for veal. Veal is meat from younger animals and is very lean. It is considered a delicacy in many countries.

There are various **by-products** that come from all types of cattle. **Tallow** is fat from cattle, and it is used in wax paper, crayons, margarine, paints, rubber, lubricants, candles, soaps, lipsticks, shaving creams and other cosmetics.

Gelatin is a protein obtained by boiling skin, tendons, ligaments, and/or bones of cattle in water. Gelatin is used in shampoos, face masks and other cosmetics. Gelatin is also used in foods as a thickener for fruit gelatins and puddings, candies and marshmallows.

Leather comes from the hides of animals. It is used to make wallets, purses, furniture, shoes and car upholstery. Leather can be made from the skin of pigs, cattle, sheep, goats and exotic species such as alligators.

2 **Read the text again, explore the questions and choose the correct answer.**

1. What products do beef cattle provide?
a) flour
b) steak
c) pasta

2. Where are dairy products often used in?
a) cleaning
b) harvesting
c) baking

3. What is dairy calf’s meat called?
a) veal
b) pork
c) mutton

4. What is tallow?
a) sour cream
b) fat from cattle
c) pork fat

5. What comes from the hides of animals?
a) ice cream
b) candies
c) leather

3 **Write an annotation of the text.**

UNIT 3

AGRICULTURE IN GREAT BRITAIN

Agriculture is the most healthful, most useful, and most noble employment of man

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Make a list of crops that can be grown in Great Britain.**

3 **Which of the following livestock are widely raised in Great Britain?**

LIVESTOCK FARMING
beef and dairy cattle // pigs // sheep // goats // horses // mules // asses // buffalo // camel // chickens // turkeys // ducks // geese // guinea fowl // squabs // ostrich // quails

SECTION A. READING

EXERCISES

1 **Read the text and find the information that supports these statements.**

1. British agriculture is highly mechanized and productive.
2. The type of farming varies with the soil and climate in Great Britain.
3. Most British farms produce a variety of products.

AGRICULTURE IN GREAT BRITAIN

Agriculture is one of Britain's most important industries. British agriculture is efficient, for it is based on ***modern technology and research***. Nearly 80% of the land is used for agriculture. Soils vary from the poor ones of highland Britain to the rich ***fertile soils*** in the eastern and south-eastern parts of England.

The UK has a temperate climate. The winters are mild and the summers are cool, but long enough to ***produce crops***. Two outstanding features of agriculture in the United Kingdom are the wide variations in soils and the significant differences in climate. The wetter north and west of the UK have always had a predominance of the raising of cattle, while the drier south-east of England and Scotland has been specialized in arable production.

Agriculture in the UK can be divided into five main types:

· **arable** (growing of crops and cereals);

· **pastora**l (rearing and production of animals including pigs, chickens, hill farming sheep, beef and dairy cattle);

· **mixed farming** (combination of arable and pastoral);

· **market gardening** (production of fruit and vegetables);

· **horticulture** (production of flowers, fruit, vegetables or ornamental plants) and **viticulture** (grapes).

Arable farming involves crop production. Various factors such as soil, light, water, nutrients, air and climate affect the growth of crops. The main cereal crops in Great Britain are wheat, barley and oats. Rye is grown in small quantities for use as cattle fodder. Potatoes, sugar beets, maize (corn), rape for oilseed are also significant. Potatoes are grown for sale, for fodder and for seed. Great Britain produces different kinds of fruit: apples, pears, cherries, gooseberries, strawberries, raspberries and others.

Arable crops are often grown in summer, spring or even autumn when seeds are started. Frost-hardy crops such as vetch, beans and cereals (such as winter wheat) are usually grown in autumn. Crops sown in spring are susceptible to drought in June or May. Traditional techniques of sowing seeds such as dibbling, broadcasting, ploughing-in and drilling are often used. Drilling is the most economical, especially in dry conditions.

Pastoral farming involves keeping livestock for wool, meat, milk and eggs. The major agricultural output is livestock. Pigs, cattle, poultry and sheep are commonly kept as meat animals. Sheep are kept for wool while alpacas and goats are kept for exotic wools such as angora and cashmere. Poultry are kept for eggs while cattle for milk and beef. British ***livestock breeders*** have developed many species of cattle, sheep and pigs with worldwide reputation.

Mixed farming involves growing crops and keeping animals on the same farm. A mixed farm produces different types of food: milk, butter, cheese, beef, pork, bacon, mutton, wheat, barley, sugar beet and, of course, all sorts of poultry products. Mixed farming has a very important role to play in the sustainability of farming in the future.

Market gardening involves growing of high value crops such as vegetables, fruits and flowers in close proximity to ready markets. A market gardening is a business that provides a wide range and steady supply of fresh produce through the local growing season. Market gardening comprises a lot of methods and tools selected according to the crops being grown and their cycle. Each tool enables a particular task to be carried out more accurately, more easily and more profitably. With the arrival of industrial cultivation, mechanical techniques and the use of multi-purpose machines have gradually replaced manual techniques. Market gardening and ***orchard farming*** are closely related to horticulture, which concerns the growing of fruits and vegetables.

Horticulture is the science, art, technology and business involved in intensive plant cultivation for human use. It is practiced from the individual level in a garden up to the activities of a multinational corporation. It is very diverse in its activities, incorporating plants for food (fruits, vegetables, mushrooms, culinary herbs) and non-food crops (flowers, trees and shrubs, turf-grass, hops, grapes, medicinal herbs). It also includes related services in plant conservation, landscape restoration, landscape design and garden maintenance, horticultural therapy. ***Viticulture*** is the science, production and study of grapes which deals with the series of events that occur in the vineyard. When the grapes are used for winemaking, it is also known as viniculture. It is a branch of the science of horticulture.

Rural landscapes in Great Britain have changed as a result of modern developments including diversification, the impact of new technology, organic farming and biofuels. Nowadays British Parliament and Department for Environment Food & Rural Affairs become more collaborative, working in partnership with farmers, land managers and others involved in agriculture to design and develop a progressive farming system.

2 **Read the text again and explain the words and word combinations in bold.**

SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Choose the right word to complete the sentences.**

1. The United Kingdom grows cereals such as oats, wheat and *potatoes // barley // beans*.
2. Soils vary from the poor ones of *highland // lowland // landscape* Britain to the rich fertile soils in the eastern and south-eastern parts of England.
3. The winters are mild and the summers are cool, but long enough to produce *weeds // breeds // crops*.
4. Arable crops are often grown in summer, spring or even autumn when *flowers // seeds // grapes* are started.
5. Cattle are kept for milk and *wool // eggs // beef*.
6. Horticulture is the technology and business involved in intensive *plant // soil // wood* cultivation for human use.
7. There are still many mixed farms on which farmers both grow crops and raise *machinery // livestock // food.*

2 **Read the following sentences carefully to decide if the statements are true, false or not given.**

1. British agriculture is efficient, for it is based on modern technology and research.
2. Agricultural methods often vary widely around the world, depending on climate, terrain, traditions, and available technology.
3. Drilling is the most economical technique of sowing seeds, especially in dry conditions.
4. The drier south-east of England and Scotland has been specialized in in pastoral farming.

5. Pastoral farming involves keeping livestock for wool, meat, milk and eggs.
6. Market gardening involves growing crops and keeping animals on the same farm.
7. Great Britain produces different kinds of fruit: apples, pears, cherries, gooseberries, strawberries, raspberries and others.
8. Viticulture is the production and study of cereal crops.
9. The farmer of a mixed farm has a great variety of products to sell.

3 **a) Make word combinations using a word or phrase from each box.**

b) Use the word combinations to complete the sentences below.

a)

1. plant	a. crops
2. outstanding	b. cattle
3. significant	c. mechanized
4. permanent	d. production
5. arable	e. pasture
6. highly	f. differences
7. dairy	g. conservation
8. cereal	h. features

b)

1. Horticulture includes related services in _____ _____, landscape restoration, landscape design and garden maintenance, horticultural therapy.

2. Two _____ _____ of agriculture in the United Kingdom are the wide variations in soils and the _____ _____ in climate.
3. Wales and Northern Ireland have always had a predominance of _____ _____ and hence the raising of cattle and dairying
4. England and Scotland have been specialized in _____ _____.
5. Agriculture in Great Britain is intensive and _____ _____.
6. British livestock breeders have developed many of the beef and _____ _____ with worldwide reputation.
7. The main _____ _____ in Great Britain are wheat, barley and oats.

4 **Complete these sentences using the correct form of the word in brackets.**

1. It must be very hard work being a *farmer* (**farm**).
2. The vegetables in our local shop have been ___ (**organic)** produced.
3. The United Kingdom has achieved a high level of self-sufficiency in the main agricultural ___ (**production)** except for sugar and cheese.
4. Modern organic farming was developed as a response to the environmental harm caused by the use of chemical pesticides and synthetic fertilizers in conventional agriculture, and it has numerous ___ (**ecology**) benefits.
5. Subsistence agriculture is producing crops and ___ (**rear**) animals.
6. The farm has little technology or ___ (**machine**) but may be labour intensive.
7. Farming is shaped by policies, markets and ___ (**technology**) change.
8. It is still argued that an English _____ **(agriculture)** revolution happened in the century or so after 1750.

9. The rich _____ **(pasture)** regions where dairy-farming and the fattening of cattle are carried on with most success
10. It owes its prosperity to manufacture of _____ **(wool)** goods

5 **Match the columns to make sentences about farming development in the UK.**

A	B	C
Farmers and land managers	is highly distributed	a new approach to improve the health of livestock
British farmers and vets	are kept	high-quality food
Arable farming	produces	in the south east areas of the United Kingdom
Many farm animals	develop	different kinds of fruit
Great Britain	provide	for specific purposes

6 **Find the definitions of the following word combinations from the text, then make a report about British Agriculture.**

variations in soils *cereal crops* *raising of livestock*	*types of farming* *ploughing-in* *mechanical techniques*

7 **Think of ten sentences you have learnt in the text "*Agriculture in Great Britain*". Close your book and tell each other.**

8 **Match the following words and expressions with their definitions. Make sentences using these words.**

1. Farming	a. the part of the year during which rainfall and temperature allow plants to grow
2. Crop	b. a regular gathering of people for the purchase, livestock, and other commodities
3. A short growing season	c. domestic fowl, such as chickens, turkeys, ducks, and geese
4. Floods	d. a plant that is cultivated for its seed (linseed) and for textile fiber made from its stalks
5. Flax	e. a cultivated plant that is grown as food, especially a grain, fruit, or vegetable
6. Market	f. an overflowing of a large amount of water beyond its normal confines
7. Livestock	g. the upper layer of earth in which plants grow
8. Pasture	h. cattle, horses, poultry and similar animals kept for domestic use on a farm
9. Soil	i. land covered with grass and other low plants suitable for grazing animals, especially cattle or sheep
10. Poultry	j. the activity or business of growing crops and raising livestock

SECTION C. COMMUNICATING

EXERCISES

1 **Answer the following questions. Use internet sources to check yourself.**

1. Is Great Britain an agricultural country? Why?
2. What are the 5 types of farming in Great Britain?
3. What crops are grown in Great Britain?
4. When are arable crops sown?
5. What crops cannot be grown in the UK?
6. What techniques of sowing seeds are often used in the UK?
7. What is the most common farm animal in the UK?
8. What does a mixed farm produce?
9. What does horticulture include?
10. What is viticulture?

2 **Express your opinion of the text. Show your attitude with your own words and the following expressions:**

- *I find the following text rather … (interesting, informative, useful, …)*
- *I think that …*
- *In my opinion…*
- *To my mind…*
- *It seems to me that…*
- *From my point of view…*
- *As far as my point of view is concerned…*

3 **Spend five minutes revising what you have learnt in unit 3. Talk about the challenges of British farming.**

4 **Work in groups. Compare various types of farming. Use the information from the texts in section A and Supplementary texts. Comparing and contrasting phrases are given below:**

Comparing	***Contrasting***
Like	Unlike
Likewise	In contrast to
As well as	As opposed to
Also, too	Whereas

Express the difference between:

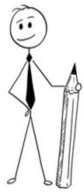
- *Arable farming and Pastoral farming;*
- *Mixed farming and Market gardening;*
- *Intensive Farming and Extensive farming;*
- *Horticulture and Viticulture.*

5 **Prepare a report about the farm of the future. The following list of criteria will help you.**

- Ø The farm can be located in any climate and still produce food year-round.
- Ø The farm can be located in a large, urban city with very little open space.
- Ø No soil is used for plant growth.
- Ø The farm will use 50% less water than a traditional farm.

SECTION D. WRITING

EXERCISES



1 **Read and translate the text. Write a catchy title to get people interested.**

British farmers who are choosing the organic farming path have to consider whether it is worth the effort for them and whether it is a financially viable course to take. There are so many things to consider when embarking on organic farming with specific rules and regulations to follow.

Farmers who choose this type of farm practice do not use chemical fertilizers or feed their livestock with feed that contains artificial additives. Organic farming is wholly reliant on natural methods such as crop rotation and biological pest control rather than using harmful synthetic sprays and pesticides on crops. Organic farming is less efficient but the produce that comes from farming organically costs more therefore farmers can make a good profit if their farm is managed efficiently. With demand for natural goods on the increase now would seem like the perfect time for most farmers in Great Britain to consider going organic.

Farmers develop a healthy fertile soil by rotating crops. Organic farmers use natural compost or manure, while adding clover takes nitrogen from the atmosphere. Wildlife is encouraged by organic farmers in order to control pests and disease.

2 **Work in groups. Find information about different types of farming in Great Britain. Make notes under the following headings and then create your own article.**

- *The place where it is used*
- *The advantages it gives*
- *The difficulties it brings*

WORKSHOP

WHAT DO YOU KNOW ABOUT AGRICULTURE IN THE REPUBLIC OF BELARUS?

1 **Work in pairs and discuss with your partner.**

In Belarus agriculture is an important source of livelihood. It plays a crucial role in the economy of our country. Agriculture provides food and raw materials and also gives employment opportunities to a very large proportion of population.

2 **Choose the adverse climate-related events that have affected farming in your country in the last decade.**

1. Falling crop yields, crop failures
2. Drought or floods
3. Increase in pests
4. Change in growing season
5. Animal health and welfare issues

3 **Work in two teams. Using your personal experience and the Internet, make a list of crops and livestock that are grown in your country. Take it in turns to choose words from the list and make sentences. Each correct sentence gets one point. The team with the most points is the winner.**

4 **Choose the right word to complete the sentences.**

1. The Republic of Belarus has long-lasting agricultural *traditions // crops*.

2. Belarus *belongs // refers* to the area of so-called unstable farming.
3. A short growing season, the lack of fertile soils and other factors make *farming // cultivating* difficult.
4. The climate of Belarus is *fairly // moderately* continental with mild and humid winter, warm summer and wet autumn.
5. The main plowed *lands // soils* have low natural fertility.
6. Much of the land can be *generative // productive* only with fertilizer application.
7. Most of the *farms // establishments* have mixed crop and livestock farming.
8. A powerful cattle breeding has been created in Belarus to *grow // manufacture* dairy and meat products.
9. Peasant farms are the most widespread representatives of small business in *agriculture //engineering*.

5 **Use these words to fill in the gaps.**

cabbage ***organic agriculture*** ***crop growing***
legumes ***agribusiness*** ***dairy products***

Belarus remains one of the leading producers of agricultural products in the CIS. The basis of agribusiness is (1) ________ and livestock breeding, and both spheres are undergoing reconstruction, introduction of new technologies and attraction of investment money.

Agriculture is one of the most state-subsidized industries. Funds are used to support enterprises and their re-equipment. One of the key aspects of the development of (2) ________ according to experts is the expansion of the network of large regional agribusiness holdings.

When considering the structure of the Belarusian agribusiness, it should be noted that the basis of crop production are cereals, (3)

_______, as well as fodder crops. Potatoes and flax hold a special place. The main vegetable crops are carrots, beets, (4) _______. Livestock breeding is focused on the production of meat and (5) _______. And at this point the livestock sector is developing new types of products and the creation of new enterprises.

It is worth mentioning that (6) _______ has developed in Belarus. There are manufacturers working according to organic methods, and three farms have already received European certificates, which open opportunities for these enterprises to export products to the EU countries.

6 **The verbs in the middle column have been jumbled. Put them in their right sentences.**

1. The Belarusian agrarian business	has been created	by large agribusiness enterprises, state and private farms.
2. Agrarian production	grow	of two main branches.
3. Many species of plants	consists	well especially grain crops, potatoes and sugar beets.
4. Fruit crops	creates	apples, pears, plums, cherries.
5. A powerful cattle breeding	is represented	in Belarus to manufacture dairy and meat products. Broiler chickens are other major livestock.
6. Belarus	include	conditions for development and support of minor business patterns in agriculture.

7 **In the text below the underlined words and phrases are in the wrong place. Move them to the correct position.**

Several farmers and agricultural producers in the Belarusian regions of Hrodna and Minsk have joined an EU-supported pilot initiative on 1) consumption production. One of the farms participating in the initiative has received some technical equipment to help automatize manual work. The farm’s 2) natural and its 19 types of products have also successfully gone through the organic certification process certifying their correspondence to the EU standards.

The certification also spreads to the three neighboring farms and has helped them to embrace the principles of organic 3) environmentally, potentially bringing positive environmental, economic and social impacts on the local communities.

The pilot initiative is being implemented in the framework of the EU-funded project “Supporting the Transition to a Green Economy in the Republic of Belarus”. Done in partnership with the country’s Ministry of Natural Resources and Environmental Protection, the project supports the country in generating “green” economic growth based on green principles, including the 4) farming sustainable and economically feasible use of 5) land resources. It also promotes environmentally sustainable production and 6) organic, as well as creating green jobs and changing its target groups' behaviour towards greater environmental sustainability.

8 **Using the active vocabulary on the topic, complete these sentences about your country. Compare your answers with your partner.**

1. In my country _____ is/are more common than _____
2. In my country a mixed salad usually contains _____

3. In my country we don’t grow _____
4. And we don’t often eat _____
5. Personally, I prefer _____ to _____
6. I love _____ but I don’t really like _____
7. My favourite meat is _____

9 **Discuss in groups the following problems:**

1. Belarusian agriculture in the 21st century: problems and prospects.
2. Belarusian agriculture needs reforming.
3. Agriculture is one of the main branches of the Belarusian economy.

10 **Suppose you are taking part in the students’ conference. Speak on:**

1. *The agricultural development in Belarus.*
2. *Consequences of the Chernobyl accident for agriculture in Belarus.*
3. *Profitable types of agricultural products.*
4. *The main goals of the national agrarian policy.*

MAKING A MULTIMEDIA PROJECT

1

a) Study the following problems of the development of agriculture in Belarus and make a plan of your future project.

CROP FARMING IN BELARUS,
LIVESTOCK BREEDING IN BELARUS,
MODERN FARMING TECHNIQUES IN BELARUS
THE FARM OF THE FUTURE

b) The following information blocks describe the directions of agricultural development in Belarus. Match the information with the above problems. Add more facts characterizing farming of your native country.

A *The revolutionary vertical farming innovations can soon replace the traditional agriculture techniques. The concept of vertical farming might seem to many startups, it is an ingenious method to produce food in environments where arable land is unavailable or rare at the most. This innovation in the field of agriculture with sustainability as its motto is making more and more heads turn today with its eco-friendly methods and making the possibility of farming real in difficult environs.*

B *A wide variety of soil and climatic conditions of Belarus makes it possible to cultivate a large range of crops and raise many species of animals. It also imposes an obligation to preserve the existing environment for future generations, to preserve the natural ecosystems and endangered animal breeds and plant species.*

C *The climate of Belarus is moderately continental with mild and humid winter, warm summer and wet autumn. The climatic conditions in Belarus are favorable for growing staple grain crops, vegetables, annual grass and fodder root crops, fruit crops and industrial crops.*

D *Livestock farming is of the greatest importance for the Republic of Belarus. The main species of livestock are cattle, pigs, sheep, goats and poultry. A powerful cattle breeding has been created in Belarus to manufacture dairy and meat products. Broiler chickens are other major livestock. They are raised at special mass-production plants. Most of them are equipped with modern facilities and milking robots. Belarus is also constantly modernizing pig and poultry farms.*

2 **Answer the following questions to know more about farming in Belarus and use this information in your farming project.**

1. What is a dynamically developing industry in Belarus?
2. What is the importance of agriculture?
3. What branches does agrarian production consist of?
4. What is the main commodity producer in our country?
5. What plants grow well in Belarus?
6. What livestock is raised in your country?
7. Where are broiler chickens bred in your country?
8. Why is fishing popular in your country?
9. What do you know about environmentally friendly farming techniques?
10. What are the challenges the farming industry faces today?

3 **Study the structure of an effective presentation and the most popular agriculture PowerPoint templates & Google Slides Themes. Make key notes for you to be helpful when creating your own presentation.**

Presentations are effective if:

- The presenter is confident, enthusiastic, knowledgeable and well prepared.
- The presentation is memorable, interesting and achieves its objectives.

Structure and contents of the presentation

Introduction

- Greet the students and introduce yourself.
- State the title and objectives. This will usually include the benefit to the audience.
- State the length of time, the format, headings and how you will deal with questions.
- Refer to any handouts that you will be distributing.
- The introduction needs to command interest and attention.

Main body

- Information needs to be delivered in a logical or chronological order, so as not to confusethe students.
- Simplify and limit the number of words on each screen. Use key phrases and include only essential information.
- The content of the delivery should be prepared maybe as a script. Reduce this to key headings and phrases noting on prompt cards, using bullets and pointers for use of a visual aid.
- Figures are helpful to illustrate a point but too many can be boring. Graphics add interest and dimension.
- Limit the number of slides. Presenters who constantly “flip” to the next slide are likely to lose their audience. A good rule of thumb is one slide per minute.
- Support the presentation with effective visual aids.

- If possible, view your slides on the screen you'll be using for your presentation. Make sure slides are readable from the back row seats. Text and graphical images should be large enough to read, but not so large as to appear "loud."
- Have a Plan B in the event of technical difficulties. Remember that transparencies and handouts will not show animation or other special effects.
- Do not read from your slides. The content of your slides is for the audience, not for the presenter.

Concluding the presentation

- Summarise the presentation bringing it back to your objectives.
- The ending needs to review and consolidate the information.
- Allow time for questions and answers, if they have not been covered during the presentation.
- Manage the question and answer session to ensure that it does not run over time.
- Are there sufficient recaps?
- Does the presentation achieve its purpose?

Feedback

- Use evaluation form to get an idea of what the students think of your presentation
- Continue with the positive aspects and develop the points that the students feel could be improved.

4 **Make up a multimedia presentation on one of the keynote topics from exercise 1 using the following useful phrases. You do not need to learn all of these phrases. Your basic aim is to be able to use at least one phrase for each function (e.g. expressing purpose and showing the structure in the introduction, using transitions between sections, referring to visual aids, concluding)**

INTRODUCTIONS
Greeting the audience · *Good morning/afternoon, teachers, students and guests.*
Expressing the purpose · *My purpose/objective/aim today is...* · *What I want to do this morning/afternoon/today is...* · *I'm here today to...*
Giving the structure · *This talk is divided into three main parts.* · *To start with, I'd like to look at...* · *Then, I'll be talking about...* · *My third point will be about...* · *Finally, I'll be looking at...*
Giving the timing · *My presentation/talk/lecture will take/last about 20 minutes.*
Handling questions · *At the end of my talk, there will be a chance to ask questions.* · *I'll be happy to answer any questions you have at the end of my presentation.*
VISUAL AIDS
· *As you can see here...* · *Here we can see...* · *If we look at this slide...* · *This slide shows...* · *If you look at the screen, you'll see...* · *This table/diagram/chart/slide shows...* · *I'd like you to look at this...* · *Let me show you...* · *Let's (have a) look at...* · *On the right/left you can see...*
TRANSITIONS
· *Let's now move on to/turn to...* · *I now want to go on to...*

· *This leads/brings me to my next point, which is...* · *I'd now like to move on to/turn to...* · *So far we have looked at... Now I'd like to...*
OTHER PHRASES
Giving examples · *such as...* · *for instance, ...* · *A good example of this is...*
Summarising · *What I'm trying to say is...* · *Let me just try and sum that up before we move on to...* · *So far, I've presented...*
Digressing · *I might just mention...* · *Incidentally...*
CONCLUDING
Summing up · *Summing up...* · *To summarise...* · *So, to sum up...*
Concluding · *Let me end by saying...* · *I'd like to finish by emphasising...* · *In conclusion I'd like to say...*
Closing · *Thank you for your attention/time (for listening/coming/very much).*
Questions · *If you have any questions or comments, I'll be happy to answer them now.* · *If there are any questions, I'll do my best to answer them.*

5 **Study the following tips for starting out in farming to create a successful presentation.**

You've dreamt of becoming a successful farmer, and you're prepared to venture into the ever-changing world of farming business. Let's have a look at some of the top tips you should consider when starting a small-scale farm.

- ***Develop a thoughtful plan***
- ***Get the right farming equipment***
- ***Identify your target market***
- ***Do what you love***
- ***Have reasonable goals***
- ***Manage your cash flow***
- ***Learn, ask questions and share your knowledge***

SUPPLEMENTARY TEXTS
TEXT 1

1

Skim the following text for studying the development of farming in Britain.

WHO WERE THE FIRST FARMERS?

Around 4,000 years ago, people in Britain started living in a new way. Instead of spending all their time hunting and gathering, they began to set up farms.

The early farmers chopped down trees so they could grow crops and vegetables. They kept cattle, sheep and pigs. People began to settle down in one place and build permanent homes.

The farms marked the start of a new age in Britain – the Neolithic period (or new Stone Age). As well as setting up farms and permanent homes, they also built massive tombs and giant stone circles. Some of the monuments and homes they built can still be seen today.

By 3500BC people in many parts of Britain had set up farms. They made clearings in the forest and built groups of houses, surrounded by fields.

The early farmers grew wheat and barley, which they ground into flour. Some farmers grew beans and peas. Others grew a plant called flax, which they made into linen for clothes.

Neolithic farmers kept lots of animals. They had herds of wild cows that had been domesticated (tamed). The cattle provided beef, as well as milk and cheese. Sheep and goats provided wool, milk and meat. Wild pigs were domesticated and kept in the woods nearby.

Dogs helped on the farms too. They herded sheep and cattle and worked as watchdogs. Dogs were probably treated as family pets, like they are today.

The early farmers still went hunting and gathered nuts and berries to eat, but they spent most of their time working on their farms.

2

Summarize the information of the text. Express your attitude towards the information given in the text. What new facts have you learnt?

TEXT 2

1 **Read the following text and give your opinions about farming in the UK.**

The United Kingdom is unusual, even among western European countries, in the small proportion of its employed population engaged in agriculture. With commercial intensification of yields and a high level of mechanization, supported initially by national policy and subsequently by the Common Agricultural Policy (CAP) of the EU, the output of some agricultural products has exceeded demand. Employment in agriculture has declined gradually, and, with the introduction of policies to achieve reduction of surpluses, the trend is likely to continue. Efforts have been made to create alternative employment opportunities in rural areas, some of which are remote from towns. The land area used for agriculture has also declined, and the arable share has fallen in favour of pasture.

Official agricultural policy conforms to the CAP and has aimed to improve productivity, to ensure stable markets, to provide producers a fair standard of living, and to guarantee consumers regular food supplies at reasonable prices. To achieve these aims, the CAP provides a system of minimum prices for domestic goods and levies on imports to support domestic prices. Exports are encouraged by subsidies that make up the difference between the world market price and the EU price. For a few products, particularly beef and sheep, there are additional payments made directly to producers. More recent policies have included milk quotas, land set-asides, and reliance on the price mechanism as a regulator.

The most important farm crops are wheat, barley, oats, sugar beets, potatoes, and rapeseed. While significant proportions of wheat, barley, and rapeseed provide animal feed, much of the remainder is processed for human consumption through flour milling (wheat), malting and distilling (barley), and the production of vegetable oil (rapeseed). The main livestock products derive from cattle and calves, sheep and lambs, pigs, and poultry. The United Kingdom has achieved a high level of self-sufficiency in the main agricultural products except for sugar and cheese.

2 **Read the text again and in pairs ask and answer comprehension questions.**

TEXT 3

1 **Read an article about the different types of urban farming to practise. Express your attitude towards the information given in the text.**

VERTICAL FARMING VS. GREENHOUSE FARMING

When starting a farming operation, the first choice you face is what type of farm to start. The options are many: indoor vs. outdoor; arable vs pastoral; intensive vs. extensive. For farmers going the indoor route, one of the biggest decisions is between vertical farms and greenhouses. Both vertical farms and greenhouses operate indoors, which means they enjoy benefits like climate control, year-round growing, and chemical-free pest control. However, there are as many differences between these types of farms as there are similarities. For a long time, it was thought that greenhouses were more efficient and profitable than vertical farms, due to the lack of a need for artificial lighting. Nowadays vertical farms enjoy a number of benefits over greenhouses.

There are some differences between vertical farms and greenhouses. First, greenhouses rely on sunlight, while vertical farms rely on artificial light. Second, vertical farms have plants stacked in layers, while greenhouses have them arranged on one horizontal plane. Third, vertical farms can operate in urban areas, while greenhouses require a large amount of space and are therefore best suited for rural or suburban environments.

The main advantage that vertical farms have over greenhouses is greater yield per square meter. Although vertical farms have higher light and heat costs, they have the benefit of more produce grown per unit of soil. One major advantage of vertical farms is centralized distribution. Compared to a rural greenhouse, a vertical farm has less distance to travel to get to customers, and when it does have to ship over a distance, it has better transportation options. As a result, vertical farm crops can be sold more quickly and at higher margins than greenhouse crops. Vertical farming is the cutting edge of agriculture. Offering the ability to grow more crops, in a controlled environment, inside major distributions hubs (i.e. cities), it takes advantage of economies of scale in a way no other farming operation can.

2 **Work in groups. Prepare questions based on the text. Exchange your questions with another group. Which group has the most correct answers?**

3 **Make up a project for developing vertical farming in your country.**

TEXT 4

1 **Read the text and state its main idea. Find synonyms for the word expressions in bold. Use your dictionary to help.**

Farming in Scotland is varied because farming depends on the weather, type of soil and even if the land is ***flat or hilly***. Beef cattle are usually raised in a variety of different ways. Some farmers raise young cows from birth until they are ready for slaughter. Other farmers rear young cattle and then sell them to other farmers in lowland areas who fatten them up ready for slaughter. ***Scottish beef*** is very famous around the world. Scotland also has its own breed of cattle (highland cattle). They have ***huge***

horns and woolly long coats to keep them warm. Pure highland beef is known for its ***exceptional tenderness*** and taste and is therefore more expensive in butchers and in restaurants. ***Dairy farms*** are usually on the lower parts of Scotland due to the cattle needing lots of grass to eat to produce lots of milk.

Like beef cattle, sheep are usually reared extensively. They are mainly fed outside and on grass and they are only housed in the worst weather or when they are lambing.

Pig farms in Scotland are not as widespread as the other farms. The north of Scotland is home to the famous Tamworth pig.

Hens are reared in different ways. ***Battery hens*** produce cheaper eggs due to being kept in cages all the time. Barn hens are able to move around a large barn but are still kept indoors. Free range hens and chickens are able to roam outside and live more naturally. This is now becoming the more popular choice for egg buyers as the eggs and meat are regarded to be healthier.

2 **Express your opinion about the information you have read. What was the most interesting? Why?**

TEXT 5

1 **Read the background information on sustainability.**

INTRODUCTION TO SUSTAINABILITY

In agriculture, sustainability means meeting today's food and textile needs now and in the future. Sustainability requires balancing the needs of people, profit and the planet – something farmers know is essential to the long-term success of their operations.

People

As much as agriculture has mechanized, people are still central to food and fiber production. Today, family farms employ 2.6 million people, and many farmers work hard to provide socially just and safe employment opportunities. That means providing adequate wages, working conditions and opportunities for advancing. You can often find farmers engaging with people in their communities by providing farm tours, hosting educational events and supporting youth organizations.

Profit

In recent years, slightly more than half of farm households have had negative farm income each year. That means most farmers are not making a profit. A sustainable farming operation should be a profitable business that contributes to a robust economy. Farmers can increase profitability through diversification (varying what they do or produce), creative marketing and policies that help secure fair farm prices.

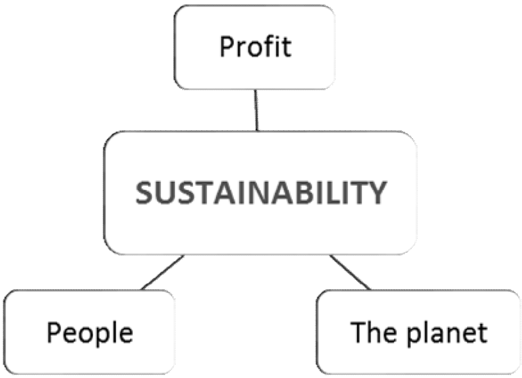
The Planet

Environmental sustainability in agriculture means good stewardship of the natural systems and resources that farms rely on. Among other things, this involves:

- Building and maintaining healthy soil
- Minimizing air and water pollution
- Promoting biodiversity

Human activity impacts the environment. Farming by its very nature alters natural ecosystems to produce food, fiber and fuel for humans. Agriculturists work hard to ensure they are working to implement sustainable practices. When farmers do better, we all do better. The opposite is also true. Today's farmers and ranchers are not only responsible for what they produce, but also how they produce it. Thanks to research and technology, farmers are adopting practices that satisfy human food and fiber needs, enhance environmental quality, use resources more efficiently, sustain economic viability and benefit society.

2 **Look at the following diagram and get ready to speak about the problems of sustainability.**



3 **Consider the statement, "When farmers do better, we all do better. The opposite is also true." Is this a fact or an opinion? Explain your reasoning.**

TEXT 6

1 **Read the text and choose the most suitable missing sentence from the list (1-4) which best fits each gap (A-D).**

MISSING SENTENCES

1. For large scale commercial farming the farms are quite big.
2. It can include both animals and plant products.
3. Man-made factors play a major role in deciding which kind of farming will be done in a particular area.
4. The crop is grown at a different place in every other season.

Based on the use of farm products, farming can also be categorised as subsistence and commercial.

Subsistence farming. When a farmer grows crops only with the purpose of feeding his family and do not sell it, then it is called subsistence farming. **A**. **_____.** This type of farming is commonly found in low economically developed countries.

Commercial Farming. When crop and animal produce is used to earn money and sold in the market for profit then it is called commercial farming. This can be done on both a large and small scale. **B**. **_____.**

Based on the input involved and techniques used in farming, there are two more subcategories of farming.

Intensive Farming is a kind of agriculture where a lot of money and labour are used to increase the yield that can be obtained per area of land.

Extensive farming is an agricultural production system that uses small inputs of labor, fertilizers, and capital, relative to the land area being farmed. Most of the farming in the UK is intensive but some areas of Scotland and Wales also come under extensive farming.

Other types of farming.

Sedentary Farming is a method of agriculture in which the same land is farmed every year.

Nomadic Farming is when a farmer moves from one place to another. **C**. **_____.** This is done mostly in tribal areas of less developed countries. Sometimes, this is also done to maintain and conserve the fertility of the soil. This type of farming is also called shifting cultivation.

D. **_____.** Government policies encourage the adoption of mixed farming in many areas as subsidies are provided by them to encourage better agricultural practices. Also, infrastructural development in an area is one of the biggest factors. For instance, dairy farming is popular in the area where roads are linked to cities and dairy keepers can easily reach out to the consumer.

