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ИНОСТРАННЫЙ ЯЗЫК
(английский язык)

Учебное пособие по развитию навыков устной речи и выполнению самостоятельной работы для обучающихся по основной образовательной программе среднего профессионального образования специальности 35.02.16
Эксплуатация и ремонт сельскохозяйственной техники и оборудования

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Иностранный язык (английский язык): Учебное пособие по развитию навыков устной речи и выполнению самостоятельной работы для обучающихся по основной образовательной программе среднего профессионального образования специальности 35.02.16 Эксплуатация и ремонт сельскохозяйственной техники и оборудования
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Цель пособия – развитие и совершенствование практических навыков иноязычной коммуникативной компетенции в пределах представленной тематики.

Издается по решению методического совета ФГБОУ ВО Приморский ГАТУ

СОДЕРЖАНИЕ

ВВЕДЕНИЕ

Данное пособие предназначено для студентов, обучающихся по основной образовательной программе среднего профессионального образования по направлению 35.02.16 Эксплуатация и ремонт сельскохозяйственной техники и оборудования и представляет собой лексико-грамматический комплекс для аудиторной и самостоятельной работы студентов неязыковых специальностей.

Пособие состоит из 8 разделов, которые включают разговорные темы, грамматический материал и лексико – грамматические упражнения, тексты для чтения и упражнения для развития навыков письма, которые способствуют активизации употребления обучающимися предложенной лексики и английского языка в ходе практической коммуникативной деятельности с последующим переходом к диалогическому и монологическому высказыванию.

Тексты снабжены глоссарием и учебно-тренировочными упражнениями.

Учебно-методическое пособие направлено на достижение следующих учебных целей:

- расширение лексического запаса студентов;
- овладение навыками просмотрового чтения;
- развитие у студентов потребности активного познания страноведческого материала;
- формирование коммуникативных навыков.

I. WHAT IS AGRICULTURE?

1. Learn the words:

achievement - достижение
agriculture – сельское хозяйство
agricultural lands – с/х угодья
allotment gardens – приусадебные участки
animal husbandry – животноводство
beef cattle – мясной скот
beneficial influence – выгодное влияние
crop production – растениеводство
dairy cattle – молочный скот
density – плотность
domestic animals – домашний скот
foodstuff – продовольствие
grain – зерно
hardy varieties of crops – выносливые сорта с/х культур
manure – навоз
poultry – домашняя птица
purpose – цель
raw material - сырье
shelter belt – защитная полоса
to apply – применять
to assure – обеспечивать
to bread – разводить
to consume – потреблять, расходовать
to control diseases – бороться с болезнями
to deal with – общаться, иметь дело с
to determine – определять
to equip – оснащать, оборудовать
to harvest – убирать урожай
to root up – раскорчевывать
to sow – сеять
to suffer from – страдать
to plow – пахать
swamp – болото
unsuitable lands – непригодные земли

2. Match the synonyms in two columns:

1. to assure	a. marsh
2. beneficial	b. aim
3. suitable	c. to secure
4. swamp	d. harvest
5. plant growing	e. food
6. purpose	f. livestock breeding
7. farmer	g. profitable
8. yield	h. grower
9. to root up	i. crop production
10. animal husbandry	j. to sow
11. to seed	k. fit
12. foodstuff	l. to stub

3. Match the antonyms in two columns:

1. fit	a. decline
2. high	b. narrow
3. increase	c. worst
4. possible	d. improper
5. best	e. low
6. wide	f. improbable

4. Match the words to their meanings:

А	**Б**
1. swamp	a. useful or beneficial
2. profitable	b. the producing of livestock
3. desert	c. something by which a result is brought about
4. animal breading	d. to clear ground by rooting up trees
5. agricultural lands	e. a piece of wet, soft land
6. means	f. an area of land without trees and water, often covered with sand
7. to stub	g. lands used for growing crops and grasses

5. Fill in the gaps with words and phrases: *retentions, drain, shelter belts, capacity, beneficial, influence, drainage, desert.*

1. … and irrigation are the main components of melioration.
2. … protect crops from drought and soils from wind and water erosion/
3. Forests help in snow … and in increasing the soil's crop … .
4. We … swamps and irrigate … .
5. Forests have … on the climatic conditions in the steppe regions.

TEXT A. AGRICULTURE

6. Read and translate the text:

Agriculture is the production of food and goods through farming.

Agriculture is a human activity in which people use areas of land to produce food, clothing, shelter and other necessary materials. The word “ager” is a Latin word. It means a field. The word “agriculture” means the cultivation of fields, growing crops it also means the use of land to breed animals.

Agriculture is an important branch of economy of any state. It supplies the population with foodstuffs, many industries with raw materials, determines the country’s achievements.

We don’t know when people began to grow crops. It was many thousand years ago. Now crop production and animal husbandry are highly developed branches of agriculture.

Agriculture was the key development that led to the rise of human civilization, with the husbandry of domesticated animals and plants (i.e. crops) creating food surpluses that enabled the development of more densely populated and stratified societies. The study of agriculture is known as agricultural science. Agriculture encompasses a wide variety of specialties and techniques, including ways to expand the lands suitable for plant raising, by digging water-channels and other forms of irrigation. Cultivation of crops on arable land and the pastoral herding of livestock on rangeland remain at the foundation of agriculture. In the past century there has been increasing concern to identify and quantify various forms of agriculture. In the developed world the range usually extends between sustainable agriculture (organic agriculture) and intensive farming (industrial agriculture).

Life is impossible without plants. They play a highly important role in everyday life of people. Plants that are grown by farmers are known as farm crops. They are used for many different purposes. Most of them are used directly as food for people, some are consumed by farm animals, others are used in industry and medicine.

Modern agriculture in all leading countries of the world is highly equipped with machinery. Such processes as plowing, sowing and harvesting are carried out by machines. Electricity is widely used in agriculture, especially in animal husbandry. We cannot imagine modern agriculture without applying commercial fertilizers, without using herbicides against pests, without means of control diseases of plants and animals. Thus, mechanization, electrification and chemization are the most important factors of rapid development of highly productive agriculture.

Land areas used in agriculture are called agricultural lands. Not all agricultural lands are absolutely fit ones. People turn unsuitable lands inti suitable by rooting up trees and bushes, by drawing swamps and irrigating deserts.

For ages agriculture in the steppe regions has suffered from drought. Long ago scientists noticed that forests had a beneficial influence on the climatic conditions in the steppe regions, on snow retention, and on increasing the soil's crop capacity. Now shelter belts protect crops from drought and soil from wind and water erosion.

Scientists have developed new hardy varieties of crops adapted to different climatic conditions. They determine regions of the best varieties of crops in different areas and assure more profitable development of crop production. The main task of agriculture is constant intensification, increasing yields of crops and productivity of animal breeding.

7. Give English equivalents:

Сельское хозяйство, земля, выращивать, производить, животноводство, разводить животных, отрасль сельского хозяйства, сельскохозяйственная культура, органическое сельское хозяйство, индустриальное сельское хозяйство, степные районы, повысить урожайность почвы.

8. Give Russian equivalents:

Animal breeding, economic sector, worldwide, gross world product, raw materials, food surpluses, major agricultural products, technological improvements, useful materials, ecological damage, animal husbandry, chemicals, modern practices, major agricultural products, a wide variety, production of food and goods, necessary materials, to breed animals.

9. Choose the right word:

1. Agriculture is the production of food and goods through … .

a) cultivation b) development c) farming

2. Agriculture is a human activity in which people use areas of … to produce food.

a) plant b) land c) animal

3. The word agriculture means the cultivation of fields and growing … .

a) land b) soil c) crops

4. At present there are two main … of agriculture.

a) fields b) surplus c) branches

5. Agriculture was the key … that led to the rise of human civilization.

a) cultivation b) development c) improvement

6. The study of agriculture is known as agricultural … .

a) science b) research c) learning

7. For ages agriculture in the … regions has suffered from drought.

a) subtropics b) steppe c) desert

10. Переведите предложения на английский язык:

1. Растениеводство и животноводство – главные отрасли сельского хозяйства.
2. Первобытные люди не культивировали растения.
3. Жизнь невозможна без растений.
4. Многие растения используются как корм для животных.
5. Земли, используемые в сельском хозяйстве, называются сельскохозяйственными угодьями.
6. Задача животноводов – увеличить производство таких продуктов, как мясо, молоко и яйца.
7. Эти поля должны быть защищены от ветровой и водной эрозии.
8. Леса оказывают благотворное влияние на климатические условия в степных районах.
9. Веками сельское хозяйство в степных районах страдало от засухи.
10. Увеличение урожая сельскохозяйственных культур и продуктивности животноводства – главная задача сельского хозяйства любой страны.

11. Answer the following questions:

1. What is agriculture?
2. What does the word “agriculture” mean?
3. What are the main branches of agriculture?
4. What does agriculture supply people with?
5. Why is agriculture very important?
6. Is life possible without plants?
7. What does organic agriculture mean?
8. How people reorganize our land?
9. When did people begin to grow crops?
10. What do our scientists do for the development of new varieties of crops?

12. Make a list of the most important points for you in the text.

TEXT B. TWO BRANCHES OF AGRICULTURE

13. Read and translate the text:

There are two main branches of agricultural production – crop production and animal husbandry. Crop production is the practice of growing and harvesting crops. The most important crops grown by man are grain crops, vegetables and grasses. In order to obtain high yields crops are grown under favorable soil and climatic conditions. Animal husbandry is a branch of agriculture including the breeding and raising of farm animals and their use. The branch of agriculture that deals with the

feeding, caring and breeding of domestic animals is called animal husbandry. Animal husbandry refers to raising or keeping of livestock (domestic animals) for farm purposes, use or profit by selling the same.

Husbanding means to use a resource carefully and without waste. Thus, animal farming or animal husbandry requires planning for domestic animal's shelter, breeding, health, disease control and proper economic utilization. Our domestic animals or livestock includes those animals which are raised for farm purposes, eg. cattle (cow, bull or ox), buffalo, yak, horse, ass, goat, sheep, camel, etc.

As we all know that human population is increasing, so besides crop production, animal production is also to be increased to meet the demand for milk, meat and eggs. The animal-based farming practices are undertaken by farmers along with agriculture as mixed farming. However, the progressive farmers take up one of these (animal farming practices) on commercial basis.

Dairy and beef cattle, hogs, sheep, and poultry are widely bred throughout the world. Farm animals are highly important sources of food for man. They are kept for the production of such nutritious products as meat, milk and eggs. Many crops grown by man are used in feeding livestock. At the same time manure produced by farm animals is an important source for the maintenance of soil fertility. Most of the nutrients taken by plants from the soil are thus returned. Applying manure, farmers improve the physical condition of the soil.

14. Give English equivalents:

Животные, скот, КРС, животноводство, мясной скот, молочный скот, мясо, молоко, яйца, птица, разведение, кормление, отрасль, навоз, овцы.

15. Find equivalents:

1) farm animals 2) animal husbandry 3) livestock 4) meat 5) eggs 6) breeding 7) feeding 8) cattle 9) dairy cattle 10) beef cattle 11) poultry 12) meat production 13) manure

1) мясо 2) кормление 3) скот 4) молочный скот 5) мясной скот 6) животные 7) животноводство 8) КРС 9) яйца 10) птица 11) разведение 12) производство мяса 13) с/х животные

16. Give Russian equivalents:

Animal husbandry, branch, breeding, raising, farm animals, feeding, livestock, resource, disease control, cattle, milk, meat, eggs, dairy, beef cattle, hogs, sheep, poultry, feeding, manure.

17. Answer the following questions:

1. What are the two branches of agriculture?

2. What is crop production?
3. What are the main farm crops?
4. What does animal husbandry include?
5. What products do farm animals produce?
6. What is manure used for?
7. How do farmers improve the physical condition of the soil?

18. Retell the text "TWO BRANCHES OF AGRICULTURE" using the following plan:

1. I'd like to retell the text.
2. The title of the text is...
3. This text is about...
4. The text could be divided into 2-3-4 logical parts.
5. It is stated that...
6. According to the text...
7. Further it is said that...
8. In conclusion it is noted that...
9. In my opinion it is interesting (boring, exciting, fascinating, informative) because....

TEXT C. URBAN AGRICULTURE

19. Translate the following combinations into Russian:

Roof gardens, community gardens, population density, road infrastructure, food security, government initiative, allotment gardens, city property, school gardens, vegetable beds.

20. Read and translate the text:

Agriculture is considered to be urban when it is in a city or the surrounding areas. Urban agriculture is diverse: roof gardens, suburban farms, micro farms, community gardens, etc.

There are differences from one city to another. In some countries, for example, agriculture has totally disappeared from cities as population density has increased. However, it has returned to certain cities and their surrounding areas. Moroccan cities, for example, are using rooftops to produce crops and attempting to save suburban agricultural areas. The same phenomenon can be observed in Algiers. The city is now creating agri-parks to protect agricultural land around the city and promoting agriculture in the city. In other countries (Madagascar, Senegal), urban agriculture has grown with the population. In Dakar, the production of lettuce has transformed from 20 years of non-professional agriculture (on rooftops, courtyards of

buildings) to commercial production. In these cases, agriculture has grown with urbanization, which has generated greater demand for local food.

It is still hard to say if all tomorrow's cities will be agricultural, but this kind of agriculture will be vital for the supply of fresh produce (eggs, milk, vegetables) in countries where the state of road infrastructure limits transport and especially refrigerated transport. It will also be important in the management of organic urban waste and in ensuring the food security in periods of crisis and shortage.

More Urban Agriculture examples:

Singapore. Urban farming in Singapore is a central focus of the government and local organizations, trying to find innovative ways to increase urban agriculture. The government initiative has already enabled the construction of 1,500 community gardens, while an entire national park, HortPark, has been converted to allotment gardens, themed gardens, and educational workshops for urban farmers. These urban farms were particularly beneficial for the Singaporean community during Covid-19.

New York City, USA. NYC is known for high cost of land and lack of space, so one might think the city has few farms. In fact, NYC has over 550 community gardens on city property, over 745 school gardens, and over 700 gardens at public housing developments. The city is focused on education and repurposing abandoned spaces. The GrowNYC Teaching Garden, for example, is a 21,000-square-foot urban garden filled with vegetable beds made from recycled materials, which holds workshops and events for agricultural education.

21. Match the highlighted words with their synonyms:

1. to manufacture 2. profit-making 3. building 4. helpful 5. teaching 6. farming 7. countryside

22. Agree or disagree with the statements:

1. Agriculture develops differently in different countries.
2. Urban agriculture will be absolutely necessary where road infrastructure is not good enough.
3. The government does not support urban farming in Singapore.
4. Urban farming can hardly develop in New York because of high cost of land and lack of space.

II. HISTORY OF AGRICULTURE

1. Learn the words:

animal power - тягловая сила животных
available – доступный
barn – сарай, амбар
captivity – плен; пленение; неволя
chaff-cutter - соломорезка
churn - маслобойка
corn-mill - зерновая мельница
deftness — проворность, ловкость
device - устройство
fallow soil – залежь; залог; перелог
fertile soil – плодородная почва
flail — молотило
hoe – мотыга
Holstein – голштинская порода крупного рогатого скота молочного направления
husking the corn — очистка кукурузы от листовой обвертки, лущение
implement – инструмент, орудие труда
internal-combustion engine – двигатель внутреннего сгорания
intricacy — многосложность
loop – петля
machinery - техника (машины)
manifold — многофункциональность, многообразие
manual labour – ручной труд
mere twisting — простое скручивание
mower - косилка
plough (a plow) - плуг
root-cutter – корнерезка
scholar – ученый
self-binder – сноповязка
self-binding reaper — жатка-сноповязалка
sheep-shearing units – оборудование для стрижки овец
shred the stalks for fodder — измельчать стебли для фуража
source - источник
specialized breed of dairy cattle – специализированная молочная порода
steam – пар
surplus – излишек, остаток
tillage – вспашка

threshing machine - молотилка
to grind - молоть, тонко измельчать
to invent – изобретать
to shear – стричь
to pull – тянуть, тащить
to tame – приучать
tribe – 1. племя; клан; колено 2. биол. родовой вид, подотряд
twine binder — сноповязалка

TEXT A. HISTORY OF AGRICULTURE

2. Read and translate the text:

For hundreds of thousands of years, prehistoric people lived by hunting, fishing, and gathering wild plants. Then about 9000 B.C., people took the first steps toward agriculture. Some tribes discovered that plants can be grown from seeds. They also learned that certain animals could be tamed and then raised in captivity. These two discoveries marked the beginning of the domestication of plants and animals. Scholars believe that domestication began in the Middle East and then spread to surrounding areas. Later, people in other parts of the world independently learned how to domesticate plants and animals. About 8000 B.C., some people living in what are now Israel and Jordan began to depend chiefly on farming for food, even though they still hunted.

Agriculture developed independently in northern and southeastern Asia about 7500 B.C. and in central Mexico by about 7000 B.C. It spread to other parts of the world from these areas and from the Middle East.

Ancient Times. People who farmed no longer had to travel in search of food. They could thus build permanent settlements. Some of these settlements developed into the first cities. Some of the cities, in turn, produced the world's first civilizations.

The Middle East. The first great civilizations arose in two regions of the Middle East. One region was the Nile River Valley of Egypt. The other was Mesopotamia, which lay northeast of Egypt between and around the Tigris and Euphrates rivers. Both regions had fertile soil, but neither received enough rain for crops to grow. Farmers discovered, however, that they could raise crops during most of the year if they used river water for irrigation. By about 3000 B.C., Egypt and Mesopotamia had developed the world's first large-scale irrigation systems. Also by about 3000 B.C., Egyptian and Mesopotamian farmers invented a plow that oxen could pull. Earlier farmers had pulled their plows by hand. The ox drawn plows worked much better and faster and required much less human labor.

The large-scale irrigation projects and ox-drawn plows helped Egyptian and Mesopotamian farmers produce much more food than their families needed. The food

surpluses enabled more and more people to give up farming and move to the cities. Classes of builders, craft workers, merchants, and priests began to appear – and systems of writing were improved. These dramatic developments contributed greatly to the growth of civilization.

The Roman Empire began as a country of small farms on the Italian peninsula before 500 B.C. By the A.D. 200s, Rome had conquered much of Europe and the Middle East and the entire Mediterranean coast of Africa. As Rome grew, farms within the empire increased in size and became highly specialized. Most large farms specialized in raising wheat, which formed the basis of the Roman diet.

The Romans introduced into Europe the advanced farming techniques of the Middle East, such as the ox-drawn plow and methods of irrigation. The Romans also developed new farming methods. For example, they began the practice of leaving half of every field fallow (unplanted) each year. The fallow soil could store nutrients (nourishing substances) and moisture for a crop the following year. The Romans also developed systems of crop rotation. In one system, they used legumes, or pulses, as a rotation crop. Legumes enrich the soil with nitrogen, one of the chief nutrients that all crops need to grow. By building terraces, Roman farmers were able to grow such fruits as grapes and olives along the Mediterranean Sea's steep shoreline. In various parts of the empire, Roman engineers built long irrigation canals and huge structures to store grain.

The selective breeding of plants and livestock began in Europe during Roman times. For example, farmers in the part of Europe that is now the Netherlands produced the first specialized breed of dairy cattle, the Holstein, about 100 B.C.

3. Complete the sentences using the words from the text:

1. Some tribes discovered … .
2. Agriculture developed independently … .
3. People who farmed no longer … .
4. The first great civilizations arose… .
5. Classes of builders, craft workers, merchants and priests … .
6. As Rome grew … .
7. The Romans developed … .
8. The selective breeding … .

4. Agree or disagree with these statements using the following phrases:

Phrases of agreement	Phrases of disagreement
You are right! - Вы правы!	You are mistaken! – Вы ошибаетесь!
I absolutely agree with you! – Я абсолютно с вами согласен!	I disagree with this statement! – Я не согласен с этим утверждением!
It's true! – Верно!	It's false! – Это ложь!

Sure! – Верно!	Surely not! – Конечно нет!
Certainly! – Конечно!	You are wrong! – Вы не правы!
I share this point of view – Я разделяю эту точку зрения!	I don't share this point of view! – Я не разделяю эту точку зрения!

1. Domestication began in southeastern Asia.
2. Agriculture spread all over the world from central Mexico.
3. Some permanent settlements developed into the first cities.
4. Mesopotamia was situated around the Tigris and Euphrates rivers.
5. The food shortage enabled people to move to the cities.
6. The Romans developed systems of crop rotation.
7. Roman farmers produced the first specialized breed of dairy cattle.

5. Answer the following questions:

1. When did people take the first steps toward agriculture?
2. Where did agriculture first develop?
3. What did the first civilizations produce?
4. Why did many Egyptians move to the cities?
5. What did large Roman farms specialize in?
6. What did the Romans introduce into Europe?
7. Where did the selective breeding begin?

TEXT B. THE HISTORY OF AGRICULTURE IMPLEMENTS' DEVELOPMENT

6. Read and translate the text:

From the early ages man tried to cultivate soil using the most elementary method of modifying soil conditions. He broke up the surface and prepared a seed-bed with the most primitive cultivating device, a digging implement - a hoe.

The greatest mechanical advance in the early days of agriculture was the evolution of the plough from the primitive hoe. The use of the plough replaced manual labour by labour of animal power. This is one of the landmarks of agricultural process. It began, thousand years ago, with simple devices for harnessing the power of man himself; then progressed with the construction of implements and machines designed to make use of the greater power of domesticated animals, mostly horses and oxen.

The plough still rests to be the most important tillage tool. It has been changed and improved during the centuries. In the 18^{th} century there was an attempt to improve agricultural implements. New methods and inventions were applied to

farming operations. By the 19th century a variety of agricultural implements appeared, which were now called "agricultural machinery". In agriculture, the use of water-power and then of steam greatly stimulated the invention of machinery, replacing manual labour.

A threshing machine was invented in the second half of the 17th, and productively used in the 19th century. It was driven by water and wind, sometimes by horse labour, and later by steam.

Later on, in 1860, the internal-combustion engine was invented. It was used to drive stationary machines, as chaff-cutters, root-cutters and corn-mills in the barn. Steam engines, though widely used on the road, suffered the disadvantage in the use on the land. Then the internal-combustion engine was perfected, and agricultural tractors appeared.

But a still newer source of power on the farm is electricity. It was firstly used for lighting. When it became available at low cost, it came into use on the farm.

Agricultural implements are now very numerous. They are subdivided into six groups:

- machinery and equipment movers, i.e. engines of all kinds, tractors, etc.;
- cultivating machinery: ploughs of all sorts, harrows, rollers, cultivators, etc.;
- harvesting machinery, such as mowers, self-binders, threshing machines, combines, elevators, potato-diggers, etc.;
- field supplementary equipment: manure and fertilizer distributers, sprinkling installations, sprayers and many others.
- stationary (or barn) equipment, including such food-preparing machines as chaff-cutters, grinding-mills, root-cutters, manure-scrappers, distributing belts, etc.;
- dairy-machinery, including milking machines, separators, churns, sterilizing machines, etc.

In addition, there is a number of other machines and devices that find intensive use in agricultural production, and sheep-shearing units, rearing chambers, grain conveyers, farm repair shop mechanized equipment, lifting and loading machines being among them.

7. Read the text one more time. Translate it, so that to generalize periods of the history of agricultural implements' development. Present agricultural progress time-line, following the given table-pattern:

Date of invention or introduction	The implement's name	The implement's designed purpose

8. Write out 5 sentences and ask 5 questions in Past Simple Tense.

TEXT C. HISTORY OF TYING MACHINE

9. Read and translate the text:

After the self-raker was introduced the next important improvement was in the binding of the grain. At first, the cut grain was raked into a receptacle which was dumped by the driver of the machine when enough had accumulated to form a bundle and the bundles were bound by men following the machine.

As in the evolution of the raker, the next step was to provide a platform for these men on the machine so that they could ride as they bound the grain and finally in 1873 a self-binding attachment was invented which increased the efficiency of the machine manifold. This self-binder, called for the use of wire which did not meet with favor as a binding material because of the difficulty of cutting it without a special tool. Efforts were therefore made to introduce twine instead. But twine cannot be fastened by mere twisting; it has to be tied and a mechanical means of tying a knot was far from an easy problem to solve. While it is true that the human body is a machine and every movement may be reproduced by mechanical means, the difficulty is to copy many operations without involving such complexity of members. It makes the mechanism impracticable. The human hand exhibits deftness and complexity of movement in tying knots and the very intricacy of this operation was enough to baffle the majority of inventors.

There was one inventor, however, who was thwarted even by so formidable an obstacle as this. In 1864 Jacob Behel secured a patent on an attachment for binders which would actually tie a knot. The mechanism passed the twine around the bundle of grain, formed a loop in the two ends, and tied a simple overhand knot in much the same way that the hand ties this knot. Ten years later Marquis L. Gorham improved the mechanism and built a successful twine binder. Finally, in 1879 John F. Appleby perfected the binding mechanism, completing the last stage in the development of the modern automatic self-binding reaper.

To keep pace with the reaper, other agricultural machines had to be invented and developed. The vast quantity of grain harvested could not be threshed by hand and the old-fashioned flail had to give way to the steam-driven threshing machine. Finally, to meet the requirements of the vast western wheat fields, the combined harvester and thresher was developed which, with a crew of four men, could reap, thresh, and bag yield.

Even more difficult than cutting and binding is the task of husking the corn. This work was always dreaded by farm hands, but now machines are provided to husk the ears and shred the stalks for fodder.

10. Read the following sentences in English paying attention to the words in brackets. Translate the sentences into Russian:

1. The human body is a machine (каждое движение) of which is capable and may be reproduced by mechanical means.

2. Finally in 1873 a self-binding attachment was invented which (повысило эффективность) of the machine manifold.

3. The mechanism passed the twine around the bundle of grain, (сформировал петлю) in the two ends, and tied a simple overhand knot.

4. To meet the requirements of the vast western wheat fields, the combined harvester and (была разработана молотилка) which, with a crew of four men, could reap, thresh, and bag yield.

11. Get acquainted with the history of the business of equipment manufacturers in America and find information about Russian inventors of agricultural machinery.

Interesting Dates

1784 - Andrew Meikle invented threshing machine.

March 14, 1794 - Eli Whitney, of New Haven, CT, received a patent for "Ginning Cotton"; cotton gin to separate inland cotton (vs. long-staple cotton grown only along the coast) from its sticky green seeds; made growing of cotton profitable, especially when tobacco was declining in profit due to over-supply, soil exhaustion; reduced labor-intensity of harvesting cotton, which quickly spread as a newly valuable cash crop for farmers across the southern states; replaced much processing by hand labor, revolutionized textile industry.

June 26, 1797 - Charles Newbold, Chesterfield, NJ, received first US patent for "Ploughs", cast-iron plow; farmers won't buy it, fear effects of iron on soil.

January 25, 1799 - Eliakim Spooner, of Vermont, received patent for a "Machine for Planting Corn and Beans"; seed-planting device (seeds fed by gravity); also received patent for a "Machine for Cutting Corn, Beans"; **August 25, 1840** - Joseph Gibbons, of Adrian MI, received a patent for a "Grain Drill"; first truly practical seeding machine (combined a grain drill with cavities to deliver seed and a device for regulating the volume).