2 **Fill in the gaps with the correct words.**

land // cropping // arable // planting // farm

MULTIPLE CROPPING

Multiple cropping is the ___ system in which farmers grow two or more crops on the same field during one calendar year. ___ crops, vegetables, fiber or fodder crops are repetitively grown one after the other. Usually, after the main crop is harvested it is followed by the ___ of the next one, and so until the year is over.

Multiple ___ is the most common farm practice of smallholder farmers. This type of cropping efficiently utilizes ___, water, and fertilizer, which results in more crops being produced and more profitable farm production.

3 **Scan the texts for additional information about farm systems in the UK to make a summary.**

TEXT 7

ORGANIC FARMING

1 **Read the following text and write a position paper on the most significant benefits and concerns of organic agriculture.**

Organic farming is a system of farming that is steadily gaining popularity in the world. Organic farming provides an alternative to the modern forms of farming such as using chemical fertilizers, genetically modified organisms, growth hormones, and other artificial techniques. Tracing its roots all the way back to the 20th century, organic farming relies on methods of using organic fertilizer such as green manure and compost manure. Organic farming also employs other techniques such as companion planting, planting of cover crops, and crop rotation. This method of farming is not only restricted to plant farming but also in animal farming. The method has gained popularity due to a number of reasons. The key reason is the protection of the environment from harmful chemicals that threaten to destroy the natural and crucial nutrients in the soil.

In Belarus, as well as around the world, organic agriculture began to develop thanks to enthusiasts and non-profit organizations. The Agro-Eco-Culture has been established, which still supports eco-friendly farmers. There is a big demand for knowledge about organic production. That's why Organic School has been launched for agricultural producers. There are some courses connecting with tillage technologies, plant protection from diseases and pests, techniques of using organic fertilizers, environmental methods of growing plants and animals. Belarus has its own scientific developments and even experimental programs. Some organic products are sold abroad. However organic production requires additional financial investments.

2 **Write down the main idea of each paragraph using one sentence only.**

3 **Work in groups. Prepare questions based on the text. Exchange your questions with another group. Which group has the most correct answers?**

TEXT 8

BERRY INDUSTRY IN BELARUS

1 **Read the text and write down ten keywords.**

Year by year Belarus increases exports of the most popular and valued kinds of its berries – garden blueberries and cranberries. More than 100 private farms and a number of state farms in Belarus are involved in blueberry cultivation.

Today the planting area and the production volume of berries in Belarus is increasingly growing. The export of berries brings foreign currency to the state budget. The key export markets for both cranberries and blueberries include the EU and Russia. However, Poland has recently begun to rival Belarusian berry vendors within the EU market. Thanks to cheaper labour market

Belarus remains number one. Unfortunately, the state offers no support to the berry producers of Belarus.

Product quality requirements are tightened every year. Manufacturers must refine techniques and improve technologies. They cover the berries with a special green netting to protect them from birds. In dry summers, the berries can become acidic and shrink in size, which reduces their sale value. To prevent this, farmers build extensive irrigation systems.

Blueberries are popular with cosmetic and pharmaceutical manufacturers. In addition, they are used in diabetic and child food. Some studies show that these berries help to prevent cancer and improve eyesight. Berry pickers often come in family groups. Although the job is not easy, it is well paid. A skilled berry-picker can gather up to 40-50 kg per day. For more than 30 years Belarus has been growing a variety of cranberries first cultivated in America. The climate of Belarus and its marshy soils are ideal for growing cranberries.

The berries are collected in two ways. Wet or mechanized harvesting is the least harmful method to gather berries. Industrial harvesting tractors do not damage these garden varieties. Seasonal workers also do dry collection by hand. They pick the most solid and good-looking berries, which will be exported abroad. The cranberries sent to Belarusian and Russian markets are used mainly for the production of jams and vitamins. In the UK cranberry sauce is usually an important part of Christmas dinner. Therefore imports of Belarusians cranberries have increased in recent years.

2 **Summarize the information of the text. Express your attitude towards the information given in the text. What new facts have you learnt?**

3 **Project Work. Prepare a report about the activity of Belarusian agricultural enterprises. Be ready to present your reports.**

TEXT 9

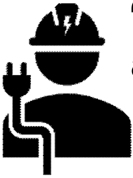
1 **Read the dialogue and role play it.**

Pavel: Do you think climate change is already affecting Belarus?
Kristy: Yes, there are studies that show changes in the last 30 years.
Pavel: Why in the last 30 years?
Kristy: Climate is defined as a period of at least 30 years.
Pavel: That's interesting. And what actually changed?
Kristy: Many things have been changing. Glaciers and ice caps are melting, and storms are becoming more intense.
Pavel: But is that really so bad?
Kristy: We don't really know. Humans have adapted to climate in agriculture. Fast changes are difficult to adapt to.
Pavel: I'm not sure I understand. Can you give an example?
Kristy: For example, less rain and more droughts. Farmers will have to change what they produce because their old crops don't get enough water anymore.
Pavel: That makes sense. My uncle is a highly specialized farmer. I don't think he could just change the whole farm without losing a lot of money.
Kristy: And that is only one example. That's why many people are scared.

2 **Read the dialogue again and decide whether the following statements are true or false.**

1. Pavel is interested in global warming.
2. Kristy speaks about intensive storms and dramatic glaciers melting.
3. Pavel doesn't believe in global average temperatures rising.
4. Kristy explores important changes in global farming.
5. Pavel assures that modern farmer needs a lot of money to adapt his farm to climate changes.

3 **Act out your own dialogues using the conversation phrases.**



“Science can amuse and fascinate us all, but it is engineering that changes the world.”

Isaac Asimov

MODULE 2

BASIC CONCEPTS OF AGRICULTURAL ENGINEERING

Unit 1
Mechanization of agriculture

Unit 2
Farm machinery

Unit 3
Electrification of agriculture

Unit 4
Electrical equipment

Unit 5
Labour safety in agriculture

UNIT 1

MECHANIZATION OF AGRICULTURE

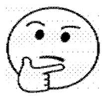
> Our age of mechanization leads along a road ending with man himself as a machine

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Find ten words that go with the topic "*Mechanization of agriculture*". Use a dictionary if necessary. Make your own sentences with these words.**

3 **Read the text and fill in the missing words from exercise 2.**

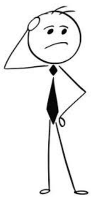


Farm ______ is the process of agricultural powered ______ use to mechanize the work of agriculture.

It began with simple ______ and designed to replace manual ______ and make use of the greater power of domestic ______ such as oxen, horses and mules.

Agricultural enterprises work in close contact with ______. Science and ______ help make agriculture more productive. They provide ______ with labor-saving technologies, produce ______ plant varieties and breeds of livestock and ______ new agricultural chemicals.

4 **Choose the best answer.**



1. What are the ancient examples of farm mechanization?

a) hoes and ploughs;
b) oxen, horses, and mules;
c) manual labour.

2. What are the modern examples of farm mechanization?

a) drones and computers;
b) tractors, trucks, and combine harvesters;
c) all the above.

SECTION A. READING

EXERCISES

1 **Read the text and find information about the following:**

1. the meaning of the term “mechanization”;
2. the aims of mechanization;
3. the main elements agricultural mechanization involves;
4. the place where agricultural mechanization has been pioneered;
5. the main technological levels of mechanization.

AGRICULTURAL MECHANIZATION

The term “mechanization” is used to describe tools, implements and machinery applied to improving the productivity of farm labor and of land; it may use either human, animal or motorized power, or a combination of these. In practice, therefore, it involves the provision and use of all forms of **power sources** and mechanical assistance to agriculture, from simple hand tools, to draught animal power and to mechanical power technologies.

Agricultural mechanization **has been pioneered** in North America and Europe and more recently in Japan, and is now spreading rapidly throughout the world. The importance of enhancing and upgrading such mechanization practices prior to the almost inevitable transition to engine-driven equipment is now well recognized.

Mechanization is a key input in any farming system. It aims to achieve the following:

• increased productivity per unit area due to improved farm operations;
• expansion of the area under cultivation where land is available;

- accomplishment of tasks that are difficult to perform without mechanical aids;
- improvement of the quality of work and products;
- reduction of drudgery in farming activities, thereby making farm work more attractive.

Mechanization systems are categorized into human, animal and mechanical technologies. Based on the source of power, the technological levels of mechanization have been broadly classified as hand-tool technology (the use of spades, pruners, shovels, rakes, hoes and post-hole diggers, etc.), draught animal power technology (providing farmers with a possibility to use manure from **draught animals** and farm power necessary to apply renewable practices for land intensification) and mechanical power technology (the use of farming equipment such as tractors, balers, harvesters, and combines).

Hand-tool technology is usually used in farming on a small scale. Traditional farm hand tools and implements have been developed through experience over generations to meet emerging farming challenges. The type of soils and topographic conditions largely influence the type, size and shape of particular tillage tools. These tools are usually light; one can use them manually, without the help of machinery or animals. Commonly, they are used for cultivating small areas or backyard-garden farming, removing soil, loosening the soil around plants and watering plants, spraying insecticides. These tools help farmers cut tall weeds and grasses, dig and break stones, brake hard topsoil, clean the ground and level the topsoil, remove the trash, haul fertilizers, manures, planting materials, and other things.

Animal power can be a cost-effective source of energy for any small farm, particularly those farms that already keep animals for other purposes. Animal power offers some advantages. It doesn’t matter whether it is a small animal such as a dog or a goat, medium animals such as ponies and horses, or large animals such as oxen and cows, animal power can be created and maintained within a diversified farm environment.

Draft animal power (DAP) has been identified as an **environmentally friendly technology** that is based on renewable energy and encompasses integration of livestock and crop production systems. Research work has linked the benefits of using DAP to several aspects such as: carrying out farming operations timely, improving seedbed preparation, deeper plowing, labour saving, and reducing drudgery. Draft animal technology offers a viable potential to increase agricultural productivity using environmentally friendly and locally available resources. Draft animals provided a large part of the power requirements of agricultural production. But, as the need for large farm production arose, the development and invention of heavier and more effective agricultural tools and machines became unavoidable. Farmers work long hours planting, maintaining, and harvesting crops as well as raising the livestock. Working on the fields requires the use of larger ploughs, harrows, mechanical planters, cultivators and heavy farm machinery such as tractors, combines, balers and harvesters to get the job done efficiently.

Therefore, the main concept of mechanical power technology is to apply engineering principles for doing agricultural operations in a better way to increase **crop yield**. This includes the development, application and management of all mechanical aids for field operation, water control, material handling, storage and processing.

2 **Read the text and explain the words and word combinations in bold. Use a dictionary to help you.**

READ ONCE AGAIN
IF YOU NEED...

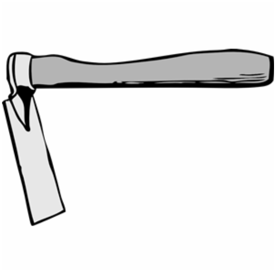
SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Match the pictures *a-f* to the words. Think of the sentences with these words.**

hand tools *seeder* *draft animal*
plough *tractor* *hoe*

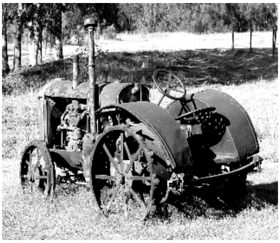
a



b

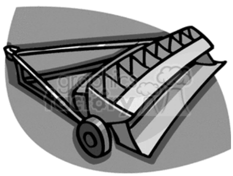
c

d



e

f

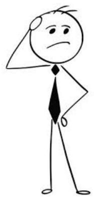


2 **a) Make word combinations using a word from each box.**
b) Use the word combinations you've made to complete the sentences below.

a)

1. agricultural	a. principles
2. hand	b. animals
3. manual	c. power
4. farm	d. activities
5. draught	e. tools
6. engineering	f. implement
7. farming	g. mechanization
8. animal	h. labour

b)



1. _____ have been used by humans since the Stone Age when stones were used for hammering and cutting.

2. A planter is a _____ usually towed behind a tractor, which sows (plants) seeds in rows throughout a field.

3. _____ may be pets or close to pets, such as guide dogs or other assistance dogs or they may be animals trained to provide tractive force, such as draft horses or logging elephants.

4. The tractor has now replaced the cattle that supplied draught _____ to perform agricultural operations.

5. In modern usage, _____ implies machinery more complex than hand tools and would not include simple devices such as an un-geared horse or donkey mill.

6. _____ is physical work done by humans, in contrast to labour by machines and working animals.

7. Renewable energy is closely connected with farmers and _____.

8. Mechanical technology in agriculture is the application of _____ and technological developments for the creation of useful agricultural products and farm machinery production.

3 **For the following words choose the best place in the sentences given below.**

implement / to implement

A. It’s a good thought, but it will be a difficult thing _____ .

B. They carried a soil tillage _____ in the truck.

labor / to labor

A. His _____ did not require a great deal of skill.

B. Because she was not strong enough _____ in the field, the girl was placed in the greenhouse to help the farmer.

tool / to tool

A. I can’t use this _____ .

B. Aluminium is difficult _____ .

farm / farming

A. His business is poultry _____ .

B. She grew up on a dairy _____ .

4 **Match these words and phrases to the definitions.**

1. farming	a. the process of changing from working by hand or with animals to doing that work with machinery; replacement of human labor with machine labor.
2. hoe	b. working the land as an occupation or way of life; the practice of cultivating the land or raising stock.
3. hand tool	c. physical work done by people, most especially in contrast to that done by machines, and to that done by working animals.
4. farm implement	d. any kind of machinery used on a farm to help with farming.

5. mechanization	e. an animal, usually domesticated, that is kept by humans and trained to perform tasks. They may be animals trained to provide tractive force, such as draft horses or logging elephants.
6. manual labour	f. any tool that is not a power tool – that is, one powered by hand (manual labour) rather than by an engine.
7. draft animals	g. a hand tool with a flat blade attached at right angles to a long handle used in gardening and farming.

5 **Choose the right word to complete the sentences.**

1. Farm mechanization began by the moment when people started seeking *food // tools // animals* and methods of work that were more efficient.
2. In the middle of the 18th century farmers tried a moldboard *plough // tractor // machine*.
3. Of greatest significance was the development of mechanical *// plant // keyboard // power* for farm work.
4. Wind, water and animals were used to provide energy for various *crops // devices // farmers.*
5. James Watt, a British engineer, *discovered* // *developed // exchanged* a steam engine in 1765.
6. The use first of water power and then of steam power stimulated the invention of agricultural machinery replacing *machine labor // skilled labor // manual labor.*
7. Agricultural *technology* // *tools* // *equipment* may be towed behind or mounted on the tractor.
8. The tractor may provide a source of power if the *operation* // *implement // invention* is mechanised.

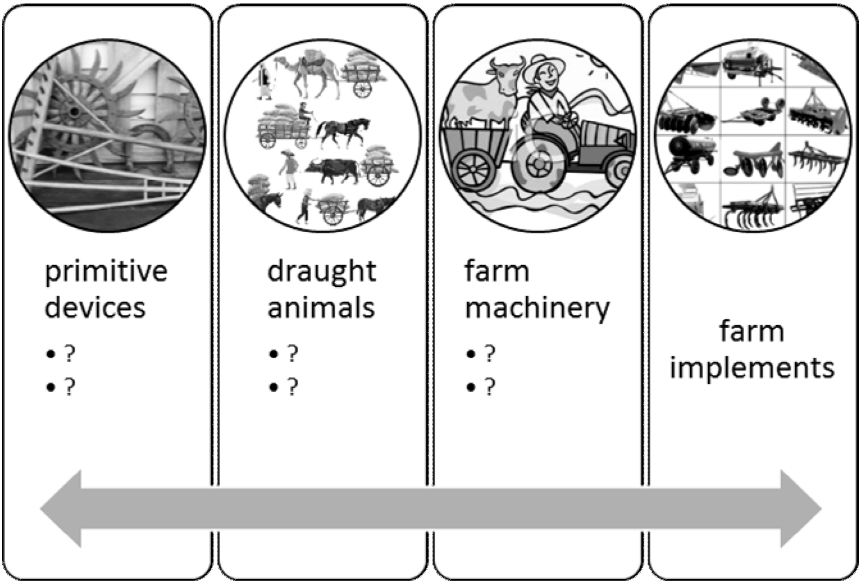
SECTION C. COMMUNICATING

EXERCISES

1 **Give some facts from the text to prove that:**

1. Mechanization is a key input in any farming system.
2. Mechanization systems are based on different technologies.
3. Animal power offers some advantages.
4. Hand tools and implements have been developed to meet farming challenges.

2 **Think and fill in the missing information in the chart. Use the prompts given below. Discuss with your partner(s) what you mean by farm mechanization.**



PROMPTS

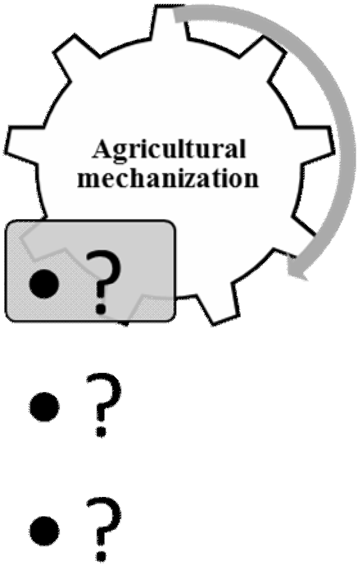
dog	farm vehicle	oxen	scuffle hoe
spades	**post-hole diggers**	**hand cultivator**	**rakes**
animal drawn implement	planter	picker	power tiller
grain processing equipment	**cows**	**harrow**	**horse hoe**
hand hoes	sprayer	threshing machine	camel
seed drill	**hauling equipment**	**ancient plough**	**electric motor**
pruners	weeder	shovels	reaper
moldboard plow	**elephant**	**bean harvester**	**horses**
engine	tractor	ponies	binder
goat	**mule**	**haymaker**	**beet harvester**
grain harvester	cultivator	mower	baler

3 **Work in pairs. Discuss the importance of mechanization for agriculture. You may use the following phrases for discussion:**

- First of all, I'd like to point out…
- I think/don't think that…
- On the one hand…, on the other hand…
- Summing up / To sum up …
- Finally, I would like to say that …

4 **Prepare a talk of advantages and disadvantages of farm mechanization. Give this talk in your group and answer the questions that may follow.**

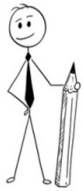
5 **Prepare a brief outline of the text. Discuss the main points of it with your colleagues.**



6 **Spend two or three minutes revising what you have learnt in this unit. Close your books and tell your partner.**

7 **Give your viewpoints. Persuade your partner that mechanised agriculture is a social welfare of any nation.**

SECTION D. WRITING



EXERCISES

1 **a) Using the instruction given below make a plan of the text *"Agricultural mechanization"* from Section A.**
b) Retell the text in writing according to your plan.

1. Read the whole text from the beginning to the end.
2. Determine the theme of the text and its main idea. (The theme is what is said in the text, but the basic idea is the reason for which it was written).
3. Divide the text into meaningful parts. Read each part carefully. Highlight the main parts and the title.
4. Write down the points of the draft plan. Read the text again. Please note the following:
- Ø the plot should twist with the text;
- Ø the headings should not be repeated and exact words should be used;
- Ø all important issues should be identified;
- Ø the theme and the main idea should be reflected in your plan.
5. Retell or write the text using the plan you compiled.
6. Copy the final version of the plan in your notebook.

2 **Look at the picture given below. Find information about the concept of agricultural mechanization. Make notes under the following headings and then create your own article.**

1. Manual	4. Using animal and mechanical power combined
2. Using manual tools	5. Using mechanical power
3. Using animals for implements and machines	6. Automatic machines

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

A BRIEF HISTORY OF FARM MECHANIZATION

1

Read the first part of the text "*A brief history of farm mechanization*". Think of the information worth mentioning and discuss it with your colleagues.

I

After 9,000 BC a great change came over the world. Previously humans lived by hunting animals and gathering plants. Then about 8,500 BC people began to grow wheat, barley, peas and lentils instead of gathering them wild. By 7,000 BC they domesticated sheep, pigs and goats. By 6,000 BC they also domesticated cattle.

Farming first began in the Fertile Crescent, which stretches from Israel north to southeast Turkey then curves southeast to the Persian Gulf. However, agriculture was also invented independently in other parts of the world as well. Meanwhile farming spread from the Middle East to Europe. By about 4,000 BC people in central Europe were using oxen to pull ploughs and wagons. About the same time people in the Middle East began using donkeys as beasts of burden. Also, about 4,000 BC horses were domesticated on the steppes of Eurasia.

II

2

Read the second part of the text "*A brief history of farm mechanization*". Name the tools and methods of work people used in ancient times.

Farm mechanization began by the moment when people started seeking tools and methods of work that were more efficient. The history of agriculture contains many examples of the use of primitive tools, such as the hoe and the plough.

Egyptians used a device called *shaduf* for irrigation. It was a "see-saw" with a leather container at one end, which was filled with water and a counterweight at the other.

In Israel farmers kept oxen and asses. Both were used for pulling ploughs. Oxen also threshed grain by walking on it. Under the Han Dynasty agriculture improved partly due to an increasing number of irrigation schemes, partly due to the increasing use of buffaloes to pull ploughs and partly due to crop rotation which was introduced into China about 100 BC.

In Roman France, a harvesting machine called a *gallus* was invented. It was a box on wheels with horizontal blades at the front. The box was pushed by an ox. As it moved forward through the wheat the blades cut the heads of the crop and they fell into the box.

Farming improved in the Middle Ages. One big improvement was the heavy plow. A new kind of plow was invented which plowed the soils of Europe much more efficiently. There were no fundamental changes to farming until the 18th century.

III

3 **Read the third part of the text "*A brief history of farm mechanization*". Find the key points to discuss.**

During the 18th century farming was gradually transformed by an agricultural revolution. Until 1701 seed was sown by hand. In that year Jethro Tull invented a seed drill, which sowed seed in straight lines. He also invented a horse drawn hoe which hoed the land and destroyed weed between rows of crops.

In the early and mid-19th century farming prospered. In the mid-19th century, it was helped by the rapid growth of towns (providing a huge market) and by railways. (The railways made it easier to transport produce).

Farming was also helped by new technology. Justus von Liebig and John Lawes introduced new fertilizers. Farmers also began using clay pipes to drain their fields. Meanwhile, Cyrus McCormick invented the reaping machine in 1834 and in 1837 John Deere invented the steel plow. The first combine was designed in 1836. In the middle of the 18th century farmers tried a moldboard plow which was designed to eliminate weeds by turning over a thick layer of the soil.

In 1856 John Fowler invented the steam plow. The year 1869 saw the appearance of a mechanical corn planter, 1875 – a self-binding reaper. In the 1880s the reaper and threshing machine were combined into the combine harvester. These machines required large teams of horses or mules to pull.

Steam power was applied to threshing machines in the late 19th century. There were steam engines that moved around on wheels under their own power for supplying temporary power to stationary threshing machines. These were called road engines, and Henry Ford seeing one as a boy was inspired to build an automobile.

In 1897 a German engineer Rudolf Diesel invented a new engine known as a diesel which began a transport revolution in cars, lorries, trains and ships. The main advantage of diesels is that they can run on rather cheap fuel.

IV

4 **Read the fourth part of the text "*A brief history of farm mechanization*". Say what information you have learned.**

In the 20th century farms greatly increased production. Tractors gradually replaced horses.

With internal combustion came the first modern tractors in the early 1900s, becoming more popular after the Fordson tractor. At first reapers and combine harvesters were pulled by teams of horses or tractors, but in the 1930s self-powered combines were developed. Today a farmer has a wide range of tractors – gasoline and diesel, with engines varying from 20 h. p. to 400 h. p.

Milking machines were rare in the early 20th century but they became common from the 1940s to the 1960s. By the 1950s farmers of corn, wheat, soy, and other commodity crops had replaced most of their workers with harvesting machines and combines. From the 1950s combine harvesters became common.

Modern agriculture is known by its full-scale mechanization of jobs requiring more intricate agricultural machinery, such as harvesting of sugar beets, mowing of grasses, silaging, livestock care, etc. Many farmers use computers to aid in farm operations.

5 **Define the main idea of each part of the text and discuss key points with your partners. Begin with:**

The main idea of part one is …
The second part highlights …
The third part describes …
The fourth part draws our attention to …

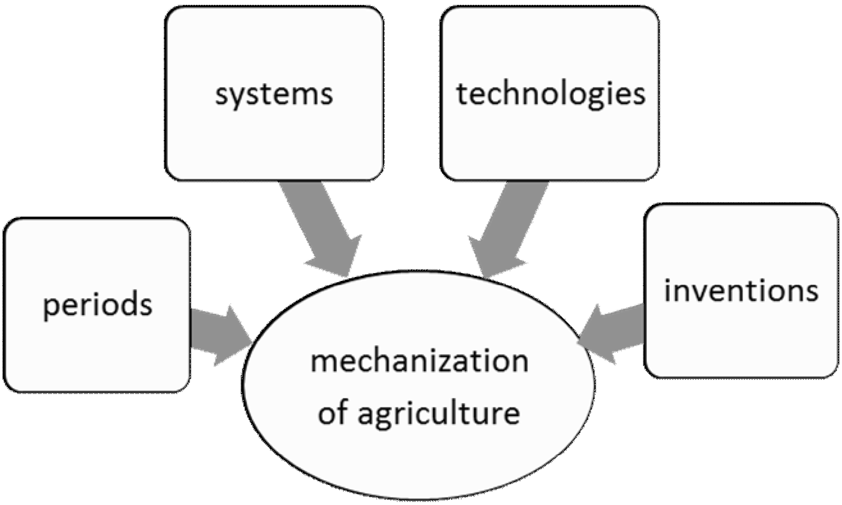
6 **Work in pairs. Ask and answer questions about:**

1. farming fundamental changes in the Ancient World;
2. farming achievements in the 19th century;
3. new technologies in modern agriculture.

7 **Work in small groups. Ask each of your partners to give you as much information as possible about the most significant inventions in farming.**

8 **Summarize all the information from the text. Express your attitude towards the text.**

9 **Speak on the topic "*Mechanization of agriculture*". Elicit the information from the text "*Agricultural mechanization*" in Section A and "*A brief f history of farm mechanization*" in Section E. Use additional information from your general knowledge on the subject.**



UNIT 2

1. FARM MACHINERY

Some of us grew up playing with tractors, the lucky ones still do

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Make a list of agricultural equipment you know. What kind of farm work do they do?**

3 **Find five words that go with the topic "*Farm machinery*". Make up your own sentences with these words.**

4 **Read the text and fill in the missing words from exercise 3. Then give an answer to the question from the title.**

WHAT ARE USES OF AGRICULTURAL MACHINES?

Throughout agricultural evolution various machines have been developed for the differing tasks:

- Providing the power

The central role in modern farming belongs to the ________. It is developed for the driving, pulling and powering of agricultural machinery.

- Preparing the Soil

Although several attachments break up and prepare soil for planting, the primary implement is the ________. It cuts and turns over the soil, uproots weeds and expels stones.

- Cultivating the Field

A field ________ is specifically meant for cultivating the farm or making the soil softer for planting.

- Planting the Seed

After the land has been tilled or cultivated, seeders and planters are used for sowing of the seeds or planting of the crops. Sowing machines, ________ are able to plant multiple rows of seed at equal spacing and depth.

- Harvesting the Crop

________ take the stalk from the ground, remove grain from the stalk, and shake debris from the grain. This process of harvesting, threshing and cleaning gives the combine its name.

SECTION A. READING

1 **Read the text and find the information that supports these statements.**

1. There is a great variety of machines and equipment for crop production and livestock breeding operations.
2. Farm equipment and farm tools are two different concepts.
3. Farm machinery is classified according to the operations they fulfill.

FARM MACHINERY

Farm machinery, mechanical devices, including tractors and implements, are used in farming to save labor. Farm machines include a great variety of devices with a wide range of complexity: from simple ***hand-held implements*** used since prehistoric times to the complex harvesters of modern mechanized agriculture.

The operations of farming for which machines are used are diverse. For crop production they include handling of residues from previous crops; primary and secondary tillage of the soil; fertilizer distribution and application; seeding, planting, and transplanting; cultivation; pest control; harvesting; transportation; storage; premarketing processing; drainage; irrigation and erosion control; and water conservation.

Livestock production, which not so long ago depended primarily on the pitchfork and scoop shovel, now uses many complicated and ***highly sophisticated machines*** for handling water, feed, bedding, and manure, as well as for the many special operations involved in producing milk and eggs.

The difference between farm tools and farm equipment is that most farm tools are smaller and handier, less weighty and less bulky. They don't require much ***technical know-how*** to handle as compared to farm equipment. Farm tools are cheaper and easier to maintain. Typical examples of farm tools are hoe, shovel, spade, etc. On the other hand, farm machinery is mainly bigger, more bulky and weightier than most farm tools. The operation of farm machinery requires much more technical know-how than farm tools. Agricultural equipment is more expensive and difficult to maintain.

There are as many farm machines as there are farm works to be done ranging from clearing to harvesting. Some farming machines are ***multipurpose machines*** meaning that they are meant to be used for doing more than one farm work.

Here are some of the most common types of farm machinery:

Agricultural equipment used as power: for example, a tractor. A Tractor is practically the basic need of every farm and farmer, and is known for performing several tasks. Tractors are available in various sizes, styles, capacities and so on to suit all the farms. Various trailers or other tools can be attached to tractors and can be customized for different purposes.

Agricultural equipment used for soil cultivation is as follows: cultivators, plows (ploughs), harrows, rollers, soil tillers, destoners, etc. Tillage is the manipulation of the soil into a desired condition by mechanical means. Soil is tilled to change its structure, to kill weeds, and to manage crop residues. Equipment used to break and loosen soil for a depth of six to 36 inches (15 to 90 centimeters) may be called ***primary tillage*** equipment. It includes moldboard, disk, rotary, chisel, and subsoil plows. ***Secondary tillage*** is aimed at improving the seedbed by soil pulverization, conserving moisture through destruction of weeds, and cutting up crop residues. It is accomplished by use of various types of harrows, rollers, or pulverizes, and tools for mulching and fallowing.

Agricultural equipment used during planting includes planters, transplanters, broadcast seeder, air seeder, seed drill, precision drill, etc. Planting equipment is introduced to place seeds or plant parts in or on the soil for production of food and feed crops.

Agricultural equipment used for spreading fertilizers or spraying other agrochemicals is presented by sprayers, fertilizer spreader, manure spreaders, etc. These are mainly used for application of fertilizers and ***pest control***.

Agricultural equipment used for irrigation: the examples are irrigators used for drip irrigation or center pivot irrigation as well as ***hydroponics***, etc.

Agricultural equipment for sorting agricultural products according to color, size, taste, weight, density includes color sorters, density sorters, weight sorters, blemish sorters, shape sorters, etc.

Agricultural equipment used for harvesting: typical examples are the various types of harvesters such as combine harvesters, threshers, reapers, sugarcane harvesters, rice harvesters, cotton harvesters, forage harvester, beet harvesters, mowers, corn harvesters, etc.

Agricultural equipment used in making hays such as balers, mowers, hay tedders and hay rakes, etc.

Agricultural equipment used for loading agricultural products: such as backhoe loaders, front-end loaders, etc.

Other farm equipment comprises carts, hedge cutters, livestock trailers, mulching machines, trimmers, etc.

In livestock production machinery and equipment can be used to help producers care for and manage their livestock. Milking machines, ***automated feeding*** and watering systems, incubators, egg candlers, tractors, computers, and many other types of equipment can be used by the producer to improve efficiency and quality of products.

As technology is advancing various types of machines for doing various types of farm work have been introduced. The farming industry has been improved greatly thanks to the use of heavy farm equipment in doing farm work. There are farming machines meant for family or subsistent agriculture and those meant for ***commercial farming***. Along with the development of the farm machinery manufacturing industry a great number of heavy haulage companies have been established in the world.

2 **Read the text and explain the words and word combinations in bold. Use a dictionary to help you.**

3 **Suggest the words in bold corresponding to the definitions in italics.**

1. *Any subsequent tillage for improving the seedbed* is accomplished by use of various types of harrows, rollers, or pulverizers, and tools for mulching and fallowing.

2. Farmers lack *knowledge and skills of the technical methods or techniques* in farming activities.

3. There are various different ways of *growing plants in sand, gravel, or liquid, with added nutrients but without soil.*

4. The main aim of the project is to develop *machines having several functions* for performing major agricultural operations like ploughing, seeding, harvesting.

5. *The first soil tillage after the last harvest* can include the use of the moldboard plow, chisel plow, or disk plow.

6. Early agricultural equipment involved hoes, spades, trowels, and other *devices manipulated by the hand.*

SECTION B. LANGUAGE PRACTICE

EXERCISES

1

a) Match the pictures *a-h* to the words. What other farm equipment can you think of?

hay tedder *combine-harvester* *harrow*

plow *fertilizer spreader* *baler*

beet harvester *front-end loader*

a

b

c

d

e

f

g

h

b) In the text find sentence examples of the words given above. Read them aloud and translate into your native language.

2 **Look at these groups of words. What is the topic for each group? Find the word that doesn't belong to this group.**

The name of the group	Machinery and operations	The odd word
	threshers, reapers, sugarcane harvesters, rice harvesters, cotton harvesters, air seeder, forage harvester, beet harvesters, mowers, corn harvesters	
	handling water, feed, bedding, and manure, fertilizer application, producing milk and eggs	
	color sorters, density sorters, mowers, weight sorters, blemish sorters, shape sorters	
	hay rakes, planters, transplanters, broadcast seeder, air seeder, seed drill, precision drill	
	balers, mowers, combine harvesters, hay tedders and hay rakes	
	cultivators, backhoe loaders, plows, harrows, rollers, soil tillers, destoners	
	primary and secondary tillage, fertilizer distribution, seeding, planting, bedding, pest control, harvesting, storage, premarketing processing, drainage, irrigation	
	sprayers, fertilizer spreader, milking machine, manure spreaders	

3 **What machinery and equipment will you choose for the following farm operations?**

1. Harvesting potatoes
2. Cutting grass
3. Cutting up crop residues
4. Reaping wheat or rye
5. Adding manure to the soil
6. Placing seeds in the soil
7. Watering young plants
8. Compressing cut and raked crop
9. Loading agricultural products
10. Transporting beets from the field

a.tractor
b. backhoe loader
c. irrigator
d. combine harvester
e. baler
f. broadcast seeder
g. harrow
h. manure spreader
i. potato harvester
j. mower

4 **a) Make word combinations using a word or phrase from each box.**
b) Use the word combinations to complete the sentences below.

a)

1. hand-held	a. spreader
2. technical	b. harvester
3. multipurpose	c. know-how
4. primary	d. tillage
5. air	e. machine
6. fertilizer	f. implements
7. forage	g. seeder

b)

1. When it comes to harvesting maize, a John Deere _____ brings great benefits all round.

2. Farm machines include a great variety of devices: from simple _____ to the complex machinery of modern mechanized agriculture.
3. Farmers use _____ to seed, apply fertilizer and distribute nitrogen at a desired interval with one pass of the machine.
4. Some farming machines are _____ meaning that they are meant to be used for doing more than one farm work.
5. _____ equipment includes moldboard, disk, rotary, chisel and subsoil plows.
6. A _____ is a modern fertilizing machine which is manufactured as trailed type with two discs, hydraulic control and PTO shaft.
7. The operation of farm machinery requires much more _____ than farm tools.