May 17, 1803 - John Hawkins and Richard French received patent for a machine for "Cutting Grain and Grass"; reaping machine.

March 31, 1814 - John Lineback. of Salem, NC, received a patent for a "Machine for Hulling Cotton Seed".

July 1, 1814 - Jethro Wood, of Scipio, NY, received a patent for "Ploughs"; 1819 - sold almost 4,000/year.

February 3, 1819 - Stephen McCormick, of Faquier Court House, VA, received a patent for a "Plough"; cast iron plow with detachable components; introduced concept of replaceable and standardized parts; **January 28, 1826** - received second patent for a "Plough"; **December 1, 1837** - received third patent for a "Plow"; cast-iron mould board had an adjustable wrought-iron point mounted beneath, able to decrease the draft, while deepening the furrow, and breaking up the soil more effectively.

June 13, 1831 - Cyrus Hall McCormick (22), of Rockbridge County, VA received a patent for a "Side-Hill Plow"; **July 1831** - demonstrated reaping machine at public trial in a field near Walnut Grove, VA - did work of six men, cut six acres in half a day; **November 19, 1833** - received a patent for a "Self-Sharpening Plow; **June 21, 1834** - received a patent for an "Improvement in Machines for Reaping Small Grain"; **1841** - sold first two machines; liberated farm workers from hours of back-breaking labor; first step in a transition from hand labor to the mechanized farming; eventually replaced by the self-propelled combine; **1846** - formed partnership with William, Leander McCormick (brothers), formed C. H. & L. J. McCormick & Bros.; **October 23, 1847** - received a second patent for an "Improvement in Reaping-Machines" ("placing the driving-wheel farther back than heretofore"); **1848** - renamed McCormick Harvesting Machine Company.

May 3, 1831 - William Manning (Plainfield, NJ) received a patent for a reaper (mowing machine), though designed by Ann Harned Manning, his wife; first to mechanize harvesting of hay and grain.

December 31, 1833 - Obed Hussy, of Cincinnati, OH, received a patent for a "Improvement in Machine for Reaping and Cutting Grain" ("for reaping or cutting all kinds of small grain and grasses"); drawn by horses hitched in front, and had a side cut and a platform on which the operator stood who raked off the grain.

October 14, 1834 - Henry Blair, of Glenross, MD, received a patent for a "Seed Planter"; corn planter; first black man to receive a patent.

November 23, 1835 - Henry Burden, of Troy, NY, former superintendent of the Troy Iron and Nail Factory, received a patent for "Making Horsehoes"; horseshoe manufacturing machine capable of making sixty horseshoes a minute, produced shoes more rapidly and uniformly than the hand production method which had been used prior to this invention; made nearly all the horseshoes used by the Union calvary during the Civil War.

August 31, 1836 - African-American inventor, Henry Blair of Glenross, MD, received a patent for a "Cotton-Planter"; cotton seed planter.

1837 - John Deere developed, manufactured first cast-steel plow in Grand Detour, IL; **1855** - sold more than 10,000 plows; **February 21, 1865** - John Deere, of Moline, IL, received a patent for "Improvement in Plows"; **1868** - John Deere's business incorporated under the name Deere & Company; **September 21, 1897** -

Deere and Company registered "John Deere" trademark first used in 1847 (wagons); **September 10, 1912** - registered logo first used in 1873 (deer leaping over log, "John Deere" arching above, "Moline, Ill." below).

January 9, 1838 - Julius Hatch, of Great Bend, PA, received patent for a "Grain Drill"; planter.

August 25, 1840 - Joseph Gibbons, of Adrian, MI, received patent for a "Grain Drill" ("new and useful improvement in the manner of constructing a machine for the planting or sowing of seeds of various kinds...the manner in which I determine and regulate the capacity of the cavities in the cylinders for the reception of the seed").

1842 - Jerome Increase Case founded the J I Case Company; gained recognition as the first builder of a steam engine for agricultural use; known in manufacturing circles as the "Threshing Machine King"; **1964** - bought by Tenneco.

1847 - Daniel Massey opened workshop in Newcastle ON, to build simple farm implements; **1857** - Alanson Harris established A. Harris and Son implement works at Beamsville, ON to make, repair farm machinery; **1938** - produced world's first commercially successful self-propelled combine; **1953** - Massey-Harris merged with Harry Ferguson Limited of Coventry, England; twin skills in harvesting machinery, tractor - produced one of world's most powerful forces in farm equipment; **1995** - acquired by AGCO Corporation.

October 21, 1852 - John Fowler of Temple Gate, Bristol, UK, received Royal Letters Patent for "Improvements in Machinery for Draining Land»; steam cultivation of land, commercialized land drainage; **1851** - first patent for Mole Drainage Plough, horse-drawn drainage plough; helped Irish peasants drain peat bogs.

May 8, 1855 - George W. Brown, of Galesburg, IL, received a patent for a "Seed Planter"; **April 5, 1864** - received a patent for a "Corn-Planter"; first successful mechanical corn planter.

December 3, 1861 - Wilkenson Furnas, of Ononwa, IA, received a patent for a "Wheel-Cultivator".

June 17, 1862 - W.H. Fancher and C.M. French of Waterloo, NY, received patent for a "Plow"; combination proposed to give those in agribusiness an "efficient weapon of defense at very slight expense in addition" to that of a plow; added elements of light ordinance, designed for "especially when used in border localities, subject to savage feuds and guerrilla warfare" to metal plow with wooden handles of ordinary construction; share served as anchor in the ground to resist recoil; wooden handles used to set direction.

January 12, 1864 - John Deere, of Moline, IL, received a patent for Improvement in Molds for Casting Steel"; casting steel in shapes in dry-sand molds.

February 16, 1864 - Jacob Behel, of Earleville, IL, received a patent for "Improvement in Grain-Binders" ("to bind gavels of grain or other materials into sheaves or bundles with cord bands, and to knot the ends of the bands together").

February 2, 1869 - James Oliver, of South Bend, IN, received a patent for "Casting Mould Boards" ("new arrangement of mould-board pattern and chill for plows"); removable tempered steel plow blade.

1872 - Thomas Chalmers founded Fraser & Chalmers Company (Chicago, IL), manufacturer of mining machinery, boilers, and pumps; **1890** - headed by William Chalmers, one of world's largest manufacturers of mining equipment.

April 7, 1874 - Edward H. Sutton, of Edenton, NC, received a patent for "Improvement in Cotton-Cultivators"; plows.

February 18, 1879 - John F. Appleby, of West Depere, WI, received a patent for "Improvement in Grain-Binding Harvesters"; established a class of binding machines.

March 23, 1880 - John Stevens, of Neenah, WI, received patent for a "Grain-Crushing Roll"; flour rolling mill.

July 4, 1882 - Sylvanus D. Locke, of Hoosick Falls, NY, received a patent for a "Grain-Binder" ("devices for holding the binding material and governing it in its passage as it is payed out in the operation of binding").

1883 - Benjamin Holt produced his first horse-drawn "Link-Belt Combined Harvester"; founded Holt Manufacturing Company in Stockton, CA; later called Caterpillar Tractor.

May 20, 1884 - Lockrum Blue, of Washington, DC, received a patent for a "Hand Corn-Shelling Device" ("for rapidly and effectually removing the grain from ears of corn").

May 11, 1886 - Black Inventor Willis Marshall, of Chicago, IL, received a patent for a "Grain-Binder" for grain harvesters; designed to remedy objections to the "construction of the tripping-dog and spring and their mode of connection".

June 1, 1886 - Black American inventor W. H. Richardson, of Baltimore, MD, received a patent for a "Cotton Chopper".

February 23, 1892 - Black American inventor, Peter D. Smith of Springfield, OH, received patent for a "Grain-Binder", way to form a binding-rope for sheaf from wisp or portion of cut grain and mechanism to be applied to reaper to perform this, knot the rope around the sheaf and eject it.

September 6, 1892- John Froelich of Froelich, IA, built and sold the first gasoline tractor in the U.S. to Langford, SD (lacked easy access to a wood or coal supply for steam-powered unit); geared for both forward and reverse motion; powered by a Van Duzen vertical single-cylinder gasoline engine mounted on wooden beams upon a Robinson running gear - powered a J.I. Case threshing machine and propelled the vehicle;

January 10, 1893 - formed the Waterloo Gasoline Tractor Engine Company; **1918** - taken over by the John Deere Plow Co. (mass-produced gasoline-powered tractors based on Froelich's designs).

April 10, 1894 - George W. Murray, of Sumter, SC, received a patent for a "Combined Furrow-Opener and Stalk-Knocker" ("to open center furrows, and simultaneously therewith knock or break stalks at each side thereof, said stalks being left upon the ground for the purpose of enriching the same"); received second patent (#517,961) for a "Cultivator and Marker" ("improvements in cultivators and to that particular class thereof employed for opening furrows for the reception of seed").

June 5, 1894 - George W. Murray, of Rembert, SC, received six patents: for a "Planter"; for a "Cotton Chopper"; for a "Fertilizer Distributor"; for a ""Planter" ("to discharge broadcast various kinds of seed; to provide for a regulation of the discharge; and for a feed for the hopper"); for a "Combined Cotton-Seed Planter and Fertilizer Distributer"; and a patent for a "Reaper" "(machine adapted to reap small grain, to gather the same into bundles, and to automatically dump the bundles at proper intervals upon the ground, whereby said grain may be readily gathered").

August 28, 1894 - Black American inventor, Robert H. Gray, of Lexington, KY, received patent for a "Baling Press".

March 24, 1896 - Clement A. Hardy, of Dallas, TX, received patent for a "Rotary Disk Plow"; designed to be drawn into the earth by their own action and by the weight of the soil lifted by the disks and carried on their faces and have a cutting action on the bottom of the furrow instead of scraping, thereby reduced weight of the machinery.

February 16, 1897 - Peter Walker, of Friar's Point, MS, received a patent for a "Machine for Cleaning Seed-Cotton" ("automatically delivering cotton containing the seed, freed from dust and various foreign matter, to the gins").

1901 - Edward P. Allis and Company merged with Fraser & Chalmers Company (Gates Iron Works of Chicago and Dickson Manufacturing Company); formed Allis-Chalmers Manufacturing Company; **1914** - built first farm tractor; became a leading manufacturer of farm equipment; **1979** - $2 billion corporation; **1985** - sold farm equipment division to K-H-Deutz AG of Germany; **1990** - acquired by AGCO Corp. (Georgia), farm equipment maker.

August 12, 1902 - C.H. McCormick & Bros. merged with other leading farm implement manufacturers (Deering Harvester Co., Plano Manufacturing Company, Milwaukee Harvester Company, Warder, Bushnell and Glessner), formed International Harvester Company; **1910** - $100 million in annual sales, over 17,000 workers; **February 28, 1922** - registered "McCormick" trademark first used in 1848; **1985** - sold farm equipment, construction businesses; **1986** - name changed to Navistar International Corporation.

November 24, 1904 - Benjamin Holt , of Holt Manufacturing Company in Stockton, CA, invented first successful track-type tractor (crawler track, with tracks to disperse weight, provide better traction; used later for tanks, moving heavy artillery); made first 'caterpillar' tractor (chosen because motion of track as it traveled resembled movement of caterpillar); **December 17, 1907** - received a patent for a "Traction Engine" ("improvement in vehicles, and especially of the traction engine class; and included endless traveling platform supports upon which the engine is carried"); **1925** - merged with longtime competitor, C. L. Best Tractor Company, formed Caterpillar Tractor Co.; consolidated dealerships of both companies into network of strong, independent Caterpillar dealerships; predecessor to modern-day Caterpillar, Inc.

October 7, 1940 - A U.S. 1-cent stamp commemorating inventor Eli Whitney was issued, with first-day-of-issue ceremonies in Savannah, GA. Whitney had been employed in Savannah to tutor the children of the owner of Mulberry Grove Plantation when he learned about the difficulty of separating seed from the cotton fibres.

1958 - Melroe Manufacturing Company (Gwinner, ND) introduced Melroe Self-Propelled Loader, machine conceived by brothers, Cy and Louis Keller, to help a Minnesota farmer work tight areas of his turkey barns; four-wheel drive and "Bobcat" name added over next few years.

III. INTRODUCTION TO ENGINEERING PROFESSION

1. Learn the words:

ability – способность
application – применение
automatic control – автоматический контроль
capability – потенциальная возможность
consequently – следовательно
cooler – охладитель
demand for (syn. requirement) – спрос
education – образование
effectiveness – эффективность
electric power – электроэнергия
equipment – оборудование
Establishment (syn. institution) – учреждение
forefront of technology – передовые технологии
fore-runner – предвестник
job opportunity – возможность трудоустройства
managerial – управленческий, административный
mechanical engineering – машиностроение
nourishment - питание
opportunity – возможность
out of date - устаревший
processing equipment – технологическое оборудование
project design – конструкторское бюро
property – собственность
reality – действительность, подлинность
reasonable – благоразумный, приемлемый, обоснованный
reliable – надежный, прочный
seasonable – соответствующий времени года
skill – мастерство, умение, квалификация
solution – решение
sophisticated – сложный
triangle – треугольник
tool-maker – слесарь-инструментальщик
to chip – стругать, обтесывать
to communicate – сообщать, передавать
to define – определять, устанавливать
to design – проектировать, конструировать
to evaluate – оценивать

to handle – обращаться, управлять, регулировать
to integrate – интегрировать, объединять
to reduce – уменьшать, сокращать
to solve – решать, находить решение
to specify – устанавливать
variations – разновидности, изменения

TEXT A. ENGINEERING

2. Read and translate the text:

Engineering is one of the most ancient occupations in history. The first tool – maker who chipped narrows and spears from rock were the forerunners of modern mechanical engineers.

Almost everything we use in modern life is made by engineers.

Engineers use theory to produce practical answers. The design solution must be a reasonable price, safe and reliable.

Engineers solve problems in a methodical way. They define a problem; design a solution, test it and then evaluate it. If a good solution is found they communicate it.

Engineering is often defined as making practical application of theoretical sciences. Technological and industrial progress depends on the scientist, the engineer and the technologist – an essential triangle.

The principle work to the engineer is design. He has to design products, machines and production systems. The most important function of the engineer is to integrate the work of the essential triangle. His interest must be in combining the abstract-theoretical world and the technical – practical world.

In recent years engineering has changed a lot. We need a person who can lead teams, solve problems, can be creative designer with a keen sense of market realities, practical individual.

Mechanical engineer. Mechanical engineering is one of the areas of engineering. It has been recognized as a separate branch of engineering since the formation of the Institution of Mechanical Engineers of Great Britain in 1847.

Mechanical engineering deals and devices of all kinds, and with research and sciences. They are at the forefront of technology: pressing the limits of material capability, developing new materials of construction, specifying complex machines and doing all of this with the most sophisticated design techniques. A farm engineer does not finish his education when he receives his diploma but he is studying new developments constantly.

Demand for qualified mechanical engineers is high. They have a wide range of job opportunities: they may be management, sales, development, research, design or production engineers.

The Department of Mechanization of the PSATU trains mechanical engineers. Today's farming is highly developed. Many agricultural processes are mechanized and the most modern farm machinery may be used today. Technical and managerial skills of agricultural engineers are used in industry.

Specialists of the department are trained to work at agricultural enterprises of different forms of property: industrial enterprises, processing plants, project-design, research centers, and educational establishments.

3. Form the names of professions from the following verbs using the suffix *-er*

Model: to work – worker

To teach, to drive, to breed, to make, to design, to operate, to research, to construct, to produce, to manage.

4. Find the nouns formed from the following verbs in the text:

To engineer, to occupy, to solve, to apply, to design, to produce.

5. Find the nouns with the suffix – *tion* in the text and translate them into Russian.

6. Agree or disagree with the following statements:

1. Engineering is a rather young occupation.
2. Engineering must know theory to produce practical answers.
3. The main task of an engineer is design.
4. Engineering is changing now.
5. Mechanical engineering is one of the areas of agricultural engineering.
6. A mechanical engineer must study new developments.
7. Demand for engineers in our country is very high.
8. Skills of engineers are used in agriculture.
9. It is difficult to get a job for a mechanical engineer today.

7. Complete the sentences with the following words: *skills, engineer (2), designer, developments, machines, project-design center, extramural department.*

1. Progress depends on the …
2. Everything we use is made by …
3. The Department of Mechanization is a legal successor of the …
4. Engineer has to design …
5. We need an engineer who can be a creative …
6. Mechanical engineering deals with the …
7. A farm engineer must study new …

8. We use technical and managerial … of an engineer.
9. Graduates of the Department of Mechanization can work at …

8. Complete the sentences with information from the text:

1. Engineers solve the problems in a methodical way: they …
2. The principle work of the engineer is …
3. The most important function of the engineer is …
4. One of the areas of engineering is …
5. Mechanical engineers deal with …
6. Demand for engineers is …
7. Mechanical engineers have a wide range of job opportunities …
8. Specialists of the department of Mechanization can work at …

9. Answer the following questions:

1. What do you know about the history of engineering?
2. What are the tasks of engineers?
3. What is an essential triangle?
4. How is the engineering changing now?
5. What branches of engineering do you know?
6. What does mechanical engineering deal with?
7. Where may technical and managerial skills of agricultural engineers be used?
8. What are the job opportunities of mechanical engineers?

TEXT B. AGRICULTURAL ENGINEERING

10. Look through the text to answer the following question: *What is agricultural engineering?*

Agricultural engineering means the application of engineering knowledge to agriculture. The agricultural engineer must understand that there are basic differences between agriculture and other industries. The biological factor is an important one in engineering application, and the engineer must know well the basic principles and practices of agriculture.

Changes in agricultural practices often need to make a machine adaptable or to increase its effectiveness. Processing equipment may also need changes to harvest crops mechanically, for the quality of yield of a crop may sometimes be reduced by the use of an improper machine.

Most field operations are seasonable in nature often with only a short period of time in which to do the job. Therefore, field machinery in many cases has a low annual duty (i. e. very few hours of operation per year).

The field of farm machinery design gives greater opportunity to an engineer than any other field of engineering. Farm machines must work where the temperature may be above 100 F or where it is below freezing. They must be able to work in rain and in snow as well. Instead of resting on the floor of a factory, they must operate over any kind of land. They must also be designed to handle wide variations in crop and soil conditions.

Not only agricultural engineers in the field of mechanization are in demand on the farm today. Electricians, i. e. agricultural engineers capable of designing, operating, controlling and adapting any form of electric energy to farm needs are wanted by modem agriculture.

As is known, electric power has become the main source of energy in agricultural production and its sphere of application is ever increasing.

For example, it is a most reasonable source of mechanical power for some kinds of equipment such as electric motors which are very suited for farm jobs because of their automatic control, long life, compact construction, ability to run in cold or hot weather, etc.

All kinds of equipment for handling milk, such as milking machines, milk coolers, water heaters and others are also operated by electricity.

The great effects of various types of radiation on seeds, plants, insects, and animals have been studied and are well known today. Those are but a few examples of electric power application on the farm which a modern agricultural engineer must work with.

11. Guess the meaning of the following international words and word combination:

Industry, biological factor, engineer, principle, adaptable, effectiveness, mechanically, operation, period, design, variations, mechanization, automatic compact construction, milk, modern, reconstruction, intensification, classification, organize, stimulation, original.

12. Match the words on the right (A) with their definition on the left (B).

A	B
1) engineer	a) outfit, tools, apparatus
2) industry	b) the application of engineering knowledge to agriculture
3) selection	c) a person who works in a branch of engineering
4) biology	d) branch of trade or manufacture
5) agricultural engineering	e) the system when only best animals, plants or trees are taken and used for future production

6) nutrients	f) science of physical life of plants and animals and animals
7) equipment	g) substances serving as or providing nourishment

13. Find the word on the right which should logically follow the word on the left:

agricultural	machines
biological	energy
field	effectiveness
electric	equipment
to reduce	the yield of crops
processing	factor
milking	knowledge
engineering	operations
to increase	engineering

14. What are these words derived from? Notice the different suffixes, indicating different parts of speech:

Engineering, application, difference, biological, adaptable, effectiveness, processing, equipment, mechanically, seasonable, freezing, resting, mechanization, designing, operating, controlling, adapting, production, reasonable, automatic, construction, ability, cooler, heater, various.

15. Juxtapose a word on the left to the appropriate antonym on the right:

efficient	harmful
often	out-of-date
below	seldom
modern	dry
moist	inefficient
to reduce	to heat
useful	above
to cool	to increase
to produce	to take
to give	to consume

16. Look back at the text again and identify in which paragraph you can find the answers to the following questions:

1. How is the equipment for handling milk operated?
2. Why are electric motors suitable for farm jobs?
3. Why are electricians wanted in modern agriculture?

4. Can radiation affect crops or animals?
5. What is meant by agricultural engineering?
6. What is there specific about field operations?
7. What factor can sometimes reduce the quality and yield of a crop?

TEXT C. MECHANICAL ENGINEERING

17. Learn to recognize international words. Give the Russian equivalents to the following words without a dictionary. Then compare your variants with the dictionary:

Design, discipline, energy, industrial, machine, material, principle, physics, process, profession, result, to analyze, to combine.

18. Use the dictionary to translate the words:

To appear, to create, to design, to determine, to develop, to employ, to involve, to overlap (with), to work (on), to be concerned (with).

19. Read and translate the following groups of international words:

1. construction (n) – constructor (n) – to construct (v) – constructional (adj) – constructed (part. II)
2. design (n) – designing (n) – designer (n) – to design (v)
3. development (n) – developer (n) – to develop (v) – developing (adj.) – developed (part. II)
4. electricity (n) – electrician (n) – to electrify (v) – electric(al) (adj) – electrified (part II)
5. electronics (n) – electronic (adj)
6. engineering (n) – engineer (n) – engine (n) – to engineer (v) – engineering (adj) – engineered (part II)
7. industry (n) – industrialization (n) – to industrialize (v) – industrial (adj) – industrialized (part. II)
8. machine (n) – machinist (n) – machinery (n)
9. mechanism (n) – mechanization (n) – mechanic (n) – to mechanize (v) – mechanical (adj)
10. manufacture (n) – to manufacture (v) – manufacturer (n)
11. operation (n) – operator (n) – to operate (v) – operational (adj)
12. product (n) – production (n) – productivity (n) – producer (n) – to produce (v) – productive (adj)
13. specialty (n) – specialization (n) – specialist (n) – to specialize (v) – specialized (part. II)
14. technique (n) – technician (n) – technical (adj) – polytechnical (adj)

15. technology (n) – technologist (n) – technological (adj)

20. Arrange the following words according to the pronunciation of the combination of letters “ch”. Pronounce the words carefully.

[ʧ]	[k]	[ʃ]
arch …	school …	machine …

Technology, mechanism, technological, chute, characteristic, stomach, technical, chemistry, chemist, change, chance, chronology, technique, mechanic, channel, scheme, polytechnic, chassis, character, choose, challenge, chemical, Chicago, machine-tool, choice, mechanical, scholar, characterize.

21. Match the equivalents:

1) a second language	a) исследовательская лаборатория
2) core concepts	b) мастер на все руки
3) current technology	c) ещё один язык
4) development	d) в сотрудничестве с
5) good communication skills	e) сильные и слабые стороны
6) in co-operation with	f) современная технология
7) to satisfy the needs of society	g) принимать решения
8) jack-of-all trades	h) удовлетворять нужды общества
9) strengths and weaknesses	i) ключевые понятия
10) professional likes and dislikes	j) применять все теории и правила
11) research lab	k) давать возможность
12) through mechanical solutions	l) охватывать широкий ряд вопросов
13) throughout their careers	m) пройти курс по
14) to offer an opportunity	n) хорошие навыки общения
15) to make decisions	o) развитие
16) to apply all the theories and principles	p) что нравится и не нравится в профессии
17) to decide the size, shape, and material	q) прослеживается назад на несколько тысячелетий
18) is traced back several thousand years	r) путём нахождения решений с помощью механики
19) to span a broad range of problems	s) на протяжении всей своей трудовой деятельности
20) to take courses in	t) определять размер, форму и материал

22. Correct the mistakes in the sentences:

1. My brother is a mechanism. He studied mechanical at technique college.
2. We need to find a good electricity to repair the electrician wires in the house.
3. I'm a computer technical. How can I help you?
4. I'm studying for a diploma in electronic. I want to be an electron engineer.

23. Fill in the gaps:

1. The … is responsible for every … in the factory. (engineering / engineer / engine)
2. I'm a … , but I want to become a … engineer. (mechanical / mechanic / mechanics)
3. The laboratory … maintains all the … equipment. (technician / technical / technology)
4. The … repairs all the … equipment of the ship. (electrical / electrician / electricity)

24. Read and translate the following text:

«Scientists investigate that which already is.
Engineers create that which never was».
ALBERT EINSTEIN

Mechanical engineering is a branch of engineering that applies the principles of physics and materials science for analysis, design, manufacturing, and maintenance of mechanical systems. It involves the production and usage of heat and mechanical power for the design, production, and operation of machines and tools. It is one of the oldest and broadest engineering disciplines.

Mechanical engineering appeared as a field during the industrial revolution in Europe in the 18th century. However, its development can be traced back several thousand years around the world. As science, mechanical engineering appeared in the 19th century as a result of developments in the field of physics. Mechanical engineering overlaps with aerospace engineering, civil engineering, electrical engineering, petroleum engineering, and chemical engineering.

Mechanical engineers use these core principles and tools like computer-aided engineering to design and analyze electric generators, internal combustion engines, turbines, refrigeration and air-conditioning equipment, machine-tools and other machinery.

The mechanical engineer is the jack-of-all trades among engineering professions. This is because the profession requires education and skills that span a broad range of technical, social, environmental, and economic problems. In general, however, the mechanical engineer is concerned with controlling the principles of motion, energy, and force through mechanical solutions.

Mechanical engineers are constantly being asked to make decisions. They must decide the size, shape, and material of every part of every mechanical product that is created. They also have to determine the best and most efficient ways to manufacture the products. Often those decisions are made in co-operation with other types of engineers. Some of the decisions they make can mean the difference between life and death: the safety features of automobiles, for example, are the responsibility of mechanical engineers.

Practically every company that designs and produces a product employs a mechanical engineer. But mechanical engineers can also be found in research labs, the military, government, and in other professions such as medicine, or teaching.

Engineers must combine a good understanding of science, mathematics, and computers with a good knowledge of current technology. In addition to the sciences and math, engineers need good communication skills. Besides, a second language can be extremely valuable because many large industrial firms that employ mechanical engineers are multinational.

At the university level, mechanical engineering students learn advanced mathematics, chemistry, and physics. After some of these core courses, mechanical engineering students take specialized courses in fluid mechanics, materials science, robotics, manufacturing processes, thermodynamics, environmental sciences.

After starting coursework in mechanical engineering, it is useful to have a summer engineering job. It helps you learn the "real world" of engineering and offers an opportunity to apply all the theories and principles taught in class. Besides, it can also help you determine your professional likes and dislikes, your strengths and weaknesses.

Mechanical engineers often continue their education throughout their careers, because technology changes rapidly. Many of the skills a student learned at the university will become out of date after only a few years.