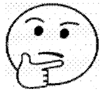
5 **Match these words and phrases to the definitions.**

1. pitchfork	a. the agricultural preparation of soil
2. multipurpose	b. a sowing device that precisely positions seeds in the soil and then covers them
3.tillage	c. the production of crops and farm animals for sale, usually with the use of modern technology
4. seed drill	d. a tool like a large fork, used on farms for lifting and carrying hay
5. commercial farming	e. a modern farm machine for threshing grain, now a part of combine harvesters rather than a separate implement.
6. thresher	f. a machine for cutting grass
7. mower	g. able to be used for several different purposes

6 **Underline the item in each group that doesn't combine with the adjective.**

hand-held	implements, machines, tools, mower, farming, device
highly sophisticated	pitchfork, combine harvester, sorter, fertilizer spreader, baler, beet harvester, loader
commercial	farming, gardening, business, planting, center, manufacture
technical	know-how, seeder, center, crops, progress, specialists, requirements, data
bulky	machinery, load, material, feed, item, harvester, farming, harrow
precision	drill, farming seeder, tillage, seed planter, instrument, hoe
primary	tillage, education, task, weeds, device, need, role
multipurpose	implement, storage, tool, machine, equipment, system, vehicle
harvesting	equipment, harrow, machine, tool, header, technique, time
mechanized	agriculture, farm jobs, industry, equipment, processing, harvesting, field

7 **In the text below the underlined words and phrases are in the wrong place. Move them to the correct position.**



Gone are the days when farmers used to spend days and nights on the farm, manually doing each and every task, right from (1) plants to harvesting crops. Farming (2) tillage has made life easier for farmers. Modern farmers use a wide range of cultivators for (3) machinery. In particular, cultivators are used for (4) seed bed before planting into a bed, as well as incorporating crop or weed residues and preparing a (5) weed control. Cultivator tines can be properly spaced to be used in a garden bed or crop field after plants are growing to (6) drive the weeds from around the plants. It takes someone with a steady hand to (7) remove the tractor in a straight line and not hit the vegetable (8) plowing with the cultivator.

8 **Match the columns to make sentences about farm equipment.**

A	B	C
combine harvester	turn over	multiple rows of seeds
plow	be used	grain from the stalk
tractor	plant	attached equipment
cultivator	pull	to get rid of weeds
sowing machine	remove	soil

9 **Organize the following farm equipment into the main groups of agricultural machinery classification. Make a table consisting of three columns:**

1. Names of farm machinery
2. Kinds of farm machines
3. Aim of application

Incubator, fertilizer spreader, corn harvester, manure spreader, hay rake, planter, broadcast seeder, seed drill, thresher, reaper, cotton harvester, air seeder, forage harvester, precision drill, beet harvester, egg candler, mower, weight sorter, blemish sorter, shape sorter, sprayer, milking machine, air seeder, cultivator, backhoe loader, plow, color sorter, harrow, roller, soil tiller, destoner, density sorter, mower, automated feeding and watering systems, irrigator, front-end loader.

SECTION C. COMMUNICATING

EXERCISES

1 **Answer the following questions:**

1. What crop production operations are fulfilled with farm machinery to safe labor?
2. What kind of machines does livestock breeding use?
3. What is the difference between farm tools and farm equipment?
4. What farming machines are called multipurpose machines?
5. What farm equipment is used as power?
6. How is tillage equipment classified?
7. What machines does planting equipment include?
8. What agricultural equipment is used for spreading fertilizers or spraying?
9. What harvesting machines are used to gather crops?
10. How is sorting organized on the farm?
11. What livestock production equipment can be used to help farmers care for and manage their livestock?

2 **Describe the main types of agricultural equipment used for crop production according to the given plan.**

PLAN

1. Definition

2. Aim of use

3. Different types

Example model*: *Harvesting equipment is equipment used to pick, reap, or otherwise gather crops. Harvesting equipment includes combines, pickers, balers, and mowers.

A combine is a machine used to harvest crops as it moves across a field.

A mower is a piece of equipment used to cut standing vegetation. Mowers are used to harvest forage crops, such as grass and alfalfa.

A baler is a piece of equipment used to harvest forage crops that have been cut, dried, and placed in rows.

3 **What farm machinery is widely used in your country? Find the ones suitable for Belarusian soils by putting a tick. Then make a short oral report of the operations they do and present your report to your groupmates.**

cotton harvester	
potato harvester	
self-propelled and trailed mower	✓
fertilizer spreader	
spraying robot	
baler	
sowing machine	

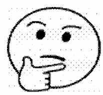
4 **a) Keep a diary for a week's practice of university students on a farm. Fill in the chart.**
b) Make an oral report to your group mates about the results of your practice activities.

Week day	Agricultural jobs/acreage	Farm machinery used	The amount of time	The number of people employed
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

5

a) Keep track of the machinery and equipment that you see being used around on a farm. Record all of your machines in the table below. For each piece of machinery and equipment list what the alternative would be if the machinery and equipment were not available.

b) Compare your list with the rest of the class and discuss what you found.

Machinery and equipment	•? •? •? 
Where used	•? •? •?
Alternative	•? •? •?

6 **Speak on the following problems using the opinion phrases given below:**

1. What types of farm machinery would you choose for a small arable farm? Give arguments for your choice.
2. What agricultural operations can be done only by machines and without a man?
3. How does farm machinery cause environmental pollution?

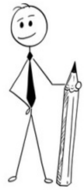
Speaking personally,
I think that…
My view is that…
As I see it…
It would seem to me that…

7 **You have come back from a two-week trip abroad. In a conversation with your friends talk about:**

- the types of agricultural equipment used on the farms you visited;
- the types of agricultural jobs you fulfilled;
- the main problems you faced.

SECTION D. WRITING

DESCRIBING FARM EQUIPMENT



1 **Write an email to your friend saying what agricultural equipment is made use of on the farm you are having your summer practice at.**

2 **Translate the following text. Write out the advantages of precision agriculture technology.**

Like many industries technology is changing the ways farmers manage their operations. New developments in machinery, software and genetics are allowing farmers to have more control over how they plant and manage their crops.

One of the greatest innovations in farming technology today is the advent of precision agriculture technology. Today’s farm tractors have more computing power than the first space shuttle that went to the moon. From autopilot features to yield monitors to rate controllers, these new advances are helping farmers improve efficiency and maximize yield. Precise application of water, fertilizer and chemicals means less waste and less input costs.

All of this data has to go somewhere, doesn't it? Big Data is the latest buzzword, and for good reason. This is going to change how farmers approach their work. Combines and tractors are tracking every inch of land, calculating soil type, seed placement, chemical application, etc. Software can then take this data and create personalized recommendations. Farmers can now lean on this hard data to make better, more informed crop decisions. App developers and investors are also jumping on the big data bandwagon. From weather monitoring to pest identification to market data, farmers can find an app to help with almost anything.

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

PRIMARY TILLAGE EQUIPMENT

1 **Read the text and translate the key sentences about all kinds of plows: moldboard, disk, rotary, chisel, and subsoil. Then fill in the following table:**

Kinds of plows	Main features	Main functions
1. moldboard plows		
2. disk plows		
3. rotary plows		
4. chisel plows		
5. subsoil plows		

Equipment used to break and loosen soil for a depth of six to 36 inches (15 to 90 centimetres) may be called primary tillage equipment. It includes moldboard, disk, rotary, chisel, and subsoil plows.

The *moldboard* plow is adapted to the breaking of many soil types. It is well suited for turning under and covering crop residues. There are hundreds of different designs, each intended to function best in performing certain tasks in specified soils. The part that breaks the soil is called the bottom or base; it is composed of the share, the landside, and the moldboard.

When a bottom turns the soil, it cuts a trench, or furrow, throwing to one side a ribbon of soil that is called the furrow slice. When plowing is started in the middle of a strip of land, a furrow is plowed across the field; on the return trip, a furrow slice is lapped over the first slice. This leaves a slightly higher ridge than the second, third, and other slices. The ridge is called a back furrow. When two strips of land are finished, the last furrows cut leave a trench about twice the width of one bottom, called a dead furrow. When land is broken by continuous lapping of furrows, it is called flat broken. If land is broken in alternate back furrows and dead furrows, it is said to be bedded or listed.

Different soils require different-shaped moldboards in order to give the same degree of pulverization of the soil. Thus, moldboards are divided into several different classes, including stubble, general-purpose, general-purpose for clay and stiff-sod soil, slat, black land, and chilled general-purpose. The black land bottom is used, for example, in areas in which the soil does not scour easily; that is, where the soil does not leave the surface of the emerging plow clean and polished.

The share is the cutting edge of the moldboard plow. Its configuration is related to soil type, particularly in the down suction, or concavity, of its lower surface. Generally, three degrees of down suction are recognized: regular for light soil, deep for ordinary dry soil, and double-deep for clay and gravelly soils. In addition, the share has horizontal suction, which is the amount its point is bent out of line with the landside. Down suction causes the plow to penetrate to proper depth when pulled forward, while horizontal suction causes the plow to create the desired width of furrow.

Moldboard-plow bottom sizes refer to width between share wing and the landside. Tractor-plow sizes generally range from 10 to 18 inches (25 to 45 centimetres), although larger, special-purpose types exist.

On modern mechanized farms, plow bottoms are connected to tractors either as trailing implements or integrally. One or more bottoms may be so attached. They are found paired right and left occasionally (two-way), with the advantage of throwing the furrow slice in a constant direction as the turns are made. A variation is the middle breaker, or lister, which is a bottom equipped with both right- and left-handed moldboards.

The *disk* plow employs round, concave disks of hardened steel, sharpened and sometimes serrated on the edge, with diameters ranging from 20 to 38 inches (50 to 95 centimetres). It reduces friction by making a rolling bottom in place of a sliding one. Its draft is about the same as that of the moldboard plow. The disk plow works to advantage in situations where the moldboard will not, as in sticky non-scouring soils; in fields with a plow sole; in dry, hard ground; in peat soils; and for deep plowing. The disk-plow bottom is usually equipped with a scraper that aids in pulverizing the furrow slice. Disk plows are either trailed or mounted integrally on a tractor.

The *rotary* plow's essential feature is a set of knives or tines rotated on a shaft by a power source. The knives chop the soil up and throw it against a hood that covers the knife set. These machines can create good seedbeds, but their high cost and extra power requirement have limited general adoption, except for the small garden tractor.

The *chisel* plow is equipped with narrow, double-ended shovels, or chisel points, mounted on long shanks. These points rip through the soil and stir it but do not invert and pulverize as well as the moldboard and disk plows. The chisel plow is often used to loosen hard, dry soils prior to using regular plows; it is also useful for shattering plow sole.

Subsoil plows are similar in principle but are much larger, since they are used to penetrate soil to depths of 20 to 36 inches (50 to 90 centimetres). Tractors of 60 to 85 horsepower are required to pull a single subsoil point through a hard soil at a depth of 36 inches. These plows are sometimes equipped with a torpedo-shaped attachment for making subsurface drainage channels.

2 **Read the questions carefully and choose the keywords in italics to answer them. Scan the text for additional information to answer the questions:**

1. WHICH PLOW IS SUITABLE FOR:

- Ø shattering plow soles?
- Ø turning the soil over and covering crop residues?
- Ø penetrating in the soil to depths of 20 to 36 inches?
- Ø create good seedbeds thanks to a set of knives or tines rotated on a shaft?
- Ø loosening hard and dry soils prior to using regular plows?
- Ø working in fields with a plow sole, dry and hard ground, in peat soils and for deep plowing?

2. WHICH PLOW DOES THIS PART BELONG TO:

- Ø bottom?
- Ø torpedo-shaped attachment?
- Ø share?
- Ø double-ended shovels mounted on long shanks?
- Ø the landside?
- Ø round, concave disks?
- Ø a set of knives or tines?

TEXT 2

SECONDARY TILLAGE EQUIPMENT

1 **Read the text and find the English equivalents for the following Russian words and phrases. Translate the sentences with these words and phrases:**

Предпосевная обработка почвы, борона, каток, зубовая борона, борона с пружинными зубьями, противоэрозионное земледелие, стерневая мульча, штанговый культиватор, паровой культиватор, растительные остатки, зарастание сорняками, почвенная влажность, всасывание влаги, влагонакопление.

Secondary tillage is aimed at improving the seedbed by increased soil pulverization, conserving moisture through destruction of weeds, and cutting up crop residues. It is accomplished by use of various types of harrows, rollers or pulverizers, and tools for mulching and fallowing. Used for stirring the soil at comparatively shallow depths, secondary-tillage equipment is generally employed after the deeper primary-tillage operations; some primary tillage tools, however, are usable for secondary tillage. There are five principal types of harrows: the disk, the spike-tooth, the spring-tooth, the rotary cross-harrow, and the soil surgeon. Rollers or pulverizers with V-shaped wheels make a firm and continuous seedbed while crushing clods. These tools often are combined with each other.

When moisture is scarce and control of wind and water erosion necessary, tillage is sometimes carried out in such a way that crop residues are left on the surface. This system is called trash farming, stubble mulch, or subsurface tillage. Principal equipment for subsurface tillage consists of sweeps and rod weeders. Sweeps are V-shaped knives drawn below the surface with cutting planes horizontal. A mounted set of sweeps provided with power lift and depth regulation is often called a field cultivator.

The typical rod weeder consists of a frame with several plow-like beams, each having a bearing at its point. Rods are extended through the bearings, which revolve slowly under power from a drive wheel. The revolving rod runs a few inches below the surface and pulls up vegetative growth; clearance of the growth from the rod is assisted by its rotation. Rod weeders are sometimes attached to chisel plows.

Some control of weeds is obtained by tillage that leaves the middles between crop rows loose and cloddy. When a good seedbed is prepared only in the row, the seeded crop can become established ahead of the weeds. Plowing with the moldboard plow buries the weed seeds, retards their sprouting, and tends to reduce the operations needed to control them. If weed infestations become bad, they can be reduced somewhat by undercutting.

Since rainfall amount and distribution seldom match crop needs, farmers usually prefer tillage methods that encourage soil-moisture storage at times when crops are not growing. From the soil-moisture standpoint, any tillage practice that does not control weeds and result in greater moisture intake and retention during the storage period is probably unnecessary or undesirable.

2 **Scan the text for additional information to make up a summary.**

TEXT 3

FERTILIZERS APPLICATION

1 **Read the text and find the information about:**

- Ø forms of fertilizers;
- Ø fertilizing equipment;
- Ø names of fertilizers and forms of application.

Fertilizers may be added to soil in solid, liquid, or gaseous forms, the choice depending on many factors. Generally, the farmer tries to obtain satisfactory yield at minimum cost in money and labour.

Manure can be applied as a liquid or a solid. When accumulated as a liquid from livestock areas, it may be stored in tanks until needed and then pumped into a distributing machine or into a sprinkler irrigation system. The method reduces labour, but the noxious odours are objectionable. The solid-manure spreader conveys the material to the field, shreds it, and spreads it uniformly over the land. The process can be carried out during convenient times, including winter, but rarely when the crop is growing.

Application of granulated or pelleted solid fertilizer has been aided by improved equipment design. Depending on design such devices can deposit fertilizer at the time of planting, side-dress a growing crop, or broadcast the material. Fertilizer attachments are available for most tractor-mounted planters and cultivators and for grain drills and some types of plows. They deposit fertilizer with the seed when planted, without damage to the seed, yet the nutrient is readily available during early growth. Placement of the fertilizer varies according to the types of crops; some crops require banding above the seed, while others are more successful when the fertilizer band is below the seed.

The use of liquid and ammonia fertilizers is growing, particularly of anhydrous ammonia, which is handled as a liquid under pressure but changes to gas when released to atmospheric pressure. Anhydrous ammonia, however, is highly corrosive, inflammable, and rather dangerous if not handled properly; thus, application equipment is quite specialized. Typically, the applicator is a chisel-shaped blade with a pipe mounted on its rear side to conduct the ammonia five to six inches (13 to 15 centimetres) below the surface. Pipes are fed from a pressure tank mounted above. Mixed liquid fertilizers containing nitrogen, phosphorus, and potassium may be applied directly to the surface by field sprayers where close-growing crops are raised. Large areas can be covered rapidly by use of aircraft, which can distribute both liquid and dry fertilizer.

2 **Make up an annotation of the text.**

TEXT 4

GRAIN DRILLS

1

Read the text and find the information about:

- **Ø the earliest versions of grain drills;**
- **Ø modern grain drills;**
- **Ø the aim of application of grain drills and planters.**

Grain drill is a machine for planting seed at a controlled depth and in specified amounts. The earliest known version, invented in Mesopotamia by 2000 BC, consisted of a wooden plow equipped with a seed hopper and a tube that conveyed the seed to the furrow. By the 17th century, metering systems were in use to ensure accuracy of the rate of planting; most consisted of wheels bearing small spoons that dipped into the seed hopper and guided it to the furrows in standard amounts.

Modern grain drills have a variety of metering systems and furrow openers. In general, the metering device, spoon, cup, fluted roll, or other, passes the seed by tube to one of several furrow openers, which are forced into the soil by springs or weights with a short length of chain dragged behind to cover the seed. Drill widths are determined by the number and spacing of furrow openers.

Grain drills and seed planters are key components in developing successful conservation plantings. They are complex machines that deliver seed at a metered rate, place it at a consistent depth in the soil, and produce light compaction to provide good seed to soil contact. Planters and drills come in many different forms with varying strength and weaknesses depending on the seed being used and condition of the planting site. Some require prepared seed beds, others require little to no seed bed preparation, and others are capable of preparing the seed bed and planting in a single pass.

2 **Work in groups. Ask and answer comprehension questions based on the text.**

3 **Make up an annotation of the text.**

TEXT 5

HARVESTING MACHINERY

1 **Read the text and translate the key sentences about different types of harvesting. Then fill in the following table:**

Types of crops	Harvesting operations	Machinery used
grains	cutting, threshing…	combine harvester

Harvesting machinery is generally classified by crop: reapers for cutting cereal grains and threshers for separating the seed from the plant. Corn (maize) harvesting is performed by mechanical corn pickers that snap the ears from the stalk so that only the grain and cobs are harvested. Corn shelling may be done mechanically in the field, after or with picking. Stripper-type cotton harvesters, which strip the entire plant of both open and unopened bolls, work best late in the season after frost has killed the green vegetative growth. Hay and forage machines include mowers, crushers, windrowers, field choppers, balers, and some machines that press the hay into wafers or pellets.

Grass, legumes, corn (maize), and other crops are often put into silos to keep them in a succulent and fermented state rather than stored dry as hay. To make silage, the crops must be cut up to permit tight packing in the silo, producing anaerobic fermentation and preventing formation of mold. Almost all silage crops are cut in the field with a forage harvester that cuts and chops the crop immediately or picks up and chops a windrow that has been cut and raked earlier.

Root crops are harvested with diggers and digger-pickers, which often pull up clods, stones, and vines with the crop. Though some machines carry workers who manually sort out extraneous material, this task is increasingly being performed mechanically. Modern sugar-beet harvesters lift the whole root from the ground, clean the earth from it, and deliver it to a bin or wagon. Sometimes the beet tops are removed before harvest of the roots and used for cattle feed. Peanuts (groundnuts) are lifted, vines and all, and allowed to dry before removal of the pods.

Tobacco-harvesting aids may be classified in three principal ways, according to the harvesting and curing methods used, which depend on the type of tobacco and its use. Flue-cured tobacco, a large plant that may stand three to four feet (90 to 120 centimetres) high, is harvested with machines that carry several workers who ride the lower platforms of the machines, cut the leaves, and place them on conveyor belts where the leaves are tied mechanically or by hand. Burley tobacco has usually been harvested by workers using a machete-type knife. After cutting, the large end of the stalk is fixed onto the sharpened end of a stick, which is hung by hand in a tobacco barn for curing. Researchers are attempting to mechanize the cutting, impaling, and hanging of burley tobacco. Little has been done, however, toward the mechanization of the harvesting of the small aromatic tobacco leaves, which are grown in the shade, picked by hand, tied with a string, and then hung for curing.

Tree-crop harvesting is accomplished by hand or with mechanical shakers. Vegetable crops such as asparagus, lettuce, and cabbage are still harvested largely by hand, though scarcity and high cost of field labour has led to some mechanization in this area, notably with tomatoes.

2 **Scan the text for additional information to make up a summary. Express your attitude towards the information given in the text. What new fact have you learnt?**

TEXT 6

CROP-PROCESSING MACHINERY

1 **Read the text and translate the sentences about dryeration methods, feed-processing methods, crop-processing equipment.**

Machinery is widely used to prepare crops for convenient transportation, for safe storage, for the market, and for feeding to livestock. Advances in such machines have been rapid, particularly with new crops, increased yields, multiple-crop practices, and changing techniques.

In the most common method of crop drying, the crop, usually grain, is spread on floors or mats and stirred frequently while exposed to the sun. Such systems, though extremely common in the underdeveloped countries, are very slow and dependent on the weather. Forced-air-drying systems allow the farmer much more freedom in choosing grain varieties and harvest time. Fairly simple in operation, these systems have been gaining popularity in the tropics. Heat is often added to increase air temperatures during the drying period.

In a process called dryeration, wet corn (maize) is placed in a batch or continuous dryer. After losing 10 to 12 percent of its moisture, the hot corn is transferred to the dryeration cooling bin, in which it is tempered for six to 10 hours and then slowly cooled by ventilation for 10 hours. This process reduces kernel damage and increases dryer output.

High moisture in stored hay not only causes rapid deterioration of its value as feed but often results in spontaneous combustion. When hay is first cut, it usually contains 70 percent or more moisture. It wilts and quickly dries to a moisture content of about 40 percent. At this stage, it can be dried to a safe storage condition, about 15 percent moisture, by blowing air through it, sometimes with supplemental heat.

Feed-processing mills, often referred to as feed grinders, are used principally for milling cereals for livestock feed, which aids digestion. The ground material is usually fairly coarse and at times may only be crushed. Modern mills frequently are designed to allow the farmer to grind the grain and to mix in various other ingredients in desired quantities.

Other types of crop-processing machinery include machines that separate desirable seed from weed seed, stems and leaves, and dirt; grading machinery to classify seed by width, length or thickness; fruit graders and separators; and cotton gins, which separate cotton seeds from the fibres.

2 **Read the text again and in pairs ask and answer comprehension questions.**

3 **Express your attitude towards the information given in the text. Where can you use this information? What university subjects is it related to?**

2. TRACTORS

The tractor is the backbone of the farm

STARTING POINTS

1 **Read the sentence in the cloud given above. What does it mean? Compare answers with a partner.**

2 **Determine the main milestones in tractor development. Put them in logical sequence with the dates. Use books of references to check yourself.**

1890	All-purpose tractor was developed
1906	Tractor models introduced turbocharged high horsepower engines
1915-1919	High horsepower machines with dual and triple wheels were developed
1920-1924	The tractor engine was invented by George Harris of Chicago
1936-1937	Large scale manufacturing of diesel tractors
1950-1960	Diesel engine and pneumatic tires were used for tractors
1980s	PTO – Power take off was introduced in the tractor
2000s	The first gasoline tractor was developed by Charles Hart from Iowa (USA)

3 **Make up a short report of the tractor development from the 19th to 21st century**

SECTION A. READING

EXERCISES

1 **Read the text and find the information that supports these statements.**

1. Modern tractors are rather sophisticated machines and can do all kinds of agricultural jobs thanks to powerful technical components.
2. Farm tractors have changed greatly since the end of the 19th century.
3. The latest tractor models introduced high power engines and rugged machinery construction with the latest technology inside and outside the cab.

TRACTORS

The word *tractor* is related to words like “traction” and “tractive” from the Latin word “tractus” meaning drawing (pulling). A tractor is essentially a machine designed to pull things along, usually very slowly and surely. A tractor is basically a machine that provides machine power for performing agricultural tasks. Tractors can be used to pull a variety of farm implements for plowing, planting, cultivating, fertilizing, and harvesting crops, and can also be used for hauling materials and personal transportation.

The farm tractor is one of the most important and easily recognizable technological components of modern agriculture. Today’s tractors are incredible, amazing, powerful feats of mechanical engineering and precision. Its development in the first half of the twentieth century fundamentally changed the nature of farm work, significantly altered the structure of agriculture, and freed up millions of workers. The tractor represents an important application of the internal combustion engine, rivaling the automobile and the truck in its economic impact.

The heart of a farm tractor is a powerful internal combustion engine that drives the wheels to provide forward motion. Direct ignition (diesel) and spark-driven engines are both found on tractors. Power from the engine can be transmitted to the implement being used through a power take-off (PTO) shaft or belt pulley. The engine also provides energy for the electrical system, including the ignition system and lights, and for the most recent models, air conditioner, stereo system, and other comforts.

As early as the 1870s, engineers had succeeded in producing steam engines, referred to today as steam tractors. These monsters, weighing in excess of 30,000 pounds (excluding water), could move under their own power, and had impressive horsepower capacity. Unfortunately, their size, mechanical complexity, and constant danger of explosion made these traction engines unusable for farms. For the reasons, adoption of steam power was clearly not a candidate to replace the horse.

With the commercialization of the internal combustion engine, a more practical alternative emerged. Companies began developing gasoline-powered traction engines during the same period; the first commercial machines were sold in 1902, and quickly became known as 'tractors'.

Between 1916–1922 more than 100 companies were producing farm tractors for farm uses. By 1928, the first general purpose tractor was introduced, which allowed for planting and cultivating three rows at a time, increasing productivity. Until the late 1930s, farm tractors had steel wheels, making farmers very cautious about whether rubber wheels would be able to do as much work as those with steel wheels. However, by 1939, the Model "B" tractor was introduced with an electric starter and lights, rubber tyres, and higher horse-power. The Model "R" tractor was the first John Deere tractor that had more than 40 horsepower, as well as the first diesel tractor.

The evolution of tractors continued and by 1966, John Deere became the first manufacturer to offer farmers a tractor that had a roll bar to help protect the operator. By the early 1970s, farm tractors started to feature more comfortable seating for the operator and a sound guard protecting the tractor cab, helping to shield them from heat, cold, and dust.

New innovations in tractor technology are coming out all the time. Technologic improvements especially in manufacturing industry have leaded to improvements in the engine frame. Innovations in the injectors have paved the way for a reduction in exhaust emission levels owing to less fuel consumption and better combustion.

Tractor world has been affected positively by the recent developments in the comfort field of the automotive sector. Modern tractor cabins are equipped with air-conditioning system, trip computer, ergonomic seat and water and dust proof design. In addition, by the means of the instrument panel placed inside the cabin, feed rate, power take-off circuit, digital hour, fuel and temperature gauge, tractor working hour, ground operated per hour, programmable service times and power supply voltage status could be monitored easily. At the same time, by enhancing the adherence capability of the tyres, it provides a high level drafting performance.

Along with the sensitive agriculture applications, robotic agriculture and robotic tractors have come to the forefront as well. Due to robotic agriculture multiple small intelligent machines replace large manned tractors, increase work requirements.

READ ONCE AGAIN
IF YOU NEED...

SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Match the pictures *a-f* to the names of farm tractors. Which of them are used nowadays?**

steam engine tractor	*gasoline-powered tractor*
general purpose tractor	*driverless tractor*
modern powerful tractor	*diesel engine tractor*

a

b

c

d

e

f

2 **a) Make up word combinations using a word or phrase from each box.**
b) Use the word combinations to complete the sentences below.

a)

1. internal combustion	a. system
2. power	b. emission
3. general purpose	c. engine
4. rubber	d. consumption
5. exhaust	e. computer
6. fuel	f. tyres
7. trip	g. tractor
8. air conditioning	h. take-off

b)

1. _____ are an essential part of a vehicle, the contact rubber cabs point between a tractor and the road surface.
2. Most modern _____ record, calculate, and display the distance travelled, the average speed, the average fuel consumption, and real-time fuel consumption.
3. The first successful light-weight petrol-powered _____ was built by Dan Albone, a British inventor in 1901.
4. A _____ is any of several methods for taking power from a power source, such as a running engine, and transmitting it to an application such as an attached implement or separate machines.
5. The _____ is an engine in which the combustion of fuel and an oxidizer (typically air) occurs in a confined space called a combustion chamber.
6. Innovations in the injectors have paved the way for a reduction in _____ levels owing to less fuel consumption and better combustion.
7. The _____ data is an important consideration during the selection and purchase of a tractor.
8. Sitting in a tractor cab with a malfunctioning _____is misery.

3 Match these words and phrases to the definitions.

1. engine	a. a rubber covering, typically inflated or surrounding an inflated inner tube, placed round a wheel to form a soft contact with the road
2. wheel	b. a wheel or drum fixed on a shaft and turned by a belt, used for the application or transmission of power
3. frame	c. an automatic device for starting a machine, especially the engine of a vehicle
4.fuel gauge	d. the rigid supporting structure of an object such as a vehicle, building, or piece of furniture
5. bar	e. a circular object that revolves on an axle and is fixed below a vehicle to enable it to move over the ground
6. starter	f. an instrument that measures and gives a visual display of the amount, level, or contents of fuel
7. belt pulley	g. a machine with moving parts that converts power into motion
8. tyre	h long rigid piece of wood, metal, or similar material, typically used as an obstruction or fastening

4 **Circle the item in each group that doesn't combine with the adjective. Explain your choice.**

powerful	engine, track, computer, tool
electric	starter, system, drive, tyre
automotive	steam, sector, fuel, transport,
drafting	performance, diesel, machine, device
manned	pressure, tractor, vehicle, aircraft,
rubber	wheels, belts, boots, cabs
digital	hour, computer, fuel, clock
power	ignition, supply, circuit, control
tractive	effort, display, power, ability
manufacturing	industry, plant, petrol, sector

5 **In the text below the underlined words and phrases are in the wrong place. Move them to the correct position.**

The farm tractor is used for (1) <u>cultivation</u> agricultural machinery or trailers for plowing, tilling, disking, (2) <u>crushing</u>, planting, and similar tasks. A variety of farm tractors have been (3) <u>fitted</u> for particular uses. These include row crop tractors with adjustable tread width to allow the tractor to pass down (4) <u>wheels</u> of corn, tomatoes or other crops without (5) <u>pulling</u> the plants. Standard tractors with fixed (6) <u>rows</u> and a lower center of gravity are designed for plowing and another heavy field work.

And high-clearance tractors with adjustable tread and increased ground clearance are often used in the (7) <u>harrowing</u> of cotton and another high-growing row crop. The durability and engine power of tractors made them very suitable for engineering tasks. Tractors can be (8) <u>developed</u> with engineering tools such as dozer blades, buckets, hoes, rippers, etc.

SECTION C. COMMUNICATING

EXERCISES

1

Answer the following questions:

1. What does the word “tractor” mean?
2. How did tractors change the nature of farm work in the first half of the twentieth century?
3. What is the heart of a farm tractor and how does it work?
4. How did the first steam tractors look like?
5. When was the first general purpose tractor introduced?
6. What did Model “B” and Model “R” John Deere tractors bring into operation?
7. What features in the tractor development appeared in the 1970s?
8. What technologic improvements paved the way for a reduction in exhaust emission levels?
9. How did the recent developments in the comfort field of the automotive sector affect the tractor configuration?
10. How does robotic agriculture change the tractor?

2

Describe the main milestones in the tractor development according to the given plan.

Plan

1. Date

2. Invention

3. Main changes

3 **What farm tractors are widely used in your country? Find the ones commonly used on Belarusian farms by putting a tick. Then make a short oral report of the operations they do and present your report to your group mates.**

John Deere 8225R	
Massey Ferguson 7600	
Belarus-82.1	✓
Class 430 Arion	
Belarus-1221	
Fendt 930	
Belarus-4522	

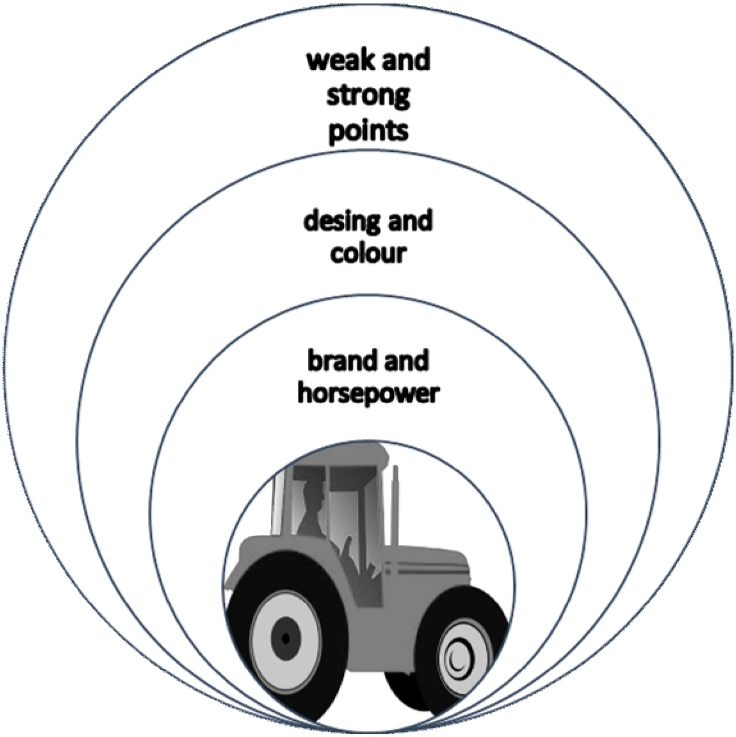
4 **Keep a diary for a week's practice of university students on a farm. Fill in the information about kinds of field operations done by a tractor, the amount of time needed, and the cultivated acreage. Make up an oral report to your group mates about the results of your practice activities.**

Week day	**Field operations**	**The acreage cultivated**	**The amount of time**
Monday	*plowing*	*5 hectares*	*6 hours*
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

5 **Speak on the following problems using some opinion phrases:**

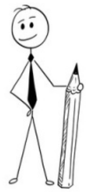
Speaking personally, I think that…
My view is that…
As I see it…
It would seem to me that…

1. What is the greatest weakness (strength) of the tractor?
2. Is it so difficult to identify the brand of the tractor by its colour?
3. What tractor has the most horsepower?
4. Why are the rear tyres on a tractor so large?



SECTION D. WRITING

EXERCISES



ASKING ABOUT A NEW MODEL

1 **You see a website advertising a new John Deer Tractor. Write an email to the website asking for more information about this model.**

2 **Translate the following text. Write out the characteristic features of modern tractors.**

The humble tractor has evolved immensely since Henry Ford mass produced the Fordson tractor almost 100 years ago. Within a short time, the tractor has revolutionised farming across the world. Today tractors are all about power, comfort and reliability, but the future of tractors is about big data, automation and big price tags.

In recent times the trend in tractor development has been similar to cars with a strong focus on technology, fuel efficiency and reliability. In peak farming seasons, drivers spend many hours in the cab so there is a big effort from manufacturers to increase comfort and reduce driver fatigue with smart driver assist technology to automate repetitive driving sequences, chilled food cabinets, air suspension seats and even compartments to keep food warm.

Like passenger cars, electric tractors are also on the market, but don’t expect to see lots of them anytime soon. Many farmers need the tractor to run long hours on busy days and the limited operating time of a battery may not suit many operations. Natural gas or renewable gas-powered tractors are also available, but have yet to make it to the mainstream.

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

TYPES OF FARM TRACTORS

1

a) Read the title of the text and say what it is going to be about. Write some questions, compare with your partner's.

b) Read the text and find the criteria of farm trators classification.

A tractor is an engineering vehicle specifically designed to deliver a high tractive effort at slow speeds, for the purposes of hauling a trailer or machinery used in agriculture. Most commonly, the term is used to describe a farm vehicle that provides the power and traction to mechanize agricultural tasks, especially tillage, but nowadays a great variety of tasks.

The tractor types can be subdivided by application in three main ways:

Type of construction. In other words, how is the tractor designed and made? Is it a tractor that allows the driver to easily sit and drive the machine with ease, or is it one where the user walks alongside of the equipment (also known as the walking type tractor)?