25. Continue the phrases:

1. A summer engineering job helps you…
2. After starting coursework in mechanical engineering…
3. Engineers must combine…
4. Many of the skills a student learned at the university…
5. Mechanical engineering involves the production and usage of heat and mechanical power for…
6. Mechanical engineering requires an understanding of…
7. Mechanical engineers can also be found in…
8. Mechanical engineers take specialized courses in…
9. The development of mechanical engineering can be traced back several…
10. The mechanical engineer is concerned with…

26. Insert the missing words:

1. … mechanical engineering students learn advanced mathematics, chemistry, and physics.

2. … the sciences and math, engineers need good communication skills.

3. A summer engineering job can also help you determine… .

4. As science, mechanical engineering appeared in the 19th century … in the field of physics.

5. In general the mechanical engineer is concerned with controlling the principles of … through mechanical solutions.

6. Mechanical engineering appeared as a field … in Europe in the 18th century.

7. Mechanical engineering is a branch of engineering that applies … for analysis, design, manufacturing, and maintenance of mechanical systems.

8. Practically every company that … employs a mechanical engineer.

9. The mechanical engineer is … among engineering professions.

27. State whether the statements are true or false. Correct if necessary:

1. A coursework in mechanical engineering helps you learn the "real world" of engineering and offers an opportunity to apply all the theories and principles taught in class.

2. As science, mechanical engineering appeared in the 19th century as a result of developments in the field of chemistry.

3. Many large multinational industrial firms employ mechanical engineers.

4. Mechanical engineering appeared as a field during the industrial revolution in Europe in the 19th century.

5. Mechanical engineers can never be found in medicine, or teaching.

6. Mechanical engineers design and analyze electric generators, internal combustion engines, turbines, refrigeration and air-conditioning equipment, machine-tools and other machinery.

7. Mechanical engineers don’t continue their education throughout their careers.

8. Mechanical engineers make decisions in co-operation with other types of engineers.

9. None of the decisions that mechanical engineers make mean the difference between life and death.

10. The safety features of automobiles are not the responsibility of mechanical engineers.

28. Answer the questions:

1. What is mechanical engineering?

2. Is mechanical engineering the oldest or the newest engineering discipline?

3. When did mechanical engineering appear as a field? As a science?

4. Mechanical engineering overlaps with other branches of engineering, doesn't it?

5. Why is the mechanical engineer the jack-of-all trades among engineering professions?

6. Where can mechanical engineers be employed?

7. Why is it valuable for a mechanical engineer to know a second language?

8. What knowledge and skills must mechanical engineers have?

9. What disciplines do mechanical engineering students' study?

10. Why is it useful for a mechanical engineering student to have a summer engineering job?

11. Why do mechanical engineers often continue their education throughout their careers?

29. Complete the text translating the words in brackets:

The term 'engineering' is a modern one. Dictionaries **(1) … (определяют)** the word 'engineering' as the **(2) … (практическое)** application of scientific and mathematical **(3) … (принципы).** Nowadays the term 'engineering' means, as a rule, the art of **(4) … (проектирования),** constructing, or using **(5) … (двигателей).**

Engineering is divided into many **(6) … (отрасли).** Up to 1750s there were only two main branches of engineering – **(7) … (гражданское) and military.** It is well-known that with the invention of the steam engine and the growth of factories some civil engineers became interested in the practical application of **(8) … (механика)** and **(9) … (термодинамика)** to the machine design. They split off and were called **(10) … (инженеры-механики).**

Note:

application	применение
art	искусство
constructing	создания
steam engine	паровой двигатель
to split (split; split) off	отделиться

30. Match the words with their definitions:

(a) aerospace engineering *(b) chemical engineering*
(c) civil engineering *(d) computer-aided engineering*
(e) electrical engineering *(f) mechanical engineering*
(g) petroleum engineering

1. Engineering activities related to the production of crude oil (сырая нефть) or natural gas. 2.

The branch of engineering concerned with the design and construction such public works as roads, dams, bridges, or harbours.

3. The branch of engineering that deals with the design, construction and operation of machinery.

4. The branch of engineering that deals with the development, design and testing of aircrafts and space vehicles.

5. The branch of engineering that deals with the use of chemistry in industry.

6. The branch of engineering that studies the uses of electricity and the equipment for power generation and distribution and the control of machines and communication.

7. Use of computers during the planning design and analysis of engineering projects.

31. Look and identify the products. Match each of the products with one of engineering disciplines (ex. 30):

a.

b.

c.

d.

e.

f.

1) asphalt
2) bridge
3) computer model of a Mars Rover
4) crane
5) electric main
6) oil well
7) space station

g.

32. Match the synonyms:

1. branch; 2. company; 3. create; 4. principle; 5. rapidly

a. concept; b. field; c. firm; d. make; e. quickly

33. Match the antonyms:

1. current; 2. likes; 3. life; 4. safety; 5. strength

a. danger; b. death; c. dislikes; d. out of date; e. weakness

34. Translate the following phrases paying attention to the underlined words that can be verbs, nouns, adjectives or adverbs without changing their form and adding suffixes:

1. core course; core principle; core concept
2. to choose a career; technical career; engineers continue their education throughout their careers
3. the development of the engine; industrial development

35. Here are 6 principles of preparing for an engineering career. Look through them and try to predict what each of them is about. Then read the abstracts below and match them with the corresponding principles:

1. Develop problem-solving skills.
2. Study successful people.
3. Examine yourself carefully and honestly.
4. Acquire an interdisciplinary technical education.
5. Prepare for the non-technical aspects of your technical career.
6. Develop practical skills.

(…) Watch them carefully to see what you can learn. They tend to have a great personal interest, a personal relationship with their technology. They usually have a passion for their work.

(…) Practise relevant summer work experience. This experience can be an advantage over other students and guarantee a minimum level of engineering competence.

(…) Try to understand your drawbacks. Strengthen your weaknesses.

(…) Companies need engineers who can understand the nature of inter-branch (межотраслевых) disciplines.

(…) Problem-solving skills are the most obvious manifestation of an initiative process and God-given engineering talent. But on the other hand, everyone has some degree of talent and even gifted people have to develop their gifts. You should develop those abilities by struggling with problems by yourself, ideally starting in early childhood.

(…) Narrow technical skills may get you in the door, but what moves you up in the ladder will be the things like the ability to communicate, to cooperate with people.

36. Retell the text:

Mechanical engineering involves production, transition and use of mechanical power.

Mechanical engineers design, operate and test all kinds of machines. They develop and build engines that produce power from steam, petrol, nuclear fuels, and other sources of energy. They also develop and build different machines that use power, including heating and ventilation equipment, cars, machine tools, and industrial-processing equipment. Mechanical engineers are involved in every phase in the development of a machine, from the construction of an experimental machine to the installation of the finished machine and training of the workers who use it.

Mechanical engineers work in many industries, such as power generation, public utilities, transportation, and all types of manufacturing. Many mechanical engineers concentrate on research and development because new types of machinery are continually needed. Mechanical engineers are involved in every other branch of engineering, whenever a new or improved machine, device or piece of equipment is required.

37. Think and speak on:

a) what the term ‘engineering’ means;

b) the history of mechanical engineering;

c) what mechanical engineering students study at the university;

d) how to become a good engineer.

TEXT D. MY CAREER AND FUTURE JOB

38. Read the following terms denoting special subjects. Learn them by heart:

tractors and automobiles – тракторы и автомобили

farm machines and implements – с/х машины и орудия

maintenance of machines and tractor fleet – эксплуатация машинотракторного парка

mechanization of stock-breeding farms – МЖФ (механизация животноводческой фермы)

farms electrification and automation – электрификация и автоматизация с/х

repair of machines – ремонт машин

strength of materials – сопротивление материалов

machine elements - детали машин

39. Translate the following word combination from English into Russian:

Development of agriculture; to get practical training; to combine theoretical knowledge; scientific and technical progress; to need highly qualified specialists; special labs and workshop; to modernize machine and tractor fleet; field works such as ploughing, sowing, cultivation and harvesting; to establish the University; to be interesting and useful.

40. Translate the word combinations from Russian into English:

Поступать в институт механизации сельского хозяйства; инженер механик; учиться в институте; после окончания школы; на третьем курсе; кафедра иностранных языков; благодаря механизации; в области сельского хозяйства; проектировать и конструировать с/х машины; нуждаться в транспортных средствах специального назначения.

41. Read the following sentences in English paying attention to the words in brackets. Translate the sentences into Russian:

1. After finishing school I (решил) to become an engineer.
2. Our faculty (готовит) farm mechanization engineers.
3. My brother (поступит) the University in 3 years.
4. At the Institute we (изучаем) various special subjects.
5. Specialization (начнется) in the third year.
6. Every year Russian manufactures (проектируют и конструируют) modern farm machines and implements.
7. Our profession (будет) useful for the development of agriculture.
8. The agriculture (развивается) quickly in our country.
9. Before the revolution animals (выполняли) practically all the jobs.
10. When I (стану) an extra-mural student I (буду совмещать) work with students.

42. Make the sentences negative and interrogative:

1. They entered the University 2 years ago.

2. He studies Higher Mathematics and Chemistry.
3. We will become good specialists.
4. Jack and Tom design a new power fool high- speed tractor.
5. Our students became farm mechanization engineers.
6. They will combine theoretical knowledge with practice.
7. This student learns how to repair machines.
8. He is a day-time student.
9. It will be a new self-propelled combine.
10. We were in the repair shop last week.

43. Make special questions to the following sentences:

1. He studies at the Farm Mechanization Institute. (Who, where).
2. They entered the University last year. (When, what).
3. The students will take a test in a week. (Who, when).
4. The students have holidays twice a year. (How often, what).
5. Jane saw Nick in the lab 15 minutes ago. (Who, whom, where, when).

44. Translate the sentences from Russian into English:

1. Я - первокурсник.
2. Мы поступили в ПГАТУ в прошлом году.
3. Через 4 года она станут инженерами-механизаторами.
4. Он изучает такие специальные предметы, как высшая математика, сопротивление материалов, детали машин.
5. После окончания школы она поступит в ПГАТУ.
6. Студенты обычно проходят практику в мастерских, на заводах и хозяйствах.
7. Академия готовит хороших специалистов в области механизации с/х.
8. Когда он поступит в институт механизации с/х?
9. Конструкторы сказали, что они хотят увеличить скорость этого трактора.
10. Плуги, культиваторы и бороны являются прицепными орудиями.
11. Механизация играет очень важную роль в с/х производстве.

45. Read and translate the following text:

My Future Profession

The demand for specialists in agriculture in the Far East made it possible to establish the Primorsky State Agrarian – Technological University. After finishing school, I decided to enter the Engineering Institute. Our Institute was opened in 1961

and it trains farm mechanization engineers. There are 6 special chairs at the Institute at which the students get deep knowledge in the field of Tractors and Automobiles Farm Machines and Implements, Maintenance of Machines and Tractor Fleet, Mechanization of Stock-breeding Farms, Farms Electrification and Automation, Repair of Machines. We also study Physics, Higher Mathematics, Chemistry, Foreign Language, Strength of Materials Machine Elements and so on. Specialization begins in the third course in special labs, workshops, repair shops, at plants, and on different farms. We combine theoretical knowledge with practice, get practical training and learn much new about our future profession. In future our work will be connected with different kinds of machines.

Every year Russian manufactures design and built modern farm machines and implements: powerful high-speed tractors, universal self-propelled machines and combine-harvesters, mounted and trailed implements (ploughs, cultivators, drills, planters, harrows, mowers); equipment for the stock-breeding farms, lorries and special-purpose vehicles and other means of transport.

Thanks to the mechanization on field works such as plowing, sowing, cultivation, and harvesting are fully mechanized. Scientific and technical progress in agricultural needs highly- qualified specialists, engineers capable of designing, operating, and controlling farm machinery and equipment.

I think that my future profession is very interesting and useful for the development of agriculture in our country.

46. Complete the following sentences:

1. Specialization begins in the third year in … .
2. … is the most modern and economical method of sowing.
3. We use … to transport all kinds of loads.
4. The future work of engineer will be connected with … .
5. Every year Russian manufactures design and built … .
6. To become good specialists we study such a special subjects as … .
7. At special labs, workshops and plants we try to combine … .
8. Today a lot of field works: … are fully mechanized.

47. Answer the following questions:

1. Where did you enter after finishing school?
2. What specialists does the Institute train?
3. What special subjects do you study?
4. What other subjects do you study?
5. Where and when does specialization begin?
6. When was the Institute opened?

7. What types of machines and farm equipment do Russian manufactures design every year?

8. What field works have been fully mechanized?

9. What do you think of your future profession?

IV. FARM MACHINERY

1. Learn the words:

apply fertilizers - вносить удобрения в почву
barnyard – скотный двор
bean cultivator - культиватор для бобовых культур
beet cultivator – свекловичный культиватор
broad-cast planter - сеялка для пропашных культур
baler - пресс-подборщик, сенной пресс
beet harvester машина для уборки свеклы
break (broke, broken) up the layers of soil – разбивать на мелкие куски пахотный горизонт
break down the soil – рыхлить почву
chisel cultivator - чизель-культиватор
consolidate the soil - трамбовать, уплотнять почву
compact - утрамбовывать
combine harvester- зерноуборочный комбайн
cover seeds - закрывать семена в почве
crush the clods – дробить глыбы, комья земли
cultivation machinery (syn. cultivator) - культиваторы
destroy (syn. eliminate) weeds - удалять сорняки
digger - копатель
disk – дисковать почву
disk coulter - дисковый нож
disk harrow - дисковая борона
disk plow – дисковый плуг
fallow - вспахивать под пар
farm machinery - сельскохозяйственная техника
fertilize the soil - удобрять почву
fertilizer distributor – туковая сеялка
fertilizing equipment - машины для внесения удобрений
field cultivator - культиватор для обработки паров
frame - рама
grain drill - зерновая сеялка
granular fertilizer – гранулированное удобрение
harrow - бороновать почву; борона
harvesting equipment – уборочные машины
headstock - присоединительная стойка навесного орудия
heavy machinery - тяжелая техника
hoe out the weeds - пропалывать междурядья

level the ground – выравнивать почву
lister cultivator - культиватор для бороздовых посевов manure - навоз
lorry- грузовик
manure spreader - навозоразбрасыватель
moldboard - отвал
moldboard plow - отвальный плуг
mounted plow - навесной плуг
mower - косилка
mulch - мульчировать
prevent weeds – предотвращать сорняки
prepare seedbed - готовить семенное ложе
penetrate - проникать
planting attachments - установки, крепления для посева
planting equipment - посевные машины
potato harvester - картофелеуборочный комбайн
power operate device - автоматическое устройство
primary tillage equipment - почвообрабатывающие орудия для первичной обработки
rake - грабли
rod weeder - штанговый культиватор
roller - каток, валец, валик, ролик
rotary hoe - ротационная мотыга
row-crop planter - широкорядная сеялка
secondary tillage equipment - почвообрабатывающие орудия для последующей обработки
semimounted plow - полунавесной плуг
share - лемех, сошник
sow (saw, sown) seeds (syn. place) – сеять семена
spike tooth harrow - зубовая борона
sprayer - опрыскиватель
spring tooth harrow - пружинная борона
stir the soil - рыхлить почву
sub-soiler – почвоуглубитель, глубокорыхлитель (без оборота пласта)
threshing machine – молотильная машина

2. Guess the meaning of the following international words:

Method, farmer, disk, machine, physical, component, cultivation, cultivator, sprayer, tractor, primitive, to compact, to crush, to prevent, principal, production, to classify, granular, deficient, element, class.

3. What are the English equivalents for the following Russian words:

1) Движение: move, movement, mower, moveless, movable;

2) Навесной: mount, mounted, mounting, mountain, mountaineer;

3) Вынужденно: forcible, forceless, forceful, force, forcing, forced, forcedly;

4) Устремленный: aim, aimed, aimless.

4. Translate these word combinations:

Agricultural implement, heavy machinery, principal kind, several types, special crops, special conditions, liquid form, gaseous form, principal machines, important machine, general work, great advantage, moldboard plow, disk coulter, skim coulter, beet cultivator, bean cultivator, lister cultivator, field cultivator, chisel cultivator, plant parts, food crops, feed crops, grain drill, barnyard manure, food elements, fertilizer distributor, seed crops, beet harvester, potato harvester.

5. Find the word or word combination which does not fit into the group of synonyms:

To include – to contain, to improve, to comprise, to consist of, to have;

Machinery – tool, device, movement, equipment, implement, machine;

To accomplish – to do, to perform, to make, to produce, to fulfill, to act, to introduce;

To keep – to move, to support, to hold, to maintain;

Soil – ground, layers of soil, seed, land;

To prevent – to let know, to use, to warn about, to avert, to anticipate, to forestall.

6. Match the words in (A) with their definitions on the left (B). One definition in B is odd:

A	B
1. equipment	preparation of land for crop-bearing
2. seedbed	thickness of material laid or lying on or spread over a surface or forming one horizontal division
3. loose	not compact, not closely packed
4. manure	things needed for a purpose seed
5. tillage	bed of fine soil in which to sow
6. seed	a source of organic matter of plant or animal origin or a mixture of both
7. layer	outfit, tools, apparatus
	a person who works in a branch of engineering

TEXT A. FARM MACHINERY

7. Read the text and say why agriculture needs many kinds of farm machinery:

We know the farmer to have a wide range of machinery to plow and disk, and harrow, and plant, and fertilize, and finally harvest faster, easier and more profitably today. The machine is known to be a device that uses force to accomplish something transmitting and changing force or motion into work.

Agricultural implements and machines being very numerous and diversified now may be divided into 4 main groups: tillage equipment, planting equipment, fertilizing equipment, harvesting equipment.

The aim of tillage is to prepare the soil for planting and to keep it loose and free from weeds during the growth of crops. The primary tillage equipment used by the farmer includes ploughs, sub-soilers, and thinners. The secondary tillage equipment embraces harrows, rollers and tools for mulching and fallowing. Plow is designed to eliminate weeds, to prepare a suitable seedbed, to improve the physical condition of the soil. Ploughs fall into mounted, semi mounted, disc, moldboard plows. The main components of ploughs are the main frame, the share, the moldboard, the disc coulter, the skim coulter, the headstock. The function of sub-soiler is to penetrate into the deeper depths and break up the layers of soil which have become compacted due to the movement of heavy machinery. A harrow is an implement used to level the ground and crush the clods, to stir the soil, and to prevent and destroy weeds. There are three principal kinds of harrow namely the disk, the spike-tooth, and the spring tooth.

Cultivation machinery is used to break down the soil before or after a crop is sown for covering seeds, for consolidating the soil and for hoeing out weeds. There are several types of cultivators designed for special crops and conditions: beet and bean cultivators, lister cultivators, rotary hoe cultivators, rod weeders, field cultivators, sub-soil and chisel cultivators.

Planting equipment is any power-operated device introduced to place seeds or plant parts in or on the soil for production of food and feed crops. It is classified as row-crop planters, broad-cast planters, grain drills and planting attachments for other equipment.

Applying such types of fertilizers as barnyard manure, granular fertilizers, and fertilizers in liquid and gaseous form is necessary where soils are deficient in plant food elements. Such fertilizing equipment as manure spreaders, fertilizer distributors, sprayers are in use.

Crops are harvested by the use of many kinds of harvesting equipment for all types of crops. The principal machines required to make hay are mowers, rakes, balers. Grain and all types of seed crops are harvested by combine harvesters. Beet

harvesters are available to harvest beet, potato harvesters and diggers being for potatoes.

The tractor is the most important machine pulling many kinds of implements that cultivate plant, fertilize, and harvest. Wheeled tractors being used for general farm work, track-laying tractors or crawlers have the great advantage that they can be available for heavy loads on any class of land.

8. Look through the text again to define whether the following statements are true or false. Correct the false ones:

1) There is a wide range of machines to plant.
2) Agricultural implements may be divided into several groups.
3) To prepare the soil for harvesting is the aim of tillage.
4) A harrow is designed to eliminate weeds.
5) After a crop is sown, fertilizing equipment is used.
6) Planting equipment is used to place seeds in the soil.
7) When soils are deficient in plant food elements, many types of fertilizers are applied.
8) There are diggers to harvest all types of seed crops.
9) A beet harvester is the most important machine on the farm.
10) Wheeled tractors are available for heavy loads.

9. Complete the sentences with the appropriate ending:

1) Today the farmer has many agricultural implements to… .
2) The machine is a device… .
3) Ploughs are divided into… .
4) The principal parts of a plow are… .
5) The sub-soiler breaks up the layers of soil… .
6) Cultivators are designed for … .
7) To make hay … .
8) To harvest beet … .
9) To pull many kinds of implements … .
10) To do general farm work … .

10. Scan the text again to find English equivalents for the following Russian words:

Преобразовывать силу в движение; проникать очень глубоко; проход техники; специальные условия; кормовые культуры; приспособления для посадки; иметь преимущество; почвы, страдающие от недостатка питательных веществ.

11. Choose the correct answers to the following questions which you think fit best:

1. What is the aim of tillage?

a. to cultivate b. to prepare the soil c. to harvest

2. What is a plow designed for?

a. making the soil more fertile b. preparing the suitable seedbed c. placing seeds

3. How many components does a plow have?

a. 4 b. 7 c. 6

4. What is a bean cultivator designed to?

a. to cultivate beets b. to cultivate beans c. to cultivate weeds

5. What can a tractor pull?

a. many kinds of implements b. food crops c. feed crops

12. Fill in the gaps with the suitable words from the box:

crawlers, planting equipment, cultivation machinery, cover, motion, sprayers, plant, level, seedbed, place, manure spreaders, harrow

1. The machine changes … into work.
2. Plow is available to prepare a … .
3. To … the ground a … is used.
4. To … seeds, … is used.
5. … can … parts or … seeds in or on the soil.
6. Fertilizers in liquid form are applied by … .
7. … apply barnyard manure.
8. … can be available on any type of land.

13. Answer to the following questions:

1. What agricultural operations is farm machinery known to perform?
2. What crops (vegetables, fruits, grain crops, industrial crops) are sown (planted), harvested on the farm?
3. What is a machine?
4. What is the most important machine on the farm? What do you know about the types of tractors? What implements can a tractor pull? What is the difference between wheeled tractors and track-laying tractors?
5. How many groups agricultural implements and machines may be divided into? What are these groups?
6. What is tillage? What equipment can be used for tillage?
7. What is plow designed for?
8. What kinds of plows do you know?
9. What are the main parts of a plow?

10. What are harrows used for?
11. What are the principal kinds of harrows?
12. What are the means to improve soil fertility? What fertilizers do you know?
13. What machinery is required for harvesting?

14. Make up a plan of the text A. Sum up the information from the text according to your plan using the following expressions:

1. The text under consideration is head-lined …
2. The text under discussion presents an outlook of…
3. The purpose of the text is to give the reader some information about…
4. The text can be divided into … parts.
5. The first part reviews some common information …
6. The second part deals with…
7. The third part touches upon…
8. The fourth part of the text includes…
9. The text highlights…
10. According to the text…

TEXT B. AGRICULTURAL MACHINES AND IMPLEMENTS

15. Guess the meaning of the following international words:

Mechanic, mechanics, mechanization, mechanize, machine, machinery; engineer, engineering; accumulation, accumulator, accumulate; cultivator, cultivate, cultivation; combine, combiner, combination; control.

16. Match the English names of the agricultural tools with their Russian equivalents:

1. spade	a. ведро
2. rake	b. мотыга
3. hoe	c. грабли
4. trowel	d. лопата
5. pitches	e. садовый совок
6. bucket	f. вилы
7. ripper	g. лейка
8. sprinkle	h. рыхлитель
9. scythe	i. серп
10. reaping-hook	j. секатор
11. garden pruner	k. коса

17. Read the text. Try to remember the names of different machinery and implements and their functions. Fill in the table after the text.

Agricultural machines are used to till the soil and to plant, cultivate and harvest crops. Since ancient times when cultures first began cultivating plants people have used tools to help them grow and harvest crops. They used pointed tools to dig and keep soil loosened, and sharp knife-like objects to harvest ripened crops. Modifications of these early implements led to the development of small hand tools that are still used in gardening, such as spade, hoe, rake, trowel, and larger implements, such as plough and larger rakes that are drawn by humans, animals or simple machines.

Modern agricultural implements adapted to large-scale farming methods are usually powered by the diesel- or petrol-fuelled internal-combustion engines. The most important machine of modern agriculture is the tractor. It provides locomotion for many other implements and can furnish power via its power shaft for the operation of machines drawn behind a tractor. The power shaft of a tractor can also be set up to drive belts that operate the equipment, such as feed grinders, pumps and electric-power generators. Small implements, such as portable irrigators, may be powered by individual motors.

Many types of implements have been developed for growing crops. They are implements for breaking ground, planting, weeding, fertilizing and combating pests. Ground is broken by ploughs to prepare the seed-bed. A plough consists of blade-like ploughshare that cuts, lifts, turns and pulverizes the soil. Modern tractor ploughs are usually equipped with two or more ploughshares so that a wide area of ground can be broken at a single sweep. Harrows are used to smooth the ploughed land and sometimes to cover seeds and fertilizers with earth. Rollers break up clods of soil to improve the aeration of the soil and its capacity for taking in water.

Some cereal crops are still planted by broadcasting seeds, that is by scattering the seeds over a wide area with broadcastsowers. Specialized implements called planters or drills are necessary for sowing crops that are planted in rows, such as maize. Fertilizers can be distributed during winter or before seeding time. They are commonly distributed together with seeds by drills or planters. Manure is distributed most efficiently by a manure spreader.

After crops have begun to grow a cultivator is used to destroy weeds, loosen and aerate the soil. Sometimes farmers use herbicides applied in the form of a spray or as granules for weed control and insecticides for pest control. A variety of mechanical spraying and dusting equipment is used to spread chemicals on crops and fields. Nowadays farmers try to apply alternative forms of pest control by using crop rotation or introducing organisms that damage or kill the pests but leave the crops unharmed. Some crops are being genetically engineered to be more resistant to pests.

Most cereals are harvested by using a combine, a machine that removes the heads or ears, beats off the grain kernels, cleans the grain and accumulates it in the attached grain tank. Hay harvesting usually requires several steps. First the grass is cut close to the ground with a mower. After drying in the sun most hay is baled. Then the pick-up baler lifts the hay to a conveyor that carries it to a baling chamber. A machine called a field chopper cuts down green hay which is brought and stored in a silo. Specialized machinery is used to harvest large root crops, such as potato and sugar beet and to harvest fruits and vegetables. They are fruit-pickers and vegetable harvesters. The use of agricultural machinery substantially reduces the amount of human labour needed for growing crops.

Agricultural tools, implements, machinery for planting	Agricultural tools, implements, machinery for cultivating crops	Agricultural tools, implements, machinery for tilling the soil	Agricultural tools, implements, machinery for harvesting crops

18. Re-read the text again to find out which of the following statements are true and which are false:

1. The modern plough is powered by animals.
2. The fertilizers are mostly spread by a human.
3.The modern tractor is powered by a steam engine.
4.The main function of the harrow is to smooth the ploughed land.
5. Using insecticides and herbicides is the best form of pest control.
6. Fertilizers should be distributed in summer.
7. The use of farm machines increases the amount of the human labour needed for growing crops.

19. Answer these questions to sum up the content of the text:

1. What are the main groups of agricultural machines and implements?
2.Could you name the major tools/machines in each of these groups?
3.What is the main difference between early agricultural tools and modern machines and implements?
4. What is the most important machine in agriculture? What are its functions?
5. What tilling implements are mentioned in the text?
6. What are the two main groups of planting machines?
7. What is the difference between them?
8. What cultivating and harvesting machines are used in agriculture?
9. What do people use agricultural machinery for?

TEXT C. THRESHING MACHINES

20. Translate the following words and word combination:

Орудия; предметы, похожие на нож; садовый совок; широко используются; обрабатывать почву; двигатель внутреннего сгорания; обеспечивает передвижение; снабжает энергией; приводить в движение ремни; дробилки для кормов; энергогенераторы; лошадиная сила; мощность трактора; хранить в топливном баке; заправлять топливом снова; необычный трактор; цепь привода; сжатый водород; электрический ток; топливный бак; вырабатывать электричество; загрязняющие вещества; работать бесшумно; трактор, приводимый в движение с помощью водорода.

21. Fill in the table:

Agricultural machine or implement	Its function
Spade	
Rake	
Tractor	
Plough	
Roller	
Harrow	
Drill	
Sower	
Cultivator	
Combine	
Agricultural machinery	
Baler	

22. Give the word suitable for the definition:

1 A part of a vehicle that produces the power which makes the vehicle move.	
2 A large farming implement with one or more blades fixed in a frame, drawn over soil to turn it over and cut furrows in preparation for the planting of seeds.	
3 An implement consisting of a heavy frame set with teeth or tines that is dragged over the plowed land to break up clods, remove weeds, and cover seeds.	
4. A tool with a sharp-edged, typically rectangular, metal blade and a long handle, used for digging or cutting earth,	

sand, turf, etc.	
5. A wild plant growing where it is not wanted and in competition with cultivated plants.	
6. A machine that has sharp blades for cutting something such as grass.	
7. An engine that uses the expansion or rapid condensation of steam to generate power.	
8. A colorless, odorless, highly flammable gas, the chemical element of atomic number 1. (Symbol: H).	
9. A unit of power equal to 550 foot-pounds per second (745.7 watts).	
10. A material such as coal, gas, or oil that is burned to produce heat or power.	

23. Make up word combinations using the words from the left and the right columns. Translate the word combinations:

A	B
plough	implements
distribute	fruit
harvest	soil
combat	fertilizers
broadcast	grass
mow	seeds
bale	ground
till	hay
mount	crops
ripened	pests

24. Insert the words from the box into the following sentences:

mower, weeds, combine, pick-up baler, tools, cereals, hay, rows

1. Some … are planted by broadcasting.
2. … are destroyed with a cultivator.
3. Hay harvesting is done with a … .
4. We use drills and planters to sow in … .
5. Harvesting is usually performed with a … .
6. The … lifts the hay to the conveyor.
7. After drying in the sun most … is baled.
8. Ancient people used … to help them grow and harvest crops.

25. Translate the following sentences into English:

1. В этом году мы должны засеять картофельное поле бобовыми культурами. Мы знаем о необходимости севооборота.

2. Мы должны попробовать альтернативные формы борьбы с вредителями.

3. – Сколько времени потребуется, чтобы вспахать это поле? – Я думаю, мы закончим работу к вечеру.

4. Вы засеяли поле рядами или вразброс?

5. Они купили новый пресс-подборщик. Заготовка сена – долгий и трудоемкий процесс.

6. Удобряя почву, они не используют навозоразбрасыватель.

7. Некоторые современные тракторы оборудованы компьютерами.

8. Кукурузу сеют рядовыми сеялками.

9. Они ремонтируют плужный лемех вот уже 2 часа.

10. Сельскохозяйственные машины широко используются на нашей ферме.

11. Этот новый трактор, работающий на водороде, может выполнять все задачи. 12. Оборудование, показанное на этой выставке, может действительно работать в поле.

13. Его можно снова заправить водородом.

14. Сжатый водород, который хранится в топливном баке, позволяет трактору заправляться снова очень быстро.

15. Водород взаимодействует с кислородом, который поступает из воздуха.

16. Выставка «Золотая осень» будет проходить в Москве с 12 по 14 сентября.

26. Find the information in the text about the evolution of the early agricultural machines:

Threshing Machines

The threshing floor, on which oxen or horses trampled out the grain, was still common in George Washington's time, though it had been largely succeeded by the flail. In Great Britain several threshing machines were devised in the eighteenth century, but none was particularly successful. They were stationary, and it was necessary to bring the sheaves to them. One patent issued by the United States to Samuel Mulliken of Philadelphia, was for a threshing machine. The portable horse-powered treadmill invented in 1830 by Hiram and John Pitts of Winthrop, Maine, was coupled with a thresher, or "separator."

The horse-powered treadmill was later replaced by the traction engine tractor, which both transported the threshing machine from farm to farm, and when a destination was reached powered the thresher.

Combination Harvester and Thresher

Another development was the combination harvester and thresher used on the larger farms of the West. This machine does not cut the wheat close to the ground, but the cutter-bar, over twenty-five feet in length, takes off the heads. The wheat isseparated from the chaff and automatically weighed into sacks, which are dumped as fast as two expert sewers can work. The motive power is a traction engine or else twenty to thirty horses, and seventy-five acres a day can be reaped and threshed. Often another tractor pulling a dozen wagons follows and the sacks are picked up and hauled to the granary or elevator.

Haying Machines

In 1822, Jeremiah Bailey, of Chester County, Pennsylvania, patented a horsedrawn machine with a revolving wheel with six scythes, used for haying and other cutting.

The haying machine was co-developed with the reaper. The basic idea in the reaper, the cutter-bar, became part of mower. Hazard Knowles, an employee of the Patent Office, invented the hinged cutter-bar, which could be lifted over an obstruction, but never patented the invention.

In 1844, William Ketchum of Buffalo, New York patented the first machine intended to cut hay only, and dozens of others followed. An improved mowing machine was patented by Lewis Miller of Canton, Ohio, in 1858.

Other Inventions

Other inventions created during the agricultural revolution included: clover hullers, bean and pea threshers, ensilage cutters, manure spreaders, and dozens of others. On the dairy farm the cream separator increased the quantity and improved the quality of the butter. New power also drove the churns. Cows were milked and sheep were sheared by newly invented machines and eggs were hatched without hens.

TEXT D. FARM MACHINES

27. Read and translate the following text:

Every collective farm has various types of machines that plow the soil, plant the seeds, cultivate the plants, harvest the crops and transport the products harvested.

Soviet collective farmers use tractors (in terms of 15 horsepower units), lorries, different drills, planters and harvesters. At present nearly every branch of agronomy uses specialized harvesters. Thus, we find grain combine harvesters, corn pickers, cotton pickers, tea pickers, fruit pickers, tomato harvesters. For harvesting root and tuber crops there exist various diggers such as potato diggers, carrot diggers, sugar beet diggers, onion diggers, etc.

28. Answer the following questions:

1. What kinds of farm machines do you know?
2. What belongs to the specialized harvesters?
3. What are the different diggers for harvesting root crops and tubers?

29. Insert the words from the box into the following sentences:

potato diggers, carrot diggers; every collective farm; specialized harvesters; collective farmers.

a. Every branch of agronomy uses … .
b. There are various diggers such as … .
c. … has various types of machines.
d. … use tractors, lorries, different drills, planters and harvesters.

30. Find English equivalents:

Используются различные экскаваторы, транспортировка выращенной продукции, в настоящее время, отрасли агрономии, сбор урожая.

31. Make singular from plural:

Types, diggers, pickers, harvesters, seeds, plants, lorries, drills.

V. MECHANIZATION OF AGRICULTURE

1. Learn the words:

adjacent - примыкающий
aerial top-cropping - подкормка с воздуха
alternation - севооборот, чередование сельхозкультур
annual – ежегодный
anti-rust preparation - раствор для антикоррозионной обработки
applicator - подкормщик (*устройство для внесения удобрения)*
auxiliary – дополнительный
battery replacement - замена аккумулятора
bush-cleaning - очистка кустов
chain – цепь
coulter - нож (*плуга*)
ditch-filling - заполнение канав
durability - нормативный срок эксплуатации
fallowing - вспашка под пар
frame – рама
full-width distributor - широкозахватный разбрасыватель
gearbox - коробка передач
gross national product (GNP) - валовой национальный продукт (ВНП)
hopper – бункер
income - доход
intricate – сложный
land-leveling - выравнивание почвы
labor – труд
liquid – жидкий
lubrication – смазка
maintenance costs - эксплуатационные расходы
mowing machine – косилка
orchard work - садовая работа
power-take-off driven manure spreader - разбрасыватель с приводом от вала отбора мощности
p.t.o-power-take-off - вал отбора мощности
ploughshare - плужный лемех
point – деталь
profit - прибыль
roller – каток
row-crop tractor - трактор для пропашных культур
rod weeder - штанговый культиватор

scope - сфера деятельности, возможности, диапазон
self-propelled combine - самоходный комбайн
service parameters - эксплуатационные показатели машины
sharpened – заостренный
specific fuel consumption – удельный расход топлива (на 100 км)
sprocket - звездочка гусеницы
stick – палка
to accomplish – выполнять
to be closed to - быть подчиненным
to break down – рыхлить
to make adjustments - регулировать, налаживать
to mount – навешивать
to overheat – перегреваться
to stipulate - обуславливать появление чего-либо
wear-proof ability - износостойкость
wheeled tractor - колесный трактор

TEXT A. MECHANIZATION OF AGRICULTURE

2. Read and translate the following text:

At the dawn of history man practiced the most elementary methods of improving soil structure. He used the most primitive cultivating devices: a sharpened stick, a simple hoe, a primitive plow.

In agriculture the use first of water power and then of steam had stipulated the invention of machinery supplementing or replacing manual labor: a threshing machine, a mowing machine, a self-binder, and a potato-digger.

In the middle of the 18th century farmers tried a moldboard plow. The mechanical corn planter and the self-binding reaper were designed in the 19th century.

In 1897 Rudolf Diesel invented a new engine known as diesel. The most far-reaching invention for agriculture was the gasoline engine mounted on a farm tractor at the beginning of the 20th century.

Modern agriculture is known for its full-scale mechanization of jobs requiring more intricate agricultural machinery.

Nowadays farmers use electric power to operate the electronic and automated equipment. Electric motors are used to run milking machines, irrigation pumps, and many other farm machines.

A farmer has a wide range of machinery to plow and disk, and harrow, and plant, and fertilize, and harvest faster, easier and more profitably today.

The machine is a device that uses force to accomplish some work. Agricultural implements and machines may be divided into 4 main groups: tillage equipment, planting equipment, fertilizing equipment, harvesting equipment.

The aim of tillage is to prepare the seedbed for planting. The primary tillage equipment used for that includes ploughs, sub- soilers; the secondary tillage equipment encompasses harrows, rollers and tools for mulching and fallowing. Cultivation machinery is used to break down the soil, to cover seeds, to hoe out weeds. There are several types of cultivators: beet and bean cultivators, rod weeders, rotary hoe cultivators, and others. Planting equipment is introduced to place seeds or plant parts. It is classified as row crop planters, broad cast planters, grain drill etc. Such fertilizing equipment as manure spreaders, fertilizer distributors, and sprayers are used for applying fertilizers. Crops are harvested with the use of combine-harvesters, potato- diggers, etc.

A tractor is the most important machine on the farm. The power of the tractor is transmitted to an implement by means of power-take-off-shaft. The tractors can be divided into the wheeled tractors and crawlers. Wheeled tractors may be further subdivided into standard and row-crop types.

Every implement or machine has many component parts such as engine, transmission system, hydraulic system, clutch, gearbox, differential, filter, pump, cylinder, and others.

3. Find a word in each group of words that unites the others:

a) Plow, tool, harrow, sub-soiler, roller, agricultural implement;

b) Wheeled tractor, crawler, machinery, combine harvester;

c) To plow, to disk, to do some agricultural work, to harrow, to plant, to harvest, to fertilize.

4. Choose an English equivalent for the following words:

1) Вспашка: plow, plowing, plowed, plough;

2) Навесной: mounted, mounting, mount, mountain;

3) Плодородный: fertilizer, fertilization, fertilize, fertilizing, fertile;

4) Дифференциал: differential, different, differ, difference.

5. Translate the following phrases:

The use of water power, the invention of machinery, farm tractor, mechanization of jobs, irrigation pump, the aim of tillage, beat cultivator, grain drill, manure spreader, the power of a tractor, transmission system, primitive devices, manual labor, new engine, electric power, agricultural implement electronic equipment.

6. Form nouns from verbs and translate them using a model:

Model: *To plant – planting (посадка)*

To improve, to cultivate, to plow, to supplement, to replace, to mow, to fertilize, to harvest, to fallow.

7. Form words of different parts of speech using a model. Translate them into Russian:

Model: *to plant (сажать) – plant (растение) – planter (посевная машина) - planting (посадка) – planted (посаженный).*

To plow, to till, to fertilize, to dig, to transmit, to roll, to cultivate, to distribute, to apply, to spray.

8. Form words using the - er suffix. What part of speech they are, what they mean:

To farm, to bind, to reap, to plant, to roll, to weed, to harvest, to dig.

9. Find in the text:

a) существительные, образованные от глаголов: *to farm, mechanize, to equip, to pump, to invent, to plow;*

b) прилагательные, образованные от существительных: *mechanic, agriculture, electricity;*

c) глаголы, от которых образованы следующие существительные: *plow, plant, harrow, hoe, fertilizer;*

d) существительные, образованные от глаголов: *to farm, to till, to cultivate, to plant, to distribute, to spread, to transmit.*

10. Find words that are not related to the text:

Tractor, engineer, department, family, soil, seeds, crops, component parts, filter, plant-growing, pig-breeding, clutch, engine.

11. Insert the words from the box into the following sentences and translate them:

crawler, seedbed, combine-harvester, farm machinery, hoe, engine, gearbox

1. Примитивным орудием людей был простой...
2. Новый... был изобретен Рудольфом Дизелем.
3. Сложная... используется сегодня на фермах.
4. Главное в первичной обработке почвы – это подготовка...
5. Сельскохозяйственные культуры убираются...
6. ... используется при сложных погодных условиях.
7. ... одна из составных частей трактора.

12. Agree or disagree with these statements:

1. At the dawn of history, a man used the most intricate devices.
2. Steam power has stimulated the invention of electronic equipment.
3. Modern agriculture uses electric motors.
4. There are many groups of farm machinery.
5. Diggers are used to plant seeds.
6. Crawlers may be divided into standard and row-crop.
7. Fertilizing equipment is used to apply manure.
8. A machine has many component parts.

13. Выберите правильные ответы на следующие вопросы (используйте информацию из текста).

1. How many types of tractors are there?

a. 2 b. 3 c. 4

2. What is the most important machine on a farm?

a. tractor b. mower c. crawler

3. How many groups of agricultural implements and machines are there?

a. 2 b. 4 c.6

4. Who invented diesel engine?

a. R. Diesel b. James Watt c. John Deer

5. When was a mechanical corn planter invented?

a. In the 18th century b. in the 19th century c. in the 20th century

14. Finish the following sentences using the information from the text:

1. The power of the tractor is transmitted by...
2. Farmers use farm machinery to...
3. The aim of tillage is...
4. The aim of cultivation is...
5. The aim of fertilizing is...
6. The aim of planting is...
7. The invention of gasoline engine was...
8. The primitive cultivating devices were...
9. The first agricultural machines were...

15. Name it:

1. 4 groups of agricultural machinery;
2. The inventions of 18-19th centuries;
3. Types of power;
4. Agricultural operations;
5. Types of tractors;

6. Component parts of machines;
7. Agricultural machines.

16. Fill in the table using the information from the text:

machine	function	sphere of application
plow	to prepare seedbed	tillage
sharpened stick		
hoe		
potato-digger		
corn planter		
tractor		
beet cultivator		
sprayer		
grain drill		
combine harvester		

17. What periods in the development of agricultural engineering do these dates belong to:

1. In the middle of 18^{th} century;
2. In 1897;
3. At the down of history;
4. In the 19^{th} century;
5. At the beginning of 20^{th} century.

18. Answer the following questions:

1. What were the most primitive agricultural devices?
2. What were the first agricultural machines that used water and steam power?
3. How did the invention of Rudolf Diesel change the agriculture?
4. What type of power is used today in agriculture?
5. What agricultural operations does a farmer do?
6. What agricultural implements and machines does a farmer use today?
7. What machine is used to pull many kinds of agricultural implements?

TEXT B. IMPORTANCE OF ECONOMIC MECHANIZATION

19. Read and translate the following text:

Mechanization of agriculture is a progressive development of steadily increasing scope and importance, and it continues with more and more exploitation of mechanical and electrical power for almost every farming task.

More and more machines and equipment of all sorts are used on farms today, replacing hand labour and increasing labour productivity. Since the 1930s, progress has been revolutionary. A rapid acceleration in the use of tractors and other engine-driven field machinery has been followed by the development of a wide range of sophisticated equipment for carrying out essential operation better and cheaper. With machines and power available, farmers may not only do more work and do it more economically; they can also perform higher-quality work, and the work may be finished in a shorter and more favourable time.

Many machines are known to be powered by tractors. Implements such as plows, cultivators and planters may be mounted on, or pulled by, a tractor. However, through economic reasons, an increasing number of farm machines are now self-propelled. Among these machines we may name grain combine harvesters, cotton pickers, forage harvesters, and many other specialized farm machines.

There are certain machinery service parameters that need to be paid attention to in terms of economic optimization of farming practices. Economics and statistics prompt that less monies will be spent in agriculture if, say, efficient power of a tractor grows, engine's specific fuel consumption goes down, machine's efficiency and reliability become higher. Also, lower maintenance costs, including service costs, as well as decreased fuel and grease costs allow extra financial means to be saved for other - most of the time more important - farm-related expenses and the business expansion. And it goes without saying that the higher is the durability and the wear-proof ability of the equipment employed, the brighter are the economic perspectives of the enterprise exploiting it.

The scope for future development is limited only by the necessity for mechanization to be economic. Already much of the new equipment includes automatic control devices, and these are certain to play an ever-increasing part in agricultural mechanization in the future. They open up whole new fields of development, such as automatic control of environment for both crops and livestock. Also, because electricity is considerably cheaper than liquid and gas fuels, machines that do not require mobility are usually driven with electric motors. Such installations include silage unloaders, livestock feeding equipment and milking machines.

To illustrate the arguments cited above, let's take Great Britain as a sound example. Mechanization, supported by other scientific advances, has transformed the place of agriculture in the national economy. In the mid-nineteenth century about a quarter of the working population of Britain were engaged in agriculture, and farming produced about one fifth of the country's wealth. Today, about 5.5 per cent of the gross national product is produced by less than 3 per cent of the gainfully employed population - a labour use considered to be the lowest in the world

of today. Current national trends of spreading and growing in volume use of mechanical equipment on farms are reflected in statistical reports dealing with it.

20. Fill in the table using the information from the text:

Tractor-driven	Self-propelled	Electrically-driven

21. Answer the following questions, use the combinations given in the following list:

As far as I remember …; If I am not mistaken …; I am not quite certain, but it seems to me that …; Frankly speaking, I don't remember, but …; I guess …

1. Since when did the most intensive process of mechanization of agriculture in the UK begin?
2. What part of the population of England was engaged in agriculture in the middle of the XIX century?
3. Which direction of agricultural mechanization is considered the most promising?
4. What factor limits the development of agricultural mechanization?
5. What has influenced the changing role of agriculture in the national economy of England?
6. What kind of process is mechanization of agriculture?
7. What are the latest achievements in the field of mechanization?
8. What limits the scope for future development of mechanization?
9. Who produces 5.5 per cent of GNP in Great Britain?
10. Where are current national trends reflected?

22. Read the dialogue given below:

A: Good morning, Dr. Bruce.

B: Nice to hear you again, Mr. Allen. I wonder if I could make arrangements with you about new tests of the livestock feeding equipment, we are buying from you.

A: Certainly, you can. This is just what Mr. Evans wanted me to talk to you about. When would you like us to have the tests made?

B: Well, as soon as possible. But I'd like you to make a few wear-sustainability tests of the frames as well.

A: This is just what we are going to do now.

B: I think, there are some defects in the engine too. The quality of the conveyer belts isn't quite up to standard either.

A: Isn't it? Then we'll try and do our best to improve it. Is there anything else you want us to replace?

B: No, nothing but the engines and belts. The rest is just fine. I'm glad that you are so easy to deal with in terms of testing. Thank you. See you soon.

A: It is our pleasure to assist such loyal clients. Good-bye.

23. Reproduce the dialogue with your partner.

TEXT C. GENERAL CHARACTERISTICS OF AGRICULTURAL MECHANIZATION IN SOME FOREIGN COUNTRIES

24. Read and translate the following text:

The efficiency of farm production is one of the economic problems associated with agriculture that many countries still face nowadays. Some other economic problems are intensification and specialization of agricultural production, labour productivity, farm planning and management, prices for farm products, their marketing and others. Simple logic makes it evident that the first three issues are closely connected with farm mechanization and automation of agricultural operations.

In Canada and in many of the Eastern and the extreme Western states of the USA conditions are not unlike those in Great Britain, but the prairie farms are entirely different and represent - with the adjacent "Great Planes" area - one of the most extreme examples of mechanization that can be found in the world. Here, as in some Southern Russia's steppe lands, the simple alternation of cereal cropping and fallow leads to a very inexpensive form of mechanization. This factor, supplemented by adequate farm human resources and up-to-date agricultural know-how, makes farming production costs reasonably low and, thus, agricultural production becomes more profitable.

New Zealand farms contrive to achieve a high output per man by making the best use of their pasture and climate, and generally providing each worker with as much equipment as he can handle for doing time-consuming chores such as milking. There is only one worker to about 155 acres (60 ha) of farm land. Extensive use is made of advanced techniques, e.g. aerial top-dressing, in order to improve the production from areas that are difficult or impossible to deal with by tractor power. This work, as with aerial top dressing and straying in the US, is carried out by contract services. The further mechanization progresses into such specialized fields, the more impossible it became for family farmers to carry out the work with machinery of their own.

Several of the countries of Eastern Europe and the USA are of particular interest from the viewpoint of mechanization, on account of their efforts which have been

undertaken to employ nationally planned policies, through a system of very spacious state, business-owned and/or private farms. Such policies clearly permit rapid introduction of large-scale high-power machinery, and that directly leads to agriculture's intensification and labour productivity.

Further increase in animal productivity is achieved both by the introduction of new machinery and by wider automation of various processes on livestock farms in the industrialized countries. Many farms are using now automatic waterers which provide water to livestock at all times; at the press of the button, silage unloaders remove the food stuffs from the silo and drop it into the conveyer that carries the silage to the feed troughs.

One of the basic principle obstacles to economic agricultural mechanization in many countries is particularly small size of farms. Though this is a quite serious problem in Britain, the situation in many countries of Western Europe is far worse, a high proportion of the farm being too small to provide a reasonable income for the occupiers in modern conditions. This is also one of the major problems in many other parts of the world, especially in parts of Africa and Asia, where farmers are also left face to face with the lack of skilled personnel and undeveloped techniques.

25. Fill in the table using the information from the text:

Region	Favorable Factors	Adverse Factors

26. Fill-in the gaps in the sentences given below with the prepositions *'with' (3), 'for' (2), 'in', 'at' (3), 'of' (5), 'to' (2), 'past'*:

1. I work … Kinze Manufacturers. A lot … foreign firms are interested … doing business … us. We have made some contacts … diesel engines … a new model lately. Our engines are … great demand nowadays, and we sell them … high prices.

2. The other day Mr. Rays … Case International. came … London to have the negotiations … us. He phoned our secretary and made an appointment … us … the next day.

3. John Deere's agent arrived to see us … half … eleven this morning. We … discussed a lot … different questions. Our terms … payment and delivery were acceptable … him.

27. Answer the following questions:

1. What are the economic problems that can be solved by using complex mechanization and automation of agricultural processes?

2. How are the work on fertilizing crops carried out in areas that are difficult to access for tractor equipment?

3. What kind of farming method helps to reduce the cost of mechanization of farms located on the prairies of Canada?

4. What is one of the most important obstacles to the process of mechanization of agriculture?

5. What is the population density in rural New Zealand?

6. Determine the importance of the state planning policy in the field of agriculture for mechanization?

28. Translate the following text in written form without dictionary:

Agricultural mechanization dates from the early 1800s. Steel mould – board ploughs were invented in 1837. George Washington took part in designing a grain seeding machine. One of the first farm machines was a grain reaper.

Early field machines were powered quite well by animals. Animals were used to produce stationary rotary power.

By 1850, steam power was introduced, and it remained an important powered source for the next seventy – five years. Production of steam – powered machines stopped in the 1920s.

Internal combustion engines were developed about 1900 and have become the power source for mobile machinery.

Most of the internal combustion engine mechanisms were adapted from earlier steam engines.

The early steam engines were furnished with belt power but had to be pulled from place to place by horses or oxen. The next step in the evolution in farm power was the conversion of the steam engine into a self – propelled traction engine. Successful steam engines appeared in the 1850s. The development of track-type agricultural tractors began about 1900.

Early attempts to develop gasoline tractors were stimulated by the need to reduce the number of workers required to attend the steam tractors, both when ploughing and when operating threshing machines. Early gasoline tractors resembled steam tractors. The internal-combustion engine became important when Otto patented his four – stroke cycle engine.