Type of drive. According to the type of drives you can find the wheel type tractor or the track type ones (the latter of which consists of half-track and full-track models). There are also two-, three-, and four-wheeler types of tractors to consider. Tracked type has half-track and full track types of tractors. Wheel type is sub divided into two wheeled, three wheeled and four wheeled types of tractors.

Track type tractors are generally used for reclaiming barren lands and are not much used for agricultural tasks. These machines are very useful in dams and in areas where earth moving tasks are required.

Early farm tractors had fixed distance front wheels with a solid front axle. The Saunderson Tractor and Implement Co., a company based in Bedford in Massachusetts, manufactured a four-wheel tractor in 1908 that proved very popular. Another successful tractor manufacturing company, established in 1837 and still in operation, is John Deere, with their distinctive green and yellow tractors.

Next came the tricycle type tractors, with either a single front wheel or closely-placed double front wheels. The tractor manufacturer Farmall was famous for its bright red, tricycle design machines. These designs were in vogue from the 1930s to the 1970s.

Four-wheel tractors, however, were easier and safer to handle. They were less likely to keel over than the three wheeled ones. They also proved more suited to the requirements of mechanized farming. Design-wise, a four-wheel tractor has two large driving wheels and two steerable wheels. The driving wheels are on an axle and the steerable wheels are below the engine compartment. The seat and the steering wheel are set in the center of the four wheels, usually inside an enclosed driving cab.

The exact purpose. The types of tractors depend upon the purpose for which they are used. Different kinds of tractors have been developed for different farming requirements. These include row crop, wheat land, high crop and utility tractors. They come in different sizes, ranging from small to large.

The row crop and high crop tractors have adjustable treads that allow careful navigation through crop rows. These vehicles can make their way through rows of tomatoes, maize, wheat or other crops without damaging the plants. The high crop types have increased ground clearance and suited for farm work with vegetables or high growing crops.

The wheat land farm tractors are used for heavy field work on extensive tracts of farmland. The utility ones are usually smaller, general purpose vehicles. These can be used for non-farming activities like gardening, landscaping and excavation. Such utility tractors are fitted with turf tires that are softer than the regular agricultural tires.

c) Have you found answers to the questions you wrote before reading the text? What are they?

2 **Summarize the contents of the text in the following table:**

Classification criteria	Tractor types	Types of work performed
1		
2		
3		

TEXT 2

WHY WERE TRACTORS INVENTED?

1 **Read the text and give an answer to the question from the title.**

Tractors are truly amazing vehicles, but have you ever stopped to consider what makes them so great? Let's take a closer look!

The first tractors were little more than replacements for farm animals: all they could do was pull things. Modern tractors can do much more because they have a power takeoff (the rotating power axle at the back) and front and rear hitches (the hydraulic lifts on the front and back).

A tractor is essentially a machine designed to pull things along, usually very slowly and surely. Tractors are designed both for pulling heavy loads and powering implements attached to the back.

Tractors have large and powerful diesel engines and, in theory, that means they should be able to go incredibly fast, just like sports cars. But in a tractor, the engine's power is designed to be used in an entirely different way: for pulling big and heavy loads. What makes this possible is the tractor's gearbox, which converts the high-speed revolutions of the mighty diesel engine into much lower-speed revolutions of the wheels, increasing the force the tractor can use for pulling things at the same time

Tractors were originally designed to replace working animals such as oxen and horses, which people have been using to pull carts and plows since ancient times. One of the pioneers of modern tractors, American industrialist Henry Ford, got at least part of his inspiration from a simple determination to come up with something better than the horse for doing heavy farm work.

Before tractors came along, horses made life much easier for farmers, but all they could really do was to pull things. Because early tractors were merely replacements for horses, pulling things was pretty much all they could do as well. Those early tractors were fueled by coal and known as steam traction engines. They looked like small steam locomotives with large sturdy metal wheels capable of rolling down roads, and they first appeared toward the end of the 19th century. Catching sight of one of these early coal-powered lumbering beasts was what really inspired Henry Ford to start developing tractors of his own. As he later remembered in his autobiography, My Life and Work: "I felt perfectly certain that horses, considering all the bother of attending them and the expense of feeding, did not earn their keep. The obvious thing to do was to design and build a steam engine that would be light enough to run an ordinary wagon or to pull a plow. I thought it more important first to develop the tractor. To lift farm drudgery off flesh and blood and lay it on steel and motors has been my most constant ambition."

2 **Make up a summary of the text.**

TEXT 3

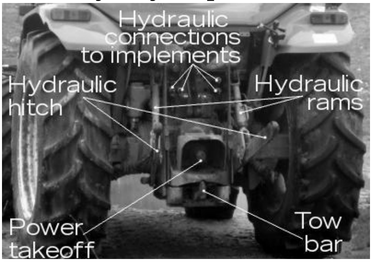
TRACTOR PARTS

1 **Read the text and find the key sentences in each paragraph (A-F).**

Modern tractors are much more sophisticated than traction engines and they can do all kinds of things, thanks to some really useful features.

(A) Hauling heavy loads is still one of the most important jobs that a tractor does for a farmer. Tractors pull implements (farm machines such as plows, trailers, hay balers, manure spreaders, and so on) using a sturdy rod called a drawbar, which makes a secure but very flexible link between the tractor and whatever is following it. The *drawbar* can pivot so a tractor can easily pull its load around corners. Reversing is a bit more tricky!

(B) All a horse can really do is drag something behind it, which is a problem because implements often have to be moved from one field to another, sometimes by driving them down public roads. Modern tractors get around this using a hydraulically powered pulling and lifting system at the back, known as a hitch. The *hitch* makes it easy for a tractor to lower a plow when it is working on a field, and then raises it up again to drive it somewhere else – but that's not all it does. It can raise and lower implements off the ground with a flick of a switch, but it also keeps the tractor pulling effectively as the ground conditions change and give more resistance. It transfers some or all of an implement's weight to the back wheels of the tractor giving it more grip against the ground. The mechanical design of the hitch keeps the whole tractor safe and stable and stops it flipping backward if the implement it's pulling suddenly snags in the ground. Most importantly of all, it allows one tractor to work with many different implements. All tractors use similar hitches, so virtually any implement will work with any make of tractor.



Rear view of a tractor. The hydraulic hitch is a lever mechanism that raises and lowers implements, powered by two hydraulic rams either side. You can also see the tow bar and the power takeoff just above it. At the top, there are hydraulic connections to power implements and electrical sockets that can be used to power things like brake lights on implements when they're being towed on the road.

Harry Ferguson, an Irish-born British tractor pioneer, popularized the modern hitch system, which is called a three-point hitch (or three-point linkage), in the 1940s, though it was largely developed by his engineer and mechanic, Willie Sands. The hitch made Ferguson rich and famous, partly because of a short-lived partnership with Henry Ford; today, Ferguson is best remembered as one of the founders of the Massey-Ferguson tractor company.

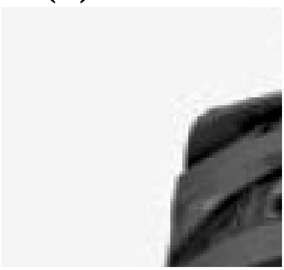
(C) Early traction engines could be used to power harvesters, elevators, and other kinds of equipment by parking them, disengaging their driving wheels, and then transmitting their power to another machine. Typically, this was done by looping a long rubber belt over the spinning wheel on top of the traction engine so it passed over a similar wheel on the machine that needed to be driven. Power was carried between the machines in much the same way as a bicycle chain takes power from the pedals to the back wheel (only with a rubber belt instead of a metal chain).

Virtually all modern tractors can power implements or machines using what's known as *the power takeoff (PTO)*. It's a rotating shaft, usually at the back of a tractor, from which power can be taken from the tractor's engine. To use the power takeoff, you need to hook up a special spinning rod (with clever, flexible connections called universal joints) between the tractor and the implement. A machine like a hay baler has spinning rakes, wheels, and gears inside it. When it's hooked to the back of a tractor, it's connected to the power takeoff so the tractor's engine powers the machinery inside the bailer as well as driving its own wheels. That's why tractors pulling powered machinery have to drive relatively slowly: a fair bit of their engine power is being diverted to the equipment behind them.

Photo: The yellow bar coming off the back of this John Deere tractor is the spinning power takeoff – one of the most dangerous parts of a tractor. Beneath the power takeoff, the drawbar is what attaches the mower securely to the tractor.

Look closely at a tractor working in a field and you can often see the power takeoff rod spinning between the tractor and whatever it's pulling. But never get close to one: they spin at about 500rpm and can be extremely dangerous.

(D) The most noticeable thing about a tractor is its giant wheels and *tires*. Large pneumatic (air-filled) tires spread the weight of the tractor over a larger area and deep treads give excellent grip. By reducing the pressure on the ground the tires stop it from sinking in to soil and mud that would quickly bog down a conventional car. The more the tires spread the load, the less damage the tractor does to the soil.



Most tractors have two-wheel drive, with the large rear wheels driven from the engine and the small front wheels used only for steering. Since a tractor is usually pulling things, that's fine: the heavy weight behind it pushes the rear wheels down, increasing their grip, so there's no particular advantage in having powered front wheels as well. (Four-wheel drive tractors are also less common because they're more complex and expensive.) Some tractors have extremely wide, multiple wheels and tires for negotiating particularly soft or difficult terrain; for obvious reasons, and you won't see those on the roads!

(E) Tractors are generally powered by large *diesel engines*, which are particularly good at providing high pulling power at very low speeds (that's why they're used in trucks and buses). Smaller tractors may have gasoline engines and some are powered by LPG (liquefied petroleum gas), usually to make them more economical or environmentally friendly.

(F) Driving a tractor might look easy – the engine is doing most of the work – but it needs a great deal of skill. Power-assisted *steering and braking* are essential to help tractor drivers keep heavy loads safely under control. Since tractors are heavy and often have to work on steep slopes and soggy, unstable ground, there's always a risk they might tip over so modern tractors generally have reinforced cabs fitted with anti-roll bars. Although tractors could never be described as luxurious, most now have heated cabs, air conditioning, and GPS satellite navigation to help farmers plan how they work their fields with military precision.

2 **Read the questions carefully and choose the keywords in italics from paragraphs A-F to answer them.**

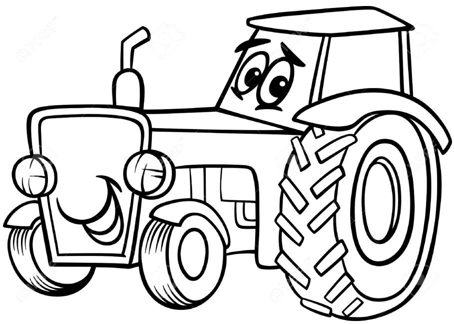
WHICH TRACTOR PART

- helps tractor drivers keep heavy loads safely under control?
- makes it easy for a tractor to lower a plow when it is working on a field?
- spreads the weight of the tractor over a larger area?
- takes the power from the tractor's engine?

- stops it flipping backward if the implement it's pulling suddenly snags in the ground?
- provides high pulling power at very low speeds?
- makes a secure and flexible link between the tractor and whatever is following it?
- can raise and lower implements off the ground with a flick of a switch?
- lessens the damage of the tractor to the soil?
- makes tractors more economical or environmentally friendly?

3 **Read the text again. Express your attitude towards the information given in the text. What new facts have you learnt?**

4 **Scan the text to make up a summary of the text.**



UNIT 3

AGRICULTURAL ELECTRIFICATION

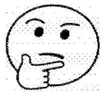
Electricity can transform people's lives, not just economically but also socially

STARTING POINTS

1. **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2. **Find five words that go with the topic *"Agricultural electrification"*. Use a dictionary if necessary. Make up your own sentences with these words.**

3 **Read the text and fill in the missing words from exercise 2.**



The use of ______ on a farm is essential to the increase of agricultural production. ______ is a clean, versatile and an inexpensive _______ of energy. In many cases this energy is ideally suited for a large number of power requirements. Agricultural ______ can much improve the standards of living of ______ areas. In future electrification will be able to improve the economic well-being of all people.

4 **Choose the best variant that answers the question.**

1. Who conducted early experiments with lightning and electricity?
a) Thomas Edison
b) Alessandro Volta
c) Benjamin Franklin
d) Michael Faraday

2. How is power measured?
a) in watts
b) in hours
c) in Volts
d) in Ohms

3. How is electricity used?
a) to run heaters and air conditioners, lighting systems, water pumps and electronic devices
b) to transmit long-distance power
c) to make a fire
d) to get rid of weeds

4. Who invented the battery?
   a) Benjamin Franklin
   b) Alessandro Volta
   c) Albert Einstein
   d) Thomas Edison

5. Where would you not find a cell phone tower?
   a) on a signpost
   b) underground
   c) on the roof
   d) in a tree

6. What is Thomas Edison famous for?
   a) invented the transformer
   b) invented the first light bulb
   c) invented the first electric battery
   d) discovered electricity

7. What are some power sources other than electricity?
   a) solar power
   b) biomass energy
   c) wind power
   d) men’s power

8. Who was the first electrical engineer?
   a) William Gilbert
   b) Andre Marie Ampere
   c) Georg Simon Ohm
   d) James Clerk Maxwell

SECTION A. READING

EXERCISES

1 **Read the text and find the information that supports these statements.**

1. Agricultural electrification is the basis of agricultural production and rural life.
2. Electric power has made a considerable impact on modern agriculture.
3. Modern applications of electricity in farming are numerous.
4. Advantages and disadvantages of rural electrification.

2 **Read the text once again and find the key sentences of each paragraph.**

AGRICULTURAL ELECTRIFICATION

Agricultural electrification means a wide range of application of electric energy in the field of agricultural production and rural life. It is the important technical basis of mechanization and automation of agricultural production, including the production, transmission, distribution and utilization of agricultural power, the development of agricultural technology and equipment.

Agricultural electrification, also called rural electrification, refers to widely establishing power plant network in rural areas, sending electricity to rural areas, improving agricultural production and farmers’ lives. In other words, rural electrification is the process of bringing electrical power to rural and remote areas. This definition appears simple but it is becoming more and more complicated as new devices and systems are developed to provide various levels of electricity service. Electric tractor cultivated land, power harvesters, power pumping irrigation machine, electric scissors for shearing and electric milking machine and so on, are inseparable from the power.

The impact of electric power on modern agriculture has been at least as significant as that of either steam or gasoline, because electricity in its nature is far more versatile than the earlier power sources. Modern applications of electricity in farming range from comparatively simple to some complex ones in manufacturing industries. They include conditioning and storage of grain and grass; preparation and rationing of animal feed; and provision of a controlled environment in stock-rearing houses for intensive pig and poultry rearing and in greenhouses for horticultural crops. Electricity plays an equally important part in dairy farming for feed rationing, milking, and milk cooling; all these applications are automatically controlled. Computers have increasingly been employed to aid in farm management and to directly control automated equipment.

Most workers in rural electrification find themselves fully occupied with one operation as farm service, adviser, inventor, agricultural engineer, distribution engineer, administrator etc. Specialists should know electrical applications, the service in keeping electric lines. They must understand and design simple electrical and electronic systems for agricultural industry, electrical equipment for agricultural production and processing operations.

Engineers were long ago able to heat buildings for chick and young animals, glass-houses and other structures used for plant production. In addition to these examples, there are further applications of electricity for soldering and welding, as well as the known process of brazing by means of carbon tips connected to the welding apparatus. The engineer and the farmer have combined to develop electrically powered equipment for crop conservation and storage to help overcome weather hazards at harvest time and to reduce labour requirements to a minimum. Grain can now be harvested in a matter of days instead of months and dried to required moisture content for prolonged storage by means of electrically driven fans and, in many installations, gas or electrical heaters.

Conditioning and storage of such root crops as potatoes, onions, carrots, and beets, in especially designed stores with forced ventilation and temperature control, and of fruit in refrigerated stores are all electrically based techniques that minimize waste and maintain top quality over longer periods than it was possible with traditional methods of storage.

Rural farms will greatly benefit from electricity. Electricity will make it possible to run their farms better. They will be able to use timers, improve irrigation, and improve their farming activities. Not all rural areas are equally isolated or off the grid. However, rural electrification will make any area safer through outside lighting, safety signs, alarm systems, and even traffic lights. Electricity is what makes many of our homes and offices safe and it can do the same for people in rural areas.

Depending on the source, rural electrification (and electricity in general) can bring problems as well as solutions. New power plants may be built, or existing plant's generation capacity increased to meet the demands of the new rural electrical users. A government may be inclined to use the cheapest generation source, which may be highly polluting, and locate the power plant next to rural areas. However, renewable energy is ever more imposing itself as not only clean but also cost-effective technology for remote rural areas.

READ ONCE AGAIN
IF YOU NEED...

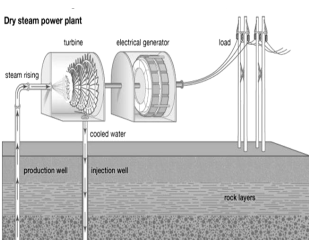
SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Match the pictures *a-f* to the words. Think of the sentences with these words.**

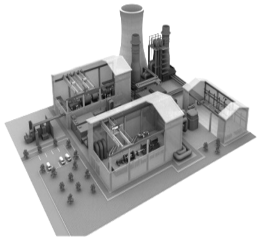
power plant *electrification* *generation*
electricity *lighting* *devices*

a



b

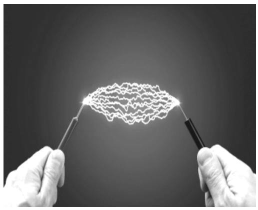
c



d

e

f



2 **a) Make up word combinations using a word or phrase from each box.**
b) Use the word combinations you've made to complete the sentences below.

a)

1. electric	a. service
2. application of	b. energy
3. automated	c. capacity
4. rural	d. power
5. electrical	e. electricity
6. power	f. equipment
7. generation	g. source
8. electricity	h. electrification

b) 1. We already have more than enough fossil gas generation to provide reliable _____.
2. U.S. nuclear _____ exceeded more than 99,000 megawatts in 2016.
3. _____ is the science and art.
4. Disconnect the _____ from the computer before opening the back.
5. New uses for the _____ are found every day.
6. The heat energy is converted to _____ using traditional industrial equipment.
7. His work includes repairing, testing and maintenance of _____ and machines.
8. Currently, Denmark gets about 20 % of its total _____ from wind.

3 **Read the sentences, define and try to remember the difference between the words in bold.**

1. a) Electricity **lights** farm-houses at night, pumps water, runs electric motors and does many other things.
   b) Artificial **light** is now often used for the sorting of fruit and other products.

2. a) In order **to power** an electronic device, you must plug it into a source of electrical energy for it to run.
b) The machine runs on solar **power**.
3. a) The potato is a tuber **plant**.
b) The radioactivity leaked out of the nuclear power **plant.**
4. a) They will be able to convert **heat** to electricity.
b) The room faces north and is difficult **to heat**.

4 **Choose the right word to complete the sentences.**

1. With the development of new farming machinery, life for those living in *rural // urban // rare* regions has changed dramatically.
2. The equipment is used for the *transmission // ventilation // electrification* of television signals.
3. Nuclear power provides nearly 80 per cent of the country's *electricity // electrification // voltage*.
4. *Lighting // Milking // Testing* is the deliberate use of light to achieve a practical or aesthetic effect.
5. Water is utilized for producing *electric // mechanical // rural* power.
6. A computer is a *device // vehicle // implement* for processing information.
7. Industry is a heavy user of electric *power // force // source*.

5 **Match these words and phrases to the definitions.**

1. power plant	a. an interconnection of electrical components (e.g., batteries, resistors) or a model of such an interconnection, consisting of electrical elements
2. grid	b. a form of energy that can be carried by wires and is used for heating and lighting, and to provide power for machines.

3. renewable energy	c. things which are used for a particular purpose, for example a hobby or job
4. equipment	d. a network of wires and cables by which sources of power, such as electricity, are distributed throughout a country or area.
5. network	e. the production of a form of energy or power from fuel or another source of power such as water.
6. electricity	f. energy produced by wind, sun, and other sources that will never run out
7. generation	g. an electric utility generating station

6 **In the text below the underlined words and phrases are in the wrong place. Move them to the correct position.**

Access to (1) generation capacity is a necessary precondition in bringing about social and economic development in rural areas. (2) Power generation is characterized by many challenging features, such as small and disperse nature of loads, low level of consumption, lack of infrastructure and others. (3) Renewable sources from fossil fuel sources inflicts a burden on the economy, and many countries suffer power shortages in serving their rural people. The shortage in power (4) lighting is one of the key reasons for the resulting underachievement and sluggishness of the rural electrification task. Rural areas are often economically unfeasible for (5) electricity extension.

The main energy use in rural households is for cooking and (6) grid purposes. (7) Rural electrification can potentially supplement rural electrification in many rural areas where grid expansion is not viable through judicious application.

SECTION C. COMMUNICATING

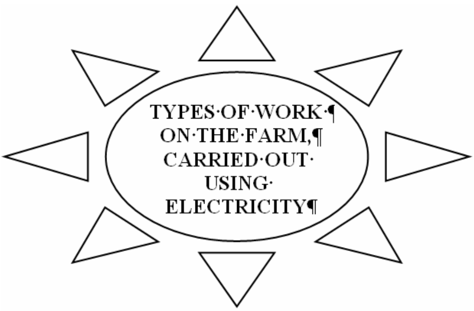
EXERCISES

1 **Answer the questions based on the text *"Agricultural electrification"*.**

1. How can agricultural electrification be defined?
2. What is the role of electric power in modern agriculture? Why?
3. What tasks do workers and engineers do in rural electrification?
4. What are the benefits of rural electrification?
5. What problems does rural electrification bring?

2 **Work in pairs. Take the roles of an electrical engineer and a reporter. Use the information in the text to act out an interview.**

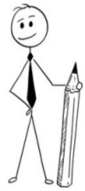
3 **Fill in the diagram. Tell your partner about the types of the farm work carried out using electricity.**



4 **Close your book and persuade your partner that rural electrification and electricity in general can bring problems as well as solutions.**

SECTION D. WRITING

EXERCISES



1 **Work in groups. Find information about agricultural electrification in English-speaking countries. Make notes under the following headings and then create your own article.**

- where/when it takes place
- how long it takes
- what advantages it gives
- what problems it brings

2 **Translate the following text. Write out the advantages of rural electrification.**

Rural areas can be very isolated and the communities there have very different lifestyles than those of us living in urban areas where electricity is given. Those of us who live in urban areas use electricity every day and in almost everything we do. Now, people are trying to make this possible for others living in rural and remote areas like Africa and the outskirts of large cities.

Rural electrification has many advantages. People in rural areas are often cut off from the rest of the world because they don’t have telephones or cell phones or any other type of communication devices. Electrification will make it possible to give them telecoms and connect them with larger cities. This is very beneficial and will help in case of an emergency or if they need assistance of some sort.

Not all rural areas are equally isolated or off the grid. However, rural electrification will make any area safer through outside lighting, safety signs, alarm systems, and even traffic lights. Electricity is what makes many of our homes and offices safe and it can do the same for people in rural areas.

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

1 **Read the text and tell your partner about electrification in New Zealand.**

Prior to public electricity supply in New Zealand, electricity was generated in conjunction with gold-mining activities. In 1884 a gold mine in Bullendale already had a generator for lighting purposes. This mine further commissioned a hydro-electric power station with a short transmission line to supply electricity to their equipment and lights.

Gold-mining may be said to have provided the initial push for the development of hydro-electric schemes in the rural areas of the country, but the desire to replace traditional lighting appliances by electric lamps was the rationale of most public electricity supply systems.

In those days many small hydro-electric power stations were built and some were joint ventures between local authorities and mining companies. However, until the fifties some remote places were provided with electricity from diesel generating plant.

Later the Rural Reticulation Council was formed which financially supported rural distribution projects. It is claimed that in the forties the majority of farms had electricity supply.

In those days remote places still had small private electricity supply systems but these were gradually taken over by public power boards. The incentive to have these small local enterprises taken over usually had to do with the continuity of supply.

2 **Work in groups. Prepare questions based on the text. Exchange your questions with another group. Which group has the most correct answers?**

TEXT 2

1 **Read the text and state its main idea. Match the words in italics in the text with the following meanings.**

distribute // provide // rural // grid // electricity // farmers // distribution // connected

In the early decades of this century, about half of the rural population in the Province of Ontario lived in hamlets or small villages and the other half, mostly *planters*, lived in scattered dwellings. This situation made extensions of the electricity *network* to supply the rural population expensive.

In the province of Ontario the sale of electricity to communal groups in rural areas has been done on a trial basis. Although the principle of co-operative associations had been applied in many other areas, the results with electricity *delivery* were disappointing.

In 1906 the Hydro-Electric Commission of Ontario was established to *give* electricity in bulk. By 1920 the Commission was supplying electricity to the local *sharing* companies of all cities and villages, but power supply to *country* areas was still in its infancy. Unlike the prevailing practice in the United States of America, the Commission applied for permission to *hand out* electricity itself to rural consumers.

At the beginning of the electrification of rural areas the service charges were relatively high and, as a result, the wealthier people and remunerative dwellings were *attached* first. This procedure appeared to have the positive effect e. i. a solid basis was formed, and opportunities were created for the gradual future connection of consumers with less spending power.

After the Second World War power stations were constructed far from load centres and this resulted in long extra high voltage lines crossing vast areas.

TEXT 3

1 **Read the text and write down ten keywords. Create a chain of major facts of the text where the keywords would be logically connected.**

Sustainable rural electrification means providing electricity services to the rural population reliably and cost efficiently, and complying with social and environmental needs. Despite electricity generation from fossil fuel sources causes a major portion of global-level greenhouse gas emissions, grid-based rural electrification in the developing countries does not cause such strong emissions. Moreover, grid-based rural electrification is considered as the preferable option for its wide-ranging acceptability and advantages. On the other hand, for many rural areas, renewable-based off-grid options can be the adaptable and flexible rural electrification option if their selections are based on social, environmental, and economic objectives. Extension of the grid is the primary option for providing electricity access to rural areas. A grid-based electricity supply is the first preference by the clients, policy makers, and other stakeholders, because it has numerous advantages, such as reliability, unrestricted capacity, and weather independence.

Rural areas have many characteristics that make their electrification more challenging compared to urban areas. In rural areas, agricultural activities are dominant, the ratio of labor to capital is high, and income is on average quite low. Due to disperse nature of households, number of connections per km of power line is quite low. Power consumption per connection is also low due to lack of productive energy uses.

2 **Read the text again and in pairs ask and answer comprehension questions.**

UNIT 4

ELECTRICAL EQUIPMENT IN AGRICULTURE

Many injuries and deaths can be prevented through an understanding of the dangers of power lines, electrical appliances, extension cords, and lightning

STARTING POINTS

1

Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.

2 **Find five words that go with the topic *“Electrical equipment in agriculture”*. Use a dictionary if necessary. Make up your own sentences with these words.**

3 **Read the text and fill in the missing words from exercise 2.**

The pioneering discovery of electromagnetic ____ was instrumental in the development of today’s vast electrical industry. The discovery of the electrochemical effect led to the development of ____ as a means of supplying electrical equipment from portable power sources using direct ____ systems. As devices which relied upon power from ____ were invented, a system of transmission and distribution of electricity was required, which led to the introduction of flexible electrical ____ (cables).

SECTION A. READING

EXERCISES

1 **Look at the title of the text and the headings. What do you think you are going to read about? Read and check.**

2 **Read the text again and in pairs find the main idea of each paragraph.**

ELECTRICAL EQUIPMENT IN AGRICULTURE

Why is electric power important?

Electricity has become the lifeline of today's industrialized world. Nowadays operation of all industrial, commercial, agricultural and residential sectors entirely depends on electric power. A variety of electrical equipment and installations are found everywhere, which makes our life easy, convenient and comfortable. Electrical equipment includes anything used, designed to be used, or installed for use, to conduct, control, convert, distribute, generate, measure, provide, rectify, store, transform, or transmit electrical energy.

What are electrical measuring devices used for?

There are many different types of electrical measuring and testing devices. Some of these test for the presence of electrical current, whether alternating current or direct current. Others test whether an electrical receptacle is properly wired. Electrical measuring devices are more commonly referred to as meters. They are used for measuring various electrical aspects such as the presence and amount of current, voltage, resistance and power through installation. Measuring these aspects is important to determine if the electrical system is installed appropriately. Some electrical measuring instruments that measure one of the electrical aspects mentioned are ammeters, voltmeter and ohmmeters.

What does an analog meter have?

Electrical measuring devices can be analog or digital. Analog meters can either measure one circuit value (current, voltage, and resistance), or they can measure all of them. Meters that measure multiple types of characteristics are called multimeters. An analog meter has a needle that swings one way or another to indicate the value being measured. A resistance meter reads in reverse. What this means is that no needle swing indicates an open circuit, or infinite resistance. Typically, an analog resistance meter must be calibrated to zero ohms resistance every time it is used to obtain optimal accuracy. Older analog meters usually have three settings, one for each value they measure. Newer meters will have multiple scales from which to choose, since the measurements of an analog meter are more accurate when the needle is in the middle of the scale.

How does an electrical testing device work?

Electrical testing devices alert the user to the presence of electricity with an audible tone, lights, or both. One of the simplest versions of this type of tool consists of two leads, one black and the other red, connected to a handle with an AC/DC light in the handle. This tool must be physically connected to the circuit to work. The most popular and safe tool that tests for the presence of electrical current is the inductive electrical tester, more commonly known as a tick tracer. This tool gives both a visual signal and an audible tone. This tool only needs to be within a certain distance of a wire carrying an electrical current in order to sense the current. There is also a type of testing devices that electricians find indispensable that will tell you whether an electrical receptacle/outlet is properly wired. This tool is plugged into the receptacle, and lights correspond to whether or not the receptacle is properly wired.

What electrical devices help carry out agricultural operations?

The main purpose of electrical devices and units used in agriculture is to supply farms with electricity. The following types of electrical equipment can be used in farms: electrical engineering (conductors, semiconductors, batteries, transformers etc.); control and measuring (meters, testers); automation equipment; lighting fixtures, etc. It will be impossible to install ventilation, provide lighting, operate milking machines and carry out other agricultural operations without such devices and units.

What is the role of transformers in agricultural applications?

The transformers are designed to provide sufficient power to support various agricultural applications and equipment. Generally, there are three types of transformers that are used for agricultural purposes. *Auto Transformers* are electrical transformers, with the primary and secondary windings combined. They are lighter in weight as compared to other transformer products, more efficient, as voltage regulation is better. For these reasons, auto transformers are used to support motors of loaders, tractors, and graders. *High Voltage Transformers* are single phase core transformers with greater insulation to withstand transient surges and voltage. They are designed with induction regulators for gradual regulation of voltage of any magnitude. For these reasons, high voltage transformers are used to supply and distribute power to equipment like boilers, choppers, levelers, and mill drives. *Power Supply Transformers* are designed to operate at high current loads. They can be used to increase or decrease the voltage levels. These transformers are capable of isolating two circuits, as there is no electrical connection between the input and output circuits. These reasons make power supply transformers ideal for supporting electronic equipment used in tractors, ploughs, and tillers.

Why are fuses and circuit breakers important?

Electricity enters the farm through a control panel and a main switch where a person can shut off all the power in emergency situations. This control panel contains either fuses or circuit breakers. A fuse is an electrical device made up of glass, porcelain or plastic material containing a tin-coated copper wire. If any fault occurs in the system and current exceeds its design rating value the fuse automatically melts and breaks the contact of the circuit. It will prevent further damage to the appliance or user. A fuse cannot be reused. A circuit breaker is usually made up of a reusable spring-loaded type of switch. The function of the circuit breaker is similar to that of the fuse but by electromagnetism principle. If current exceeds its breaking setting, it will spring open and break the circuit as in a fuse. The device can be reused by resetting the spring-loaded switch. It is correct to fix the fuse or circuit breaker at the live wire before the appliance. When the circuit is loaded with excessive current, the fuse or circuit breaker will break and open the circuit. It will prevent overloading, burning or damaging the appliance.

What can help extend service life of the equipment?

The main task of operating electrical equipment is to maintain it in good condition during the entire period of operation and ensure its uninterrupted and economical operation. So as to accomplish this task it is necessary to carry out the maintenance of electrical equipment. When operating electrical equipment its technical condition deteriorates due to wear, breakdowns, adjustment violations, loosening of fasteners, etc. Even a minor malfunction, such as unreliable contact in an electric machine, can lead to electrical equipment failure and in some cases to an accident. Maintenance allows identify and eliminate faults that occur during operation, or the causes that may entail a malfunction.

READ ONCE AGAIN IF YOU NEED...

SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Match the pictures *a-i* to the words. Think of the sentences with these words.**

wire	*tick tracer*	*plug*
lighting fixture	*battery*	switch
fuse	*extension lead*	*receptacle*

a

b

c

d

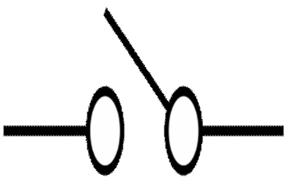
e

f

g

h

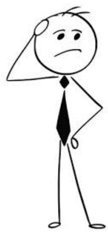
i



2

a) Make up word combinations using a word or phrase from each box.
b) Use the word combinations you've made to complete the sentences below.

1. alternating	a. breakers
2. measuring	b. equipment
3. rating	c. wire
4. electrical	d. machine
5. electric	e. value
6. live	f. current
7. circuit	g. switches
8. spring-loaded	h. devices



1. _____ means equipment for the generation, distribution or use of electricity.
2. The inverter changes the solar direct current into the _____ used by most household appliances.
3. _____ are available in two types: normally open and normally closed.
4. Pressure _____ normally measure the difference between applied pressure and atmospheric pressure.
5. _____ is an electrical wire through which there is a flow of electrical current.
6. In electrical engineering, _____ is a general term for machines using electromagnetic forces, such as electric motors, electric generators, and others.
7. Current _____ is important for cable/wire sizing.
8. All resettable _____ should open the circuit in which they are installed regardless of the position of the operating control when an overload or circuit fault exists.

3 **Choose the right word to complete the sentences.**

1. Electrical *equipment // wire // meter* makes farmer’s work easy, convenient and comfortable.
2. Electrical *measuring // testing* // *controlling* devices test for the presence of electrical current.
3. Analog meters can measure one *circuit* // *plug // load* value.
4. Electrical testers can be used to check *voltage* // *lighting // wiring* levels in both AC and DC circuits.
5. It's important that the battery is fully *charged // electrified // isolated* in order for the tester to work properly.
6. The *outlet // circuit // tool* must have power in order for the tester to work.
7. A good electrical *conductor // insulator // resistor*, such as copper, also conducts heat well.