VI. COMPONENT PARTS OF MACHINES

1. Learn the words:

accurate – точный
ball bearing – шариковый подшипник
beam – луч
bearing - подшипник
bolt - болт
cam - кулак, кулачок, эксцентрик
clutch - сцепление
cylindrical pin - цилиндрический штифт
conical pin- конический штифт
device – устройство
differential – дифференциал
discharge – разряд
drilling – сверление
effort – усилие
entirely – полностью
essentially – существенно
first-class lever – рычаг первого рода
fluid power - гидравлическая система
friction – трение
friction clutch - фрикционная муфта
fuel - топливо
fulcrum – точка опоры
gearbox - коробка передач
gradually – постепенно
inclined plane – наклонная плоскость
interchangeable – взаимозаменяемый
intermittent motion – прерывистое движение
key - клин, шпонка
left/right hand thread – левая/правая резьба
lever – рычаг
machine-tools - станки
nose - передняя часть машины
nut - гайка
overrunning clutch - муфта свободного хода
pin - штифт, палец, стержень, шейка (вала)
power take-off – shaft (p.t.o) – вал отбора мощности
pulley – шкив, блок, ролик

rear wheel – заднее колесо
rolling bearing – подшипник качения
safety clutch - предохранительная муфта
screw - винт, болт, шуруп
shaft - вал, ось, шпиндель
simple machine – простейший механизм
single pulley – простой блок
sliding bearing - подшипник скольжения
speed ration - отношение скоростей, передаточное число
spring - пружина
sprocket - звездочка, ведущее колесо (гусеницы)
stationary motion - постоянное движение
surface - поверхность
supporting bearing - опорный, несущий подшипник
thread - резьба, нарезка
to accomplish - выполнять
to alter - изменять(ся)
to bring about (brought, brought) - вызывать, быть причиной
to convert - вращать
to fasten - закрепить, крепить, скреплять
to lubricate – смазывать
to move forward – двигать вперед
to revolve – вращать
transmission system - трансмиссионная система
valve - клапан
washer - шайба
wedge – клин
wheel and axle – колесо и ось

2. Learn to recognize international words. Give the Russian equivalents to the following words without a dictionary. Then compare your variants with the dictionary:

activity	complex	energy	specialized
adaptation	cone	form	standardized
application	conveyor	machine	support
basic	cylinder	plank	type
centre	effectiveness	revolution	to combine
class	element	roller	to modify

3. Match the equivalents:

1. to satisfy needs	a. прилагать силу к
2. to give control over	b. разрабатывать машины
3. to harness the energy of	c. обуздать энергию
4. to do work	d. уменьшать трение
5. to exert force on	e. вгонять ударами
6. to develop machines	f. производить работу
7. to reduce friction	g. удовлетворять потребности
8. to drive by blows	h. давать контроль над
9. early people	i. обод колеса
10. in a complex way	j. сложным образом
11. machine age	k. угол тонкого торца
12. the ratio between	l. может свободно двигаться
13. is allowed to move freely	m. век машин
14. a variety of	n. разнообразие
15. the edge of the wheel	o. древние люди
16. an angle of the thin end	p. соотношение между
17. wrapped in a spiral around a cylinder	q. обёрнутый по спирали вокруг цилиндра
18. the length of the incline divided by the vertical rise	r. отношение окружности винта к расстоянию
19. the ratio of the circumference of the screw to the distance	s. длина наклона, поделенная на длину вертикального подъёма

4. Translate the sentences. Mind the degrees of the adjectives. Give the initial forms of the adjectives:

1. The wedge is used to raise a **heavy** load over a **short** distance or to split a log.
2. The inclined plane makes it **easier** to slide a load upward than to lift it directly.
3. Without machines, residents of our cities will find it **more difficult** to live in.
4. The wheel and axle can move a load **farther** than a lever can.
5. The effort is **smaller** than the load because it is at a greater distance from the axle which is the fulcrum.
6. A thin wedge is **more effective** than a thick one.
7. The **smaller** the angle of an inclined plane, the **less** the force required to raise a given load.
8. The **longer** the slope, the **smaller** the effort required. The amount of work, however, is no **less** than if the load were lifted directly upward.
9. The lever is one of the **earliest** and the **simplest** machines.

10. The wheel itself is regarded as one of the **most important** inventions of all time.

5. a. Study the mathematical expressions and do the tasks below:

+ plus
– minus
× times or multiplied by
÷ divided by
= equals or is

Examples:	6 + 9 = 15	Six plus nine equals/is fifteen.
	13 – 2 = 11	Thirteen minus two equals/is eleven.
	5 × 6 = 30	Five times six equals/is thirty.
		Five sixes equal/are thirty.
		Five multiplied by six equals/is thirty.
	18 ÷ 3 = 6	Eighteen divided by three equals/is six.

b. Work through the examples. Read the examples minding the numerals:

0.5 + 7.2 =	1,101 – 0.01 =	11 × 5 =	143 ÷ 13 =
86,041 + 402 =	983 – 53 =	27 × 8 =	61,875 ÷ 99 =

c. Translate the sentences. Mind the mathematical expressions:

1. The mechanical advantage will be four to one.
2. Distance equals time multiplied by velocity.
3. Work is force multiplied by distance.
4. Power is work divided by time.
5. Power is force multiplied by velocity.
6. Kinematic energy plus potential energy equals mechanical energy.
7. The mechanical advantage of an inclined plane is the length of the incline divided by the vertical rise.
8. The mechanical advantage of a single pulley equals 1.

TEXT A. SIMPLE MACHINES

6. Read and translate the text:

Machine is a device that does work. Almost every activity in our daily life depends in some way on machines.

People have constructed a wide variety of machines to satisfy their needs. Early people made stone axes that served as weapons and tools. The machines that were gradually developed gave people great control over their environment. To operate these improved machines, people harnessed the energy of falling water and of such

fuels as coal, oil, and the atom. Today, we use so many machines that the age we live in is often called the machine age.

Most machines consist of a number of elements, such as gears and ball bearings that work together in a complex way. But no matter how complex they are, all machines are based in some way on six types of simple machines. These six types of machines are the lever, the wheel and axle, the pulley, the inclined plane, the wedge, and the screw.

Lever. There are three basic types of levers, depending on where the effort is applied, on the position of the load, and on the position of the fulcrum. In a first-class lever, such as a crossbar, the fulcrum is between the load and the applied force. In a second-class lever, such as a wheelbarrow, the load lies between the fulcrum and the applied force. In a third-class lever, the effort is applied between the load and the fulcrum. For example, when a person lifts a ball in the palm of the hand, the load is on the hand and the fulcrum is at the elbow. The forearm supplies the upward force that lifts the ball.

Wheel and axle. The wheel and axle are essentially a modified lever, but it can move a load farther than a lever can. In a windlass used to raise water from a well, the rope that carries the load is wrapped around the axle of the wheel. The effort is applied to a crank handle on the side of the wheel. The centre of the axle serves as a fulcrum. The mechanical advantage of the windlass depends on the ratio between the radius of the axle and the distance from the centre of the axle to the crank handle.

Sometimes teeth called cogs are placed around the edge of the wheel, as in the sprocket of a bicycle or in a cogwheel.

The wheel-and-axle machine has important applications when it is used to transport heavy goods by rolling rather than by sliding. The wheel itself is regarded as one of the most important inventions of all time. It is widely used in all types of machinery.

Pulley. A pulley is a wheel over which a rope or belt passes. It is a form of the wheel and axle. The mechanical advantage of a single pulley equals 1, because the downward force exerted on the rope equals the weight lifted by the other end of the rope that passes over the pulley. The main advantage of the single pulley is that it changes the direction of the force. For example, to lift a load, a person can conveniently pull down the rope, using the weight of the body. When one pulley is attached to a support and another is attached to the load and allowed to move freely, a definite mechanical advantage is obtained.

Inclined plane. The inclined plane is such a simple device that it hardly looks like a machine at all. The average person cannot raise a 100 kilogram box up 1 metre into the rear of the truck. But by placing a 4 metre plank from the truck to the ground, a person could raise the load easily. If there were no friction, the force required to move the box would be exactly 25 kilograms. The mechanical advantage of an

inclined plane is the length of the incline divided by the vertical rise. By adding rollers, it is possible to make a roller conveyor that will reduce friction and have great efficiency.

Wedge. The wedge is an adaptation of the inclined plane. It can be used to raise a heavy load over a short distance or to split a log. The wedge is driven by blows from a mallet or sledgehammer. The effectiveness of the wedge depends on an angle of the thin end. The smaller the angle, the less the force required to raise a given load.

Screw. The screw is actually an inclined plane wrapped in a spiral around a cylinder or a cone. The mechanical advantage of a screw is approximately the ratio of the circumference of the screw to the distance the screw advances during each revolution.

A jackscrew, such as those used to raise homes and other structures, combines the usefulness of the screw and the lever. The lever is used to turn the screw. The mechanical advantage of a jackscrew is quite high, and a small effort will raise a heavy load.

By combining the principles of simple machines engineers develop new and specialized machines. The parts for many of these machines are often standardized so they can be used in a variety of machines that perform entirely different tasks.

7. Continue the phrases:

1. A pulley is…
2. Almost every activity in our daily life depends in some way on…
3. Machine is a device that…
4. The centre of the axle serves as…
5. The effectiveness of the wedge depends on…
6. The machines that were gradually developed gave people…
7. The mechanical advantage of a screw is…
8. The six types of simple machines are…
9. The wedge is an adaptation of…
10. The wheel and axle is…
11. There are three basic types of levers, depending on…
12. To operate these improved machines, people harnessed the energy of…
13. Today, we use so many machines that the age we live in is often called…

8. Insert the missing words:

1. … is regarded as one of the most important inventions of all time.
2. … is such a simple device that it hardly looks like a machine at all.
3. By … engineers develop new and specialized machines.
4. Early people made … that served as weapons and tools.

5. In …, such as a crossbar, the fulcrum is between the load and the applied force.

6. In …, such as a wheelbarrow, the load lies between the fulcrum and the applied force.

7. In …, the effort is applied between the load and the fulcrum.

8. Sometimes teeth called … are placed around the edge of the wheel, as in the sprocket of a bicycle or in a cogwheel.

9. The effort is applied to … on the side of the wheel.

10. The mechanical advantage of an inclined plane is the length of the incline … the vertical rise.

11. The screw is actually … wrapped in a spiral around a cylinder or a cone.

12. The wedge is driven by … from a mallet or sledgehammer.

13. The wheel-and-axle machine has important applications when it is used to … by rolling rather than by sliding.

9. State whether the statements are true or false. Correct if necessary:

1. A cogwheel is a wheel with teeth called cogs.
2. All machines are based in some way on 6 types of simple machines.
3. Coal, oil, and the atom are fuels.
4. Early people made stone axles that served as weapons and tools.
5. Sometimes teeth called cogs are placed around the edge of the wedge.
6. The age we live in is often called the machine age.
7. The effectiveness of the wedge depends on an angle of the thick end.
8. The inclined plane can be used to raise a heavy load over a short distance or to split a log.
9. The mechanical advantage of a jackscrew is quite low.
10. The screw is widely used in all types of machinery.
11. The wheel and axle is essentially a modified inclined plane.
12. There are three basic types of levers, depending on where the effort is applied, on the position of the load, and on the position of the fulcrum.

10. Answer the questions:

1. Is the machine a device that does work?
2. The time we live in is often called the age of machines, isn't it?
3. Did people start to construct machines in early times?
4. How many simple machines are there? What are they? Which of them are adaptations of the lever? Of the inclined plane?
5. What types of the lever do you know? What are they? How do they work?
6. The wheel itself isn't regarded as one of the most important inventions of all time, is it?

7. What is the main advantage of the single pulley?
8. How is the mechanical advantage of the inclined plane counted?
9. Where can the wedge be used?
10. Where do engineers apply the principles of simple machines?

11. Complete the text using the words from the list below:

(a) less plane	*(d) lifting*	*(g) heavy*
(b) pushing	*(e) device*	*(h) inclined*
(c) load	*(f) small*	*(i) simple machines*

The (1) … is a (2) … used to raise a (3) … load with relatively (4) … force. For example, (5) … a load up a ramp onto a platform requires (6) … effort than (7) … the load onto the platform, because the (8) … travels farther. The inclined plane is one of the six (9) … .

12. Complete the text translating the words in brackets:

In **(1) … (механизмы)** that transmit only mechanical **(2) … (энергия)**, the **(3) … (отношение)** of the **(4) … (сила)** exerted by the machine to the force applied to the machine is known as **(5) … (выигрыш в силе)**. This can be demonstrated with a **(6) … (перекладина)**, which is a type of **(7) … (рычаг)**. When one end of the crossbar is directly under the weight, a part of the crossbar must rest on a **(8) … (опора)** called **(9) … (точка опоры)**. **(10) … (Чем ближе)** the fulcrum is to the load, **(11) … (тем меньший)** the effort required to **(12) … (поднять)** the load by pushing down the handle of the crossbar, and **(13) … (тем больше)** the mechanical advantage of the crossbar. For example, if the **(14) … (груз)** is 200 kilograms, and the distance from the load to the fulcrum is one fourth of the distance from the handle to the fulcrum, it will take 50 kilograms of **(15) … (усилие)** to raise the load. Therefore, the mechanical advantage will be four to one. But the distance the load will be moved will be only one fourth of the distance through which the effort **(16) … (прилагается).**

13. Match the words with their definitions:

(a) inclined plane	*(c) lever*	*(e) wedge*
(b) pulley	*(d) screw*	*(f) wheel and axle*

1. A simple machine for raising loads that consists of a plane surface that makes an acute angle with the horizontal; a ramp.
2. A simple machine of the inclined-plane type that consists of a spirally grooved cylinder or a cone.
3. A simple machine shaped like a V that can be pushed between two things to separate them.

4. A simple machine that consists of a wheel attached to an axle that rotate together and force is transferred from one to the other.

5. A simple machine that consists of a wheel with a groove in which a rope can run to change the direction or point of application of a force applied to the rope.

6. A simple machine that gives a mechanical advantage when given a fulcrum.

14. Match the synonyms:

1. apply; 2. great; 3. ramp; 4. efficiency; 5. do; 6. early

a. perform; b. effectiveness; c. large; d. exert; e. inclined plane; f. ancient

15. Match the antonyms:

1. complex; 2. push; 3. upward; 4. thin; 5. low; 6. small; 7. short

a. thick; b. simple; c. high; d. great; e. pull; f. downward; g. long

16. Translate the following words into Russian paying attention to the underlined words that can be verbs, nouns, adjectives or adverbs without changing their form and adding suffixes:

1. early morning; early people; I got up early yesterday.
2. machine age; the Middle Ages; What is your age?
3. a massive support; to support a wall; to support the idea.
4. a wide spiral; a spiral plane; the road spirals around the mountain.

17. What do the following mean?

Example: km = kilometre/ kilometer

km	kW	cm	yd
kg	ft	L	V
°C	ml	lb	g
°F	min	km/h	mm

18. Translate the text in a written form without dictionary:

The lever is one of the earliest and the simplest machines. Its advantage lies in the short distance between the fulcrum and load, and in the long distance between the fulcrum and the point where the effort is applied.

The wheel and axle has a rope attached to the axle to lift the load. The crank handle is the point where effort is applied. The effort is smaller than the load because it is at a greater distance from the axle which is the fulcrum.

The pulley consists of a grooved wheel over which a rope is passed. It is used to change the direction of the effort applied to the rope. A block and tackle use two or more pulleys to reduce the effort needed to lift a load.

The inclined plane makes it easier to slide a load upward than to lift it directly. The longer the slope, the smaller the effort required. The amount of work, however, is no less than if the load were lifted directly upward.

The wedge, when struck with a mallet or sledgehammer, exerts a large force on its sides. A thin wedge is more effective than a thick one. The mechanical advantage of the wedge is of great importance.

The screw is a spiral inclined plane. The jackscrew is a combination of the lever and the screw. It can lift a heavy load with relatively small effort. Therefore, it has a very high mechanical advantage for practical purposes.

19. a. Fill in the table:

(a) boiler	*(e) robot*	*(i) watermill*	*(m) stacker*
(b) compass	*(f) spectacles*	*(j) abacus*	*(n) needle*
(c) crane	*(g) wedge*	*(k) lever*	*(o) hoe*
(d) hydraulic jack	*(h) wind turbine*	*(l) dragline*	

Simple machines	Tools	Heavy machine tools	Self-propelled machines

b. Work in pairs. What are the 10 most important tools in the history of mankind? Make a list in order of importance. Explain your choice. Give reasons for your group's choice.

Note: the tools must be *hand-held* or *easily portable*. Do not include *simple machines* (such as levers or pulleys), *heavy machine tools* (like hydraulic jacks) or *complex, self-propelled machines* (such as cars, windmills or computers).

TEXT B. COMPONENT PARTS OF MACHINES

20. Guess the meaning of the following international words:

Construction, diameter, type, bolt, rotation, cylindrical, operation, machine, component, position, contact, differential, transmission, system, friction, reduction, hydraulic, method, motor, tractor.

21. Give the Russian equivalents for the following English words:

According to, the construction of farm machinery, in connection with, beneath, intermittent motion, to remain stationary, to hold in position, fixed bearing surface, rolling contact, to change force into work, moving parts, a power source, working parts, a speed reduction, rear wheel, speed ration, fluid power, useful life, to move forward, a power-take-off shaft, farm machinery, taper pin, farm equipment, ball

bearing, roller bearing, transmission system, friction clutch, speed ration, fluid power, speed reduction, machine part, safety clutch, a great variety, several means, conical pins, an essential part, intermittent motion, a hydraulic system, useful life.

22. Translate the following combinations of words:

1. Component part, a component part of a machine, to use this component part of a machine;
2. Many screws, many screws of the farm equipment;
3. Sprockets of this machine, to fasten sprockets to this machine;
4. Shafts, different shafts, to fasten pulleys to different shafts;
5. Springs, springs for this machine.

23. translate the sentences into Russian, paying attention to the *highlighted* words:

1. Screws *threads* may be left-hand. He *threads* the film into the camera.
2. *Pins* are subdivided into taper or cylindrical. She *pins* these parts together.
3. *Spring* is coming. *Spring* plays an important part in the operation of agricultural machinery.
4. He has a long *nose*. The *nose* comes around to the cam.
5. *Bearings* hold parts in position. He is *bearing* an arm.
6) It produces power by *burning* fuel. The house is *burning*.

24. Match the word on the left A with its definitions on the right B:

A	B
1. Power	a) to begin something
2. Speed	b) to support something
3. Tractor	c) a measure of the time in which something moves or happens
4. Bearing	d) a motor vehicle for pulling farm machinery or other heavy loads
5. Engine	e) a device for preventing friction in a machine
6. Wheel	f) mechanical or electrical energy
7. To start	g) a machine that provides power
8. Roller	h) a round device that turns on a shaft that passes through its centre
9. To hold	i) a cylinder for rolling over things or on which something is wound

25. Read and translate the text:

Component Parts of Machines

The great variety of bolts is used in the construction of farm machinery. Most bolts are classified according to length, diameter and type of thread. Many types of nuts are used on farm machinery. Many types of screws are also used in the construction of farm machinery. Screws threads are made right-hand and left-hand.

Different kinds of washers are used in connection with bolts in farm machinery. They may be used on the end either beneath the head of the bolt or beneath the nut.

There are several means to fasten sprockets and pulleys to rotating shafts. Keys are commonly used to fasten pulleys and sprockets to shafts. Pins are also needed. Pins can be divided into cylindrical pins and conical or taper pins. Springs play an important part in the operation of farm machinery. A cam is an essential part of farm equipment. A cam produces intermittent motion. Anything resting against the cam will be moved only when the nose comes around to it; otherwise it remains stationary. Thus, machine parts are held together by different components.

Bearings in farm equipment are required to hold parts in position. Bearing are divided into sliding and rolling. In sliding bearing, the revolving shaft is in direct contact with a fixed bearing surface. Rolling bearings have balls or rollers placed between the shafts and supporting bearing. Bearing with rolling contact may be divided into ball bearings and roller bearings.

A machine is a device that uses force to accomplish something. More technically it is a device that transmits and changes force or motion into work. A machine must have moving parts. An engine produces power by burning air and fuel.

Clutch, gearbox and differential are the necessary components in the transmission system. A clutch is a device between a power source and a machine or between the working parts in a machine. In the operation off arm equipment, clutches permit the starting of the engine with the machine disconnected. Friction clutches, safety clutches, overrunning clutches are in use. Gearbox brings about a speed reduction between the engine and rear wheels. The speed ratio can be altered by the gearbox. The differential unit permits one wheel to rotate faster than the other when the machine turns.

A hydraulic system is a method of transmitting power from the power source to the machine or component being operated. It contains many parts: the pump that converts the power from the engine to fluid power, the cylinder or motor that converts the fluid power to the motion and action that are being performed, valves, filter which determines the useful life of other parts in the system. In operation of many farm machines, tractor is used to move the machine forward. The power is transmitted from tractor to machine by means of a power take-off shaft.

26. Complete these definitions:

1. A tractor is a machine…
2. A component part is a …

3. Diameter is a …
4. Farm machinery is …
5. Air is a substance …
6. Fuel is…
7. To operate a machine is to …

27. Define whether the following statements are true or false. Correct the false ones.

1. Differential is one of the components of the transmission system.
2. Bolts may be classified according to length and width.
3. Bolts are used in connection with many kinds of washers.
4. Sprockets are fastened by several means.
5. In sliding bearing the revolving shaft is not in direct contact with a fixed bearing surface.
6. The power in the tractor is transmitted to a machine by a power-takeoff.
7. Tractor is used in operation of many machines.
8. Keys are used to fasten bearings.
9. An engine produces power by burning air.
10. Bearing with sliding contact may be divided into ball and roller bearing.

28. Find in the text the sentences that mean the same as:

1. Имеется несколько способов крепления звездочек.
2. Он позволяет одному колесу вращаться быстрее, чем другому.
3. Трактор используется для приведения в движение различных машин.
4. Резьба может быть правосторонняя и левосторонняя.
5. Гидравлическая система включает множество частей.
6. Шайбы используются с болтами.
7. Пружины помогают в управлении машиной.
8. Они крепят звездочки к валу.
9. Отношение скоростей изменяется благодаря коробке передач.

29. For questions 1-5, choose the answers (A, B, C) which you think fits best:

1. Where is power produced?
a. in the engine b. in the gearbox c. in the clutch
2. What is used in operation of many machines?
a. component parts of machines b. tractor c. differential
3. How many ways to fasten sprockets to rotating shafts are there?
a. some b. only one c. no one
4. Why are different parts of machines held together?

a. due to different components b. due to the farm equipment c. due to the engine

5. How can the speed be altered?

a. by clutch b. by gearbox c. by fluid power

6. What must a machine have to move?

a. moving parts b. tractor c. a component

30. Fill in the gaps with the suitable words from the box:

transmission system, filter balls, motion, wheel, fuel, the component parts, bearings

1. The second unit in the… is the gear box.
2. When a tractor turns the left … must rotate faster.
3. … are placed between the shaft.
4. A machine changes … into work.
5. …may be divided into two main classes.
6. When designing … of farm equipment must be taken into consideration.
7. Energy is produced by burning … within the engine.
8. …determines the useful life of many parts in the hydraulic system.

31. Put the sentences into the right order. Mind the contest of the text:

1. Clutch, gearbox and differential are the main components of the transmission system.
2. The machine parts are held together by different components.
3. Screws are used in the farm machines.
4. The differential permits one wheel to rotate faster than the other.
5. Rolling bearings have rollers.
6. A power-take-off transmits the power from the tractor to machine.
7. Pulleys and sprockets are fastened to shafts.
8. Intermittent motion is produced by a cam.
9. The useful life of the machine parts is determined due to a filter.
10. There are moving parts in a machine.

32. Provide the answers to the following questions:

1. What component parts are used in the construction of farm machinery?
2. How are most bolts classified?
3. Where are washers used?
4. What is the function of keys?
5. What component plays an important part in the operation of farm machinery?
6. What is the function of a cam?
7. Where are bearings required?
8. What types of bearings do you know?

9. What is the difference between sliding bearings and rolling bearings?
10. How is the power produced?
11. What is a transmission system? What is it used for?
12. What are the main components of a transmission system?
13. What types of clutches do you know?
14. What method is called a hydraulic system?
15. What parts does it contain?
16. How is the power transmitted to a machine?

TEXT C. MACHINE-TOOLS

33. Read and translate the text:

Machine-tools are used to shape metals and other materials. The material to be shaped is called the workpiece. Most machine-tools are now electrically driven. Machine-tools with electrical drive are faster and more accurate than hand tools: they were an important element in the development of mass-production processes, as they allowed individual parts to be made in large numbers so as to be interchangeable.

All machine-tools have facilities for holding both the workpiece and the tool, and for accurately controlling the movement of the cutting tool relative to the workpiece. Most machining operations generate large amounts of heat, and use cooling fluids (usually a mixture of water and oils) for cooling and lubrication.

Machine-tools usually work materials mechanically but other machining methods have been developed lately. They include chemical machining, spark erosion to machine very hard materials to any shape by means of a continuous high-voltage spark (discharge) between an electrode and a workpiece. Other machining methods include drilling using ultrasound, and cutting by means of a laser beam. Numerical control of machine-tools and flexible manufacturing systems have made it possible for complete systems of machine-tools to be used flexibly for the manufacture of a range of products.

34. Make the summary of the text using following phrases:

1. The text explains …
2. The main function of machine-tools is …
3. At present most machine-tools are …
4. That’s why they are …
5. Besides, all machine-tools have …
6. Finally, machine-tools usually work …
7. To sum it up, ….

35. State the part of the speech of the following words:

Native, material, impurity, undesirable, distribute, involve, absorption, apply, mix, metallurgy, vary, markedly, cutting, internal, permanently.

36. Insert *somewhere, anywhere, nowhere or everywhere:*

1. I can't find my book … I have looked all over the house.
2. Johnny lives … near Chicago.
3. It so happened that he had … to go to. So last summer he stayed at home in his beloved city for his holidays.
4. Do you live … near them?
5. Is it … in Russia? – Yes, it's … in Russia.
6. Where are you going? – I am not going … .
7. I put my dictionary … yesterday and now I can't find it … . – Of course, that is because you live your books … .
8. You must go … next summer.
9. Did you go … on Sunday?
10. Today is a holiday. The streets are full of people. There are flags, banners and flowers … .

37. Learn the following word combinations for connected reading:

drilling machine – сверлильный станок
sensitive drilling machine – сверлильный станок повышенной точности
upright drilling machine – вертикально-сверлильный станок
radial drilling machine – радиально-сверлильный станок
multi-spindle machine – многошпиндельный станок
milling machine – фрезерный станок
bench lathe – верстальный станок
chucking lathe – патронный токарный станок
screw machine – винторезный станок
boring mill – расточный станок
crankshaft lathe – коленчатовальный станок
wheel lathe – колесотокарный станок
engine lathe – токарно-винторезный станок

38. Read and translate the text:

The machine-tool is the principal manufacturing equipment in a machine shop. It is essential in the manufacture of every product from a giant turbine to minute jewels for aircraft instruments.

One of the simplest tools is the ordinary drilling machine. It consists of a spindle which imparts rotary motion to the drilling tool, mechanism for feeding the tool into the work, a table on which the work rests, and a frame.

The drilling machines or drill presses are grouped into the following four classes: sensitive, upright, radial and multi-spindle machines.

A milling machine is a machine-tool that removes metal as the work is fed against a rotating cutter.

The lathe is a machine-tool which can perform a wide variety of operations. It is primarily used for turning and boring operations. In addition, the lathe can be used for drilling, reaming, tapping and, by employing suitable adapters, operations of milling and grinding may be carried out without difficulty.

The lathe is the oldest machine-tool, but it is still widely used.

There are many types of lathes that differ in their size, design, method of drive, arrangement of gears and purpose.

According to the character of work performed, the design and construction lathes are divided into the following types: bench lathes, chucking lathes and automatic lathes. There are also screw machines, boring mills, crankshaft lathes, wheel lathes, etc.

39. Find in the text English equivalents for the following word combinations:

Различаются по размеру; операции фрезерования и шлифования; расположение шестерен; широко используется; удаляет металл; для подачи инструмента; гигантская турбина; придает вращательное движение.

40. Answer the questions to the text:

1. What is the machine-tool?
2. Where are machine-tools used?
3. What parts does the ordinary drilling machine consist of?
4. What types of drilling machines do you know?
5. What machine-tool removes metal with a rotating cutter?
6. What operations can the lathe be used for?
7. What are the main types of lathes?
8. What do many types of lathes differ in?