4 **Fill in the missing words. Consult the dictionary. Use the words in your own sentences.**

___**convert**____	__**converter**____
________________	__conductor_____
___generate____	________________
___rectify______	________________
___transform___	________________
________________	__installation___
________________	__resistance____
___maintain____	________________
________________	__equipment____

5 **What electrical equipment will you choose for the following operations? Match the columns:**

1. to measure the amount of current
2. to test the presence of electrical current
3. to provide lighting
4. to supply and distribute power to equipment like boilers, choppers, levellers, and mill drives
5. to protect much more expensive electrical components from the damaging effects of over current
6. to support motors of loaders, tractors, and graders
7. to power electrical devices
8. to make low resistance measurements

a. auto transformers
b. fuses
c. high voltage transformers
d. micro-ohmmeters
e. battery
f. lighting fixtures
g. a tick tracer
h. ammeter

6 **Which adjectives *"electric" or "electrical"* do we use with the following nouns? Complete the table.**

*engineering *lighting * current *meter *equipment *power *fan *installation *monitor *circuit *device

ELECTRIC ……………………………………………………………

ELECTRICAL ……………………………………………………

7 **Fill in the gaps with the correct words from the word bank.**

WORD BANK			
a) rating		*b) generates*	
	c) unplug		*d) induction*
e) recharge		*f) rectify*	
	g) device		*h) plug in*
i) electricity		*j) converts*	
	k) outlet		*l) windings*

1. In the US, a normal house _____ generally has anywhere from a 15 to 30-amp fuse rating.
2. It is important to _____ all of the appliances and devices from that circuit before installing a new fuse.
3. The fuse _____ should exceed the amperage demands of the appliances it protects.
4. A wind turbine collects kinetic energy from the wind and _____ it to electricity that is compatible with a home's electrical system.
5. The diesel engine _____ electricity for the batteries.
6. _____ describes the process by which a varying current in one conductor 'induces' a voltage into either the same conductor or into a nearby conductor.
7. If you neglect to _____ a battery, it dies.
8. Diodes are electronic devices which _____ alternating current to direct current.
9. _____ the monitor, keyboard and mains power cables and switch on.
10. These chargers use an autotransformer in which the primary and secondary _____ are electrically connected.
11. New uses for the application of _____are found every day.
12. Thomas Edison once developed a _____to electrocute cockroaches.

8 **Fill in the missing word, and then read the dialogue aloud.**

recharge // socket // extension lead // fuse // battery // plug // circuit

Tom: Oh no, the _____ has almost run out on my electric drill.

Nick: Why don't you plug it in over there and then it'll _____?

Tom: Thanks - but I can't reach the _____ with this plug.

Nick: Wait a minute – here's an _____ – it should be long enough.

Tom: Thank you. Oh, I forgot – my drill has an American _____. I don't suppose you have an adaptor?

Nick: It's your lucky day; try this.

Tom: Excellent, it fits. You know, I should really buy one of these. They're so useful. Oh no, wait a minute. Did you hear that?

Nick: Whoops – I think a _____ has blown. Let me just check… Yes, I think your drill overloaded the _____ and tripped the fuse.

Tom: Oh no, has it damaged anything?

Nick: No, the fuse protects things. You'll have to unplug the drill.

Tom: Oh, thanks a million – I don't know what I'd do without you.

9 **Think of ten words you have learnt in the text "*Electrical equipment in agriculture*". Close your book and tell each other.**

SECTION C. COMMUNICATING

EXERCISES

1 **Read the text again and discuss with a partner whether the following sentences are true or false. Mark true sentences (*T*).**

1. Electric power has become the main source of energy in agricultural production. ___
2. Electrical measuring devices are more commonly named as electrical testers. ___
3. Electrical measuring devices help determine if the electrical system is installed appropriately. ___
4. Analog meter’s measurements are more accurate when the needle is in the middle of the scale. ___
5. Electrical testing devices alert the user to the presence of electricity only with lights. ___
6. It is impossible to define whether an electrical receptacle/outlet is properly wired. ___
7. Electrical devices and units help carry out different agricultural operations. ___
8. Two types of transformers that are used for agricultural purposes. ___
9. When electricity enters the farm it goes through a lighting fixture. ___
10. A fuse and a circuit breaker are designed to protect electrical equipment. ___
11. A fuse is usually made up of a reusable spring-loaded type of switch. ___
12. The function of the circuit breaker is similar to that of the fuse.
13. A fuse or circuit breaker should be fixed at the live wire before the appliance.

14. It is compulsory to carry out the maintenance of electrical equipment. ___
15. Unreliable contact in an electric machine can lead to electrical equipment malfunction. ___

2 **Work in groups. Express the difference between:**

- electrical measuring and testing devices;
- electrical analog and digital measuring devices;
- auto transformers, high voltage transformers and power supply transformers;
- fuses and circuit breakers.

3 **Imagine you work for an electrical equipment company. Use the headings in the text "*Electrical equipment in agriculture*" to talk about electrical equipment used in agriculture.**

4 **Spend two or three minutes revising what you have learnt in this unit. Close your books and tell your partner.**

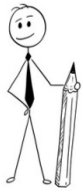
5 **In groups, collect information and prepare a three-minute speech about agricultural electrical equipment that is not described in the text. Use the prompts:**

- Definition
- Aims of use
- Installation
- Maintenance

6 **You have come back from a two-week trip abroad. In a conversation with your friends talk about the types of electrical equipment used on the farms you visited.**

SECTION D. WRITING

EXERCISES



1 **Here is a jumbled text. Put it in the correct order and paragraph it appropriately. Write a catchy title to get people interested.**

1. Insulators are a vital part of electric fencing; they insulate the conductors from any connection to earth.

2. Insulators are used to protect us from the dangerous effects of electricity flowing through conductors.

3. Their atoms have tightly bound electrons that do not move throughout the material.

4. In addition to protecting loss of current, insulators make an electrical current more efficient by concentrating the flow.

5. When choosing the type of insulator, you should consider how long you want the electric fencing to last.

6. Sometimes the voltage in an electrical circuit can be quite high and dangerous.

7. Good quality insulators distinguish themselves with less resistance, which makes the electric fencing system more effective and energy efficient.

8. If the voltage is high enough, electric current can be made to flow through even materials that are generally not considered to be good conductors.

9. Because the electrons are static and not freely roaming, a current cannot easily pass.

10. There are special insulators for each type of conductor, wire, tape or rope.

11. Insulators possess a high resistivity and low conductivity.

2 **Translate the following texts. Make up a comparative table of ammeters and voltmeters.**

A. Ammeters are electrical instruments utilized to measure current in a circuit. The evaluation it does in the flow of current is read in “amps” as the unit. Ammeters are available in various designs which allow them to test the presence and amount of current in electrical devices of different sizes. They are used in various applications both residential and commercial use. The wiring system of new buildings needs to be checked to make sure they are properly working. This can be done with the use of ammeter. It is also used by electricians to see if there are problems on the wiring system of older buildings. Manufacturing companies involve in the production of electrical equipment also utilize this electrical measuring instrument to test the products before they are supplied to the market for sale. There are ammeters that can measure direct current, alternating current or both. They have to be properly set to avoid short circuit or the device to malfunction as ammeters tend to have low resistance.

B. Voltmeters are electrical devices that measure the voltage or potential difference between two points in a circuit. The units of measure of voltmeters are expressed in “volts”. Voltage works by connecting it parallel to the circuit. There are analog and digital voltmeters which difference can be distinctly recognized by how the readings are presented. Analog voltmeters show the voltage through a pointer that moves across the scale while digital voltmeters provide a numerical display of voltage. Voltmeters are also made available in a variety of styles. There are portable voltmeters, also known as multimeter for its ability to measure current and resistance, applied in testing electrical and electronics work. The ability of multimeter to measure voltage, resistance and current is made possible by Ohm’s Law. Fixed apparatus such as generators need instruments that can be mounted in a panel permanently.

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

1 **Read the text and explain the words in bold. Use your dictionary to help you.**

Copper wires are found in most electrical or electronic-related devices. Copper **wire** offers a variety of advantages, making it one of the most widely used electrical wires in the world. However, some materials perform better than copper, such as fiber-optics, which have led to several significant competitors to copper wire.

Copper wires are second only to silver when it comes to electrical conductivity. Compared with other non-precious metals, copper wires can handle a wider load of electrical power, allowing it to use less insulation and **armoring**. They have high resistance to heat, eliminating most issues of **overloading**. Copper wires are also **resistant** to corrosion. Although patina, a **tarnish** produced by oxidation, might be present, the material will not lose functionality.

Copper has a high **ductility**, allowing wires thinner than human hair strands. **Malleability** allows it to be bent into nearly any form without the threat of breaking. Copper is used to create thick electrical cable wires within electrical posts and in applications where very thin wires are need, such as in headphone wires.

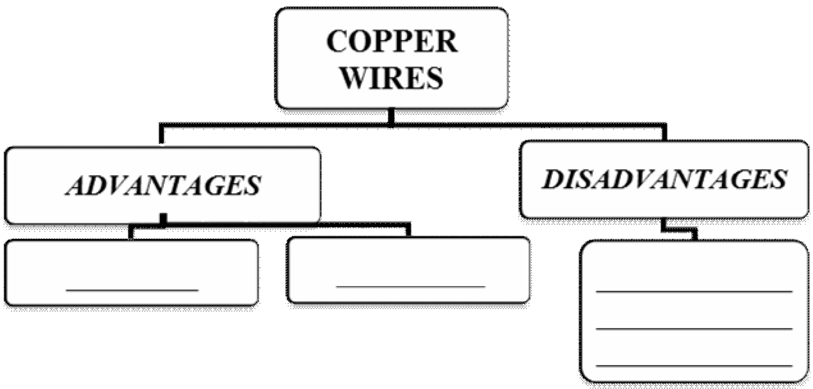
Although copper wires are excellent conductors, it does not perform very well when handling very exact amounts of small electrical charges. Copper wires are usually not used in high-tech automotive parts and **semiconductors** because of its inability to control electrical **surges**. Manufacturers and makers of semiconductors often use silver and gold wires in these applications because these metals are more stable when handling small amounts of electricity, ensuring no electrical surges destroy sensitive components.

Copper wire is susceptible to electromagnetic interference, potentially leading to some devices working improperly. Applications that require connection stability, especially in communication, often experience issues when copper wires are used because of this disadvantage. Manufacturers of communication devices prefer using optical fibers, which are unaffected by electromagnetic interference, as opposed to copper wires.

2 **Work in groups. Prepare questions based on the text. Exchange your questions with another group. Which group has the most correct answers?**

3 **Express your attitude towards the information given in the text. Where can you use this information? What university subjects is it related to?**

4 **Fill in the diagram. Speak about the advantages and disadvantages of copper wires.**



TEXT 2

1 **Read the text and state its main idea. Find synonyms for the words in bold. Use your dictionary to help.**

Innovation in lighting technologies has greatly improved the efficiency of **lighting fixtures** in transforming **electricity** into visible light. Lighting operators' activities is one of the most common uses of light fixtures on farms. **Artificial lights** are used in different ways for different agricultural applications. The most generic use of lights is for area lighting, to provide sufficient illumination for basic needs. Task lighting is needed in specific areas of agricultural operations, including offices and packing and processing areas. Lighting used to supplement or replace natural light for plant growth has very specific requirements and is typically the most intensive use of energy for **lighting** in agriculture. Lighting may also be used in animal housing to provide illumination for livestock and poultry.

There are many types of lighting. The most commonly used lighting fixtures are incandescent, fluorescent and a variety of high intensity discharge lights. Halogen **lamps** are a type of incandescent lighting that is slightly more efficient than incandescent lamps, but typically more expensive to purchase. Fluorescent lamps may be linear or curved tubes or small diameter compact bulbs (CFLs). High intensity discharge (HID) lamps include low-pressure sodium (LPS), high-pressure sodium (HPS), mercury vapor and metal halide. As light emitting diode (LED) technologies evolve, LEDs are used more frequently in a variety of applications.

There are three main types of lighting fixtures used in agriculture for growing crops. They are fluorescent grow lights, LED grow lights and HID grow lights.

The standard fluorescent bulb, commonly denoted T12, makes a decent grow light for houseplants, starting seeds, supplementing the **natural light** of a window, and other situations where lighting needs are modest. They are fairly weak in light intensity, however, and must be placed within a few inches of the **foliage** to have much of an effect. To provide the right balance of light for flowering plants you should look for specialized full-spectrum fluorescent grow bulbs.

While they are considerably more expensive than fluorescent bulbs, LEDs use half the electricity and last five times longer, more than paying for themselves **in the long run**. LED grow bulbs are capable of much greater light intensity than fluorescent bulbs and are available in full-spectrum form. An easy rule of thumb: Fluorescent bulbs are often used when growing just **a handful of plants**; LEDs are preferable for larger quantities since you can achieve **higher light intensity** per square foot. LEDs produce very little heat compared to other bulbs – an issue that can become problematic when you have a lot of lights in a small space.

Before the advent of LED grow lights, HID (high-intensity discharge) lights were the main option for large indoor plantings. They are extremely powerful, but are expensive to purchase, consume electricity inefficiently, require special light fixtures, and give off a lot of heat. All that said, they are very effective and are still widely used. If you want to grow large plants like tomatoes or lemon bushes, HIDs are **good bet** because the light penetrates farther into the foliage than with other bulbs.

2 **Read the text again and suggest an appropriate title for the text. Then in pairs, ask and answer comprehension questions.**

3 **What are the pros/cons of using fluorescent / HID / LED lamps for growing crops? Discuss with a partner.**

TEXT 3

1 **Read the text and write down ten keywords. Create a chain of major facts of the text where the keywords would be logically connected.**

Induction Motor is an AC electric motor, having a stator and a rotor just like other motors. An induction motor is also called asynchronous motor, because the speed of rotation of its rotor is less than stator. In other words, it does not run at its synchronous speed.

Rotor is the rotating part of the induction motor, which is actually the shaft of the motor. Rotor of an induction motor is a laminated cylindrical core. Moreover this laminated cylindrical core has slots that carry aluminum or copper conductors, which are joined at ends. Stator is the stationary part of the induction motor. Stator has slots to carry the winding circuit which is supplied by an AC power. Both stator and rotor are made up of an electric circuit to carry current and a magnetic circuit to carry magnetic flux.

In induction motors, both the stator and rotor have laminated cores and if the core material is judiciously chosen, iron losses can be greatly minimized. If high quality copper wire is used in the stator windings then copper losses will be minimal. Squirrel cage rotors have aluminum cast into the rotor slots for better performance.

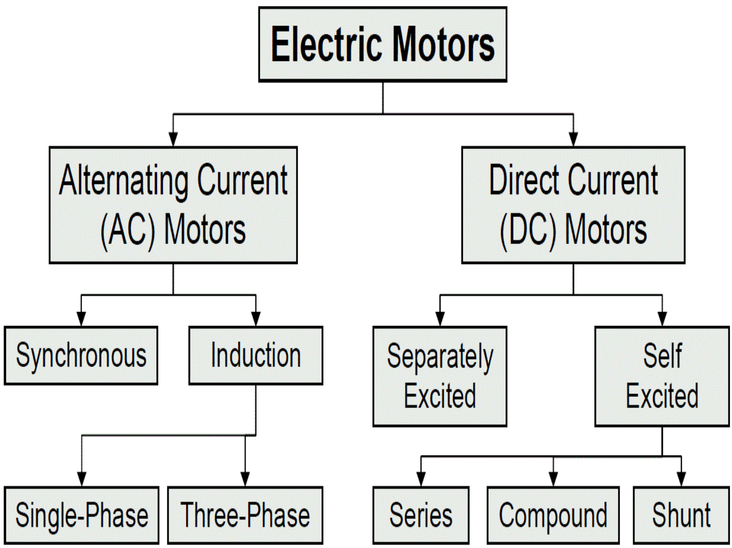
Induction motors use electromagnetic induction from the magnetic field of the stator winding to produce an electric current in the rotor and hence torque. These are the most common type of AC motor and important in industry due to their load capacity.

Induction motors are widely used in agriculture too. They require normal starting torque, which leads to considerable improvement in full load running performance of motor and offsets the extra cost of starting equipment. Single-phase induction motors are used mainly for smaller loads but constant speed, like household appliances, small farming appliances, agricultural tools and machinery. Three-Phase induction motors are used more in industrial applications including compressors, pumps, conveyor systems and lifting gear.

2 **Read the text again and in pairs ask and answer comprehension questions.**

3 **Summarize the information of the text. Express your attitude towards the information given in the text. What new facts have you learnt?**

4 **Study the diagram given below. Prepare a report based on the diagram.**



UNIT 5

LABOUR SAFETY IN AGRICULTURE

The first wealth is health

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Make a list of agricultural equipment that can cause damage. What kind of farm jobs can be hazardous?**

3 **Which of the following problems can relate to farm work?**

- *burns*
- *falling from height*
- *cuts*
- *car accidents*
- *lung problems*
- *poisoning*
- *bites*

4 **Which of the phrases below would you use to suggest solutions to those problems?**

Personal protective equipment, maintenance checks, proper training practice, air conditioning systems, taking care when handling animals, using respirators, proper guidance, keeping in order.

SECTION A. READING

1 **Read the text and find the information that supports these statements.**

a) Most work related accidents on the farm are due to machinery and vehicles.
b) The risk of being injured during a fall from height is very high.
c) There is a great variety of poisonous hazardous chemicals on the farm.
d) Handling livestock is also unsafe.

FARM HEALTH AND SAFETY

Agriculture is one of the most hazardous of all economic sectors and many agricultural workers suffer occupational accidents and poor health every year. There are many hazards on farms that are less common in other workplaces. The most common types of accident on farms involve vehicles and machinery, falls from heights, lifting and handling, hazardous substances and livestock.

Accidents involving farm machinery and vehicles cause numerous injuries and fatalities. The majority of these could be prevented by taking the proper precautions. When using your farm machinery and vehicles, you must be sure that they are always well maintained, repaired and in good working order. Regular maintenance checks should be carried out according to the individual manufacturers' guidelines. Seatbelts (or lap belts) should be worn to prevent workers from being thrown from the vehicle. Vehicle and machinery parts can cause damage if not properly maintained or regularly replaced. Many farm machines have dangerous parts such as drive shafts, belts, pulleys, augers, conveyors and other moving components which cut, chop or process materials. These can cause severe injuries if people come into contact with them, so it is essential that they are properly guarded. Machines should always be made safe before attempting to deal with blockages or other problems.

Training in how to operate equipment safely, the use of personal protective equipment and the procedures required to work safely are vital. It is also a legal requirement. Recognised standards of formal training and competence are normally required for using chainsaws, tree work, applying pesticides, riding all-terrain vehicles, operating fork lift trucks and telescopic materials handlers, sheep dipping and first aid.

Many farming items are very heavy and difficult to move without assistance. Bales of hay, feed bags and other items should be moved by mechanical means where possible, e.g. using a forklift that is operated by a properly trained person. The proper handling of bales or other heavy objects using safe lifting techniques should ensure that back injury is minimised.

Falls from height are one of the highest cause of deaths and major injuries in agriculture. It's necessary to make sure that all work at height is properly planned, supervised and carried out by people who are competent to do the job. When working on roofs the right equipment, suitable weather conditions and enough time should be available to do the task safely. When stacking and loading, a falling stack of bales can be extremely dangerous. It's necessary to make sure that staff are properly trained and adequate equipment is used.

Some of the agricultural substances that are hazardous to health include dust from plants, animals, poultry, pesticides, medicines and feed additives, products used in silage production, fertilizers, paints, oils, lubricants, brake fluid, cleaning chemicals, micro-organisms and animal-borne diseases, toxic gases (slurry pit gases), exhaust fumes and other fumes (fumes from welding) and so on.

In order to reduce the risks of hazardous materials on the farm, one should look at using less hazardous alternatives where possible. If this is not possible, one should consider control measures, for example: put lids on storage bins, enclose transfer points and conveying systems, install dust extraction, operate fresh air blowers, wear suitable personal protective clothing and equipment including respirators, wash exposed skin after work and apply moisturising cream after drying. Some dusts such as grain and poultry dust can cause occupational asthma. It’s necessary to monitor the workers’ health so as to detect early symptoms and seek appropriate medical advice.

Handling livestock should be a major component of health and safety policy in order to prevent injury to those who have to handle livestock, such as vets. Every farm that handles cattle should have proper handling facilities which are well maintained and in good working order. The minimum requirements are a crush and holding pen with short race. A good, well-designed handling system will last many years, reduce labour requirements, improve animal welfare and be safer.

Health and safety is a fundamental requirement of a sustainable farming business and should be regarded as an essential part of farm business management.

SECTION B. LANGUAGE PRACTICE

EXERCISES

1

Match the pictures *a-f* to the names of farm hazards. Which of them are the most common?

handling of bales *cutting and chopping*
using a forklift *stacking and loading*
handling livestock *applying pesticides*

a

b

c

d

e

f

2

a) Make up word combinations using a word or phrase from each box.
b) Use the word combinations to complete the sentences below.

a)

1. handling	a. diseases
2. maintenance	b. checks
3. personal	c. damage
4. hazardous	d. injury
5. animal-borne	e. protective equipment
6. cause	f. system
7. prevent	g. substances

b)

1. Many of ___________ are caused by bacteria, viruses, parasites and fungi that are carried by animals and insects.
2. Motors and rotating machines are fitted with the necessary protection to ___________ to workers.
3. ___________ is equipment that will protect the user against health or safety risks at work.
4. Lubrication is one of the first and most important of ___________.
5. Flooding and droughts will ___________ to the ecosystems.
6. A ___________ can be any product or chemical, whether solid, liquid or gas, that may cause harm to your health.
7. Manure storage and ___________ enable livestock producers to utilize all the components in their manure management system.

3 **Match these words and phrases to the definitions.**

1. fatality	a. a small area with a fence round it in which farm animals are kept for a short time
2. fork lift truck	b. a large bundle, especially of a raw or partially processed material, bound by ropes, wires, etc., for storage or transportation

3. bale	c. a substance used for lubricating an engine or component, such as oil or grease
4. stack	d. container that you keep or store things in
5. lubricant	e. an occurrence of death by accident, or from disease
6. storage bin	f. the health, happiness, and fortunes of a person or group
7. holding pen	g. a pile of objects, typically one that is neatly arranged
8. welfare	h a small vehicle with two movable parts on the front that are used to lift heavy loads

4 **Circle the item in each group that doesn't combine with the adjective.**

appropriate	accident, medical advice, handling, maintenance
hazardous	substance, chemical, fume, welfare
occupational	disease, job, hazard, guidance
proper	injury, handling, maintenance, warning
protective	equipment, measures, service, clothing
safe	work environment, stacking, risk, occupation
severe	injury, damage, training, burn
sustainable	business, equipment, level, development
vital	branch, safety, importance, element

5 **In the text below the underlined words and phrases are in the wrong place. Move them to the correct position.**

Farming is one of the most (1) protective jobs in the United States. Farms have many health and safety (2) pesticides, including: chemicals and (3) hazards, machinery, tools and (4) injuries that can be dangerous, hazardous areas, such as (5) accidents, silos and wells, livestock that can (6) prevent diseases or cause (7) equipment.

Farming injuries are very common. Physical labor and (8) grain bins can cause injuries.

Most farm accidents involve machinery. Proper machine inspection and maintenance can help (9) spread accidents. Using safety gloves, goggles and other (10) dangerous equipment can also reduce accidents.

6 **Match the columns to make up sentences about farm safety.**

A	B	C
Personal protective equipment	improve	severe injuries
Safe lifting techniques	prevent	injuries and fatalities
A well-designed handling system	cause	the risks of hazardous mate
Regular maintenance checks	minimize	animal welfare
Dangerous parts	reduce	body injuries

SECTION C. COMMUNICATING

EXERCISES

1

Answer the following questions:

1. What are the most common types of accident on farms?
2. What do accidents involving farm machinery and vehicles cause?
3. What do seatbelts prevent workers from?
4. What dangerous parts and moving components can cause injuries and traumas?
5. What preventive measures are required to work safely?
6. How handling of bales or other heavy objects should be organized?
7. What precautions should be available to do the task safely when working on roofs?
8. What control measures are necessary in order to reduce the risks of hazardous materials on the farm?
9. How can we prevent injuries when handling animals?
10. Why should health and safety be regarded as an essential part of farm business management?

2

Describe the most common hazards in agriculture according to the given plan:

PLAN

1. Type of accident

2. Possible reasons

3. Safety guidelines

3 **What is the most hazardous place on the farm? Find the most common dangerous places on modern farms by putting a tick. Then make up a short oral report of the possible reasons and the main safety precautions. Present your report to your group mates.**

Workshop	
Livestock barn	
Stacking place	✓
Grain field	
Forklift cabin	
Driver's seat	
Glasshouse	
Manager's office	

4 **Read the information about the accidents. Match the accident with its possible cause. Then tell the group what should be done to avoid such accidents.**

ACCIDENTS

1. A worker in the UK lost part of his arm while maintaining a forage harvester. He was helping a colleague to repair the sharpening mechanism on the machine after the stone carriage had jammed. The worker reached in to remove the blockage when the cutter rotated and caught his arm by the cutter cylinder. His arm was amputated below the elbow.

2. A 62-year-old worker was killed while repairing a tipper lorry. He lifted the tipper lorry and secured it with jack stands. While repairing the lorry, the jack stands failed and the worker was crushed under the tipper.

3. A farmer was injured while clearing a blockage in a harvester. Although the power was turned off, the victim did not realize that the machine's chopping mechanism was powered directly from the power take off (PTO). He fractured and lacerated two fingers.

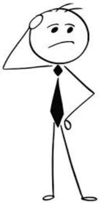
POSSIBLE CAUSES

A. Unguarded PTO shaft and no tool provided for clearing blockages safely.

B. The jack stands were not adequately placed and secured.

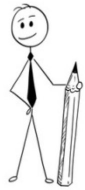
C. Inadequate operator training led to the use of unguarded equipment.

5 **Speak on the following safety slogans using opinion phrases.**



Safety rules are the best tools.
Safety shoes to house your toes; safety glasses on your nose.
The key to safety is in your hands.

SECTION D. WRITING



WRITING A NEWSPAPER ARTICLE

1 **Write a short article to a local newspaper about an accident on the farm based on Exercise 3 from Section 3 Communicating.**

2 **Translate the following text. Write the possible reasons for the described accident.**

MAN SERIOUSLY INJURED AFTER BEING 'CRUSHED' BY HAY BALE

A man has been airlifted to hospital after he was seriously injured in a farm accident in Clare this evening.

The incident happened at around 7pm at a farm in Fanore in the north of the county. It’s understood that a hay bale rolled over the man.

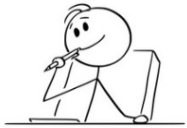
The Doolin unit of the Irish Coast Guard was requested to respond to the scene and assist the National Ambulance Service.

The Shannon-based search and rescue helicopter, Rescue 115, which had been returning from a training exercise in Galway Bay, was also tasked and requested to land on the beach in Fanore where Coast Guard members had secured and marked a landing zone.

Ambulance paramedics and Coast Guard volunteers stretchered the casualty to the helicopter before he was airlifted to Shannon Airport. From there he was transported by road to University Hospital Limerick for treatment.

The man is understood to have sustained crush injuries in the accident.

SECTION E. READING FOR SPECIFIC INFORMATION



TEXT 1

LABOR SAFETY IN LIVESTOCK PRODUCTION

1 **Read the text and find the information about:**

- **noise sources and its main risks;**
- **farmer’s contact with chemicals;**
- **ergonomic risks;**
- **exposure to dust.**

The dairy farmer is a livestock specialist whose aim is optimizing the health, nutrition and reproductive cycling of a herd of cows with the ultimate goal of maximal milk production. Major determinants of the farmer’s exposure to hazards are farm and herd size, labour pool, geography and degree of mechanization. A dairy farm may be a small family business milking 20 or fewer cows per day, or it may be a corporate operation using three shifts of workers to feed and milk thousands of cows around the clock. In regions of the world where the climate is quite mild, the cattle may be housed in open sheds with roofs and minimal walls. Alternatively, in some regions barns must be tightly closed to preserve sufficient heat to protect the animals and the watering and milking systems. All of these factors contribute variability to the risk profile of the dairy farmer. Nevertheless, there are a series of hazards which most people working in dairy farming around the world will encounter to at least some degree.

One potential hazard which clearly relates to the degree of mechanization is noise. In dairy farming, harmful noise levels are common and always related to some type of mechanical device. Leading offenders outside of the barn are tractors and chain-saws. Noise levels from these sources are often at or above the 90-100 dBA range. Within the barn, other noise sources include bedding choppers, small skid-steer loaders and milking pipeline vacuum pumps. Here again, sound pressures may exceed those levels generally considered to be damaging to the ear. Prevention of hearing losses may be accomplished by efforts directed at noise abatement and muffling, and institution of a hearing-conservation programme. Certainly, the habit of wearing hearing protective devices, either muffs or earplugs, may help reduce the risk of noise-induced hearing loss.

The dairy farmer has contact with some chemicals which are commonly found in other types of agriculture, as well as some which are specific to the dairy industry, such as those used for cleaning the automated vacuum-powered milking pipeline system. This pipeline must be effectively cleaned before and after each use. Commonly this is done by first flushing the system with a very strong alkaline soap solution (typically 35% sodium hydroxide), followed by an acidic solution such as 22.5% phosphoric acid. A number of injuries have been observed in association with these chemicals. Spills have resulted in significant skin burns. Splatters may injure the cornea or conjunctivae of unprotected eyes. These situations can be best prevented by the use of an automated, closed flush system. In the absence of an automated system, precautions must be taken to restrict access to these solutions. Measuring cups should be clearly labelled, reserved for only this purpose, never left unattended and rinsed thoroughly after each use.

Like others working with livestock, dairy farmers may have exposure to a variety of pharmaceutical agents ranging from antibiotics and pregestational agents to prostaglandin inhibitors and hormones. Depending upon the country, dairy farmers also may use fertilizers, herbicides and insecticides with varying degrees of intensity.

Dairy farmers have increased risk of arthritis of the hip and knee compared to non-farmers. Similarly, their risk of back problems may also be elevated. Although not well studied, there is little question that ergonomics is a major problem. The farmer may routinely carry weights in excess of 40 kg-often in addition to considerable personal body weight. Tractor driving produces abundant vibration exposure. However, it is the portion of the job devoted to milking that seems most ergonomically significant. A farmer may bend or stoop 4 to 6 times in the milking of a single cow. These motions are repeated with each of a number of cows twice daily for decades. Carrying the milking equipment from stall to stall imposes an additional ergonomic load on the upper extremities. In countries where milking is less mechanized, the ergonomic load on the dairy farmer might be different, but still it is likely to reflect considerable repetitive strain. A potential solution in some countries is the shift to milking parlours. In this setting the farmer can milk a number of cows simultaneously while standing several feet below them in the central pit of the parlour. This eliminates the stooping and bending as well as the upper-extremity load of carrying equipment from stall to stall.

Various farming practices such as drying of the hay and shaking out of feed for the animals by hand, and the choice of bedding material, can be major determinants of the levels of both the dust and its associated illnesses. Farmers can often devise a number of techniques to minimize either the amount of microbial overgrowth or its subsequent aerosolization. Examples include the use of sawdust, newspapers and other alternative materials for bedding instead of moulded hay. If hay is used, the addition of a quart of water to the cut surface of the bale minimizes the dust generated by a mechanical bedding chopper. Capping vertical silos with plastic sheets or tarpaulins without additional feed on top of this layer minimizes the dust of subsequent uncapping. The use of small amounts of moisture and ventilation in situations where dust is likely to be generated is often possible. Finally, farmers must anticipate potential dust exposures and use appropriate respiratory protection in these situations.

2 Find the words related to the following topics:

NOISE	Tractors, chain-saws…
CHEMICALS	Strong solutions, spills…
ERGONOMIC RISKS	Carrying weights, …
DUST	Allergenic materials, …

3 Find the nouns derived from the following verbs:

Expose, mechanize, prevent, lose, conserve, protect, abate, muffle, carry, solve, stoop, bend, shop, eliminate, vibrate, weigh, injure, move, measure, automate, minimize, ventilate.

4 Generalize the main idea using NOUN PHRASES:

to prevent from loss of hearing	***prevention of hearing losses***
to preserve heat	***heat preservation***
to protect the animals	
to injure the cornea or conjunctivae of unprotected eyes	
to burn the skin	
to apply and store materials	
to carry the milking equipment	
to generate dust	
to choose suitable bedding material	
to minimize the dust	

5 **What is the central idea of each passage? Show the key points of each passage with the help of short sentences. Begin with:**

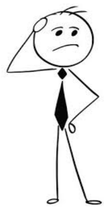
The main idea of passage one is…
The second passage highlights…
Paragraph three elicits…
The forth passage describes…
The fifth passage draws the readers' attention to…
The sixth passage is concerned with…

6 **Summarize the text in writing expressing the contents in your own words. The following phrases will help you:**

As the title implies the text describes...
According to the text …
It is spoken in detail about…
It draws our attention to…
It is pointed out that …
The author concludes that…

7 **Express your opinion of the text. Show your attitude with your own words and the following expressions:**

Ø *I find the following text rather… (interesting, informative, useful, …)*
Ø *I think that …*
Ø *In my opinion…*
Ø *To my mind…*
Ø *It seems to me that…*
Ø *From my point of view…*
Ø *As far as my point of view is concerned…*



TEXT 2

MAINTENANCE SAFETY

1 **Read the text and find the information about:**

- **day-to-day maintenance of farm machinery;**
- **the main hazards of the workshops;**
- **maintenance of portable tools;**
- **maintenance of agricultural vehicles.**

Maintenance activities in agriculture include the maintenance of both machinery and infrastructure and they can range from simple tasks (changing a light bulb) to more complicated ones (maintenance and repair of machinery in large plants).

Equipment maintenance and repair is necessary to avoid down time and to minimize major repairs. However, maintaining and repairing machines can lead to serious injuries. Workers should be trained in shop safety and have the proper equipment to minimize or even eliminate the impact of shop accidents. Day-to-day maintenance keeps machinery, vehicles and equipment on farms safe. It includes oil and filter changes, battery charging and replacement.

Workshops are needed to service, repair, and adjust equipment and keep tools in one location for all kinds of farm work. Workshops may therefore contain a range of dangerous tools and substances. It is important that workshops are properly designed and equipped. A good workshop can improve the efficiency of farm work and facilitate preventive maintenance of equipment. Broken equipment, machines and vehicles have to be repaired as soon as possible.

The maintenance of machinery and its implements, equipment and farm vehicles includes tasks such as maintenance of electrical connections, replacing or repairing safety guards, sharpening or replacing cutting blades, regular maintenance of engines and cooling systems, lubrication, oil changes, filter changes, maintenance of lifting equipment, metal machining, welding, operations with compressed air and tyres, maintenance of hydraulic systems and others.

Portable tools such as saws, hammers, screwdrivers, axes and wrenches and powered portable tools such as circular saws, drills, motor winch or high pressure cleaners are part of everyday work in agriculture. These everyday tools can be very dangerous and when they are not maintained properly they can cause serious injuries, such as electric shock, finger or hand injuries or severe eye injuries.

Especially dangerous are broken or defective tools, or tools that have been modified unprofessionally. Powered hand tools can also cause physical hazards such as vibration and noise, and can cause ergonomic injuries especially if they are not properly maintained. Portable electrical tools have been responsible for many electrocutions on farms. Such tools include electric welders, drills, angle grinders, and battery chargers. The tasks to be performed are as follows: cleaning, lubricating, sharpening blades, saw chains and drills, replacing broken and used parts. Tools must be kept in good condition and appropriately stored.

Regular inspection and service of agricultural vehicles is important to ensure continuity of farm work and to prevent accidents in the field and in the work shop. However, workers can be seriously and even fatally injured while performing simple maintenance tasks and repairs to agricultural vehicles such as tractors. Repair of vehicles out in the fields presents a great challenge and should be carried out with particular care.

2 **Find the words related to the following topics:**

WORKSHOP JOBS	Replacing , repairing, sharpening; …
TYPES OF TOOLS	Saws, hammers, screwdrivers, …
MACHINE PARTS	Filters, tyres, …
SAFETY MEASURES	Regular inspection, …

3 **Find the nouns derived from the following verbs:**

Maintain, equip, injure, repair, replace, adjust, facilitate, weld, sharpen, lubricate, change, clear, transport, perform.

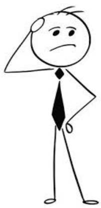
4 **Generalize the main idea using NOUN PHRASES:**

a technician for maintenance of farm machinery	a farm machinery maintenance technician
to charge and replace batteries	batteries charging and replacement
to replace cutting blades of machines	
to perform simple maintenance tasks	
to maintain portable tools	
to facilitate preventive maintenance	
to store tools appropriately	

5 **What is the central idea of each passage? Show the key points of each passage with the help of short sentences. Begin with:**

The main idea of passage one is…
The second passage describes …
Paragraph three draws the readers' attention to …
The forth passage highlights …
The fifth passage elicits …
The sixth passage is concerned with…
Paragraph seven proves that …

6 **Summarize the text in writing expressing the contents in your own words. The following phrases will help you:**



The text is head-lined…
The text presents an outlook of…
Much attention is given to…
It is pointed out that…
It should be noted that…
As a final point…

7 **Express your opinion of the text. Show your attitude with your own words and the following expressions:**

- Ø *I find the following text rather … (interesting, informative, useful, …)*
- Ø *I think that …*
- Ø *In my opinion…*
- Ø *To my mind…*
- Ø *It seems to me that…*

TEXT 3

ELECTRICAL SAFETY ON THE FARM

1 **Read the text and find the information about:**

- **general electrical hazards;**
- **power cords safety;**
- **safety measures when using equipment;**
- **the main rules of helping a shock victim.**

Over the years, electrically powered farm equipment has become an indispensable element of modern farming. With the widespread use of electricity on the farm, more emphasis needs to be placed on using electricity and electrical equipment safety. Farmers and gardeners rely on electricity to perform a number of tasks involving lighting, tools and equipment.

Electrical shock occurs when part of the body completes a circuit between conductors of different voltages or between an electrical source and a ground. Here are some basic safety tips when working with electricity.

Inspect the area for electrical hazards such as exposed wires and damaged electrical boxes, and call the local utility service to locate underground wires. Avoid contact with overhead wires when working with ladders, pruning shears, saws, or when operating tall equipment.

In the case of an electrical fire, shut off the power and use a fire extinguisher approved for electrical fires. Do not use water to put out electrical fires – this can result in a fatal shock.

Inspect wires and plugs before each use. Repair or replace damaged wires or plugs. Do not place tape over gashes in wires and do not splice wires. Use approved extension cords only temporarily (less than 90 days).

Make sure extension cords are appropriate for outdoor use, and make sure the electrical load does not exceed the rated capacity. Avoid using multi-plug adaptors or plugging multiple extension cords together. Circuit overloading can increase the risk of fire.

Use only double-insulated power tools or equipment with three-prong plugs. Don't use equipment with broken plugs and stop using a tool immediately if a tingling sensation is felt while using it.

Don't use electrical equipment in damp or wet areas. Protect plugs and outlets from moisture and don't leave a plug connection in a puddle or other collection of water.

If someone receives an electrical shock while using faulty equipment, call for help immediately. Stop the flow of electricity in the victim's body by disconnecting or de-energizing the circuit, if the victim is unable to pull away from the current source. Do not try to remove the victim from the current source. Touching the victim could cause the rescuer to be shocked as well.

2 **Find the words related to the following topics:**

Electrical power sources	wires, electrical boxes, …
Electrical hazards	electrical shock, fire, …
Safety measures	double-insulated tools, …

3 **Find the nouns derived from the following verbs:**

___**inspect**_____	__**inspection**___
___expose_____	_______________
___extinguish___	_______________
___replace_____	_______________
___disconnect__	_______________
___remove_____	_______________
___protect_____	_______________

4 **Generalize the main idea using NOUN PHRASES:**

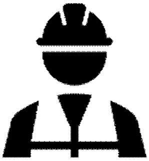
inspect the area	area inspection
repair damaged wires	
protect plugs and outlets from moisture	
damage electrical boxes	
disconnect the circuit	
overload the circuit	

5 **Which of the following situations can be hazardous to the worker? Tick them.**

damaged rods and wires around buildings and power poles	
broken plugs	
using double-insulated power tools	
plugs and outlets protection from moisture	
touching the victim of electrical shock	
use approved extension cords temporarily	
use of electrical equipment in damp or wet areas	

6 **Summarize the text in writing expressing the contents in your own words. The following phrases will help you.**

The text is concerned with…
It is spoken in detail about …
The text gives valuable information on…
It draws our attention to…
In conclusion the author shows that…



Find a job you enjoy doing,
and you will never have to work
a day in your life.
Confucius

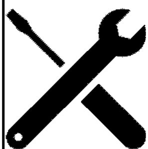
MODULE 3

JOB ANALYSIS OF AN AGRICULTURAL ENGINEER

Unit 1
Agricultural engineer

Unit 2
Mechanical engineer

Unit 3
Electrical engineer



Unit 4
Job analysis of the engineer

UNIT 1

AGRICULTURAL ENGINEERS

My grandfather used to say that once in your life you need a doctor, a lawyer, a policeman and a preacher but every day, three times a day, you need a farmer

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Make a list of agricultural engineer duties and responsibilities. What kind of work do they do?**

3 **Find five verbs that go with the topic “*Agricultural engineer duties*”. Make up your own sentences with these words.**

4 **Read the text and fill in the missing verbs from exercise 3. Then give an answer to the question from the title.**

WHAT DO AGRICULTURAL ENGINEERS DO?

Agricultural engineers ______ their knowledge and skills to improve sustainable agriculture production. Agricultural engineers ______ methods to conserve soil and water and _______ the processing of agricultural products.

Agricultural engineers integrate technology with farming. For example, they _______ new farming equipment that may work more efficiently. They design and build agricultural infrastructure such as dams, water reservoirs, warehouses, and other structures. Farm engineers design and _______ agricultural machinery, equipment, and parts.

5 **Choose the best answer.**

1. What made you choose to apply to agriculture?
a. I always wanted to work with machinery.
b. The region where I live is well known for agriculture.
c. All our family is involved in this profession.

2. Are you OK working outside in poor weather conditions?
a. It gives me pleasure working outdoors.
b. Yes, I'm easy adjustable.
c. Yes, I enjoy a lot of field work.

SECTION A. READING

EXERCISES

1 **Read the text and find the information about:**

Ø the meaning of agricultural engineering profession;
Ø professional activities of agricultural engineers;
Ø personal characteristics of agricultural engineers;
Ø place of work of agricultural engineers;
Ø educational qualifications;
Ø the scope of career opportunities.

AGRICULTURAL ENGINEER

Agricultural engineering combines the disciplines of mechanical, civil, electrical, and chemical engineering principles with a knowledge of agricultural principles. An agricultural engineer is someone who helps to make farming sustainable, safe, and **environmentally friendly**. He or she analyzes agricultural operations and looks at new technologies and ways of doing things to improve land use, increase yields, and conserve resources. Agricultural engineers also recommend ways to protect the health, safety and security of workers, animals, and agricultural products.

Agricultural engineers design equipment and develop methods for land preparation, planting and harvesting. They use automation, precision, and **smart or "intelligence" technologies** with new and existing equipment. Sensors are used in combination with microcomputers, controllers, artificial intelligence and other software, which optimizes efficiency, sustainability, and the reliability of food, feed, fiber and fuel for the economy.

Agricultural engineers improve ways to reduce crop loss from field damage during handling, sorting, packing and processing. Warehousing of food and fibre are an important part of the agriculture industry; the agricultural engineer plans the heating, cooling, ventilation, post-harvest handling, logistics and more.

Agricultural engineers work with:

- **food engineering** and the processing of agricultural products;
- the design of agricultural machinery, equipment, and agricultural structures;
- poultry, swine, beef, aquaculture, and plant environmental control;
- **water management**, conservation, and storage for crop irrigation and livestock production;
- utilizing GPS, yields monitors, remote sensing and variable-rate technology;
- worker safety and comfort;
- sales, service, training, management, planning, market and product research.

Agricultural engineers have distinct personalities. They tend to be **investigative individuals**, which means they are intellectual, introspective, and inquisitive. They are curious, methodical, rational, analytical, and logical. Some of them are also realistic, meaning they are independent, stable, persistent, genuine, practical, and thrifty.

Agricultural engineers work both indoors and outdoors. Their work can depend on the weather or growing seasons, so they sometimes work long hours to take advantage of the right conditions. They spend time in offices creating plans and managing projects, and in agricultural settings inspecting sites, monitoring equipment, and supervising reclamation and water management projects. These positions may involve a significant amount of travel. They may **collaborate with others** to plan and solve problems. For example, they may work with horticulturalists, agronomists, animal scientists, and geneticists. Some agricultural engineers work directly with farmers and agricultural technicians to solve issues with crop, land, and livestock. A good number of engineers work for government agencies that oversee agricultural entities.

Agricultural engineers usually work full time, including occasional overtime. For example, they may work long hours to make progress on projects during periods of good weather.

If you are a high school student considering a career as an agricultural engineer, you should have strong marks or an interest in mathematics, physics, chemistry, biology. **Entry-level jobs** in agricultural engineering require a bachelor's degree, preferably in agricultural or biological engineering. Such programs typically include classroom, laboratory, and field studies in science, math, and engineering.

A post graduate degree, master's degree, or PhD may be required and can improve employment prospects and salary. Agricultural engineers may advance to supervisory and management positions over time. Some go into sales, explaining machinery and products to potential customers, and helping with product planning, installation, and use.

Agriculture engineering is a technologically **sophisticated field** that offers bright career prospects and opportunities. Well-paid careers are available for qualified agricultural engineers in government and public sector organizations, agribusiness firms, food processing and retail industry, research organizations and laboratories, banks and financial corporations, central and state government organizations and private firms.

The available career options for agricultural engineering are the following: agricultural engineer, agricultural crop engineer, agricultural inspector, agricultural specialist, farm shop manager, researcher, environmental controls engineer, **food supervisor**, plant physiologist, agronomist, microbiologist, soil scientist, survey research agricultural engineer.

SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Look at the phrases in bold from the text and try to explain their meaning.**

2 **Fill in the correct words and phrases from the word bank.**

WORD BANK			
a) crop loss		*c) develop methods*	
	b) curious		*d)employment*
e) full time		g) *career*	
	f) combines		*h) design*
i) available		*j) smart*	

1. Agricultural engineering _____ the disciplines of mechanical, civil, electrical, and chemical engineering principles with a knowledge of agricultural principles.
2. Agricultural engineers design equipment and _____ for land preparation, planting and harvesting.
3. _____ technologies optimize efficiency, sustainability, and the reliability of food, feed, fiber and fuel for the economy.
4. Agricultural engineers improve ways to reduce _____ from field damage during handling, sorting, packing and processing.
5. Agricultural engineers work with the _____ of agricultural machinery, equipment, and agricultural structures.

6. Agricultural engineers tend to be _____, methodical, rational, analytical, and logical.
7. Agricultural engineers usually work _____, including occasional overtime.
8. Post graduate degrees can improve _____ prospects and salary.
9. Well-paid careers are _____ for qualified agricultural engineers in different fields of agribusiness.
10. Some of the _____ options for agricultural engineers are the following: agricultural engineer, agricultural crop engineer, farm shop manager, environmental controls engineer and others.

3 **What kind of agricultural engineers have the following professional responsibilities? Match the columns.**

1. Processing of agricultural products	a. labour safety engineer
2. Worker's safety and comfort	b. mechanical engineer
3. Environmental control	c. electrical engineer
4. Sales, management, planning, market and product research	d. microbiologist
5. Designing agricultural machinery, equipment, and agricultural structures	e. agricultural manager
6. Supervising electrical components, including lighting, wiring, generators, and electricity transmission systems	f. food technologist
7. Food engineering research	g. environmental controls engineer

4

a) Make up word combinations using a word or phrase from each box.
b) Use the word combinations to complete the sentences below.

a)

1. improve 2. increase 3. create 4. oversee 5. offer	a. managing projects b. agricultural entities c. yields d. career prospects e. land use

b)

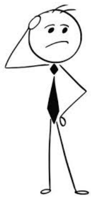
1. A good number of engineers work for government agencies that ______.
2. Farm business ______ a wide spectrum of ______ for agricultural engineers.
3. Agricultural engineers spend time in offices to ______ plans and ______.
4. Agricultural engineer looks for new technologies and ways to ______ ______.
5. Precision farming can improve time management, reduce water and chemical use, and ______ crop ______.

5

Match these features of character to their synonyms.

1. analytical	a. practical
2. thrifty	b. dogged
3. realistic	c. economical
4. persistent	d. reasoning
5. introspective	e. curious
6. investigative	f. inquisitive
7. inquisitive	g. self-analyzing

6 **In the text below the underlined words and phrases are in the wrong place. Move them to the correct position.**



An agricultural engineer works on a (1) reliability of projects like forestry, seafood farming (aquaculture), food processing, and farming. They (2) automate control systems to improve the comfort and productivity of livestock. Animal waste disposal is another (3) intelligence that an agricultural engineer works in. He or she may have the job of improving (4) problem solving in fertilizer application. They (5) develop harvesting systems into agricultural areas by using computer programming skills with artificial (6) area and geospatial systems. Agricultural engineers test equipment for (7) variety and safety. They should have skills in communication, math, (8) efficiency, and analytical skills.

7 **Match the columns to make sentences about agricultural engineers' job responsibilities.**

A	B	C
Agricultural engineers	collaborate improve use plan develop	Ø methods for land conservation; Ø IT to optimize efficiency; Ø handling, sorting, and processing; Ø post-harvest handling and logistics; Ø with horticulturalists, agronomists, animal scientists, and geneticists.

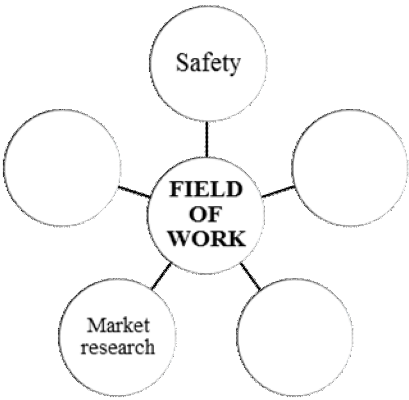
SECTION C. COMMUNICATING

EXERCISES

1 **Answer the following questions:**

1. What engineering principles does agricultural engineering combine?
2. What do agricultural engineers do?
3. What job responsibilities does warehousing include?
4. What smart or "intelligence" technologies do modern engineers use so as to make farming sustainable and efficient?
5. What individual personalities do agricultural engineers tend to be?
6. Where does an agricultural engineer work?
7. What education is necessary to become an agricultural engineer?
8. Who can improve employment prospects and salary?
9. What is the job demand for agricultural engineers?
10. Are you suited to be an agricultural engineer?

2 **Fill in the diagram. Tell your partner about agricultural engineers' fields of work.**



3 **Compare the jobs in the two pictures. Think of the qualities and qualifications needed, the advantages and the disadvantages of each, and the lifestyle each job involves. Which of the jobs shown would you prefer to do?**

4 **In small groups discuss the following problems. Use the given prompts.**

- **What are the main activities of agricultural engineers?**

PROMPT 1. THE ENGINEER'S LOAD OF WORK

designing equipment // developing methods for land preparation, planting and harvesting // improving ways to reduce crop loss // controlling plant environment // creating plans and managing projects // monitoring equipment // overseeing reclamation and water management projects // planning the heating, cooling, ventilation, post-harvest handling and logistics

- **What are the main benefits of being an agricultural engineer?**

PROMPT 2. POSITIVE SIDES OF THE PROFESSION

being surrounded by animals and plants // plenty of jobs to be employed in // being always in demand

Ø **What are the main drawbacks in management careers?**

PROMPT 3. NEGATIVE SIDES OF THE PROFESSION
working overtime // unexpected losses due to weather conditions // having no fixed income

5 **Study the list of personal qualities. Which of them do you think are suitable for agricultural engineering jobs? People with what features of character are not appropriate for this career? What kind of person are you?**

Analytical ability	***Yes***	Flexibility	
Creativity		Generosity	
Continuous learning		Laziness	
Collaboration		Leadership	
Confidence		Problem solving	
Dependability/Reliability		Optimism	

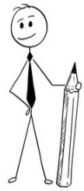
6 **Speak on the following problems using some opinion phrases:**

Speaking personally, I think that…
My view is that…
As I see it…
It would seem to me that…

1. How can agricultural engineers help the environment?
2. Are agricultural engineers introverts or extroverts?
3. Can climate-smart farming save the earth and make money?

SECTION D. WRITING

EXERCISES



1 **Write an advertisement for an in-demand job in agricultural engineering.**

2 **Translate the following advertisement.**

Research Agricultural Engineer

The Application Technology Research Unit (ATRU) in Wooster, Ohio is seeking a Research Agricultural Engineer. The incumbent provides technical expertise for national/international organizations on pesticide spray application issues and provides scientific and technical leadership to develop innovative concepts, strategies and methodologies to promote sustainable agriculture. Responsibilities:

Lead research to identify application factors affecting the distribution and quality of pesticide deposits on food and horticultural crops.

Identify application factors affecting distribution and quality of spray droplet deposits of pest management materials applied to nursery, floricultural, vegetable, fruit, greenhouse and field crops.

Integrate findings with Drift Reduction Technology research into crop production programs.

Investigate new technologies to apply biological pesticides.

Travel Required

Occasional travel will be required to conduct field tests and attend training and scientific meetings and conferences.

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

AGRICULTURAL ENGINEERS

1 **Read the text and translate the key sentences about agricultural engineers' career prospects. Then make a plan of the text. Write down the keywords to each item of the plan.**

Agricultural engineers work in many different areas. An agricultural engineer may work in biofuel development, nature conservation, aquaculture, forestry, habitat planning, food processing, or land farming. Agricultural engineers are sometimes called biological and agricultural engineers.

Agricultural engineers improve farming practices using science and technology. They design enhanced navigation and control systems for farming machinery. Working with scientists who specialize in plant production and use (called agronomists), agricultural engineers help to develop improved crops using biological applications. They also assist in managing the environmental impact of large farms, and in conserving water resources. In addition, agricultural engineers are working on developing certain kinds of algae and other biomass which can be used as fuel. Many agricultural engineers focus on a single specialty, like food and bioprocess engineering, machinery design, or environmental engineering. They may work in the areas of management, production, research and development, or sales.

Agricultural engineers do much of their work outdoors, visiting farms and other sites to ensure that equipment is working properly and safely, in accordance with governmental regulations. They often work on job sites, managing water resources and supervising environment restoration.

Agricultural engineers may also work in offices, laboratories, and classrooms.

Licenses are required for agricultural engineers who work with the public directly. Agricultural engineers who have received their license are called professional engineers (PEs). To receive a license, an engineer must have:

The following industries employ most agricultural engineers:

- Architectural, engineering, and related services;
- Food manufacturing;
- Government;
- Agriculture, construction, and machinery manufacturing;
- Educational services.

Scheduling is a special concern for agricultural engineers, since so much of their work is dependent on weather conditions. When the weather is favorable, they may need to work especially quickly, or work long hours, in order to get the job done.

The technologies being developed by agricultural engineers are redefining the way we make food and other products, the way we manage our water resources, and the way we get and use fuel. Also, agricultural machinery and equipment is continually being rethought and redesigned, which creates more jobs for agricultural engineers.

The need for agricultural engineers is expected to go up as more companies sell farming equipment to farmers in other countries.

2 **Read the text again and in pairs ask and answer comprehension questions.**

3 **Scan the text for additional information to make up a summary.**

TEXT 2

WHAT IS THE BEST DEGREE PATH TO BECOME AN AGRICULTURAL ENGINEER?

1 **Read the text and find the English equivalents for the following Russian words and phrases. Translate the sentences with these words and phrases:**

Карьерная дорожка, построить карьеру, работа, удовлетворяющая требованиям, представительный совет по технике и технологии, высшая математика, дифференциальное уравнение, совместное обучение, начальная должность, продвижение до руководящих должностей, экзамен по основам инженерии, получить лицензию, приносить пользу обществу.

Choosing a career path is a major decision, and so is choosing the correct educational and professional path to reach that career goal. If you decide to pursue a career in engineering, you are setting yourself up for a profitable career. For agricultural engineers, the fulfilling job matches the rewarding pay. Agricultural engineers research and develop solutions to agricultural and biological problems, including inventing agricultural equipment, designing electrical systems and innovating new storage solutions for agricultural crops. Agricultural engineering plays a role in how society farms on land and in aquatic environments, how it develops and uses biofuels and how manufacturers process food products.

Undergraduate Degree

The first step in preparing for a career as an agricultural engineer is earning a college degree. Because this discipline of engineering requires a background in agriculture and biology as well as engineering, students should be sure to find an accredited degree program in agricultural engineering or a related discipline, like biological engineering.

In the USA the Accreditation Board for Engineering and Technology, ABET, currently accredits just 21 undergraduate degree programs in agricultural engineering and 26 in the related discipline of biological engineering. To qualify for ABET accreditation, a program must combine the theory and application of engineering concepts with high-level mathematics that include differential equations and studies in biology encompassing such topics as agriculture, aquaculture, forestry or natural resources. Students will learn textbook materials and engineering design principles through a combination of classroom lectures, laboratory research, field work and cooperative learning projects.

A bachelor's degree is enough to fulfill requirements for many entry-level agricultural engineering jobs. To improve their prospects for future advancement into supervisory or management positions, some students choose to earn a master's degree.

The Path to a License

Once a student has graduated from an undergraduate college degree program in agricultural engineering, the next step is to take an examination called the Fundamentals of Engineering exam. Passing this test is essential because it allows candidates to officially become engineer interns or engineers-in-training, the role they hold while acquiring the practical experience necessary to obtain a license. After gaining the required experience – typically about four years, according to the United States Bureau of Labor Statistics – students can take the final test to get a license, the Professional Engineering exam.

A career as an agricultural engineer requires preparation in the classroom and in the work environment. Though obtaining a license as a professional engineer takes time and effort, it also opens up a world of exciting career opportunities. Agricultural engineers have the chance to make important changes in farming and food processing that could greatly suit society as a whole.

2 **Read the text for additional information and give an answer to the question from the title. Compare the degree path of becoming an agricultural engineer with that in the Republic of Belarus. Use comparing and contrasting phrases given below:**

Comparing	**Contrasting**
Like	Unlike
Likewise	In contrast to
Same as	As opposed to
As well as	Different from
Also, too	Whereas

TEXT 3

TOP QUALITIES OF A GREAT AGRICULTURAL ENGINEER

1 **Read the text and translate the key sentences about different qualities of agricultural engineers. Then fill in the following table:**

Types of skills	**Main abilities**	**Scope of application**

A good agricultural engineer will have commendable technical knowledge but a great agricultural engineer also has social and emotional intelligence. Engineers design primarily for the common man, not for themselves or for machines. Hence, the ability to communicate on an emotional level is also a key factor in the making of a great agricultural engineer.

Let’s take a look at some more such qualities to find out if you have what it takes to be a great agricultural engineer:

Analytical skills. Agricultural engineers must analyze the needs of complex systems that involve workers, crops, animals, machinery and equipment, and the environment. They need to be able to comprehend complex systems, how they work, how problems arise and how to fix them.

Communication skills. Agricultural engineers must understand the needs of clients, workers, and others working on a project. Furthermore, they must communicate their thoughts about systems and about solutions to any problems they have been working on.

Math skills. Engineering is a complex science that requires performing calculations of varying difficulty so it's necessary to brush up on math skills. Agricultural engineers use calculus, trigonometry, and other advanced mathematical disciplines for analysis, design, and troubleshooting.

Problem-solving skills. A great engineer must be able to address problems as they arise, figure out where they stem from, and deal with them methodically and effectively. Agricultural engineers' main role is to solve problems in agricultural production. Goals may include designing safer equipment for food processing or reducing erosion. To solve these problems, agricultural engineers must creatively apply the principles of engineering.

Technology continues to evolve at a rapid pace and if you want to be a great agricultural engineer, you need to keep yourself abreast of the new and recent developments in the industry.

2 **Scan the text for additional information to make up a summary.**

UNIT 2

MECHANICAL ENGINEER

Mechanical engineering – profession for intelligent people

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Read the statements 1-5 and the dialogue that follows them, and then mark the statements as T (true) or F (false).**

1. The candidate designed a functional steering system when he was a kid. ______
2. The most difficult thing for the candidate was to create an axle and get the thing to turn right. ______
3. Being a good communicator is the most important skill for an engineer. ______
4. Axle system helps bear some of the weight of the car and turn wheels. ______
5. The candidate took a course on the design of biogas water heating systems a few months ago. ______

Interviewer: What was the first thing you ever designed?
Candidate: I designed a toy car with a functional steering system when I was a kid. I spent weeks on it, figuring out how to create an axle and getting the thing to turn right. I used pieces from other toy cars and screws from around the house.
Interviewer: What skills would you say are most important for an engineer?
Candidate: The ability to be innovative is the most important quality for an engineer. We have to be able to look at things in a new way, even if it means realizing our past ideas are not as perfect as we thought they were. Our job is always trying to top our last design. Being a good communicator is also a good skill, because you have to be able to explain your idea to the rest of your team and get them to buy into it.
Interviewer: How would you explain a car's wheel and axle system to a layperson?
Candidate: Axles serve two main purposes. They help bear some of the weight of the car, and they help the steering system turn your wheels. So, when you turn your steering wheel to the right, the axle helps turn the tires and absorbs any weight shift.
Interviewer: Why do customers buy a product?
Candidate: A customer buys a product because it makes their life better. Especially with technology, the product needs to make something easier for them if they're going to spend their money on it.
Interviewer: What is a new engineering skill you've acquired in the last year?
Candidate: I took a course on the design of solar water heating systems a few months ago. As the future of energy moves toward solar, I wanted to be familiar with the components and processes of using solar collector systems to generate energy. A lot of what I learned can be applied to other forms of solar absorption construction.

SECTION A. READING

EXERCISES

1 **Read the text and label the paragraphs with the correct headings. One heading does not match.**

A Good advice for mechanical engineering students

B The workplace of a mechanical engineer

C Responsibilities of a mechanical engineer

D Requirements for the position of a mechanical engineer

E Abilities a mechanical engineer should posses

F Tasks of a mechanical engineer

G Mechanical engineering and a mechanical engineer

H Types of industries mechanical engineers can work in

MECHANICAL ENGINEER

1____

Mechanical engineering is one of the oldest and most diverse of the engineering disciplines. It is the branch of engineering that involves the design, production, and operation of machinery by applying physics, engineering, mathematics, and materials science principles.

Mechanical engineers play an important role in the automotive, aerospace, biotechnology, computer and electronics, automation, and manufacturing industries. They design, develop, build, and test all sorts of mechanical devices, tools, engines and machines. Mechanical engineers are able to design and manufacture everything from small parts like miniature connectors to large machine tools like drill presses. They take a product from start to finish, and design for aesthetics, functionality, and durability. Examples of products that mechanical engineers can design and develop are: transmissions; engine parts; aircraft engines; control systems; prosthetic devices; disk drives; printers; semiconductor tools; sensors; gas turbines; wind turbines; fuel cells; compressors; robots; and machine tools.

2____

Mechanical engineers typically do the following: create solutions and solve problems, playing a central role in the design and implementation of moving parts in a range of industries. Mechanical engineers provide efficient solutions to the development of processes and products, ranging from small component designs to extremely large plant, machinery or vehicles. They can work on all stages of a product, from research and development to design and manufacture, installation and final commissioning. Mechanical engineers can be involved in the management of people, projects and resources, as well as the development and use of new materials and technologies.

3____

Mechanical engineers should possess such skills as a high level of technical and scientific knowledge and the ability to apply this knowledge to practical problems. In order to design and manufacture mechanical systems, mechanical engineers need to have a deep understanding of mechanics, dynamics, thermodynamics, electricity, and structural analysis. Often, mechanical engineers develop products for clients who are not familiar with mechanical engineering terminology. They may have to explain complex machines, devices, and ideas to people, therefore good oral communication skills and confidence in dealing with a range of people are necessary in order to explain things clearly and effectively. Precise and concise written communication skills are important as well as the ability to work well within a team as being a mechanical engineer involves a lot of teamwork and having to collaborate with others. Moreover, IT skills, particularly CAD (computer-aided design), and CAM (computer-aided manufacturing) to produce and analyze their designs, as well as to monitor the quality of products; creative ability; organisational skills, such as time and resource planning are among the required skills of a mechanical engineer too. Fluency in a second language may be helpful for dealing with international offices or clients, depending on the type of industry.

4____

To get into mechanical engineering you will usually be required to have a degree, although some employers place as much emphasis on people's skills and commercial awareness as on class of degree. Mechanical engineers must have at least a bachelor's degree in mechanical engineering. A pre-entry postgraduate qualification is not essential but it can be useful, especially if your first degree is not in an engineering or other related subject.

Work experience is valuable and many large employers offer structured internship programmes and summer placement schemes. These provide an excellent insight into the nature of the work and are often hands-on. Some degree courses offer a year in industry, which really helps to demonstrate what the career will be like, as well as making some good contacts for future job prospects. This type of relevant experience will provide evidence of skill development and commercial awareness.

5____

Mechanical engineers are the second largest engineering occupation. They can find employment in a huge range of sectors. Mechanical engineers work mostly in engineering services, research and development, manufacturing industries, and the federal government. The rest are employed in general-purpose machinery manufacturing, automotive parts manufacturing, management of other companies, and testing laboratories. Most careers in engineering lead to a senior position with responsibility for other staff or larger projects and budgets.

6____

The majority of mechanical engineers work full time, with some working as many as 60 hours or more per week. Working hours typically include regular extra hours, but not usually weekends or <u>shifts</u>. Self-employment and freelance work are possible for qualified engineers with a good track record and experience. Short-term contract or consulting work is also possible, often arranged through agencies.

The work of a mechanical engineer is mainly office-based with regular visits to plants, factories, workshops or building sites. Opportunities are usually available in towns and cities that have a strong manufacturing or research base, or in regions where there is a local facility that supports specialists in engineering. Mechanical engineers work often to <u>deadlines</u>, particularly in consultancy work. Dress code can vary from smart for office-based work to a hard hat and overalls when working on site. Travel within a working day is frequent.

7____

Depending on what field of work you go into will depend on what your job will be like. Mechanical engineering is a broad career that deals with mechanical issues, and engineers typically work with mechanical physics, vibrations, forces, rotation, and velocity on a daily basis. Becoming a well-rounded student with real work experience and good academic success is what will give you the optimal chance in landing a great engineering job. Note that top jobs will require both good grades and real engineering experience. Every summer that you're in university, make it a top priority to get an internship.

SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Fill in the adjectives from the text, then make sentences using the completed phrases.**

1. ________	hat	7. ________	solutions
2. ________	skills	8. ________	commissioning
3. ________	experience	9. ________	hours
4. ________	work	10. ________	devices
5. ________	position	11. ________	disciplines
6. ________	parts	12. ________	ability

2 **Fill in the underlined synonyms from the text.**

1. Periods	=	________	6. Closing date	=	________
2. Boss	=	________	7. Cope with	=	________
3. Answer	=	________	8. Manufacturing	=	________
4. Knowledge	=	________	9. Abilities	=	________
5. Plan	=	________	10. Vocation	=	________

3 **Fill in the correct preposition where necessary.**

1. Inventions typically involve _____ minor improvements in technology.
2. Ongoing technological innovation may provide solutions _____ current challenges.
3. She needs to work _____ her interview technique if she's going to get a job.

4. He is involved _____ a political club at the university, and hopes to run for office in the near future.
5. Mechanical engineering is deals _____ mechanical issues.
6. Many diploma courses require _____ the submission of a project.
7. We take all proposals seriously that really lead _____ more jobs.
8. Experts in agricultural statistics are expected to be familiar _____ both agriculture and statistics.

4 **a) Make up word combinations using a word or phrase from each box.**

1. create	a. problems
2. deep understanding of	b. other people
3. monitor	c. experience
4. solve	d. work
5. collaborate with	e. student
6. relevant	f. the quality of products
7. a well-rounded	g. mechanics
8. freelance	h. hours
9. working	i. solutions

b) Use the word combinations you've made to complete the sentences below.

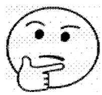
1. We must _______ that our shareholders will find acceptable.
2. Measures should be taken to _______ in planning, design, construction and management.
3. Mechanical engineers need to have _______ to design and manufacture mechanical systems.

4. It's time to take a fresh look at the way manufacturers _______ in their facilities.
5. The problem that most workers have is that they aren’t trained to _______.
6. An effective resume includes a summary of the candidate's background, education and _______ for the position.
7. For both men and women, almost seven out of ten employed persons had normal _______.
8. A _______ is one who is academically prepared and is active outside the classroom.
9. A _______ is one where a person works for themselves, rather than for a company.

5 **Match the words to their meanings, then make sentences using them.**

1. Engineer	a. methods, systems, and devices which are the result of scientific knowledge being used for practical purposes
2. Mechanical	b. the job or profession that someone does for a long period of their life
3. Technology	c. a person who uses scientific knowledge to design, construct, and maintain engines and machines or structures such as roads, railways, and bridges
4. Career	d. the act of passing the examinations you need to work in a particular profession
5. Qualification	e. relating to machines and engines and the way they work

6 **Think of ten words you have learnt in the text “*Mechanical engineer*”. Close your book and tell each other.**



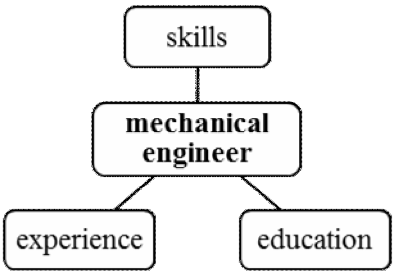
SECTION C. COMMUNICATING

EXERCISES

1 **Answer the questions based on the text “*Mechanical engineer*”.**

1. What does mechanical engineering involve?
2. Where can mechanical engineers work?
3. What can mechanical engineers design and manufacture?
4. What are the duties of a mechanical engineer?
5. Are mechanical engineers involved in management? Prove your point of view.
6. What skills should a mechanical engineer have?
7. What is necessary to work as a mechanical engineer?
8. Where can mechanical engineers work?
9. What does a working day of a mechanical engineer look like?

2 **Fill in the diagram. Tell your partner about the requirements necessary to become a mechanical engineer.**



3 **Work in pairs. Discuss**

a) duties of mechanical engineers;
b) career opportunities of mechanical engineers;
c) working conditions of mechanical engineers;
d) dress code of mechanical engineers.

4 **Work in pairs. Take the roles of an employee and an employer. Use the information in the text to act out a job interview.**

5 **Think of what you have learnt in this unit. Close your books and tell your partner.**

6 **Quiz time. In this career quiz, there are 10 questions that will analyse if the Mechanical Engineers career is right for you. There are 3 answers to each question: *Dislike, Okay* and *Like.***

a) Pass the quiz.

Answer "*Dislike*" if you tell yourself "Ugh… Sounds boring" or "I'm not sure"

Answer "*Okay*" if you tell yourself "Umm… I think I will be okay with that"

Answer "*Like*" if you tell yourself "Yes, I'm interested"

QUESTION	DISLIKE	OKAY	LIKE
1. You're interested in engineering and technology like applying principles, techniques, procedures, and equipment to the design and production of various goods and services.			
2. You're interested in design like design techniques, tools, and principals involved in production of precision technical plans, blueprints, drawings, and models.			
3. Read and interpret blueprints, technical drawings, schematics, or computer-generated reports.			

4. Assist drafters in developing the structural design of products using drafting tools or computer-assisted design (CAD) or drafting equipment and software.			
5. You like working with ideas, and require an extensive amount of thinking.			
6. You like searching for facts and figuring out problems mentally.			
7. You like work that includes practical, hands-on problems and solutions.			
8. You like dealing with plants, animals, and real-world materials like wood, tools, and machinery. You like working outside, and hate paperwork or working closely with others.			
9. You like following set procedures and routines.			
10. You like working with data and details more than with ideas.			

b) Evaluate your results Count how many points you have. Dislike = 0 point. Okay = 1 point. Like = 2 points.