41. Complete the sentences choosing appropriate variants from the box:

their size, design, method of drive, arrangement of gears and purpose; the oldest machine-tool; removes metal; drilling, reaming, tapping; sensitive, upright, radial and multi-spindle machines; the lathe; drilling machine

1. … consists of a spindle which imparts rotary motion to the drilling tool, mechanism for feeding the tool into the work, a table on which the work rests, and a frame.

2. The milling machine is a machine-tool that … as the work is fed against a rotating cutter.

3. … is used for turning and boring operations.

4. The lathe is still widely used in spite of it is … .

5. Lathes differ in … .

6. The lathe can be used for … .

7. The drilling machines are divided into four classes … .

42. Translate into English:

1. Станок – необходимое в производстве оборудование.

2. Сверлильный станок – простейший станок.

3. Сверлильный станок состоит из шпинделя, механизма по подаче инструмента к детали, стола и рамы.

4. Деталь лежит на столе.

5. Сверло вращается при помощи шпинделя.

6. Фрезерный станок удаляет металл с детали с помощью фрезы.

7. Токарный станок используется для сверления, развертывания и нарезки резьбы метчиком.

8. Фрезерование и шлифование проходят без особых трудностей.

43. Read the following text. Put the words from the right side in appropriate form if it is necessary:

Metal undergoes a number of processes before it is formed into the required shape: casting, rolling, welding, piercing, trimming, spinning, bending, drawing, etc.	
The machines which perform all these kinds of works ____ called machine-tools. The most common machine-tool found in almost any workshop is the lathe. The main parts of it are: the headstock, the chuck, the tailstock, the carriage.	to be
The automatic lathe is a _____ of the ordinary lathe. Its tools are changed automatically. A worker skilled in the use of a lathe is called a _____.	perfect to turn
There are many other machine-tools that work on plane surfaces, for example, milling machines, planning and shaping machines. _____ holes are drilled by a drilling machine or bored by a boring machine or a boring mill. Thread milling machines are used in the _____ of different machine elements. Gear	circle to produce

cutting machines include gear milling machines. All these machines use cutting tools made of high-speed steel.	
There are three types of lathes produced by our machine tool _____ works: heavy, medium and light types. The type of a lathe depends upon the size of diameter of workpieces.	to manufacture
The most convenient and efficient machine is the model combination lathe for turning, milling, drilling, grinding, slotting, and tool-sharpening jobs. It can be used both in _____ and mobile repair shops, on ships, etc.	station
Majority of drilling machines are equipped with mechanisms, permitting not only drilling, countersinking and reaming, but also cutting female threads with the _____ of taps.	help
Both universal and special-purpose type radial drills are built	

VII. THE TYPES OF ENGINES

1. Learn the words:

admission – поступление, доступ, вход
boiler – котел
camshaft – распредвал
charge – заряд
combustion chamber – камера сгорания
crankshaft – коленвал
exhaust valve – выпускной клапан
explosive powder – взрывчатый порошок
flywheel – маховик
force – сила
fuel – топливо
furnace – печь, топка
gallon – галлон – англ. (4,54 л); амер. (3,78 л)
hence – следовательно
ingenuity – изобретательность
inlet valve – впускной клапан
internal combustion – внутреннее сгорание
intrinsic – присущий, встроенный
pipe – труба
piston – поршень
power – энергия
pressure – давление
quality fuel – качественное топливо
resistant – прочный, стойкий
revolution – оборот, поворот
screw – винт
secure – укреплять, прикреплять
shaft – вал
source – источник
spark plug – искра свечи
spray – брызги, струя
steam – пар
stroke – ход
succession – последовательность
to achieve – достигать, добиваться, осуществить
to be referred to as – именоваться, называться
to cause – заставлять, вызывать, причинять

to comprise – включать, заключать в себе
to extinguish – потушить, погасить
to ignite – воспламенять, зажигать
to inject – впрыскивать
to melt – плавить
to obtain – получать, приобретать
to succeed – следовать за чем-либо
valve – клапан
wheel – колесо
wind-powered engines – ветряные двигатели
wooden blades – деревянные лезвия

TEXT A. A SHORT HISTORY OF ENGINES

2. Read and translate the text:

Do you know what the first engine was like? It was called the “water wheel”. This was an ordinary wheel with blades fixed to it, and the current of a river turned it. These first engines were used for irrigating fields.

Then a wind-powered engine was invented. This was a wheel, but a very small one. Long wide wooden blades were attached to it. The new engine was driven by the wind. Some of this one can still be seen in the country.

Both of these, the water- and wind-operated engines are very economical. They do not need fuel in order to function. But they are dependent on the weather.

Many years passed and people invented a new engine, one operated by steam. In a steam engine, there is a furnace and a boiler. The furnace is filled with wood or coal and then lit. The fire heats the water in the boiler and when it boils, it turns into steam which does some useful work.

The more coal is put in the furnace, the stronger the fire is burning. The more steam there is, the faster a train or a boat is moving.

The steam engine drove all sorts of machines, for example, steam ships and steam locomotives. Indeed, the very first aeroplane built by A.F. Mozhaisky also had a steam engine. However, the steam engine had its disadvantages. It was too large and heavy, and needed too much fuel.

The imperfections of the steam engine led to the design of a new type. It was called the internal combustion engine, because its fuel ignites and burns inside the engine itself and not in a furnace. It is smaller and lighter than a steam engine because it does not have a boiler. It is also more powerful, as it uses better-quality fuel: petrol or kerosene.

The internal combustion engine is now used in cars, diesel locomotives and motor ships. But to enable aeroplanes to fly faster than the speed of sound another,

more powerful engine was needed. Eventually, one was invented and it was given the name “jet engine”. The gases in it reach the temperature of over a thousand degrees. It is made of a very resistant metal so that it will not melt.

3. Look through the text and find definitions of:

- water wheel
- steam engine
- internal combustion engine
- jet engine

4. Find the English equivalents to the following words and word combinations in the text:

Изобретать, совершать полезную работу, приводить в действие, воспламеняться, гореть, плавиться, печь и котел, паровой двигатель, слишком много топлива, орошение полей, несовершенство, топливо лучшего качества, скорость звука, реактивный двигатель.

5. Complete the following sentences using the ideas from the text:

1. The water wheel was an ordinary wheel with…
2. The wind-operated engines are very…
3. The steam engine drove…
4. The imperfections of steam engines…
5. The advantages of internal combustion engines are…
6. The gases in jet engines reach…
7. Water – and wind-operated engines are dependent…

6. Explain the difference between an external and internal combustion engine (2-3 sentences).

7. Translate the following sentences into English and answer them according to the content of the text:

1. Что представляли собой первые двигатели?
2. Каковы были достоинства и недостатки первых двигателей?
3. Из чего состоит паровой двигатель?
4. В чём заключается принцип работы парового двигателя?
5. Где используют паровой двигатель?
6. Что такое “двигатель внутреннего сгорания”?
7. В чём его преимущества перед паровыми двигателями?
8. Где используются двигатели внутреннего сгорания?

8. Find the pairs of words with an opposite meaning:

A	B
1. external	a. heavier
2. melt	b. less
3. fill	c. shot
4. lighter	d. extinguish
5. wide	e. freeze
6. ignite	f. internal
7. long	g. empty
8. more	h. narrow

9. Define which of the words in each line is the odd word:

a. disadvantage	imperfection	fault	drawback
b. external	extended	internal	exterior
c. achieve	reach	attain	cause
d. inner	inside	outside	intrinsic
e. still	but	however	nevertheless
f. stick	fix	fasten	attach
g. work	function	serve	operate

10. a) Match the words in column A with their definitions in column B:

A	B
1. current	a. fix or join to smth else
2. irrigate	b. make smth or someone move
3. inventor	c. the gas or vapour that comes from boiling water, used to drive machinery
4. attach	d. supply land with water so that crops can grow
5. drive	e. smth. that is burnt to produce heat or power
6. fuel	f. a hard-black mineral substance used for burning to supply heat
7. furnace	g. make or become liquid by heating
8. coal	h. water or air etc. moving in one direction
9. steam	i. be the first person to make or think of a particular thing
10. melt	j. a device in which great heat can be produced

b) Choose any 5 words and use them in sentences of your own.

11. Match the beginnings and the endings of the sentences in A and B:

A	B

1. The first engine was…	a)… used in cars, diesel locomotives and motor ships.
2. The internal combustion engine is …	b)… dependent on weather.
3. The wind-operated engine was …	c)… a steam engine.
4. The very first aeroplane built by Mozhaisky also had …	d)… the design of a new type.
5. The imperfections of the steam engine led to …	e)… ignites and burns inside the engine itself.
6. In the internal combustion engines fuel …	f)… an ordinary wheel with blades fixed to it.

12. Translate the following text in written form without dictionary:

Engine is a machine that converts energy into power or motion. This word was taken from old French *engin*, from Latin *ingenium* which means "talent, device". The original sense was "ingenuity, cunning", hence "the product of ingenuity, a plot or snare", also "tool, weapon" whence a machine, used later on combinations such as steam engine, internal combustion engine.

The history of invention of engines was long. In 1678, Abbe Jean de Haute – feuille proposed to use an explosive powder to obtain power. He was the first man to design an engine using heat as a motive force. Christian Huyghens was the first man to construct an engine having a cylinder and a piston. Later on, a great number of engines were constructed but they were not successful. Only in 1876 N. A. Otto patented the first successful engine operating on four stroke cycle principle. Two years later D. Clerk invented two – stroke – cycle engine, producing one power stroke for every revolution instead of for every two revolutions.

Another invention was the work of R. Diesel. He proposed to utilize the heat produced by high compression for igniting the fuel charge in the cylinder.

13. Use the prepositions in the box to complete the sentences in the passage. Translate the passage with the help of a dictionary in writing:

in	for	of	from	inside	at	into
per	with	without	toward			

Nowadays there are many types 1)___ engines 2)___use 3)___various purposes. These engine types have one thing 4)___ common. The energy is derived 5)___ a chemical reaction, which takes in for of from inside at into per with without toward place 6)___ the engine itself. Therefore, all the engines 7)___ present used 8)___ aircraft can be classed as internal combustion engines. In general, internal combustion engines may be divided 9)___ piston and jet engines.

The conventional piston engines are not suitable 10)___ speeds in excess of 500 miles 11)___ hour, because of propeller limitations. It was necessary to develop power plants 12)___ propellers in order to drive airplanes 13)___ sonic and supersonic speeds.

The modern trend 14)___ aircraft power plants is 15)___ jet propulsion primarily because 16)___ the increased speeds and great heights possible 17)___ jet engines.

14. Insert the verb "to be" in the proper form:

1. The new field of electronics … very promising.
2. Gamma rays … invisible electromagnetic waves.
3. Electrons … extremely light.
4. This device … made twenty years ago in the USSR.
5. Yuri Gagarin … the first to penetrate into cosmic space.
6. The new types of engines … more advanced.
7. The characteristics of this unit … bad.
8. There … no difference between these two designs.
9. The compass needle points to the North. It's direction … always the same.
10. … there new instruments in your laboratory?
11. Mathematics … of great importance for engineers.
12. This … a square. All its angles … right.
13. My friends … engineers.
14. How … she now? – She … fine.

15. Translate the sentences into English:

1. Альберт Эйнштейн был великим физиком двадцатого века.
2. Он был очень способным и закончил школу в 16 лет.
3. Моя мама – не учительница. Она – инженер.
4. К концу 1969 года второй прототип самолета был готов к испытаниям.
5. Ты сейчас очень занят?
6. Почему эти инструкции так важны?
7. Существует несколько способов обнаружения неисправностей в электронных схемах.
8. Давление в конденсаторе будет выше, чем в испарителе?

16. Choose the correct tense (Simple or Continuous):

1. The rocket (have) the highest speed possibilities.
2. If you (leave) school so soon, you (forget) what you have learned.
3. My friend always (tell) me the truth, but I see that she (tell) a lie now.
4. Tell me if you (finish) your article in May and when exactly you (finish) it.

5. Note the direction in which the piston (move) at a given moment.

6. We (have) a conference tomorrow. You (be present)?

7. This copper became separated from the solution while the current (pass) through it.

8. The scientist was making a very interesting experiment when they (enter) the lab.

9. Tomorrow we (provide) you with all the necessary data.

10. I (not recognize) the man who (give) a talk.

17. Choose the correct tense (Simple or Perfect):

1. Electronics (undergo) more revolutionary steps than any other industry.

2. He looked at the girl and understood he (see) her somewhere before.

3. What you (do) last night?

4. He (graduate) from the university in 2017.

5. Margaret was late for work. Her friend (be) very surprised. She never (be) late before.

6. They (complete) their research by the beginning of the conference.

7. Three methods recently (use) by our team to overcome the problem.

8. By the time we (arrive) they (complete) their experiment.

9. He (forget) his French since he (leave) Paris.

10. We (get) a fax from Boston an hour ago, but we (not answer) it yet.

18. Choose the correct tense (Present Perfect or Present Perfect Continuous):

1. They (investigate) the problem for two years.

2. The students (study) the property of metals for two days.

3. The astronomers (determine) the distance between the sun and the Earth.

4. Science (achieve) great success in space research.

5. We (enter) the age of thinking machines.

6. What (happen) to the fridge?

7. I know him well. I (know) him since our childhood.

8. Ann (fail) her exam three times because she is so bad at doing sums. But she (practice) for a week now, I hope she will pass it in the end.

19. Translate from Russian into English:

1. Ты сделал очень много ошибок в своей предыдущей работе?

2. В этой библиотеке мало французских книг.

3. Вы когда-либо летали на самолете? – Нет, я боюсь летать.

4. Сегодня я не выходил из дома, поскольку идет дождь и у меня много дел.

5. Эти студенты делают упражнения или переводят текст?

6. В будущем году я поступаю в магистратуру.

7. Я уже говорил им об этом два раза.

8. Я закончил работу и пошел домой.

9. За последнее время мой брат выучил много новых английских слов.

10. Не звоните мне вечером. Я буду занята.

11. Я не видел ее с тех пор, как уехал в Москву.

12. В этом регионе часто идут дожди.

13. Наконец мы получили новое оборудование к концу месяца. Мы ждали его уже несколько недель.

14. Я все еще буду работать, когда ты приедешь.

15. К двум часам мы уже проведем испытание.

16. Они обсуждали этот вопрос с двух до трех часов.

17. Мы уже завершили сборку двигателя, когда в цех пришел главный инженер.

18. Мы используем данный метод с 1990 года.

19. Когда эксперимент завершается, мы изучаем полученные результаты.

20. Наш руководитель никогда не опаздывает. Он очень пунктуален

TEXT B. ENGINE CYCLE AND PRINCIPLES OF OPERATION

20. Read and translate the text:

A mechanical device or machine that converts heat and other forms of energy such as wind, flowing water, and electricity into useful power is called an engine or a motor. Since the fuel is ignited and burned inside the cylinder, the engine is called internal combustion engine.

Four distinct types of internal combustion engines have been developed and are being utilized. These are:

1. the rotary engine
2. the jet engine
3. the gas turbine engine
4. the reciprocating or piston-type engine.

Let us consider the last one.

Cycle of operations. Any piston-type internal-combustion engine is known as the four-stroke-cycle type and the two-stroke-cycle type. A cycle consists of the strokes taking place in each cylinder of an engine between two successive explosions in that cylinder. These strokes are:

1. the intake of a combustible mixture
2. the compression of this mixture

3. the ignition of the compressed mixture, and the expansion of the burned gases producing the power

4. the exhaust of the products of combustion.

In the two-stroke-cycle engine, two strokes of the piston or one revolution of the crankshaft is required to complete this cycle. In the four-stroke-cycle type, four strokes of the piston or two complete revolutions of the crankshaft are needed, and the four strokes are called intake, compression, power and exhaust. It must be kept in mind that, in engines of more than one cylinder, this cycle of stokes must be carried out in each of the cylinders.

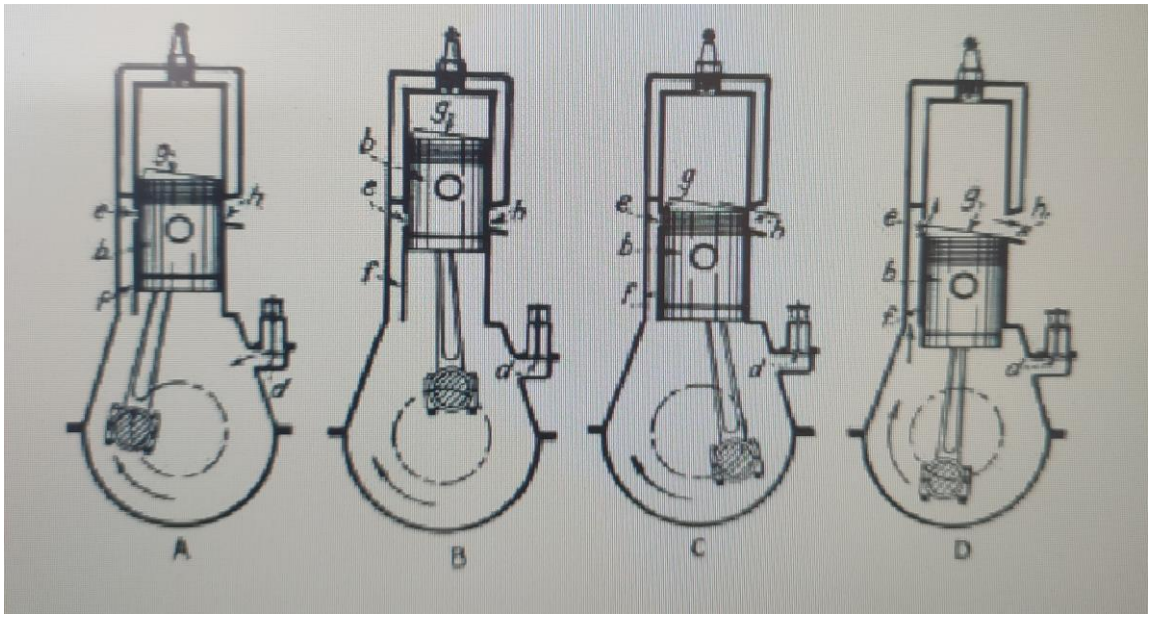
Two-stroke-cycle operation. Two important characteristics of two-stroke-cycle construction must be kept in mind:

1. that ports or openings in the cylinder walls at some distance below the head serve as intake and exhaust valves

2. that the crank end of the engine cylinder is enclosed.

The piston in its upward motion has closed the ports *e* and *h* and is compressing the charge. At the same time the crankcase through an opening *d*, to be compressed on the next downward stroke of the piston and forced through a connecting passage *f* into the combustion space when the intake port *e* is uncovered.

Near the end of the compression stroke the spark is produced and the compressed charge is fired. The explosion and resulting expansion send the piston downward on its power stroke, the two ports are uncovered. Considerable pressure remains in the cylinder, thus forcing the burned gases out through the exhaust port *h*. At the same time, the fresh mixture in the crankcase has been compressed on the downward stroke and passes upward through the intake port to the combustion chamber. The piston has now completed two strokes, and the crankshaft has made one revolution, thus completing the cycle.



Characteristics. Two-stroke-cycle engines have the following distinguishing mechanical characteristics:

1. The crankcase is enclosed and must be as airtight as possible.

2. Ports or openings in the side of the cylinder, opened and closed by the piston, take the place of valves.

3. No valve-operating mechanism of any kind is necessary.

4. The fuel mixture usually enters and passes through the crankcase on its way to the cylinder.

Some of the important advantages of two-stroke-cycle engines are as follows:

1. They are lighter in weight per horsepower.

2. They are simpler in construction.

3. They have a greater frequency of working strokes.

Some disadvantages are as follows:

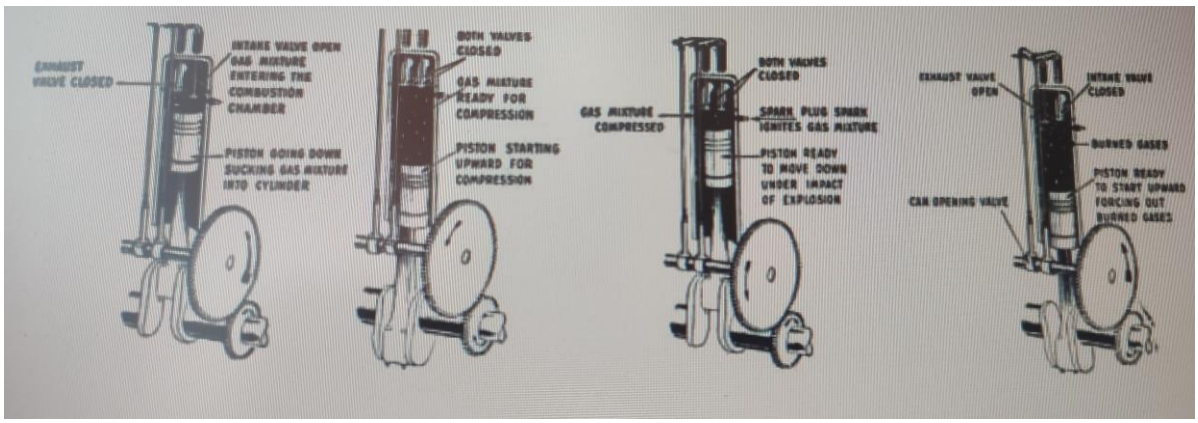
1. Their fuel mixture is controlled with difficulty.

2. They are inefficient in fuel consumption.

3. They do not operate satisfactorily under fluctuating loads.

They frequently give considerable troubles in starting and during operation because complete exhaust of the burned gases is extremely difficult.

Some diesel engines utilize the two-stroke-cycle principle very successfully. Since they use fuel injection rather than carburetion, certain disadvantages and difficulties are not encountered.



Four-stroke-cycle operation. Figure shows the usual four-stroke-cycle construction and operation. Valves located in the cylinder head are used instead of ports. Starting with the piston at the top of the cylinder, it moves toward the bottom, drawing in a fuel mixture through the open intake valve. Soon after the end of this stroke, the intake valve closes and the mixture is compressed as the piston returns to the head end of the cylinder. Near the end of the stroke, a spark is produced that ignites the charge, causing an explosion, which, in turn, sends the piston on the power

stroke. Near the end of this stroke the exhaust valve is opened, and the burned gases are completely removed from the cylinder as the piston moves backward toward the cylinder head. It is the exhaust stroke. The piston has now passed through four complete strokes, the crankshaft has made two revolutions, and a cycle has been completed.

The two-stroke-cycle single-cylinder engine has a power impulse for each revolution of the crankshaft, and the four-stroke-cycle single-cylinder engine gives one power impulse in two revolutions. This explains why heavy flywheels are necessary on one-cylinder engines. These flywheels, owing to the inertia, carry the piston through these so-called idle strokes in spite of the resistance offered by the load and thus maintain uniformity of speed. A one-cylinder two-stroke-cycle engine will not require a heavy flywheel as the four-stroke, because it fires twice as frequently.

21. Answer the following questions:

1. Compare two- and four-stroke cycle engines as to simplicity of design, efficiency, power, and general adaptability to various power applications.
2. What is the basic principle of operation of four-stroke-cycle and two-stroke cycle engines?
3. Name the advantages and disadvantages of two-stroke-cycle engines.
4. Explain why a flywheel is necessary.

22. Choose the answer that matches each question:

1. Where do the strokes take place?	two revolutions
2. What does a cycle consist of?	in the cylinder
3. Where is the fuel mixture delivered?	strokes
4. What are used instead of ports in four-stroke engines?	flywheel
5. What is necessary on one-cylinder engines?	valves
6. How many revolutions does the crankshaft make?	into the crankcase

23. Which of the following words and expressions are used to describe the engine's parts?

Crankcase, stroke, tire, valve, harvest, combustion chamber, fuel, mixture, crankshaft, power, piston, revolution, flywheel, camshaft, burned gases, ignition.

24. In these sentences one alternative is correct and two are wrong. Choose the best:

1. Internal combustion engines are ... into two types.

a) separated b) shared c) divided

2. Burned gases are ... through the valve.
a) avoided b) exhausted c) escaped
3. Mixture is ... into the cylinder.
a) drawn b) pulled c) dragged
4. The piston has ... two strokes.
a) ended b) concluded c) completed
5. A spark is ... .
a) manufactured b) produced c) done

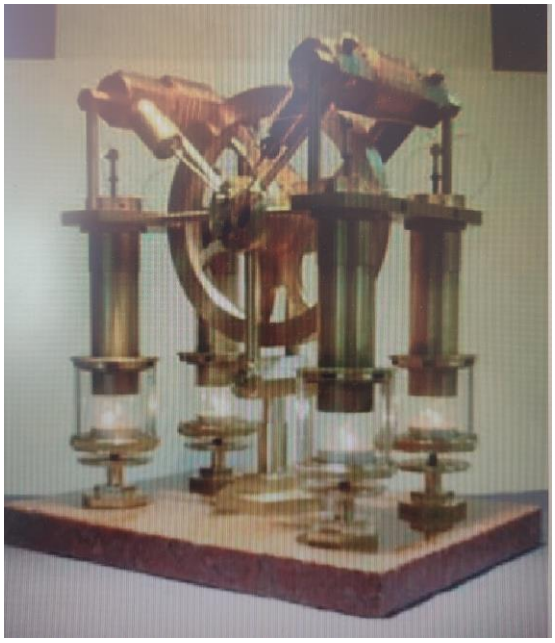
25. Write the comparative:

1. high..... 5. hot.....
2. good..... 6. powerful.....
3. low..... 7. efficient.....
4. simple..... 8. bad.....

26. Only two of these comparative sentences are correct. Correct the mistakes where necessary:

1. My tractor is moderner than your tractor.
2. He paid less for such engine than you did.
3. The temperature is more high in the cylinder.
4. This flywheel is not as heavier as that one.
5. A new engine is quieter.
6. They use fuel much economically.

27. Translate the following text in written form without dictionary:



In 1816, a Scottish inventor Robert Stirling patented a new engine for pumping water of mines. It could run on any fuel, including whisky. He died in 1878 and his engine was still unperfected. Soon everybody forgot about his engine, because a newer gasoline-powered internal combustion engine was designed.

Now, as Detroit seeks fuel-saving, less-polluting alternatives to the modern auto engine, Stirling's machine has taken on new life. The Dutch electronics firm, Philips, has tested Stirling prototypes in boats, large pumps and buses.