0 to 9 points = You will not like this career

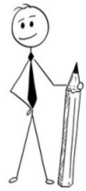
10 to 15 points = You are the right person for the job

16 to 20 points = You are perfect for this career

c) Discuss the results you have with your partner.

SECTION D. WRITING

EXERCISES



1 **Read the advertisements, choose any of them and write a letter in reply. Use the plan below to write your letter. Prove that you are the best fit for the job.**

a)

Jobs for Mechanical Engineer

Mechanical Engineer/Mechanical technician

Company/Location: Para la Naturaleza, located in Manati P.R. 00674

Job Description: Mechanical Engineer or Mechanical Technician who make sure the sugar mill, boilers, electric generator, treatment plant, greenhouse's pumps and irrigation systems, fire pumps system and any other equipment operate as per organization's standards, manufacturer or specialists' specifications and state and federal regulations.

Preferred Skills: Must be fully bilingual in English and Spanish (oral & written).

Educational Requirements: Bachelor's Degree from a credited university or college, preferably in Mechanical Engineering or Mechanical Technology, or a related technical area.

Mechanical Engineer

Company/Location: KLA–Tencor, Milpitas C.A. 95035

Job Description: to design and manufacture Scanning Electron Microscope (SEM) equipment for wafer inspection (fast defect finding) and ultra-high resolution defect review

Preferred Skills: Direct experience designing systems/subsystems used for electron optics, they must also be able to create 3D part/assembly models and detail drawings for fabrication, you should also know how to work with ProE

Educational Requirements: Bachelor's Level Degree with at least 12 years of experience or Master's Level Degree with at least 8 years of experience or Doctorate (Academic) with at least 5 years of experience or Equivalent Industry Experience.

b)

MECHANICAL ENGINEERS

Urgently required GRADUATE and DAE Mechanical Engineers having knowledge & experience of Diesel Generator maintenance and overhaul. Minimum hands-on experience required in case of Graduates (03 years) and DAE (05 years). Please apply in confidence on

PLAN

Dear …

Introduction

(Para 1) *opening remarks and reasons for writing:*

I am responding to your job posting on … [website or newspaper name] for …. /I'm writing to apply for the position of …, as advertised on … [website or newspaper name]

Main Body

(Para 2) *experience details: three to four sentences about your professional background, qualifications, achievements and career highlights.*

Conclusion

(Para 3) *closing remarks: re-emphasize why you are interested in the position, why you are passionate about the company and why you'd make a good fit. In addition, describe how you, if hired, would contribute to the company.*

Sincerely,

[Your name]

2

a) In writing translate the following advertisement.
b) Ask questions to get the reader's attention.

DMI Mechanical Engineering can boast a wealth of knowledge across our agricultural mechanical engineers. When you need agricultural handling machinery and materials you can rely on our team to deliver exactly what you are looking for without the hassle.

Grain harvesting and harvesting season can be the most important time for a farmer and having the right machinery and materials is essential. If your machinery is failing and not performing at maximum capacity it can have a detrimental effect on your performance and productivity. To avoid this situation all together, get in touch with our team to ensure that you can keep on top of your machinery maintenance and keep within your harvesting targets all year round.

Our agricultural mechanical engineers can build, service and maintain all machinery items no matter what size, make or model. We understand the common problems farmers are having with harvesting and can use our expertise to solve these issues before they become further damaging or unsolvable. With cost-effective solutions for moving, drying and handling all grain harvest, you can count on our agricultural mechanical engineers in for:

- Grain Ducting
- Elevator Belt Parts
- Grain Handling Spares
- Sheet Metal Work
- Milling and Welding in Steel and Aluminium
- Machine Repairs and Refurbishments
- Plant Breakdown Repairs

c) Imagine that you work for a company that deals with maintenance of agricultural machinery. Write an advertisement about the scope of your work by analogy with the advertisement given above.

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

1 **Read the text and state its main idea.**

Mechanical Engineering is one of the most demanded engineering disciplines in the world. Every year, a stream of mechanical engineers graduate from their bachelor's degree and do their best to get a job that would pay them the highest mechanical engineer salary for their services. The reason is clear – mechanical engineering is one of the most in-demand engineering disciplines and is highly in demand within several industries in all countries around the world.

In addition to that, it is one of the highest paid fields. The more training a mechanical engineer takes up, the more he or she can expect their annual salary to go up. And the more skilled a mechanical engineer is, the more he or she can negotiate their pay.

Mechanical engineers are expected to know and execute research, build and test mechanical devices and tools, design, develop, and understand how systems and machines work.

As a researcher, a mechanical engineer analyzes issues relating to mechanical devices and thermal tools among other research duties. He is also the one responsible for making sure these tools and devices work to complete projects on time and produce acceptable results.

A mechanical engineer also acts as a process engineer, for example, taking care of the manufacturing processes for many of the company's products, which could include engines parts or medical devices. They are also responsible for designing the parts and components that are to be manufactured. You can work in various fields and industries including construction, energy, electric, machinery, aerospace, gas and so on.

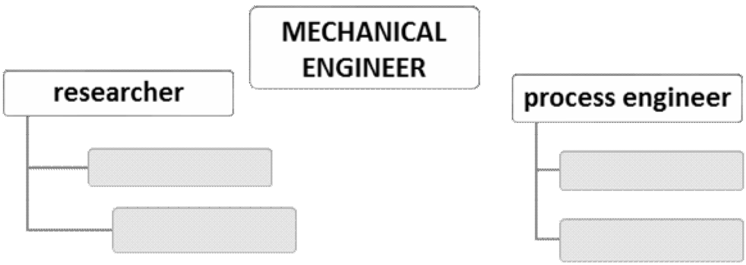
Mechanical Engineers can start a career in almost every industry out there, from making elevators and escalators work to designing systems that dispense ice-cream, to creating parts that are used in a space shuttle. They are quite computer savvy and can even get involved in control systems programming and software-based solutions. Mechanical Engineers can wear different hats. Some can become Systems or Engineering Managers. Others can become Senior Designers or Drafters. Some others would choose to become Materials Engineers, Mathematicians, Mechanical Technicians, and Natural Sciences Managers to name a few.

2 **Work in groups. Prepare questions based on the text. Exchange your questions with another group. Which group has the most correct answers?**

3 **Prove that**

- **mechanical engineering is one of the most in-demand engineering disciplines;**
- **mechanical engineering is one of the highest paid fields.**

4 **Fill in the diagram and speak about the duties a mechanical engineer does acting as a researcher or as a process engineer.**



TEXT 2

1 **Read the text and write down ten keywords. Create a chain of major facts of the text where the keywords would be logically connected.**

Mechanical Design Engineer

The primary roles and responsibilities of a mechanical design engineer include researching, testing, designing, manufacturing, and developing machines, engines, and tools or devices. A mechanical design engineer plays a major role in the production process because he or she takes charge of the machines used to run the project smoothly and to its optimum level.

In other aspects, a mechanical design engineer can be considered a process or project manager. He or she looks after the company's resources, including its workforce and equipment suppliers. He may also be tasked with managing company budgets as well as maintaining materials and keeping specifications of designs up to date.

While the careers of a mechanical engineer and a mechanical design engineer are similar in some ways, there are significant differences in responsibilities, educational requirements and salary. For example:

Mechanical engineers design mechanical products, machines, and systems. Mechanical design engineers create technical drawings based on the mechanical engineer's specifications and plans.

Mechanical engineers use mathematics and physics in order to determine the best plans and designs for a project. Mechanical design engineer use CAD programs (computer aided design) to create detailed drawings.

Mechanical engineers must have at least a bachelor's degree in mechanical engineering. Mechanical design engineer must complete an associate's degree in drafting.

Job responsibilities of a mechanical engineer include:
- applying physics, engineering, mathematics, and materials science principles;
- determining how mechanical devices can help to solve a manufacturing problem;
- developing a prototype of the mechanical product;
- analyzing complex tests to determine the reason for components failing in mechanical equipment;
- understanding and using blueprints to determine how mechanical systems work with other components;
- overseeing the installation of their mechanical products and systems and the manufacturing process;
- traveling to various manufacturing sites to ensure specifications are followed.

Job responsibilities of a mechanical design engineer include:
- turning the mechanical engineer's roughly sketched designs into technical drawings;
- designing 3-D models using computer-aided design software;
- adding in any manufacturing procedures to their schematics;
- following specific drafting standards and regulations;
- going over the details and dimensions of each part in the drawing;
- changing drawings based on engineer's feedback;
- redesigning older systems based on efficiency.

In spite of the fact that both a mechanical engineer and a mechanical design engineer have some significant differences no one can deny the fact that many projects require collaboration between a mechanical engineer and a mechanical design engineer. Both fields are pretty broad in the type of work you could be doing. Every field can be specialized so once you choose a major you have to choose yet again what part of it you will be working with. Finding out the differences between the two will help you make an informed decision about what’s the right Bachelor’s to apply for.

2 **Read the text again and in pairs ask and answer comprehension questions.**

3 **Summarize the information of the text. Express your attitude towards the information given in the text. What new fact have you learnt?**

TEXT 3

1 **Read the text and state its main idea.**

The following are examples of different types of mechanical engineers:

Automotive research engineers try to improve the performance of cars by working to improve traditional features of cars such as suspension, and work on aerodynamics and new possible fuels. Automotive research engineers focus on the development of passenger cars, trucks, buses, motorcycles or off-road vehicles. They design new products, modify existing ones, troubleshoot, and solve engineering problems.

Heating and Cooling Systems Engineers. Heat engineering, also known as heat transfer or thermal sciences, is an academic specialty of mechanical engineering. Heating and cooling systems engineers develop environmental systems (systems that keep temperatures and humidity within certain limits) for airplanes, trains, cars, computer rooms, and schools. They design test control apparatus as well as equipment, and develop procedures for testing products. They also calculate energy losses for buildings, using equipment such as computers, combustion analyzers, or pressure gauges.

A *robotics engineer* is a behind-the-scenes designer, who is responsible for creating robots and robotic systems that are able to perform duties that humans are either unable or prefer not to complete. Robotics engineers will spend the majority of their time designing the plans needed to build robots, and will also design the processes necessary for the robot to run correctly. Through their creations, a robotics engineer helps to make jobs safer, easier, and more efficient, particularly in the manufacturing industry.

Materials engineers attempt to solve problems in several different engineering fields, such as mechanical, chemical, electrical, civil, nuclear, and aerospace. They do this by developing, processing, and testing materials in order to create new materials that meet certain mechanical, electrical, and chemical requirements. Materials engineers study the chemical properties, structures, and mechanical uses of plastics, metals, nanomaterials (extremely small substances), ceramics, and composites according to the place of usage.

2 **Work in groups. Prepare questions based on the text. Exchange your questions with another group. Which group has the most correct answers?**

3 **Express your opinion about the information you have read using opinion phrases (p. 229). What was the most interesting? Why?**

UNIT 3

ELECTRICAL ENGINEER

Electrical science has revealed to us the true nature of light, has provided us with innumerable appliances and instruments of precision, and has thereby vastly added to the exactness of our knowledge

STARTING POINTS

1 **Read the sentence in the cloud given as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **a) Read the statements 1-5 and the dialogue that follows them, and then mark the statements as T (true) or F (false).**

1. The candidate exceeded in functional steering systems. ____
2. The most recent candidate’s project dealt with the acquisition of substation parameters. ____
3. The candidate has a great deal of experience as a microelectronics engineer. ____
4. The candidate has no ideas of electrical engineering computer software. ____
5. The candidate knows the essence of direct and alternative current. ____

Interviewer: When and where did you get your electrical engineering degree(s), and in what classes did you exceed?
Candidate: While they were difficult courses, I exceeded in signal processing and circuits. I also did well in linear algebra, and I am most proud of the grade I earned in convex optimization. I did equally well in the majority of my university's electrical engineering computer software classes.
Interviewer: What projects have you worked on, and what was your position? Were you the project lead or subject matter expert?
Candidate: My most recent project, one in which I worked as the lead, dealt with the acquisition of substation parameters.
Interviewer: What is your specialty within electrical engineering: industrial, residential, etc.?
Candidate: While I have worked in the capacity of an industrial engineer more often than in any other field, I have also gained a great deal of experience as a residential electrical engineer by working on complex, short-term projects.
Interviewer: What electrical engineering computer software are you familiar with?
Candidate: The majority of my experience, as with most electrical engineers, is with Calculatoredge. I also have experience with E3. series, Electrical Tools & Reference and Electronics Bundle.
Interviewer: Can you explain the difference between direct and alternating current?
Candidate: Simply direct current has no return cable. Alternating current is a circuit. While alternating current is most common, because of the safety factor, direct current also has its advantages including longer travel distances, more power with less loss, and it is less expensive.

b) Role play the dialogue.

SECTION A. READING

1 **Read the text and label the paragraphs with the correct headings. One heading does not match.**

A Good advice for electrical engineering students

B The workplace and working hours of an electrical engineer

C Duties of an electrical engineer

D Requirements for the position of an electrical engineer

E Skills an electrical engineer should posses

F Tasks of an electrical engineer

G Electrical engineering and an electrical engineer

H Types of industries electrical engineers can work in

ELECTRICAL ENGINEER

1____

Electrical engineering dates back to the late 19th century, and is one of the newer branches of engineering. Electrical engineering is the design, building and maintenance of electrical control systems, machinery and equipment. Electrical engineering is concerned with the technology of electricity and specifically deals with electricity, electro-magnetism and electronics. It also covers power, telecommunications and signal processing. Some electrical engineering concerns are also found in mechanical and civil engineering. The term electrical engineering often includes electronics engineering.

The emergence of the modern age is noted by the introduction of electricity to homes, businesses and industry, all of which were made possible by electrical engineers. Whenever you go to flip a light switch in your house or even check the time on your smartphone, it took a series of electrical engineers to make that happen. The everyday things that we take for granted – like being able to turn on a light when it's dark – are actually the result of hundreds of years' worth of work by dedicated engineers. An electrical engineer is someone who applies the physics and mathematics of electricity, electromagnetism and electronics to solve problems, to design and develop new electrical equipment and systems to process information and transmit energy, and to test equipment.

2____

Electrical engineers are usually concerned with large-scale electrical systems such as motor control and power transmission, as well as utilizing electricity to transmit energy. Electrical engineers may work on a diverse range of technologies, from the design of household appliances, lighting and wiring of buildings, telecommunication systems, electrical power stations and satellite communications. Another emerging field for electrical engineers is microelectronics – the design and development of electrical systems and circuits in computers and mobile devices, radars, navigation systems, and other kinds of electrical systems. More and more, electrical engineers are relying on computer aided design (CAD) systems for the creation of schematics and to lay out circuits, and they use computers to simulate how electrical devices and systems will function.

3____

Electrical engineers are responsible for design new uses of electrical power for product development and enhancement. They prepare electrical system specifications or drawings; plan layout of electrical generation and delivery systems, including plants, distribution lines, and electrical stations and substations. In addition, electrical engineers oversee production, testing, and installation of electrical equipment to confirm compliance of products with applicable codes and regulations; formulate electrical systems in buildings for efficient use of electricity, such as employing natural lighting. Among electrical engineer job duties there are also calculation and estimation of material, equipment, and labour costs for products and projects involving electrical systems and use of electrical power. Electrical engineers receive and respond to customer or client concerns or complaints involving electrical power as well as identify problems in electrical systems, and propose and help implement solutions to those problems and supervise members of electrical systems or equipment teams.

4____

Electrical engineers work in various industries and the skills required also vary. These skills can range from basic circuit theory to those required to be a project manager. To become an electrical engineer, one should have the following skills:

Concentration Skills. To design, develop, and oversee establishment of complex systems, electrical engineers must avoid loss of focus. These professionals must handle multiple design elements and track technical details of their system designs.

Computer Skills. Electrical engineers must know how to use engineering software such as computer aided design (CAD) and analytical software.

Interpersonal Skills. The ability to collaborate with manufacturing workers, other engineers, and technicians allows electrical engineers ensure the proper implementation of their plans. Interpersonal skills included in the electrical engineer job description are supervising or monitoring manufacturing workers, and clearly and concisely communicating solutions to any complications that may arise.

Math Skills. Algebra, calculus, geometry, and calculus skills help electrical engineers in their designs and troubleshooting of electrical systems. These professionals must understand how to calculate distances, angles, and equations for circuit analysis.

5____

To work as an electrical engineer, one must have at least a bachelor's degree in electrical engineering or electrical engineering technology. Nearly one in four electrical engineers holds a master's degree as well. Many people enter the profession with a degree in electrical or electronic engineering. However, entry may also be possible with other engineering degrees, particularly mechanical engineering. You don't need a postgraduate qualification to get a job. Employers will be more impressed by your enthusiasm to gain professional status and by relevant industrial experience. However, a relevant masters can help with career progression.

<u>Experience</u> to become an electrical engineer normally comes through post-graduate work with a licensed engineer. As a prerequisite to licensing, candidates must have four years of experience. In certain electrical engineering programs, students can combine on-the-job opportunities and other field work with courses during the academic year. Universities, manufacturers, and aerospace are among the main places where prospective engineers can find internships. This pre-graduation experience can prove valuable for electrical engineers who seek entry-level jobs upon graduation, or who want to work for a specific company's engineering department. Such positions, as they do not involve oversight of projects or other services to the public, do not require a professional engineer's license.

6____

Electrical engineers are generally full-time professionals. In fact, 68 percent of electrical engineers say they log more than 40 hours per week. With electrical plants and other facilities operating around the clock, electrical engineers may have to report on evenings or weekends to job sites. Emergencies and malfunctions spur the need for work beyond traditional office hours and weekdays. Approaching project deadlines also contribute to work weeks that run beyond 40 hours and/or regular work hours.

The workplace of an electrical engineer may be located in a production plant, workshop, office, laboratory, factory or on site, or a mixture of several of these. Travel within the working day is common. Self-employment and consultancy are possible after building up expertise and a reputation within the profession.

7____

Depending on what field of work you go into will depend on what your job will be like. Electrical engineering is a broad career that deals with the study and application of electricity, electronics, and electromagnetism in all of their forms. The future of electrical engineering work is likely to be both large and small. Electrical engineers will be able to choose whether they want to focus on the complicated circuits that make up personal computing devices or the huge instruments that control spacecraft, and even entire power grids. Becoming a well-rounded student with real work experience and good academic success is what will give you the optimal chance in landing a great engineering job. Note that top jobs will require both good grades and real engineering experience. Every summer that you're in university, make it a top priority to get an internship.

READ ONCE AGAIN
IF YOU NEED...

SECTION B. LANGUAGE PRACTICE

EXERCISES

1 **Fill in the adjectives from the text, then make sentences using the completed phrases.**

1. ______ engineering (*more than one variant*)
2. ______ engineers (*more than one variant*)
3. ______ appliances
4. ______ field
5. ______ design
6. ______ devices (*more than one variant*)
7. ______ codes and regulations
8. ______ equipment
9. ______ lighting
10. ______ status

2 **Fill in the underlined synonyms from the text.**

1. closing date = ________
2. important = ________
3. abilities = ________
4. using = ________
5. practice = ________
6. manufacturing = ________
7. illustrations = ________
8. apparatus = ________
9. power = ________
10. illumination = ________

3 **Fill in the correct preposition where necessary.**

1. Electrical engineering deals _____ electricity, electromagnetism and electronics.
2. Ongoing technological innovation may provide solutions _____ current challenges.

3. She needs to work _____ her interview technique if she's going to get a job.
4. The work of an electrical engineer may be located _____ a production plant.
5. Such positions, as economists do not involve _____ oversight of projects.
6. Many diploma courses require _____ the submission of a project.
7. More and more, electrical engineers are relying _____ computer-aided design systems.
8. Electrical engineers are relying on computer aided design systems to lay _____ circuits.

4 **a) Make up word combinations using a word or phrase from each box.**

1. turn on	a. material
2. handle	b. manufacturing workers
3. flip	c. electrical control systems
4. track	d. electrical systems
5. design of	e. a circuit
6. estimation of	f. household appliances
7. troubleshooting of	g. technical details
8. to lay out	h. a light
9. collaborate with	i. multiple design elements
10. maintenance of	j. a light switch

b) Use the word combinations you've made to complete the sentences below.

1. The intent of periodic ______ is to keep the systems operating at an acceptable level of service to the public.
2. This man can drift in and out of reality as easily as you ______.

3. Maybe we should _____ and see where we are.
4. ______ means to represent an integrated circuit in terms of planar geometric shapes.
5. Concentration skills are necessary for engineers to ______.
6. Electrical engineers should be able to ______ of their system designs.
7. How well you ______ will greatly impact the outcome of the group project.
8. ______ fault can be challenging.
9. ______ for construction works or projects deals with calculation of quantities of various materials, labors etc. required for construction.
10. Last year he worked as a consultant for the ______.

5

Match the words to their meanings, then make sentences using them.

1. Engineer	a. methods, systems, and devices which are the result of scientific knowledge being used for practical purposes 
2. Electrical	b. the job or profession that someone does for a long period of their life
3. Technology	c. a person who uses scientific knowledge to design, construct, and maintain engines and machines or structures such as roads, railways, and bridges
4. Career	d. the act of passing the examinations you need to work in a particular profession
5. Qualification	e. concerned with, operating by, or producing electricity

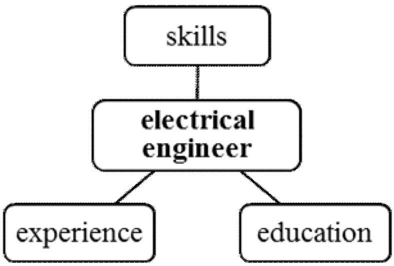
SECTION C. COMMUNICATING

EXERCISES

1 **Answer the questions based on the text *“An electrical engineer”*.**

1. What is electrical engineering concerned with?
2. What is an electrical engineer like?
3. What are electrical engineers concerned with?
4. What can electrical engineers work on?
5. What is an electrical engineer responsible for?
6. What skills should an electrical engineer have?
7. What is necessary to work as an electrical engineer?
8. Where can electrical engineers work?
9. What does a working day of an electrical engineer look like?

2 **Fill in the diagram. Tell your partner about the requirements necessary to become an electrical engineer.**



3 **Work in pairs. Discuss**
a) duties of electrical engineers;
b) career opportunities of electrical engineers;
c) working conditions of electrical engineers.

4 **Work in pairs. Take the roles of an employee and an employer. Use the information in the text to act out a job interview.**

5 **Think of what you have learnt in this unit. Close your books and tell your partner.**

6 **Quiz time. In this career quiz, there are 10 questions that will analyse if the electrical Engineers career is right for you. There are 3 answers to each question: *Dislike, Okay* and *Like.***

a) Pass the quiz.

Answer "*Dislike*" if you tell yourself "Ugh… Sounds boring" or "I'm not sure"

Answer "*Okay*" if you tell yourself "Umm… I think I will be okay with that"

Answer "*Like*" if you tell yourself "Yes, I'm interested"

QUESTION	DISLIKE	OKAY	LIKE
1. You're interested in engineering and technology like applying principles, techniques, procedures, and equipment to the design and production of various goods and services.			
2. You're interested in design like design techniques, tools, and principals involved in production of precision technical plans, blueprints, drawings, and models.			
3. Prepare technical drawings, specifications of electrical systems, or topographical maps to			

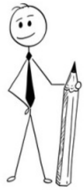
ensure that installation and operations conform to standards and customer requirements.			
4. Operate computer-assisted engineering or design software or equipment to perform engineering tasks.			
5. You like working with ideas, and require an extensive amount of thinking.			
6. You like searching for facts and figuring out problems mentally.			
7. You like work that includes practical, hands-on problems and solutions.			
8. You like dealing with plants, animals, and real-world materials like wood, tools, and machinery. You like working outside, and hate paperwork or working closely with others.			
9. You like following set procedures and routines.			
10. You like working with data and details more than with ideas.			

b) Evaluate your results. Count how many points you have. Dislike = 0 point. Okay = 1 point. Like = 2 points.
0 to 9 points = You will not like this career
10 to 15 points = You are the right person for the job
16 to 20 points = You are perfect for this career

c) Discuss the results you have with your partner.

SECTION D. WRITING

EXERCISES



1 **Read the advertisements, choose any of them and write a letter in reply. Use the plan below to write your letter. Prove that you are the best fit for the job.**

a)

CAREER OPPORTUNITY

Electrical Engineer

Education: B.Sc. Electrical Engineering

Experience: 5-10 years experience of working in different sectors. Preferably from WAPDA / LESCO

Civil Engineer/Public Health Supervisor

Education: B.Sc. or DAE (Civil)

Experience: 5-10 years experience in different construction sectors, having experience in water supply & sewerage etc. Preferably from LDA / WASA

Lab Attendant

Education: DAE (Civil) / B.Tech (Civil)

Experience: 15-20 years experience in diversified fields in civil construction. Preferably from NESPAK

Company Offers Excellent Employment Package!

Apply with full confidence by sending detailed resume

b)

Wanted

Electrical Engineers

There are vacancies in our organization for Electrical Engineers.

interested candidates
holding a Bachelor's degree in Electrical Engineering
and having 2-3 years industrial working experience
and willing to travel extensively throughout Pakistan.

are invited to
send applications in confidence
duly supported with educational and experience certificates
and a recent passport size photograph by

PLAN

Dear …

Introduction

(Para 1) *opening remarks and reasons for writing:*

I am responding to your job posting on … [website or newspaper name] for …. /I'm writing to apply for the position of …, as advertised on … [website or newspaper name]

Main Body

(Para 2) *experience details: three to four sentences about your professional background, qualifications, achievements and career highlights.*

Conclusion

(Para 3) *closing remarks: re-emphasize why you are interested in the position, why you are passionate about the company and why you'd make a good fit. In addition, describe how you, if hired, would contribute to the company.*

Sincerely,

[Your name]

2 **a) In writing translate the following advertisement.**
b) Ask questions.

Position Summary

CRB is looking for an energetic, self-motivated, and innovative individual for a key position as an Entry-Level Electrical Engineer. In addition to the basic qualifications listed above, the successful candidate must possess the skills required to successfully develop and execute project tasks and deliverables, be a collaborative team player, and have a strong drive to deliver quality project designs to customers. This person will develop and implement electrical and special systems deliverables, coordinating with internal architects, process, mechanical, and I&C engineers, and client personnel. Experience in AutoCAD and Revit is necessary for developing drawing deliverables, as well as experience with Excel for developing panel schedules. Project sizes will vary, and will consist primarily of pharmaceutical, biotech, or other advanced technology projects including both existing building renovations / retrofits and new construction.

Qualifications

- Degree in Electrical Engineering or equivalent
- 0-2 years of experience, preferably in a design firm setting
- Experience with AutoCAD and Revit
- Experience with National Electric Code (NEC) and other industry standards

Responsibilities

- Assisting in developing electrical power concepts for new or renovated high tech facilities.
- Assisting in developing single line diagrams to depict the electrical power system at a high level.
- Performing electrical calculations for power and lighting systems.
- Selecting electrical devices for power, lighting, and special systems.
- Working with other disciplines to ensure electrical and special systems designs are fully coordinated.

- Assisting in developing electrical and special systems design drawings from concept through detailed design.
- Developing electrical construction specifications.
- Following projects after construction documents are issued and reviewing submittals, providing electrical design support, and making field visits to verify construction of electrical scope is proceeding per the intent of the design.

Position Type

This is a full-time position.

Benefits

CRB offers a complete and competitive benefit package designed for individuals and families.

c) Imagine that you work for a company that deals with installation and maintenance of electrical equipment. Write an advertisement about job vacancy of an electrical engineer. Make use of the plan.

PLAN

Position Summary

Qualifications

Responsibilities

Position Type

Benefits

SECTION E. SUPPLEMENTARY TEXTS

TEXT 1

1 **Read the text and write down ten keywords. State the main idea of the text.**

Electrical engineering is the branch of engineering that deals with the technology of electricity. Electrical engineers work on a wide range of components, devices and systems, from tiny microchips to huge power station generators.

Early experiments with electricity included primitive batteries and static charges. However, the actual design, construction and manufacturing of useful devices and systems began with the implementation of Michael Faraday's Law of Induction, which essentially states that the voltage in a circuit is proportional to the rate of change in the magnetic field through the circuit. This law applies to the basic principles of the electric generator, the electric motor and the transformer. The advent of the modern age is marked by the introduction of electricity to homes, businesses and industry, all of which were made possible by electrical engineers.

Some of the most prominent pioneers in electrical engineering include Thomas Edison (electric light bulb), George Westinghouse (alternating current), Nikola Tesla (induction motor), Guglielmo Marconi (radio) and Philo T. Farnsworth (television). These innovators turned ideas and concepts about electricity into practical devices and systems that ushered in the modern age.

Since its early beginnings, the field of electrical engineering has grown and branched out into a number of specialized categories, including power generation and transmission systems, motors, batteries and control systems. Electrical engineering also includes electronics, which has itself branched into an even greater number of subcategories, such as radio frequency (RF) systems, telecommunications, remote sensing, signal processing, digital circuits, instrumentation, audio, video and optoelectronics.

The field of electronics was born with the invention of the thermionic valve diode vacuum tube in 1904 by John Ambrose Fleming. The vacuum tube basically acts as a current amplifier by outputting a multiple of its input current. It was the foundation of all electronics, including radios, television and radar, until the mid-20th century. It was largely supplanted by the transistor, which was developed in 1947 at AT&T's Bell Laboratories by William Shockley, John Bardeen and Walter Brattain, for which they received the 1956 Nobel Prize in physics.

2 **Work in groups. Prepare questions based on the text. Exchange your questions with another group. Which group has the most correct answers?**

3 **Express your opinion about the information you have read. What was the most interesting? Why?**

4 **Imagine that you are going to take part in a conference *“The most prominent pioneers in electrical engineering”*. Make a PowerPoint presentation.**

TEXT 2

1 **Read the text and write down ten keywords. State the main idea of the text.**

There are many sub-disciplines of electrical engineering. Some electrical engineers specialize exclusively in one sub-discipline, while others specialize in a combination of sub-disciplines. The most popular sub-disciplines are:

Power Engineer. A power engineer, also called a power system engineer, deals with a subfield of electrical engineering that involves the generation, transmission, distribution and utilization of electric power, along with the electrical equipment associated with these systems (such as transformers, generators, motors and power electronics). Although much of a power engineer's focus is concerned with the issues faced with three-phase AC power, another area of focus is concerned with the conversion between AC and DC power and the evolution of specific power systems like those used in aircraft or for electric railway networks. Power engineers draw the majority of their theoretical base from electrical engineering.

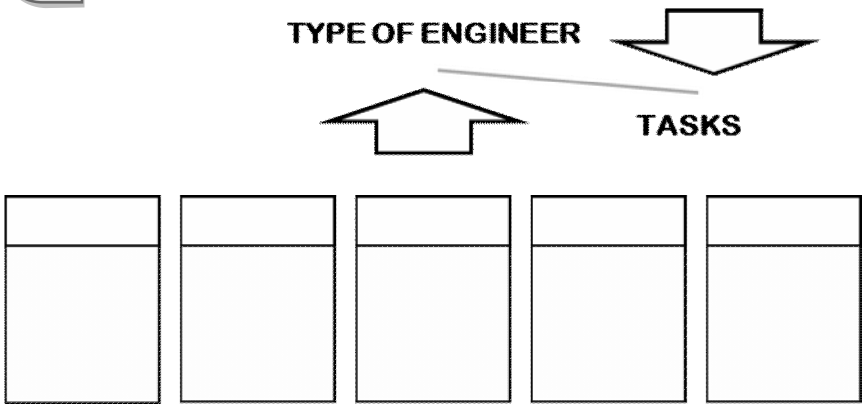
Control Engineer. Control engineering, or control systems engineering, is typically taught along with electrical engineering at many universities, and specifically focuses on implementation of control systems obtained by mathematical modeling of a wide range of systems. This type of engineering discipline uses the automatic control theory to design controllers that cause systems to behave in a certain way, using micro-controllers, programmable logic controllers, digital signal processors and electrical circuits. By using detectors and sensors to measure the output performance of the controlled process and provide corrective feedback, desired performance can be achieved.

Telecommunications Engineer. Telecommunications engineering is a discipline centred on electrical and computer engineering which attempts to assist and improve telecommunication systems. A telecommunications engineer's work will range from doing basic circuit design, providing high-speed data transmission services, and overseeing the installation of telecommunications equipment (such as electronic switching systems, optical fibre cabling, IP networks, and microwave transmission systems). They use an assortment of equipment and transport media in order to design the network infrastructure (such as twisted pair, coaxial cables, and optical fibres) and provide solutions for wireless modes of communication and information transfer, such as wireless telephone services, radio and satellite communications, and internet and broadband technologies.

Instrumentation Engineer. Instrumentation engineering finds its origin in both electrical and electronics engineering and deals with the design of measuring devices for pressure, flow and temperature. In short, this field deals with measurement, automation and control processes which involve a deep understanding of physics. Instrumentation engineers develop new and intelligent sensors, smart transducers, MEMS Technology, and Blue tooth Technology. One can find instrumentation engineers working at almost all process and manufacturing industries involved with steel, oil, petrochemical, power and defense production.

2 **Read the text again and in pairs ask and answer comprehension questions.**

3 **a) Summarize the information of the text and fill in the diagram given above.**



b) Express your attitude towards the information given in the text. What new fact have you learnt?

UNIT 4

JOB ANALYSIS OF THE ENGINEER

Once you decide on your occupation, you must immerse yourself in your work. You have to fall in love with your work. Never complain about your job. You must dedicate your life to mastering your skill. That is the secret of success.

STARTING POINTS

1 **Read the sentence in the cloud given above as an introduction to the unit. What does it mean? Compare answers with a partner.**

2 **Answer the following interview questions:**

1. What exactly are the major duties of your position?
2. What physical locations do you work in?
3. What are the education, experience, and skill requirements?
4. What are the job’s responsibilities and duties?
5. What are the job’s physical demands? The emotional and mental demands?
6. Are you exposed to any hazards or unusual working conditions?

SECTION A. READING

EXERCISES

1 **Study the information about job analysis and find English equivalents to Russian words and combinations:**

Задачи, обязанности; технические условия; способности; возможности; поведенческие характеристики; навыки; полученное образование; условия работы, работающего по найму; льготы.

JOB ANALYSIS

Job analysis (professiogram) contains the information about job description (tasks and responsibilities tagged to a job) and job specifications (capabilities of job holders). Job analysis is concerned only with the job and not with the job holders, but however, the information about the job is gathered from the incumbents.

Job analysis is a detailed examination of tasks that make up a job (employee role); conditions under which an employee performing his/her job; requirements in terms of aptitudes (potential for achievement), attitudes (behavior characteristics), knowledge, skills, educational qualifications and the physical working condition of the employee.

Some important definitions of job-analysis are as follows:

According to Harry L. Wylie "Job analysis deals with the anatomy of the job.....This is the complete study of the job embodying every known and determinable factor, including the duties and responsibilities involved in its performance; the conditions under which performance is carried on; the nature of the task; the qualifications required in the worker; and the conditions of employment such as pay, hours, opportunities and privileges".