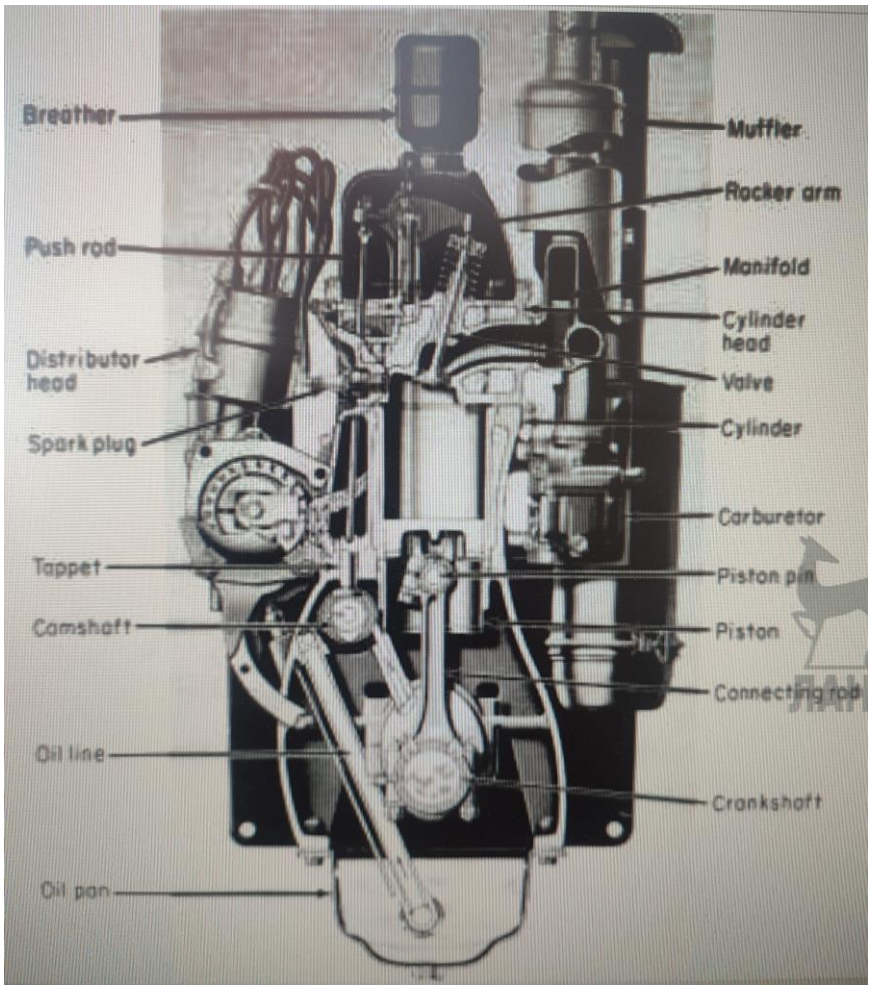
Unlike typical internal combustion

engines, the Stirling engine is powered by heat from an external source. Hydrogen gas is heated by a burner, which can run on any kind of fuel. The sealed-in hydrogen then expands, enters one cylinder and pushes a sliding piston. As the piston moves, it forces gas out of the other end of the cylinder; the gas is cooled and then moves toward a cylinder, where heat is used once more and the process is repeated. As the gas shuttles between inter connected cylinders, the pistons move back and forth and piston rods push against a so-called swash plate, or disk. The disk, in turn, forces a drive shaft to rotate.

Engineers point out that a Stirling engine would be quieter than an equivalent internal combustion engine, would exhaust less harmful fumes, and would use fuel more economically.

TEXT C. ENGINE CONSTRUCTION – TRACTOR ENGINE TYPES

28. Read and translate the text:



All piston-type internal-combustion engines, regardless of size, type, and number of cylinders, are made up of certain basic parts and assemblies.

Principal Engine Parts. The main parts and systems of a simple internal-combustion engine are as follows:

1. cylinder
2. cylinder head
3. piston
4. piston rings
5. piston pin
6. connecting rod
7. crankshaft
8. flywheel
9. valve system a) valves – intake and exhaust b) cam or camshaft and cam gear
10. fuel-supply and carburetion system
11. ignition and electrical system
12. cooling system
13. lubrication system

Cylinder. It is a cylinder-shaped part in which a piston moves. The cylinder and cylinder block of an engine are the principal and supporting part of the engine power unit. Their major function is to provide the space in which the piston operates to draw in the fuel mixture, compress it, and allow it to expand and generate power. The design and construction of the cylinder depend upon such factors as power required, exact purpose of engine, compression ratio, valve arrangement, method of cooling, arrangement of cylinders, and production operations.

Cylinder head. It is a detachable metal casting that fi ts onto the top of a cylinder block with a number of bolts. All engines have removable cylinder heads. The cylinder head contains the space above the cylinder and piston known as the *combustion chamber*.

Crankcase and oil pan. The crankcase is that part of the engine, which supports and encloses the crankshaft and camshaft, provides a reservoir for the lubricating oil. The lower part of the crankcase is commonly called the oil pan.

Piston. The piston of an engine is the first part to begin movement and to transmit power to the crankshaft as a result of the pressure and energy released by the combustion of the fuel. It is attached by a connecting rod to a crankshaft or flywheel, thus converting reciprocating motion into rotary motion.

Piston ring. It is a ring on a piston sealing the gap between the piston and cylinder wall. The primary function is to retain compression and, at the same time, reduce the cylinder-wall and piston-wall contact area to a minimum, thus preventing friction losses and excessive wear. Other important functions are the control of the oil and cylinder lubrication and the transmission of heat away from the piston. Piston rings are classed as compression rings and oil rings, depending upon their specific function and location on the piston.

Piston pin. The function of the piston pin is to join the connecting rod to the piston and, at the same time, provide a flexible connection between the two.

Connecting rod. It is a rod that connects the piston to the crankshaft in an internal combustion engine. A connecting rod, attached to the piston by means of the piston pin, converts the reciprocating motion of the piston to a rotary motion of a crankshaft.

Crankshaft. It is the main shaft of an internal combustion engine to which the connecting rods are attached.

The size of the crankshaft, the number of main bearings, and the number and arrangement of the cranks depend upon the type, size, and the speed of the engine.

Flywheel. Flywheel is a heavy wheel in some engines, and its primary function is to regulate the engine's rotation making it operate at a steady speed when it is not receiving energy from a piston. The size of the flywheel varies with the number of cylinders and the type and size of engine.

Valves. Engine has two valves. The intake valve allows the fuel mixture to enter the combustion chamber on the intake stroke. The exhaust valve allows the products of combustion to escape.

Camshaft. It is a shaft with one or more cams attached to it and is used to operate the valve in an internal combustion engine. A camshaft opens the valves against the tension of the valve springs at the proper time and holds them open for the required interval. A separate cam is provided on the camshaft for the operation of each valve. The cam shaft is driven from the crankshaft.

Tractor-engine types. All tractor engines are either of the four-stroke cycle, heavy-duty, carbureting type or of the diesel type. Gasoline, gas, and diesel fuels are the predominating fuels.

The vertical four-cylinder type of engine predominates in the tractor at the present time. Some of the reasons for this are:

1. Good weight distribution is secured.
2. Fuel mixture distribution is simplified.
3. Uniform cylinder and bearing lubrication is facilitated.
4. Valve mechanisms, ignition devices, and other parts are made more accessible.
5. The clutch and transmission parts can be assembled in such a way as to give the entire machine a balanced construction.

Compression ratio. The compression ratio of an engine is the ratio of the cylinder volume existing when the piston is on the bottom dead centre and the volume remaining above the piston when it reaches top dead centre. For example, if the total cylinder volume with the piston on the bottom dead centre is 120 in^3 and this is reduced to 20 in^3 when the piston reaches the top dead centre, the com pression ratio is the relationship of 120:20 or 6:1. The power and overall operating efficiency

of an engine depend on its compression ratio. High compression ratios give better fuel utilization and thermal efficiency. However, the fuel type and characteristics, the type of ignition system used, and other de sign factors determine the maximum practical compression ratio which can be used in an engine. Compression ratios depend on fuel type and quality.

29. Work in pairs. Answer True or False:

1. All engines have removable cylinder heads.
2. The main function of the piston rings is to control piston motion.
3. Flywheel is used to smooth out the flow of power from the engine.
4. A crankshaft opens each valve at the proper time.
5. The cylinder block, together with connecting rod, form the main body of the engine.
6. The crankcase supports the crankshaft and camshaft by means of bearings.

30. Do you agree or disagree with the following statements? Give your reason:

1. The greater the number of cylinders, the shorter the distance moved by the crankshaft between two successive explosions in the engine.
2. The exhaust valve is never given more clearance than the intake valve.
3. The power output of an engine is largely determined by its piston displacement and crankshaft speed.
4. Engines cannot be made to perform under the ideal cycle conditions.

31. Write down the opposites of the following words:

1. exhaust..... 3. low..... 5. rigid.....
2. common..... 4. efficient..... 6. disadvantage.....

32. Choose the best alternative to complete these sentences:

1. All valves are ... in the head.

a) fixed b) mounted c) put

2. The cylinder is .... .

a) vacant b) blank c) empty

3. The piston ... the top dead centre.

a) reaches b) achieves c) gets

4. ... is transmitted to the crankshaft.

a) might b) strength c) power

5. The temperature of the fuel mixture ... .

a) enlarges b) multiplies c) increases

6. The different parts of the engine ... the different functions.

a) perform b) do c) fulfil

33. Which of the following verbs are used to describe the engine's operation:

To rotate, to burn, to harrow, to ignite, to cut, to include, to move, to exhaust, to improve, to combust, to harvest, to spray, to handle, to revolve, to require, to heat.

34. Complete the sentences. Use the superlative:

1. The method of transmitting power from its source to the point of use is one of …….. problems. (great)
2. The……. compression ratio is 15:1. (common)
3. The carburetor mixes fuel for the……combustion. (efficient)
4. It was the…… design of the engines. (good)

TEXT D. DIESEL ENGINE – CONSTRUCTION AND OPERATION

35. Read and translate the text:

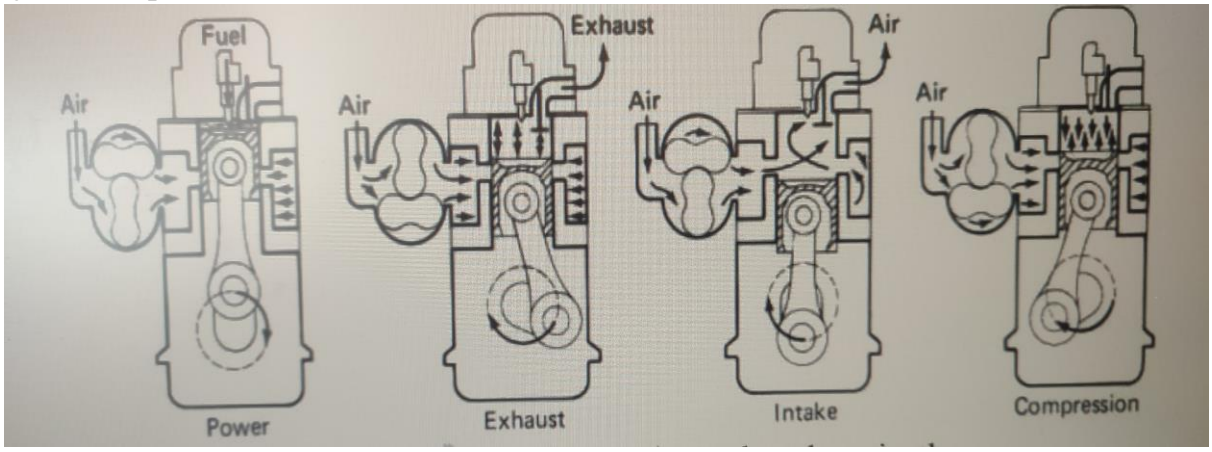
Diesel engines. A diesel engine is that type of an internal-combustion engine which injects fuel oil in a finely divided state into a cylinder within which air has been compressed to a high pressure and temperature. First engines were heavy, slow-speed, single- or multiple-cylinder units of either the two- or four-stroke-cycle type.

Lighter weight, higher speed diesel engines appeared about 1925, but development was slow. However, by 1930 reliable and well-designed multiple-cylinder, high-speed diesel engines were being used for some makes of heavy-duty farm tractors. Now diesel tractors are available in all sizes from about 20 to 200 hp or more and have largely displaced gasoline and gas-burning tractors.

Tractor engine characteristics and design. The diesel tractor engine may be considered as a heavy-duty automotive type engine. The operating principles are identical with those of the auto engine, with the possible exception of the fuel handling and ignition process. The principal difference is that all diesel engines are designed and built heavier and stronger and, in most cases, operate at lower speeds than the conventional automobile engine. Tractors use the in-line cylinder arrangement, with the number of 20 cylinders varying from two to eight, depending on the tractor type and power requirements.

Principles of operation. The diesel engine differs from a carbureting type engine primarily in two ways, namely, 1) only air is taken in on the intake stroke of the piston, the liquid fuel being injected directly into the combustion chamber at the end of the compression stroke and 2) the fuel mixture is ignited by high compression, and no special ignition device or mechanism is needed. On the other hand, all diesel engines operate on either the two- or the four-stroke-cycle principle like other internal-combustion engines.

Two-stroke-cycle diesel. The cycle begins with the upward movement of the piston from its TDC position. The intake and exhaust ports are closed and the charge of fresh air is compressed. When the piston reaches BDC, a charge of fuel is injected into the combustion space. The high temperature ignites the mixture of fuel and air, and combustion takes place. Expansion continues until the exhaust port is opened and the burned gases are exhausted. The intake port is uncovered after the exhaust port. The cycle is repeated.



Four-stroke-cycle diesel. The strokes take place in the same manner as in the ordinary four-stroke-cycle carbureting-type engine, with the exception that air alone is drawn in on the intake stroke and the liquid fuel is injected into the cylinder at or near the end of the compression stroke. Two valves, intake and exhaust, operated by a gear and camshaft are necessary.

Fuel-injection systems. The proper injection of the fuel into the combustion chamber against the high pressure is one of the most difficult problems. The mechanism must supply a fuel charge sufficient only for a single explosion. The principal requirements of a diesel fuel supply and injection mechanism are: 1) that it supply a correct fuel charge to each cylinder according to the engine load and speed, 2) that it inject the fuel at the correct time in the cycle, 3) that it facilitate efficient fuel utilization by atomizing the charge at the time of injection, and 4) that it not be subject to undue wear or require frequent adjustment or servicing.

All modern high-speed engines inject each fuel charge mechanically into the compressed hot air. This is known as direct injection. A diesel fuel injection system consists of certain main parts:

1. fuel tank
2. fuel transfer pump
3. primary fuel filter
4. two-stage secondary filter
5. injection pump
6. injection nozzles
7. governing mechanism.

The low-pressure transfer pump pushes the fuel through the filters to the high-pressure injection pump which, in turn, forces the necessary fuel charges to the nozzle, and then into the combustion chamber.

Diesel engine governing. The control of the power output and speed of a gasoline engine is simple because the proper fuel mixture is created before it enters the combustion chamber. It is impossible in a diesel engine, for the proper air-fuel mixture cannot be produced in the same way and fed into the cylinder under the high pressure and temperature conditions. Control ling the diesel engine speed and load must involve control of the charge of injected fuel. For this reason, the mechanism must be connected to and become a part of the injected pump.

Turbocharger. Superchargers are used in gasoline engines for forcing a great amount of fuel mixture into the cylinder than would be drawn in and thereby increasing the power output. Diesel engines are equipped with turbochargers that perform the same function. Since the fuel and air are not mixed in the diesel engine until they enter the cylinder, any similar increase in power must be dependent only upon increasing the amount of air combining with the fuel charge. Another difference between supercharges and turbochargers is that the former uses a gear-driven blower, while the latter uses the exhaust-gas pressure to operate the blower.

Diesel starting methods. One of the disadvantages of a diesel engine is the amount of energy required to crank it when starting because of the very high compression pressure. Some mechanical starting arrangements are needed. They are: 1) compressed air system, 2) hydraulic system, 3) electric motor, 4) small gasoline engine.

It is difficult to start an engine if the temperature is rather low. Some methods provide effective starting: 1) heating the coolant and lubricating oil, 2) using more volatile fuels.

36. Answer the following questions:

1. What are the specific differences between gasoline and diesel engines?
2. Explain the general operation of fuel-injection systems.
3. Discuss the difference between the superchargers and turbochargers.
4. What is the difference in the starting procedure for a diesel under summer and winter conditions?

37. Work in pairs. Discuss the advantages and disadvantages of the diesel engine.

38. Four of these sentences contain errors. If there are any mistakes in a sentence write the correction:

1. Higher speed diesel engines appeared in the 19th century.

2. There is no difference between diesel and gasoline engines.

3. To ignite fuel mixture special ignition devices are not needed in diesel engines.

4. Diesel engines are equipped with superchargers.

5. There is no problem in starting a diesel engine at low temperatures.

6. Diesel engines may be the two- or four-stroke cycle engines.

39. Choose the best alternative to fill the gaps in these sentences:

1. Burning is the process of ... a fuel with the oxygen in the air.

a) uniting b) combining

2. The oil is heated to a ... temperature.

a) tall b) high

3. The flywheel returns some of the power to the piston by first ... up a little extra speed.

a) collecting b) picking

4. The engine is ready to ... in a charge of air.

a) draw b) drag

40. Match a verb from the list A with a noun from the list B:

A	B
to move	power
to rotate	piston
to exhaust	shaft
to ignite	valves
to open	mixture
to transmit	gases

41. Which is the odd word out?

1. to mix	to compress	to burn	to plough
2. bearing	head	harrow	flywheel
3. heavy	light	slow	angry
4. known	impossible	incorrect	irregular

42. Fill in missing words: *compressed, fuel burned, diesel engine, ship's screws, runs motors, kind of fuel, is blown.*

1. The _____is an internal combustion engine.

2. This air is being _____on the return stroke.

3. The electricity _____which are connected to the wheels of the train or to the _____.

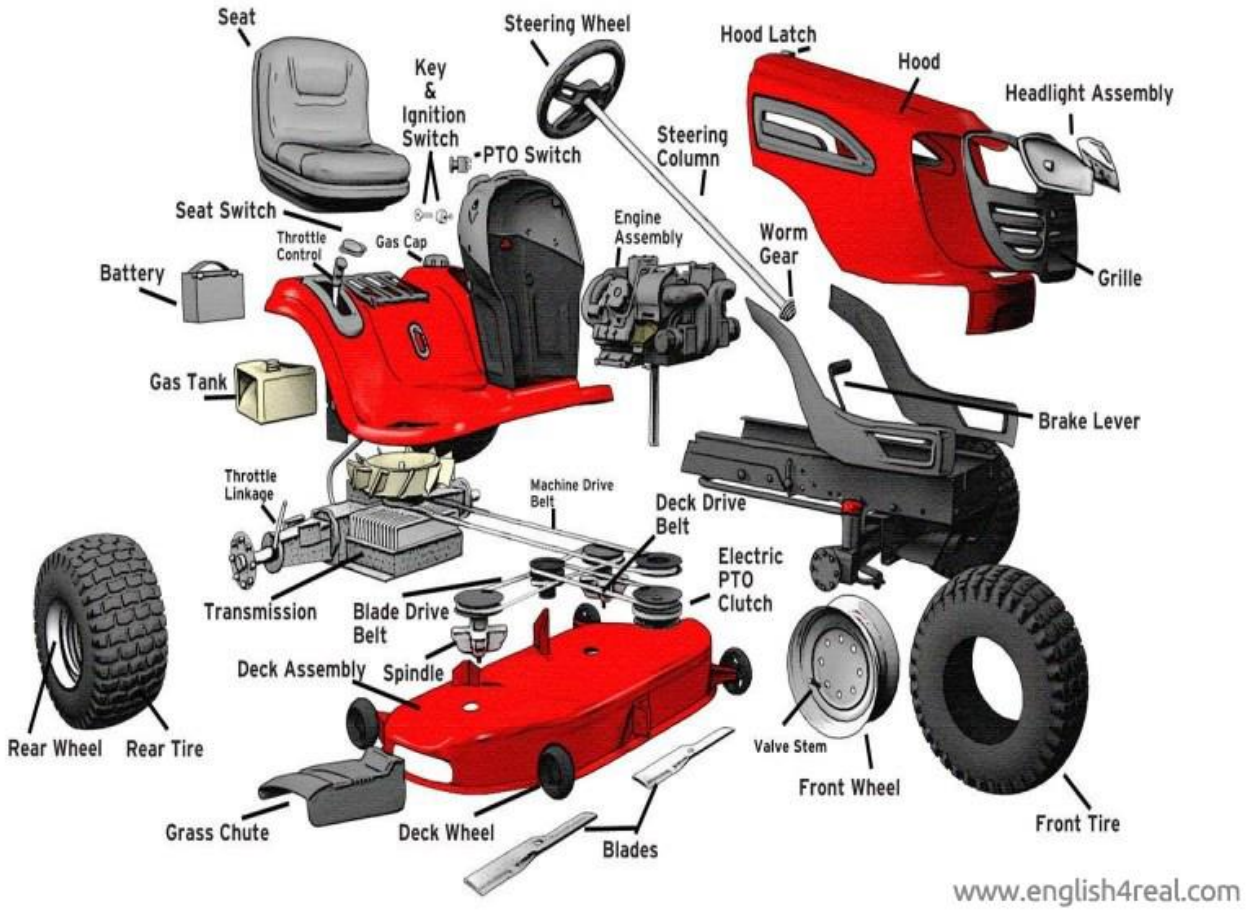
4. Diesel engines use a cheaper _____and give more power for each gallon of _____than gasoline engines.

5. In diesel engines only air _____into the cylinder.

VIII. TRACTORS. COMBINES.

1. Learn the words:

exhaust pipe - выхлопная труба
driver's cab - водительская кабина
headlight - передняя фара
mudguard – брызговик
step – подножка
tire – покрышка
warning light - предупреждающий свет
wheel – колесо



battery - аккумулятор
blades – лопасти
blade drive belt - ленточный приводной ремень
brake lever - рычаг тормоза
deck drive belt - приводной ремень
engine assembly - сборка двигателя
front tire - передняя шина
front wheel - переднее колесо
gas cap - крышка бензобака
gas tank – бензобак
grass chute – травосборник
grille - решетка
headlight assembly - сборка фар
hood – капот
hood latch - защелка крышки
key and ignition switch - ключ и выключатель зажигания
rear tire - задняя шина
rear wheel - заднее колесо
seat – сиденье

seat switch - переключатель сиденья
spindle – шпиндель
steering column - рулевая колонка
steering wheel – руль
transmission - коробка передач
valve stem - шток клапана
worm gear - червячный редуктор

TEXT. A THE TYPES OF FARM TRACTORS

2. Read and translate the text:

Tractor is a farm vehicle that is used to pull farm machinery and to provide the energy needed for the machinery to work. The word “tractor” was taken from the Latin verb “trahere” which means “to pull”.

The tractor is the usual present-day source of farm power. The tractor is in fact not a farm machine, but a source of power to operate farm machines. However, tractors are generally considered as farm machines.

Farming conditions and requirements vary considerably, which necessitates power units adapted to specific needs. As a result, there are many types and kinds of tractors.

Classification of tractor types. Tractors can be classified as follows:

A. according to method of securing traction and self-propulsion:

1. wheeled tractors,

a. tricycle with single or double front wheels,

b. four wheels with single or dual rear-drive wheels and standard- or high-clearance front axle,

c. heavy-duty two- or four-wheel drive,

2. track-type tractors,

B. according to utility:

1. general purpose,
2. all-purpose or row-crop type,
3. orchard,
4. industrial,
5. garden and lawn.

The most widely used tractor is the all-purpose type because it can be used for a great variety of jobs including planting, cultivating and harvesting row crops.

All types of tractors are alike in many ways. They have:

1) an internal comustion engine as a source of power,

2) a clutch to connect and disconnect the engine power and driven parts,

3) a transmission system for conveying power to the driving members or to the other points where power is applied. Nearly all types are available with spark-ignition engines and are designed to use gasoline, kerosene or distillate as fuel.

Method of attachment. Today's agricultural tractor is a complex vehicle used to propel and power a large variety of implements for agricultural production. Implement applications, therefore, have considerable effect on tractor design.

Implements are generally attached to and operated by tractors in one of four ways:

1. trailed, single-point hitch,
2. mounted, three-point hitch,
3. semi-mounted, three-point hitch,
4. frame mounted.

Power may be transmitted to the implement by a power-take off shaft.

Wheel tractors. The wheel-type tractor is the predominating type of machine in agriculture. The four-wheel tractor with an adjustable front axle for both wheel tread and clearance height is available for the more popular tractor sizes and has displaced tricycle types. Most wheel tractors are equipped with low pressure rubber tires. Rubber tires decrease wheel slippage under most conditions, increase operating efficiency, and reduce wear and tear.

Track-type tractors. The traction mechanism in the track-type tractor consists of two heavy, endless, metal-linked iron devices known as tracks. The long tracks distribute the tractor weight and provide small pressure on soil. Steering is done through the tracks themselves by reducing the movement of one track below the speed of the other. Track-type tractors have a limited use in agriculture. They are often used for many heavy-duty, earth-moving, and industrial jobs requiring tractor power. They are well adapted for swampy, sandy soils, orchard cultivation, for grain and other crop-production operations in some hilly sections, on large farms, particularly in irrigated areas; and for land clearing.

General-purpose tractor. A general-purpose tractor is one of more or less conventional designs such as an ordinary four-wheel machine. It is made to perform practically all tractor jobs such as ploughing, harrowing, road grading, combining, hay baling.

Orchard tractors. Orchard tractors are small- or medium-size, general-purpose machines of either the wheel or crawler type, so it is constructed and equipped to be operated around trees. Such tractors are often built lower.

All-purpose tractors. An all-purpose or row-crop type tractor is a tractor designed to handle practically all the field jobs on the average farm, including the planting and row crop tillage. The most important requirements of such tractors are 1) greater clearance, both vertical and horizontal, 2) adaptation to the usual row widths, 3) quick, short-turning ability, 4) convenient and easy handling, 5) quick and easy attachment and removal of field implements, and 6) hydraulic controls and power take-off. All-purpose tractors are made in several types and sizes.

Steering and control. Ease of handling and control of an all-purpose tractor and its attached field equipment are important. The steering mechanism should 1) permit short, quick turning; 2) require the minimum of effort in its operation, regardless of whether the machine is moving or stationary; and 3) permit accurate control of the attached units, particularly planters and cultivators. Tractors equipped with a hydraulically operated steering mechanism have a definite advantage in these respects.

Power take-off and hydraulic controls. A power take-off drive and shaft, hydraulic controls, lifts for the various attachments and machine are needed to operate such field machines as ploughs, harrows, cultivators, planters, and other similar machines.

Small tractors. Garden tractors. For many years the smallest tractors were largely light-weight, two-wheel machines powered by a 2- to 5-hp engine utilized for gar den and vegetable production. Today the only available machine resembling these early garden tractors is the rotary tiller. The modern tractor is a four-wheel riding machine also adapted to such field operations as ploughing, harrowing, planting, cultivating, and so on.

Selecting a tractor as a power plant. A tractor should be selected only after

considering the advantages and disadvantages of the different types available. Original cost, adaptability, soil conditions, farming program, economy, and timeliness of operations are factors to consider in selecting a tractor. The ability of an operator to operate, maintain, and adjust the tractor selected is also important.

Common tractor troubles. A modern tractor causes very little trouble especially if it is given proper care and is checked periodically. The largest percentage of tractor troubles is referred to the engine. An engine needs three things to make it run: fuel, compression, and spark.

Engine will not start, if: a) empty fuel tank; b) poor quality of fuel; c) foreign material in fuel tanks; d) carburettor out of adjustment; e) too much fuel, "flooding" cylinder; f) poor compression; g) engine too cold.

3. Answer the following questions:

1. There are many types of tractors with respect to size and utility. How would you classify them?
2. Under what conditions would the purchase and use of a track-type tractor by a farmer be desirable?
3. Name what you consider as important changes and improvements that have taken place with respect to overall designs and operations between the earliest and the latest types of tractors.
4. Trace the trend in the development of tractors and tractor-mounted units. What are the reasons, if any, for this trend?

4. Work in pairs. Imagine that your friend wants to buy a tractor. What information would you give? Discuss these questions:

1. Which is the best local shop for agricultural machinery?
2. What type of tractor is he going to buy?
3. How should a tractor be selected?
4. What causes common tractor troubles?
5. How much does a tractor cost?

5. Write down the opposites of these adjectives:

1.heavy.....	3.old.....	5. endless.....	7. rich.....
2.high.....	4.slow.....	6. full.....	8. hot.....

6. Choose the best alternative to fill the gaps in these sentences:

1. Steering ... through the tracks themselves.

a) is done b) is performed c) is operated

2. We ... the power take-off to operate mowers.

a) want b) need c) have

3. This tractor is adapted to sandy ... .

a) ground b) earth c) soil

4. The track-type tractor is used where ... traction conditions are encountered.

a) firm b) hard c) difficult

5. An implement is ... to the three-point linkage.

a) attached b) fixed c) fastened

7. Fill the gaps in these sentences with a suitable preposition from the list: ***with to for by through***

1. Tractor troubles are referred ... the engine.
2. The row-crop tractor has advantages ... working some crops.
3. The horse was replaced ... the tractor.
4. The tractor supplies power ... a power take-off shaft.
5. Details of tractor design differ ... make and size.

8. Write sentences from the words in brackets (…). Use the active or passive.

1. (the tractor / equip / with tires)…….
2. (tracks /distribute / weight)……...
3. (when / invent / the tractor)……..?
4. (tractor / need /fuel / to run)……..

9. Complete the sentences using one of these verbs in the correct form: ***increase do design adapt develop make***

1. Farm machines…….. for many operations.
2. The number of tractors……
3. In the past all farm operations……by animals.
4. Combines…….. for wheat harvesting.
5. Plant breeders…recently… new types of cotton planters.
6. Cheese…….. from milk.

10. Read the texts carefully and write down some of the differences between these tractors:

British Levland 2100 tractor

This type of tractor is designed to provide increased power, improved field economy, low smoke levels and low oil consumption. Features include detachable wet cylinder liners, improved combustion, bigger valves with new port design, better cooling and injection characteristics and modified piston ring arrangement.

Driver comfort is given top priority in these tractors with a spacious safety cab, hydraulic suspension seat and hydrostatic steering. Ten forward and two reverse

gears are provided. Maximum horse power from the independent two-speed PTO is 74 or 85 hp tractors, 88 or 100 hp tractors.

Power for the driven front axle of the four-wheel models is taken independently from bevel gears on each side of the rear axle. Telescopic shafts connect to a spiral bevel crown wheel and gear driving each front wheel. This system gives braking and differential lock action on all four wheels.

Ploughs and heavy implements may be used with this type of tractors.

The model Harvall

The model Harvall is a 140 hp self-propelled power unit which has been developed in Holland.

The prototype unit was used with a front-mounted 16-ft rotary mower and a two-row 80 ph maize harvester. The Harvall may be also used to power sprayers and spreader.

The Harvall is not a tractor. It has not sufficient power at the wheels to pull soil-working implements. About 40 hp is available for tractor, 100 hp is directed along the machine's five PTO shafts. There are two at the front and three at rear, all running at 1,300 rpm. Hydraulic linkages are also fitted to both ends of the machine.

The front of the tractor is the ideal place to mount a machine. The driver can see exactly what he is doing, and is able to drive straight in the crop.

The tractor is powered by a six-cylinder truck engine. Power is taken to the wheels via a three-speed gear box and hydrostatic transmission. Speed is variable in the three forward ranges. The Harvall is 13ft long, 6ft wide, and weighs 55cwt.

TEXT B. TRACTORS

11. Before reading the text «Tractors» agree or disagree with the following statements:

1. Tractor is one of the main machines on the farm.
2. The maximum horse power of a tractor is from 10 to 20 h.p. today.
3. Air-conditioned cabs are fitted to the tractor.
4. A standard tractor has four wheels.
5. Crawlers are more expensive than wheeled tractors.
6. Wheeled tractors are much more difficult to maintain than tracklaying tractors.
7. Crawlers can perform transport works.

12. Read and translate the text:

The internal combustion engine brought major changes to agriculture in most of the world. The first successful gasoline tractor was built in the United States in 1892.

Within a few years several companies were manufacturing tractors in Germany, the United Kingdom and the United States.

Major changes in tractor design throughout the century have produced a much more efficient and useful machine. Principle among these were the power take off, introduced in 1918, in which power from the tractor's engine could be transmitted directly to an implement through the use of a special shaft; all purpose or tricycle-type tractor (1924), which enabled farmers to cultivate planted crops mechanically; rubber tires (1932), which facilitated faster operating speeds; and the switch to four-wheel drives and diesel power in the 1950s and1960s, which greatly increased the tractor's pulling power.

The last innovations have led to the development of enormous tractors usually having double tires on each wheel and enclosed, air- conditioned cabs–that can pull several gangs of plows.

In agriculture tractors find their use in the wide variety of farm jobs such as ploughing, disking, planting, cultivating, fertilizing, harvesting, transport work sand running machinery off the PTO shaft.

Tractors occupy an important place on the farm as a source of power. On many farms they together with truck or trailers, have entirely displaced horses for farm work. Advantage of tractors power over the horse is that tractor can be used continuously for heavy work. In addition to pulling implements like plough sand cultivators, a tractor may be used with implements for bush-cleaning, ditch filling and land-levelling. Small tractors from 1 to 10 horse power, fitted with single- or twin cylinder petrol engines, may be used for garden and orchard work.

Farm tractors may be divided into two groups: wheeled and tracklaying. Wheeled tractors may be subdivided into standard and row-crop types. Standard wheeled tractors are used for general work and do not have the special features associated with row-crop tractors. Row-crop tractors can be used for all ordinary purposes, but in addition they are specially designed for working on root and other row crops.

Track-laying tractors or crawlers have the great advantage that they can be used for heavy loads on almost any class of land. They are considerably more economical in fuel than are wheel machines, but their greater initial cost and their maintenance particularly that of the tracks, may outweigh this advantage. The crawler is, however, the more efficient type of tractor and, moreover, can go on the land earlier after rain and so can work a greater number of days per year.

13. Give the English equivalents for the following Russian word combinations:

Двигатель внутреннего сгорания, эффективная и полезная машина, универсальный трактор, резиновые шины, кабина с установкой для

кондиционирования воздуха, колесные тракторы, вал отбора мощности, колесные и гусеничные тракторы, последние новшества.

14. Read the first sentences of each paragraph and name the problems that will be discussed in each of them.

15. Choose the best endings to the following statements:

1. The internal combustion engine brought major changes to ... in most of the world.

a) industry b) education c) agriculture

2. The first gasoline tractor was built...

a) in Germany in 1892 b) in the USA in 1892 c) in the United Kingdom in 1982

3. In 1918 ... was introduced.

a) the clutch b) the crankshaft c) power-take- off

4. Tractors are used in agriculture in the wide variety of farm jobs such

a) buying, advertising and selling b) making measurements, testing and operating c) planting, cultivating and transport works

5. Small tractors can be used for ...

a) garden work b) orchard work c) garden and orchard work

6. Row-crop tractors are specially designed ...

a) for working on root crops b) for all ordinary purposes c) for all ordinary purposes and on root and other row crops

7. Track-laying tractors can be used for heavy loads ...

a) on almost any class of land b) on over moistened soils c) on sandy soils

16. Match the words on the right (A) with their verbs on the left:

A	B
1) tractor	a) to be displaced
2) power	b) to be done
3) crops	c) to work on root
4) several plows	d) to be transmitted
5) horses	e) to be used for garden
6) disking, planting, cultivating	f) to be used for heavy work
7) wheeled tractors	g) to pull
8) row-crop tractors	h) to be cultivated
9) crawlers	i) to be subdivided
10) small tractors	j) to be built

17. Answer the following questions:

1. When did the first gasoline tractor appear?
2. Did the first tractor survive many changes in its design? What are they?
3. Where are modem tractors used now? Why can they perform these kinds of farm jobs?
4. What groups of tractors do you know?

18. What words/ideas would you associate with the notion «Tractor»?

19. What facts in the text were quite new and were already known to you?

20. Find information in the text to prove that...

- the appearance of the first tractor is connected with the internal combustion engine
- major changes in tractor design have produced more efficient and useful machine
- tractors displaced horses for farm work
- there is a difference between standard wheeled tractors and row-crop tractors
- there is a difference between wheeled tractors and crawlers.

TEXT C. COMBINES

21. Read and translate the text:

Combine is an agricultural machine that cuts, threshes, and cleans a grain crop in one operation. It was invented in the USA by Hiram Moore in 1834 and early versions were pulled by animals.

Functional elements of a combine. The five basic operations performed by a combine are:

1. cutting the standing grain,
2. conveying and feeding the cut material to the threshing mechanism,
3. threshing or removal of the seed from the head,
4. separating the seed and chaff from the straw,
5. cleaning the chaff and other debris from the seed.

In direct combining, the reel pushes the standing stalks against the cutter bar and then delivers the cut material back onto the header platform. The platform cross-conveyer delivers the material from the header platform to the feeder conveyer. The feeder canvas or feeder conveyer elevates the material and feeds it into the cylinder-and-concave assembly where the threshing and much of the separation take place. The seed and chaff separated by the concave grate fall directly onto the oscillating grain pan.

The cylinder beater is used to strip the threshed material from the cylinder, aids in further separation at this point, and directs the straw and remaining seed onto the straw carrier. The check curtains prevent threshed seed from being thrown out of the rear of the machine by the beater or the cylinder. The straw carrier agitates the material to separate out any remaining seed as the straw is moved rearward to be discharged from the machine. The material separated from the straw is collected by the grain return pans (or a conveyer) and delivered to the grain pan at the front of the chaffer sieve.

The mixture of threshed seed, unthreshed heads, chaff, and other small debris is moved from the grain pan onto the front of the oscillating chaffer sieve. As the mixture is moved rearward over the chaffer sieve, an air blast directed upward through the sieves helps in separating out the threshed seed and unthreshed heads and blows the light chaff out the rear of the machine. Most of the unthreshed heads ride over the chaffer sieve and drop through the larger openings of the chaffer extension into the tailings auger. The tailings are then returned to the cylinder for rethreshing.

The free seed falls through the chaffer sieve and is further cleaned by passing through the shoe sieve, which has smaller openings. The cleaned seed is then delivered to the grain tank by means of grain auger and elevator.

Cutting and conveying. The cutting and conveying assembly is a header. It consists of the reel, the cutter bar, a platform for receiving the cut material, and conveyers for delivering the material to the cylinder. The most common type of reel has several slats (bats) mounted rigidly on radial arms. The position of the reel with respect to cutter bar is adjustable both vertically and horizontally to accommodate different crop conditions.

Most self-propelled machines have platforms across the front of the combine. Large augers are generally used to convey the cut material to the end or center of the platform. A separate feeder conveyer is provided to elevate the material from the platform to the cylinder. Some combines have a beater mounted above or behind the upper end of the elevating conveyor to help in feeding the material into the restricted area between the cylinder and concave.

Types of threshing cylinders. Removal of seeds from the heads is done with rotating cylinders whose threshing action depends on impact. When the relatively slow-moving material comes in contact with the high-speed cylinder, the impact shatters seeds from the head and frees a portion of the seed from the straw. Then

threshing is obtained by the rubbing action as the material is accelerated and passes through the restricted clearance space between the cylinder and the concave.

The arrangement of the spike-tooth cylinder and concave is such that the cylinder teeth pass midway between staggered teeth on the concave, thus producing a combing action. The teeth in the concave are mounted on removable sections. The total number of rows of teeth depends on the crop and the threshing conditions.

In a rasp-bar cylinder, threshing is done between corrugated cylinder bars and stationary bars of the concave grate.

Separating. Under normal operating conditions, a large portion of the threshed seed is separated from the straw at the threshing unit, falling through openings in the concave-and-grate assembly or through the concave-extension grate. Separation of the remaining free seed takes place on the straw carrier as the straw is agitated and moved to the rear of the machine.

The most common types of straw carriers are the multiple-section straw walker. The action of the straw walkers is to accelerate the straw in a rearward and upward direction. While returning to the forward position, they leave the straw in midair. The material then falls onto a section of the walker nearer to the discharge end and is moved another step toward the rear by the next stroke of the walker.

Cleaning. After the seed has been separated from the straw, it is still mixed with large quantities of chaff and other plant residue that have passed through the grates. The functions of the cleaning unit (shoe) are to separate and clean the threshed seed, return unthreshed heads to the cylinder to thresh once more, and dispose of the remaining debris.

The main components of a cleaning shoe are oscillating sieves, a fan, a chaffer extension at the rear of the upper sieve, and augers for conveying the tailings and the clean seed to elevators.

The air blast from the fan is directed upward and rearward through the sieves, agitating the mixture on the chaffer (upper) sieve to help in separation of the seed as the material is moved rearward. The air blast also blows out most of the light, chaffy material as the seeds fall through the large openings of the chaffer sieve and then through the smaller openings of the shoe sieve.

Small pieces of unthreshed heads and other heavy material that pass through the chaffer sieve but do not fall through the openings of the shoe sieve are discharged into the tailings auger. Most of the unthreshed heads pass over the chaffer sieve onto the chaffer extension, which has openings large enough for them to fall through into the tailings auger. Since the shoe sieve is primarily for size separation, the openings should be just large enough to permit free passage of the seed.

22. Answer the following questions:

1. Name and describe the basic operations of a combine.

2. Where does the threshing take place?
3. What is the action of straw walkers?
4. Why is a header used?
5. What function does a beater have?
6. What is the basic principle of operation of rotating cylinders?
7. Compare the operation of a spike-tooth cylinder and a rasp-bar cylinder.
8. Explain the functions of a cleaning unit.
9. What are the main components of a cleaning unit?

23. Work in pairs. Discuss these questions and make notes:

1. Enumerate the advantages and disadvantages of direct combining
2. What information does this text not give you which you would need?
3. What questions would you ask the manufacturers of modern combines?
4. What trends have been in the design of combines recently? What are reasons, if any, for these trends?

24. Which definition is for a combine as one of the farm machines?

1. group of persons, trading companies, etc. joined for a purpose
2. machine that both reaps and threshes (grain)

25. Guess the meaning proceeding from the agricultural vocabulary:

1. Head of the plants is ….

a) mass of leaves or flowers at the top of a stem or stalk. b) unit of a flock or herd.

2. Cylinder beater is probably ….

a) man employed to drive birds, animals to those waiting with guns to shoot them. b) tool for beating.

3. Chaff is ….

a) good-humoured joking. b) outer covering of grain, removed before the grain is used as human food.

26. Which is the odd word out?

1. beater, operator, header, thresher
2. corn, wheat, barley, debris
3. cutting, cleaning, remaining, separating

27. Sort the words in Exercise IV into the following categories:

a) cereals b) operations c) elements of a combine

28. Put each word in the box in its correct group:

dried	auger	harvester	by	chaffy	hilly

1. reel platform cutter bar ……
2. combine harrow plough ……
3. cut threshed delivered ……
4. heavy clean light ……
5. onto out through ……
6. flat mountainous swampy ……

29. Highlight the words or phrase in the text which mean the same as the following:

Hole, to allow, with the help of, to include, as for, rubbish.

30. Work in pairs. Answer True, False or I don't know:

1. Cutting is the most difficult function of a combine.
2. The threshing takes place in the cylinder and concave assembly.
3. The tailings are not returned to the cylinder.
4. The free seed is cleaned by passing through the chaffer sieve.
5. The main components of a cleaning shoe are oscillating sieves, a fan, a chaffer extension and augers.
6. The widely spread type of straw carriers are multi-section straw walkers.

TEXT D. SMALL GRAIN COMBINE

31. Read and translate the text:

This small grain combine is a combine specially designed for harvesting small grain. There are no straw walkers because they have been replaced by the tine-separator system. So, when the crop enters the separator module, heavy-duty tines penetrate the crop mat, pulling it through the housing when the crop mat spins backward, tines release the straw near the top of the housing, freeing trapped grain.

The extra-wide feeder house delivers a thin uniform crop mat to the cylinder / concave area. A concave nose design promotes a smooth, quick flow into the cylinder / concave area, thus reducing the possibility of repeated cylinder impact.

The large, slow-moving cylinder has rasp bars. The larger cylinder lets a farmer slow the cylinder speed.

The large beater has eight segmented wings for constant contact with the crop. This keeps material flowing smoothly from the threshing area into the tine separator module. The tine separator provides a wide, unrestricted opening for the large amount of incoming material. Since the crop is divided between the two tine separators, the crop mat is thinner than what straw walkers or single rotors must handle.

Fixed-direction vanes help move the material through large separator grates several times. The combined action of the spinning tines provides good separation. Free grain falls onto the large grain conveyer located under the tine separator grates. This conveyer carries the grain to the cleaning system for final cleaning. This system has a precleaner, chaffer, sieve, high velocity cleaning fans. The precleaner improves cleaning efficiency. Chaff and debris are immediately suspended, while some of the grain can move on right to the grain tank. The heavier grain falls onto the precleaner away from the trash, before reaching the chaffer.

The precleaner, chaffer and sieve are modular. So, one man can easily remove, service, or adjust the smaller sections. When grain and residue reach the chaffer and sieve, the heaviest straw and debris have already been removed. The separated grain easily filters through the chaffer and sieve.

There are some powerful fans on this combine. Air flow is strong, constant and evenly distributed. The constant stream of air is sent in two directions: to the precleaner where chaff and debris are suspended and through the chaffer and sieve to complete the cleaning process. Because of the different crop conditions, the cleaning-fan speed control is inside the cab.

The combine is equipped with a new pickup platform. Stainless-steel feed plates provide a smooth crop flow to the cross auger. They do not rust, so feeding is smooth.

Pickup reels are standard on flexible or rigid platforms.

Pickup platform performance may be increased by the header-height control and automatic belt speed control.

The combine must work under difficult conditions, for example, moisture, weedy crops, with a full grain tank, so it uses a powerful engine. It is the 6-cylinder turbocharged, air-cooled diesel engine. The power is 260hp. Engines are known for constant power, good lugging ability, and fuel efficiency. The engine gearbox is massive. Gear drives and smooth hydrostatic drives replace most high-power belts found on other combines. All hydrostatic and most hydraulic pumps are gear driven for positive engagement and greater reliability.

Hillside combine. It is a combine especially designed for slope operations. Wide wheel tread and positive braking systems provide excellent stability and control.

The 404-cubic inch, turbocharged diesel engine develops 135 horsepower. Durable band belts transmit power efficiently from engine to separator.

Hydrostatic ground drive provides good

manoeuvrability. Hydrostatic ground drive is standard equipment. The transmission has four ranges. There is no clutch and an operator can go forward or back in each range as needed, without shifting gears and losing power or control.

When the shift lever is in neutral position with engine running, the combine is hydraulically braked.

Crop feeding to the cylinder is direct and smooth, because the feeder house angle is shallow and the front of the concave is low, so there are no abrupt changes in direction of flow.

A dump-type stone trap is positioned ahead of the cylinder. Crop, entering the threshing area, passes over the trap. The cleanout door is located under the feeder house.

The cylinder is 22inches in diameter and 44inches wide. Hardened rasp-bars prolong service life.

Cylinder speeds are adjustable from 350 to 1,058 rpm. An operator can set cylinder speed and concave spacing from the seat.

Straw walkers are 130inches long. Straight walker sides help keep long straws on the move. Each straw walker has five steps for aggressive tumbling action. Walker risers help retard and break up the material effectively.

Auger conveyer system delivers grain more evenly across the width of the cleaning shoe. Front auger sections convey threshed grain from under the concave to the cleaning shoe. Reverse flight on the rear portion of the augers below the walkers carries separated grain forward to the cleaning shoe. Movement is uniform in both directions for steady grain flow.

Cleaner grain is ensured by opposed-motion shoe action and powerful fan. Chaffer and sieve move in opposite directions. This motion reduces the chance of material build-up between chaffer and sieve. Shoe action is carefully calibrated and turned to the rest of the separator so cleaning efficiency is good.

Both chaffer and sieve are mounted on rubber bushings to reduce wear and for quiet running. Chaffer and sieve openings are adjustable.

The fan operates as on ensilage blowers. Fan blades are placed closer to the top and sides of the housing. The delivery duct directs air to the front of the chaffer and sieve, where loads are heaviest. Fan speed is variable.

This combine is equipped with a new lighting system which permits to work at night. There are four headlights, three header lamps, and two grain tank lights. The direction of each lamp is adjustable.

32. Answer the following questions:

1. Describe briefly the operations and construction of hillside combines.
2. What provides good manoeuvrability?
3. Why are there no straw walkers?

4. What is meant by a pickup platform?
5. Why is it used for?
6. How can its performance be increased?
7. Discuss under what conditions these combines must work.
8. What new information, if any, have you learnt about these combines?

33. Match two halves of the sentences:

1.Straw is	a. device for reducing speed or stopping motion of a car, tractors, etc.
2. Crop is	b. set of toothed wheels working together in a machine.
3. Brake is	c. agricultural plants in the fields.
4. Gear is	d. dry cut stalks of wheat, barley, rice and other grains.
5. Sieve is	e. device in a machine or engine for connecting and disconnecting working parts.
6. Clutch is	f. utensil with wire network or gauze for separating finer grains from coarse grains.

34. Choose the words or phrases which best completes each sentence:

1. This grain combine is … for harvesting small grains.
a) careful b) efficient c) thorough
2. In hard threshing crops, the concave zero adjustment should ….
a) be watched out b) be looked after c) be checked
3. The speed of a combine … many conditions.
a) depends on b) relies on c) counts on
4. The combine is equipped with a (an) … straw chopper.
a) second-hand b) ancient c) old

35. Complete the list with the correct form of the word:

Adjective	**Noun**
1. adjustable	…
2. …	aggression
3. different	…
4. …	reliability
5.powerful	…
6. …	separation

36. Choose the correct form:

1. Rotor speed is less important/more important to control material.
2. This sieve uses more/the most air than other sieves.

3. The more/many the chaffer sieve is opened, the faster/fast the fan speed should be set.

4. Straw walkers are 130 inches long/longest.

37. Do a complete run-through of the text and write a paragraph describing the new combine:

Rotary design versus conventional design of combines

The combine harvester or combine is a machine that harvests grain crops. It combines into one operation what previously has taken three separate operations (reaping, binding, threshing). Among the crops harvested with a combine are grain crops and other small seeds. The waste straw left behind on the field is remaining dried stems and leaves of the crop with limited nutrients which is either chopped and spread on the field or baled for feed and bedding for livestock. There are two general types of combines: conventional and rotary.

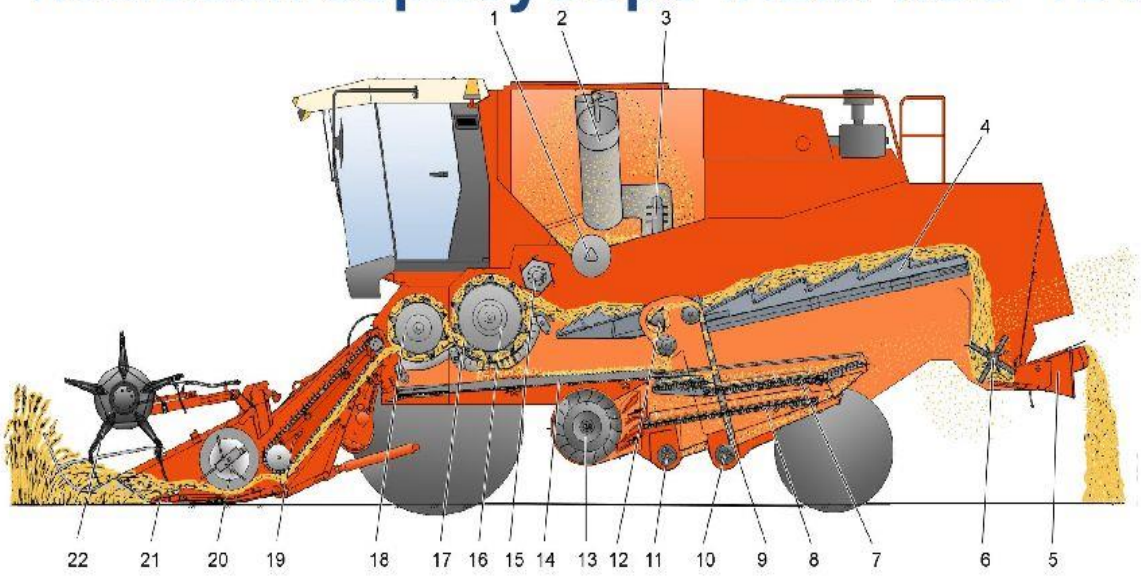
For some time, combines used the conventional design, which used a rotating cylinder at the front-end which knocked the seeds out of the heads, and then used the rest of a machine to separate the straw from the chaff, and the chaff from the grain. The TR70 from Sperry-New Holland was the first rotary combine in 1975. Several inventors had pioneered designs which relied more on centrifugal force for grain separation and less on gravity alone. Then most manufacturers had settled on a "walkerless" design with much larger threshing cylinders to do most of the work.

Advantages were faster grain harvesting and gentler treatment of fragile seeds, which were often cracked by the faster rotational speeds of conventional combine threshing cylinders.

It was disadvantages of the rotary combine (increased power requirements and over-pulverization of the straw by-product) which promoted a resurgence of conventional combine in the late nineties. Large engines that powered the rotary machines were employed in the conventional machines, the two types of machines delivered similar production capacities. Research showed that incorporating above-ground crop residue (straw) into the soil was less useful for rebuilding soil fertility than previously believed. This meant that pulverized straw into the soil became more of a problem than a benefit. An increase in feedlot beef production also created a higher demand for straw as fodder. Conventional combines, which use straw walkers, preserve the quality of straw and allow it to be baled and removed from the field.

38. Translate into English the following parts of the combine

Комбайн зерноуборочный КЗС-1218



1 – шнек горизонтальный
2 – шнек загрузной зерновой
3 – элеватор зерновой
4 – соломотряс
5 – дефлектор
6 – соломоизмельчитель
7 – верхний решетный стан
8 – нижний решетный стан
9 – элеватор колосовой
10 – шнек колосовой
11 – шнек зерновой
12 – домолачивающее устройство
13 – вентилятор
14 – стрясная доска
15 – отбойный битер
16 – барабан молотильный
17 – подбарабанье
18 – барабан-ускоритель
19 – транспортер наклонной камеры
20 – шнек
21 – режущий аппарат
22 – мотовило

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