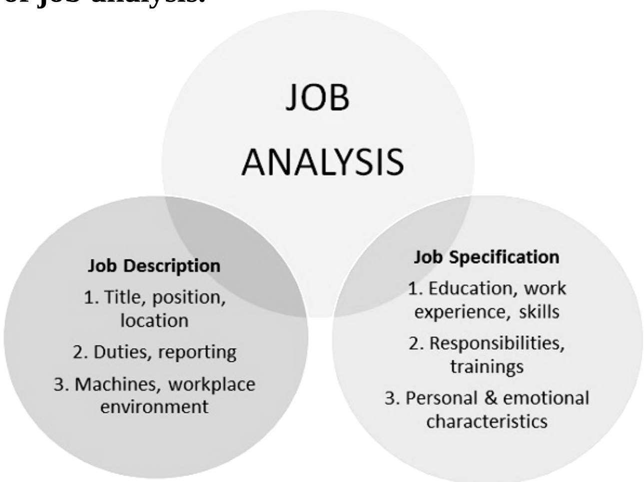
In the words of Blum, "A job analysis is an accurate study of the various components of a job. It is concerned not only with an analysis of the duties and conditions of work, but also with the individual qualifications of the worker."

In simple words job analysis is a formal programme which examines the tasks, duties and responsibilities contained in an individual unit of work. The professiogram covers all aspects of a particular professional activity-social, socio-economic, historical, technical, technological, legal, hygienic, psychological, which are presented collectively, in a concise and descriptive manner.

2 **a) Read the text again and make notes under the following headings:**

- job analysis component parts;
- job analysis definition;
- aspects of professional activity of the professiogram.

b) Give a short talk about the main constituent parts and aspects of job analysis.



SECTION B. WORKSHOP

MAKING A MULTIMEDIA PRESENTATION

INSTRUCTIONS HOW TO CREATE A PROFESSIOGRAM:

1 **Study the following steps of creating a professiogram and make a plan of your future profession job analysis:**

Step 1: Make a general characteristic of the profession. Describe its social significance, the needs for the profession. Specify the necessary education and qualifications, as well as career advancement prospects.

Step 2: Describe the working process: contents, objectives, means and the main results of labor. Describe the main responsibilities of the profession.

Step 3: Note the general requirements for the employees: necessary general and specific knowledge and skills. Outline the required state of health, the physiological characteristics of a person. Specify medical contraindications. Describe the working conditions: sanitary conditions (noise, temperature, etc.); and economic conditions (wages, benefits, vacation), and technical conditions, etc.

Step 4: Describe exactly all the activities, their timing during the day, important events and their frequency of repetition, statistical or dynamic loads during the working day. Describe labor characteristics: specific difficulties, occupational hazards, benefits, expression of latitude, breadth of communication.

Step 5: Make a psychological description of the profession. Describe the type of thinking, memory, responsibility, self-control, the ability to work under time pressure and to make decisions. Set out other requirements for mental processes (emotions, speech, motivation, experience, intelligence, moral and psychological stability, character traits).

Step 6: Provide information about the availability of the profession (education, literature on professions).

2 **The following information blocks describe an engineering profession. Match the information with the professiogram steps. Restore the order of presenting a professiogram:**

A

Agricultural engineers are methodical and disciplined. They see a problem and seek to understand a solution. They then realize that their chosen solution may not be the optimal one and are willing to listen to alternative approaches. They test their approach. They also interact with the customer to make sure that their proposed solution will meet the customer's needs. Additionally, they can explain, in either written or oral form, any aspect of their solution in a clear and concise manner.

B

The Agricultural Engineering training program is among the winners of the project Best Educational Programs of Innovative educational courses in the Sphere of Professional Education and the National Centre for Public Accreditation.

C

Agriculture Engineering is a technologically sophisticated field that offers bright career prospects and opportunity in any country around the world, and in various sectors. Some of the higher study options for the B. Tech graduates in agriculture are: Master of Technology in Agricultural Engineering, Master of Technology in Farm Machinery and Power Engineering, Master of Technology in Renewable Energy, Master of Technology in Crop Production, Master of Science in Rural Technology, Doctor of Philosophy in Agri-Informatics, Doctor of Philosophy in Rural Technology. Well-paid careers are available for qualified agricultural engineers in government and public sector organizations, agribusiness firms, food processing and retail industry, research organizations and laboratories, banks and financial corporations, central and state government organizations and private firms.

D

Agricultural engineers typically do the following:

- Design agricultural machinery components and equipment;
- Test agricultural machinery and equipment;
- Design food-processing plants and supervise manufacturing operations;
- Plan and direct construction of rural electric-power distribution systems;
- Design structures to store and process crops;
- Design housing and environments to maximize animals' comfort, health, and productivity;
- Design and supervise environmental projects;
- Discuss plans with clients, contractors, consultants, and other engineers.

E

Agricultural engineers typically

- Work full time. Schedules may vary because of weather conditions or other complications. When working on outdoor projects, agricultural engineers may work more hours to take advantage of good weather or fewer hours in case of bad weather.
- Have a medium to high level of social contact.
- Communicate daily by telephone, e-mail, and in person.
- Communicate by letters and memos, but less often.
- Work as part of a group or team.
- Are somewhat responsible for the work done by others.
- Are responsible for the health and safety of others.
- Occasionally are placed in conflict situations.

F

Agricultural engineers spend time at a variety of worksites, both indoors and outdoors, traveling to agricultural settings to see that equipment and machinery are functioning according to both the manufacturers’ instructions and federal and state regulations. They may work onsite when they supervise environmental reclamation or water resource management projects. Other worksites where they are employed include research and development laboratories, classrooms, and offices.

3 **Study the rules of making a successful presentation. Make key notes for you to be helpful when creating your own presentation.**

HOW TO MAKE A SUCCESSFUL PRESENTATION

5 EASY STEPS TO PERFECTION

Giving a presentation terrifies most of us, especially when talking before a crowd of people about an unfamiliar topic. Never fear! There are ways to make a good presentation. The more presentations you do, the easier they will become! To learn how to make a successful presentation and become a PowerPoint hero, check out these tips.

1. THE TOPIC

Love your topic. Your listeners will only ever be as excited about the topic as you are. Be interested in what you are saying.

Research. Know what you are talking about. Don't guess. Don't assume. Read, listen, find facts and have an informed opinion.

Context. Think about your audience and tailor your topic to the way they think and prioritise.

2. THE FORMAT

Time limit. There will be one, and if there isn't, make one. Then aim to fill three quarters of it, and leave time for questions.

Plan on paper. You need to be able to pool your ideas and images together, move them around and play with structure first, then decide how to present it.

PowerPoint. There is a lot of debate about whether PowerPoint is good or evil, but the fact is it's the standard. Remember the 10-20-30 Rule for Slideshows. This is a tip from Guy Kawasaki of Apple. He suggests that slideshows should:

1) Contain no more than 10 slides;

2) Last no more than 20 minutes; and

3) Use a font size of no less than 30 point.

This last is particularly important as it stops you trying to put too much information on any one slide. Slides should keep you going, not hold you up.

Images inspire. Don't fall back onto boring stock photography and clip art. Consider using your own personal photographs or explore creative commons sources like Flickr for more intimate and relatable imagery.

3. THE CONTENTS

Short and sweet. This applies to the presentation as a whole and each word you use. Stick to short words and avoid jargon.

Tell a story. People respond to stories. Everybody creates narratives; it's how we understand the world. Find the story in what you want to say.

Use examples. Presentations can often get a bit abstract. Keep your points grounded in reality and use everyday experiences that anyone can relate to when explaining complex ideas.

Pre-empt questions. What will the audience want to know next? Of course, you want to spark interest and debate after your talk, but make sure no one has to ask an obvious question.

Know what you can leave out. Questions can arise, people arrive late: sometimes things don't run to plan. Know in advance which slides and points you can skip without losing key points or narrative flow.

4. THE PREPARATION

Know how to use your tools. If you are using PowerPoint, be sure you understand how.

Rehearse. You have to practice: you need to be familiar enough with your presentation that if the power fails and notes get lost, you could still communicate the core of your message. Go through the presentation three times in the morning, and three times at night in the run up to the day.

Plan your outfit. You will have enough to worry about on the day. It may seem silly but don't leave it to the night before to decide what you are wearing. Choose it, check it's clean and ironed and hang it up ready to fall into on the day.

Get a lay of the land. If you can, try to find out what room you will be presenting in and exactly who you will be presenting to. Will you have to project your voice, or will it be relaxed and informal? Is it always freezing in there? Are the chairs uncomfortable? These factors will affect your audiences' attention span, and for those things out of your control, you need to be conscious of them in how you present.

Run a fact check. You did your research, but often things can change pretty quickly. There might be a change in the hierarchy. On the day before make sure your presentation is as up to date as you are.

5. THE DAY

Take everything you need (and a backup). Have your laptop cables and connectors. Take a backup of your presentation on a memory stick in case you have to use someone else's hardware, and have some bullet point notes about the slides in case all technology fails.

Arrive early. Don't get flustered. Have time to find the loos, sort the technical stuff, get a drink and warm up.

Warm up. There are lots of ways to relax and loosen up before a presentation. There are a lot of videos that teach you how to use acting techniques to battle nerves, loosen your tongue and stay focused.

Connect with your audience. Watch your audience to see if they are engaged, listen for murmurs and change tack if brows are furrowed. Be engaged to get engagement.

Share and follow up. Think of a way to share your presentation with attendees after the event, for example with Slide Share. Send a follow up email, thank people for their attendance and invite questions and feedback.

Remember the advice of Steve Jobs: "People who know what they're talking about don't need PowerPoint." PowerPoint is a tool to visualisation, and it should not be the focus of your presentation.

4 **Make sure you know the general rules of making a presentation. Provide answers to the following questions. Consult the text if necessary.**

1. What are the main five steps of a perfect presentation?
2. What does the 10-20-30 rule for slideshows mean?
3. Is it possible to use complex detailed text slides?
4. What is the best way of giving examples when explaining complex ideas?
5. Why is it necessary to rehearse the whole presentation?
6. Is it essential to make sure your presentation is up-to-date? Why?
7. Why is it recommended to take a backup copy of your presentation on a memory stick?
8. How can you relax and loosen up before a presentation?
9. What are the ways to connect your speech with the audience?
10. How do you understand the words of Steve Jobs: "People who know what they're talking about don't need PowerPoint"?

5 **Study the phrases for better flowing a successful presentation. Choose the ones suitable for your presentation "*My future profession job analysis*".**

PHRASES TO IMPROVE THE FLOW OF YOUR ENGLISH PRESENTATIONS

1. THE INTRODUCTION

All good presentations start with a strong introduction. There are a number of different ways you can open your English presentation, depending on your goal. Introduce yourself (greeting), explaining the reasons for listening. Describe different sections of the presentation.

Here are some phrases which you can use to structure the introduction in this way:

Greeting

- Ø Good morning/afternoon (everyone) (ladies and gentlemen).
- Ø It's a pleasure to welcome … here.

Introduce the presentation topic

- Ø I plan to say a few words about…
- Ø I'm going to talk about…
- Ø The subject of my talk is…

Outline

- Ø My talk will be in (three parts).
- Ø In the first part…
- Ø Then in the second part…
- Ø Finally, I'll go on to talk about…

Questions

- Ø Please interrupt if you have any questions.
- Ø After my talk, there will be time for a discussion and any questions.

2. MAIN BODY

Now you have finished the introduction, and we need to transit to the main body, and its individual parts in a smooth way.

There are three parts of the main body of a presentation where linking phrases can be used:

1. Beginning the main body
2. Ending parts within the main body
3. Beginning a new part

Here are some phrases which you can use for these parts:

Beginning the main body

- Now let's move to / turn to the first part of my talk which is about…
- So, first…
- To begin with…

Ending Parts within the Main Body

- That completes / concludes…
- That's all (I want to say for now) on…
- Ok, I've explained how…

Beginning a New Part

- Let's move to (the next part which is) …
- So now we come to the next point, which is…
- Let's turn to the next issue…

3. LISTING AND SEQUENCING

If in your English presentation, you need to talk about goals, challenges, and strategies, listing phrases can help link these together and improve the flow of your speech. If you have to explain processes, sequencing phrases are helpful:

Listing

- There are three things to consider. First… Second… Third…
- There are two kinds of… The first is… The second is…
- We can see four advantages and two disadvantages. First, advantages…

Sequencing

- Ø There are (four) different stages to the process.
- Ø First / then / next / after that / then (…) / after x there’s (…).
- Ø There are two steps involved. The first step is… The second step is…
- Ø There are four stages to the project.
- Ø At the beginning / later / then / finally…
- Ø I’ll describe the development of the idea. First the background, then the present situation, and then the prospect for the future.

4. ENDING

After you have presented the main body of your English presentation, you will want to end it smoothly. Here are typical sections of the presentation, and some phrases which you can use for these parts:

Ending the Main Body

- Ø Okay, that ends (the third part of) my talk.
- Ø That’s all I want to say for now.

Beginning the summary or conclusion

- Ø To sum up…, / To conclude…
- Ø I’d like to end by emphasizing the main points.

Concluding

- Ø In my opinion, we should…
- Ø I recommend/suggest that we…

An ending phrase

- Well, I've covered the points that I needed to present today.
- That concludes my talk for today.

Inviting Questions and Introducing Discussion

- So, now I'd be very interested to hear your comments.

Thanking the Audience

- Thank you for listening / your attention. / Many thanks for coming.

5. CONCLUSION

Linking phrases are like the skeleton which holds your presentation together.

Not only do they improve the flow and help guide the audience, by memorizing them they can also help you remember the general structure of your presentation, giving you increased confidence.

It's recommended to say the linking phrases on their own from the beginning to the end of your presentation while practicing.

Memorize the introduction word for word. By doing this, you will get off to a great start, which will settle your nerves and transmit a positive first impression.

BASIC VOCABULARY

Accomplishment (n)	выполнение, завершение, достижение
adaptor (n)	переходник
additive (n)	добавка (пищевая)
adherence (n)	сцепление (например, колеса с почвой)
advancement (n)	продвижение, улучшение
agriculture (n)	сельское хозяйство
alfalfa (n)	люцерна
allow (v)	позволять, допускать, разрешать
alter (v)	изменять; менять; видоизменять, вносить изменения, переделывать
application (n)	прибор; аппаратура; сфера применения
appropriate (adj)	подходящий, соответствующий; должный
apricot (n)	абрикос
aptitude (n)	пригодность; склонность
assume (v)	допускать, предполагать
attendee (n)	участник (конференции, семинара) , слушатель
auger (n)	бурав, сверло, бур, шнек (транспортёра)
availability (n)	годность, полезность, пригодность
awareness (n)	информированность
Backup (n)	запас, резерв
backyard-garden (n)	приусадебный участок
bale lifter (n)	тюкоподъёмник

baler (n)	пресс-подборщик (сена, соломы)
barley (n)	ячмень
battery (n)	батарея; электрическая батарея; аккумулятор
bedding (n)	подстилка для скота
bee (n)	пчела
beet (n)	свекла
belt (n) *seatbelt	пояс, ремень *ремень безопасности
blemish (n)	физический дефект, недостаток
blow (v)	перегорать (о предохранителе)
brake (v)	разбивать, разрыхлять
branch (n)	отрасль
break (v)	дробить
breed (n, v)	1. порода 2. выводить, разводить (животных); вскармливать
bulky (adj)	большой, объёмистый; громоздкий, занимающий много места
Cabbage (n)	кочанная капуста
capacity (n)	мощность, нагрузка; производительность
career (n) *career prospect	карьера, занятие, профессия *направления карьерного развития
carob (n)	рожковое дерево
carry out (v)	выполнять, осуществлять; приводить в исполнение
cart (n)	повозка; телега
cattle (n)	крупный рогатый скот

*dairy cattle (n) *beef cattle (n)	*крупный рогатый скот молочного направления *крупный рогатый скот мясного направления
cause (v)	послужить причиной, поводом (для чего-л.); мотивировать (что-л.)
chainsaw (n)	цепная пила
check (n) *maintenance check	проверка *проверка технического состояния; эксплуатационная проверка
cherry (n)	черешня
chickpea (n)	нут, турецкий горох
circuit (n) *circuit breaker	цепь, контур *автоматический выключатель
clover (n)	клевер
collaborate (v)	участвовать; работать совместно, действовать совместно с
commissioning (n)	ввод в действие или в эксплуатацию; пуско-наладочные работы
computer-aided (adj)	компьютеризованный; компьютерный
conduct (v)	проводить (ток)
conductor(n)	проводник тока; провод
conjure up (v)	вызывать в воображении
conservation (n)	охрана, сохранение; защита
contemporary (adj)	современный
contraindication (n)	противопоказание
convert (v)	преобразовывать (ток)
copious (adj)	обширный, большой
corn (n)	кукуруза, зерно

crop (n) *industrial crop *root crop *vegetable crop	сельскохозяйственная культура *техническая культура *корнеплод *овощная культура
crucial (adj)	решающий, ключевой
cucumber (n)	огурец
cultivate (v)	выращивать, возделывать, обрабатывать
cultivation (n)	выращивание, возделывание, разведение
cultivator (n)	культиватор
curious (adj)	любопытный; любознательный, пытливый
current (n) *direct current *alternative current	ток *ток постоянного напряжения *ток переменного напряжения
cut (v)	жать (урожай), косить
cutter (n) *hedge cutter	режущий инструмент; резец *машина для подрезки живой изгороди
Damage (n)	вред, повреждение; дефект, поломка; убыток, ущерб, урон
density (n)	плотность, удельная масса
destoner (n)	камнеотборочная машина
destruction (n)	разрушение; уничтожение
detect (v)	замечать, открывать, обнаруживать
develop (v)	развивать, разрабатывать
device (n)	устройство, приспособление; механизм, аппарат, прибор
dig (v)	копать, рыхлить
digger (n) *post-hole digger	копалка *бур-машина, ямобур

digital (adj) *digital hour	цифровой, числовой *цифровой счетчик
dipping (n) *sheep dipping (n)	дезинфицирующий состав (для овец) *уничтожение паразитов у овец
disease (n) *animal-borne disease	болезнь *передающаяся животными болезнь
distribution (n)	распределение
diversify (v)	варьировать, дифференцировать, изменять
domesticate (v)	приручать, выращивать
drafting (n) *drafting performance	тяговый *тяговые эксплуатационные качества
draw (v)	тащить, волочить; тянуть
drawing (n)	чертёж
drill (n) *seed drill *precision drill	сеялка *рядовая сеялка *сеялка точного высева
drudgery (n)	тяжелая работа
Egg candler (n)	сортировщик яиц
electricity (n)	электричество
electrification (n)	электрификация; электризация
emerge (v)	появляться; всплывать, вставать, возникать (о вопросе)
emission (n) *exhaust emission	выделение, распространение (тепла, света, запаха); выброс *выделение продуктов сгорания с отработавшими газами

employ (v)	нанимать; предоставлять работу
employer (n)	наниматель; работодатель
employment (n)	служба; занятие; занятость
encompass (v)	содержать, охватить, вмещать
engage(v)	заниматься, участвовать
engagement(n)	вхождение в контакт
engine (n) *internal combustion engine *spark-driven engine *gasoline-powered engine	двигатель; мотор *двигатель внутреннего сгорания *двигатель, приводимый в движение от искры зажигания *бензиновый двигатель
engine-driven (adj)	приводимый от двигателя, с механическим приводом
engineering (n) *mechanical engineering *electrical engineering *civil engineering (n)	инженерное дело, техника *машиностроение *электротехника *жилищно-гражданское строительство
enhance (v)	увеличивать, усиливать, совершенствовать улучшать (обычно какое-л. положительное свойство)
enterprise (n)	предприятие
entry-level (adj)	начальный, первоначальный (относящийся к первой работе или к первому опыту деятельности в определенной области)
evaluate (v)	1. оценивать; устанавливать стоимость; определять количество; 2. оценивать, давать оценку; составлять мнение

Fallow (v)	вспахивать под пар; поднимать пар
farming (n) *crop farming *livestock farming (n) (syn.) livestock production, animal husbandry	сельское хозяйство *растениеводство (земледелие) *животноводство
farmland (n)	пахотная земля, сельскохозяйственные угодья, обрабатываемая земля
fatality (n)	беда, бедствие; злоключение; несчастье; смерть (от несчастного случая и пр.)
feature (v)	являться характерной чертой, отличительным признаком; отличать, характеризовать
feed (n)	корм
fibre (Br) fiber (Am) (n) *wool fibers	волокно *волокна шерсти
flax (n)	лен
font (n)	шрифт
food (n) *food quality *food safety *food security *food supervisor	пища, еда, продовольствие *качество продуктов питания, пищевое качество; *продовольственная безопасность; безвредность пищевых продуктов; *продовольственная обеспеченность; *специалист по санитарному надзору за производством и качеством пищевых продуктов
forage (n)	корм для животных, фураж, кормовые культуры

forefront(n)	передний план; важнейшее место
frame (n) *engine frame	рама, рамка *подрамник двигателя
freelance (n)	работающий без контракта; не состоящий в штате
fuel (n) *fuel consumption	топливо, горючее *расход горючего; потребление горючего
full time (adj)	занятый полную рабочую неделю; штатный; полный рабочий день
fuse (n)	предохранитель
gauge (n) *fuel gauge *temperature gauge	мера, масштаб, размер, калибр *измеритель горючего; топливный расходомер, *бензиномер, датчик измерения температуры
General purpose (adj)	универсальный, общего применения
generate (v)	вырабатывать
generation (n)	выработка электрической энергии
genuine (adj)	искренний, ненаигранный
goat (n)	козёл; коза
grading (n)	сортировка
grain (n) *cereal grains	зерно; хлебные злаки *зерновые культуры (злаки)
grid (n)	электросеть, энергетическая система
grinder-mixer (n)	дробилка-смеситель
grounded (adj)	обоснованный; аргументированный
Handle (v)	обходиться, обращаться; управляться, справляться (с

*materials handler	кем-л. / чем-л.) *рабочий на станции загрузки-разгрузки
handy(adj)	удобный (для пользования); полезный; легко управляемый
harrow(n)	борона
harvester (n)	уборочный комбайн
hat(n) *hard hat	шапка; головной убор *защитная каска
haul (v)	тащить, тянуть, буксировать, оттаскивать
haulage (n) *heavy haulage	буксировка; перевозка; транспортировка; доставка *транспортировка тяжёлых грузов
hay (n) *haymaking	сено *сенокос
hazard (n)	риск, опасность, источник опасности
hazardous (adj)	рискованный, опасный
height (n)	высота
hoe (n)	мотыга
hog (n)	домашняя свинья, боров
hold up (v)	останавливать, задерживать
hygienic (adj)	санитарный, гигиенический
Ignition (n) *direct ignition *ignition system	зажигание, воспламенение *непосредственное зажигание *система зажигания (двигателя)
impact (n) *environmental impact	сильное воздействие; влияние *воздействие на окружающую среду, последствия для окружающей среды

implement (n)	инструмент, прибор; орудие, средство, инвентарь
improve (v)	улучшать, совершенствовать
induction (n)	электромагнитная индукция
inevitable (adj)	неизбежный, неизменный, обязательный
injury (n)	травма, рана, ушиб
inquisitive (adj)	любознательный, пытливый
install (v)	монтировать; устанавливать
installation (n)	установка; монтаж оборудования
intelligence (n)	интеллект, рассудок, разум; умственные способности
introspective (adj)	интроспективный, занимающийся самоанализом
investigative (adj)	пытливый, любознательный
irrigation (n) *drip irrigation *center pivot irrigation	полив; ирригация, орошение *капельное орошение *круговое орошение
Job (n) *job analysis (n)	работа, должность, служба, место работы *анализ профессиональной деятельности
Labour (Br), labor (Am) (n)	работа, труд, рабочая сила
large-scale (adj)	крупномасштабный
latitude (n)	свобода; самостоятельность (о поведении, действиях, образе мыслей)
lay out (v)	раскладывать; размещать; подготавливать схему соединений
lead (n)	*эл.* подводящий провод

*extension lead (n)	*кабель-удлинитель
leave out (v)	пропускать, не включать
legumes (n)	бобовые растения
lentils (n)	чечевица (*овощи*)
level (v)	выравнивать, делать ровным
lift (v)	поднимать
lighting (n) *lighting fixture(s)	освещение *светильник; осветительная техника
load (n) *overload	нагрузка *перегрузка
loader (n) *backhoe loader *front-end loader	погрузчик, погрузочное приспособление; загрузчик, загрузочное устройство *экскаватор-погрузчик *погрузчик фронтальной навески, фронтальный погрузчик
loosen (v)	рыхлить, разрыхлять
loosen up (v)	разминаться
lupin bean (n)	фасоль
Mains (n)	электрическая сеть
manure (n) *green manure	навоз, компост, удобрение *зеленое удобрение, сидеральное удобрение
manure spreader (n)	разбрасыватель навоза
measure (n)	измерить; замерять
measurement (n)	измерение; замер
memory stick (n)	карта памяти
mesquite (n)	мескитовое дерево
meter (n)	измерительный прибор; счетчик
millet (n)	просо, пшено

mixer (n) *feed mixer (n)	смешивающий аппарат *смеситель для комбикормов; кормомешалка
monitor (v)	контролировать; следить
motor (n) *electric motor	двигатель; мотор *электродвигатель
mower (n)	(сено)косилка
mulch (v)	мульчировать (покрывать почву перегноем, соломой для защиты от испарения, замерзания)
multipurpose (adj)	универсальный; комплексный; многоцелевой
mussel (n)	мидия
Nourishment (n)	питание, питательное вещество
numerous (adj)	многочисленный
nutritious (adj)	питательный
Oats (n)	овес
occupation (n)	занятие; профессия; занятость
off-farm (adj) *off-farm transport	вне фермы, несельскохозяйственный *несельскохозяйственный транспорт
onions (n)	лук
opportunity (n)	шанс, возможность; перспектива
orange (n)	апельсин
outlet (n)	точка присоединения потребляющего агрегата (напр. штепсельная розетка)
oversee (v)	наблюдать, надзирать; следить, смотреть (за чем-л.)
overtime (adv)	сверхурочно

oyster (n)	устрица
Pave the way (v)	прокладывать путь, подготавливать почву
peach (n)	персик
peanut (n)	земляной орех, арахис
pear (n)	груша
peas (n)	горох
pen (n) *crush pen *holding pen	загон *узкий загон для скота (с широким входом; скот туда загоняется для пересчёта, клеймения и т. п.) *загон для отдыха скота; загон для предубойной выдержки скота
pepper (n)	перец
persistent (adv.)	настойчивый, упорный
pig (n)	свинья, кабан, свиноматка
pitchfork (n)	сенные вилы
plant (n, v) *plant physiologist	1. растение 2. сажать, сеять, засаживать *специалист по физиологии растений
planter (n)	сеялка, сажалка
plough (Br), plow (Am) (n)	плуг
plug (n, v)	1. штепсельная вилка; 2. вставлять в розетку
plum (n)	слива
point (n) *bullet point (n)	пункт, момент, вопрос; дело *наиболее важный пункт списка; ключевой момент (в выступлении)

pool (v) *pool ideas	объединять в общий фонд *объединять идеи
pork (n)	свинина
position (n)	положение; должность
potato (n) *sweet potato	картофель *сладкий картофель
poultry (n) *poultry breeding (syn.) poultry farming	домашняя птица *птицеводство, разведение домашней птицы
power (n, v) *power plant *animal power *draught animal power *power supply	1. источник энергии; мощность; электроэнергия 2. снабжать энергией; приводить в действие; служить источником энергии *электростанция *животная тяга *животная тягловая сила *электроснабжение, энергоснабжение
power take-off (PTO) (n) *power take-off (PTO) shaft *power take-off circuit	отбор мощности, вал отбора мощности *вал отбора мощности; механизм отбора мощности *цикл вала отбора мощности
precaution(n)	предосторожность; предусмотрительность; мера предосторожности
precision(n)	точность; чёткость, аккуратность; правильность
prevent from (v)	предотвращать
processing (n) *premarketing processing	обработка, переработка *предпродажная обработка
profit (n)	прибыль, доход

profitable (adj)	прибыльный, выгодный, доходный
prospect (n) *employment prospect	перспектива; шансы (на успех); виды, планы на будущее; *перспектива занятости
provision (n)	снабжение, заготовка, обеспечение
pull (v)	тянуть, тащить
pulley (n)	шкив, блок; ворот
pulverize (v)	растирать, дробить, измельчать
purchase (v)	покупать, приобретать
Radish(n)	редис, редиска
raise (syn) bring up, grow	выращивать
rake (n) *hay rake	грабли, разгребатель *сенные грабли
rape (n)	рапс
raspberry (n)	малина
rate (n) *feed rate	скорость; интенсивность; частота *скорость подачи
reaper (n)	жатвенная машина, жатка
receptacle (n)	гнездо для подключения проводов; штепсельная розетка
recharge (v)	перезаряжать; повторно зарядить
rectify (v)	выпрямлять ток
renewable (adj)	возобновляемый
require (v)	требовать, нуждаться
residue (n)	остаток

resistance (n)	сопротивление
responsibility (n)	ответственность (за что-л.)
retail (adj)	розничный
rice (n) *rice huller	рис *шелушильный постав для риса
roll bar (n)	брус, предохраняющий водителя при опрокидывании автомобиля, штанга стабилизатора боковой устойчивости
roller (n)	каток (для обработки почвы)
run out (v)	разрядиться, сесть
rural (adj) *rural electrification	сельский *электрификация сельских районов
rutabaga (n)	брюква
rye (n)	рожь
Scoop shovel (n)	экскаватор; землечерпалка
seeder (n) *broadcast seeder *air seeder	сеялка; посевной агрегат *разбросная сеялка *пневматическая сеялка
severe	серьёзный, тяжёлый, сильный
shaft (n)	*тех*. вал, ось, шпиндель
shield from (v)	заслонять, защищать; прикрывать, ограждать от
shift (n)	смена (рабочая)
shop manager (n)	начальник цеха
shovel (n)	лопата, совковая лопата
silage (n)	силос
site (n)	место выполнения работ
skill (n)	навык; мастерство
slurry	навозная жижа

*slurry pit (n)	*яма для навозной жижи; жижесборник; жижехранилище
soil (n)	почва
soil tiller (n)	почвообрабатывающая машина
solution (n)	решение
solve (v)	устранять проблему
sophisticated (adj)	сложный, сложно устроенный, современный, передовой
sorter (n)	сортировальная машина, сортировальное устройство
source (n)	источник
soybean (n)	соя, соевый боб
spade (n)	лопата, совок
specifications (n)	техническая характеристика
spray (v)	распылять, разбрызгивать, опылять
spreader (n) *fertilizer spreader *manure spreaders	приспособление для распространения, разбрасывания, расширения чего-л. *разбрасыватель удобрений; тукоразбрасыватель *разбрасыватель органических удобрений, навозоразбрасыватель
stack (n) *stacking	скирда, стог *скирдование; стогование
starter (n)	стартёр (для пуска двигателя)
stick to (v)	придерживаться чего-л.
storage (n)	сохранение, хранение; заготовка, складирование
store (v)	накапливать; аккумулировать

strawberry (n)	клубника
subsistent (adj)	натуральный
sub-soiler (n)	глубокорыхлитель
substance (n)	вещество
succulent (adj)	сочный; аппетитный
sugar cane (n)	сахарный тростник
supervise (v)	смотреть, наблюдать (за чем-л.); надзирать; заведовать
sustainable (adj)	устойчивый; жизнеспособный, (экологически) устойчивый (не наносящий ущерба окружающей среде), экологически рациональный
switch (n) *light switch	выключатель; разъединитель, прерыватель; *выключатель света
Tack (n)	курс (действий)
tailor to (v)	приспосабливать для (кого-л. / чего-л.)
tamarind (n)	тамаринд, индийский финик
tank (n) *water tank	бак, резервуар, цистерна, чан *бак для воды
tedder	сеноворошилка
thresher (n)	молотилка
thrifty	бережливый, расчётливый, экономный
tick tracer (n)	индикатор
till (v)	возделывать землю, пахать
tillage (n) *primary tillage *secondary tillage	обработка почвы *первичная обработка почвы *предпосевная обработка почвы
tiller (n)	окучник, культиватор

*power tiller	*мотокультиватор
tool (n) *hand tool *tillage tool	инструмент, станок, орудие *ручной рабочий инструмент *почвообрабатывающее орудие
track (v)	прокладывать маршрут
traction (n)	тяга; тяговое усилие
transmission (n)	передача
transplant (v)	пересаживать (растения)
troubleshooting (n)	выявление неисправностей
trout (n)	форель
truck (n) *fork lift truck	грузовой автомобиль, грузовик *автопогрузчик с вильчатым захватом; вилочный подъёмник; вилочный автопогрузчик
tyre (Br), tire (Am) (n)	шина; покрышка
Upgrade (v)	модернизировать, реконструировать, обновлять
utilization (n)	использование
Venture (n)	предприятие
vital (adj)	(жизненно) важный, насущный, существенный; необходимый
voltage (n) *voltage status	напряжения *состояние напряжения
Wage (n) =wages	заработная плата (рабочих)
warm up (v)	разогреваться перед выступлением, готовиться к выступлению
weed (n)	сорная трава, сорняк
weighty (adj)	важный, веский, весомый
welding (n)	сварка
welfare (n)	благополучие, благосостояние

wheat (n)	пшеница
wheel (n)	колесо
winding (n)	электрообмотка
wire (n, v)	1. провод 2. монтировать проводку (провода); вмонтировать

REFERENCES

1. Английский язык: англо-русский словарь для студентов агротехнических специальностей / сост.: Л. В. Захарьева, Н. И. Токарева. – Минск : БГАТУ, 2011. – 145 с.

2. O'Sullivan, Neil. Agriculture / Neil O'Sullivan, James D. Libbin. – Express Publishing, 2011. – 40 p.

3. About health and safety in agriculture [Electronic resource]. – Mode of access: https://www.hse.gov.uk/agriculture/hsagriculture.htm – Date of access: 12.09.2019.

4. AgriLand [Electronic resource]. – Mode of access: https://www.agriland.ie/– Date of access: 21.09.2019.

5. Center for environmental solutions / Organic farming in Belarus today [Electronic resource]. – Mode of access: https://www.ecoidea.by/en/article/3971 – Date of access: 20.07.2019.

6. Computer Desktop Encyclopedia [Electronic resource]. – Mode of access: https://encyclopedia2.thefreedictionary.com/ – Date of access: 22.06.2019.

7. Electrical guide / P N Junction Diode Theory (Working) [Electronic resource]. – Mode of access: https://www.yourelectricalguide.com/2020/02/p-n-junction-diode-theory-working-principle.html – Date of access: 13.12.2019.

8. Encyclopedia Britannica / Rural electrification (agriculture) [Electronic resource]. – Mode of access: https://www.britannica.com/technology/rural-electrification – Date of access: 10.06.2019.

9. Encyclopedia of Occupational Health and Safety / Electrical Appliances and Equipment [Electronic resource]. – Mode of access: http://www.ilocis.org/documents/chpt81e.htm – Date of access: 05.09.2019.

10. Engineering Council [Electronic resource]. – Mode of access: https://www.engc.org.uk/ – Date of access: 15.10.2019.

11. European Agency for Safety and Health at Work / Maintenance in Agriculture - A Safety and Health Guide [Electronic resource]. – Mode of access: https://osha.europa.eu/en/publications/reports/maintenance-in-agriculture-a-safety-and-health-guide – Date of access: 12.02.2020.

12. Food and Agriculture Organization of the United Nations / Animal Production [Electronic resource]. – Mode of access: https://www.ecoidea.by/en/article/3971 – Date of access: 25.11.2019.

13. GOLDSPIN / Overhead power line towers [Electronic resource]. – Mode of access: https://goldspin.ru/en/equipment/types-of-supports-ow-overhead-power-lines.html – Date of access: 11.08.2019.

14. Livestock rearing: its extent and health effects [Electronic resource]. – Mode of access: http://www.ilocis.org/documents/chpt70e.htm – Date of access: 12.12.2019.

15. Wisegeek / What Is Crop Production Management? [Electronic resource]. – Mode of access: https://www.wisegeek.com/what-is-crop-production-management.htm – Date of access: 30.11.2019.

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