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ФЕДЕРАЦИИ
КАЗАНСКИЙ ГОСУДАРСТВЕННЫЙ АРХИТЕКТУРНО-СТРОИТЕЛЬНЫЙ
УНИВЕРСИТЕТ**

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ROAD MACHINERY AND TRAFFIC SAFETY

Учебное пособие

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Основная цель учебного пособия – развитие и совершенствование навыков устной коммуникации и письменной речи в рамках предложенной тематики.

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INTRODUCTION

Настоящее учебное пособие предназначено для студентов первого курса автодорожных специальностей, изучающих английский язык. Главными целями учебного пособия являются развитие и совершенствование умений и навыков устной речи в деловой и общепрофессиональной коммуникации, а также формирование профессионально ориентированной лингвистической компетентности студентов. Учебное пособие направлено на развитие разных видов речевой деятельности: чтения, диалогической и монологической речи, навыков письменного и устного перевода.

Структура учебного пособия состоит из тринадцати разделов (Units). Деление на разделы осуществляется в соответствии с тематикой. Раздел 1 посвящен проблемам строительства, раздел 2 раскрывает историю и типы дорожно-строительной техники, разделы 3-8 рассказывают об основных машинах, применяемых на строительных площадках. Разделы 9-13 посвящены актуальным проблемам организации безопасности дорожного движения.

Каждый раздел включает в себя тексты для ознакомительного, изучающего и просмотрового чтения, которые содержат актуальную информацию из аутентичных источников. Тексты сопровождаются также значительным количеством иллюстраций, что привлекает внимание студентов и облегчает понимание представленного им материала.

Профессионально ориентированная терминология, представленная перед каждым текстом, закрепляется и активизируется в послетекстовых упражнениях. Каждый раздел включает в себя лексические упражнения, направленные на расширение словарного запаса по специальности. Профессиональная лексика изучается и запоминается также с помощью использования визуального компонента – цветных иллюстраций (рисунков, схем, фотографий).

В учебном пособии предусмотрены задания для индивидуальной, парной и групповой работы, в которых студенты создают и участвуют в коммуникативных ситуациях профессиональной направленности, что способствует преодолению языкового барьера при реальном общении с носителями языка. Таким образом, каждый текст сопровождается упражнениями, имеющими коммуникативную направленность и позволяющими активизировать приобретенные навыки в речи.

Представленные задания помогут студентам научиться вести беседы на темы вышеуказанных сфер деятельности на английском языке, тем самым формируя общее представление об области дорожного строительства. Таким образом, изучив представленные в учебном пособии материалы, студенты смогут на базовом уровне участвовать в процессе коммуникации на профессиональные темы.

Каждый раздел содержит контрольные задания (What do you remember?), направленные на контроль усвоения пройденного материала.

Учебное пособие содержит приложение (Additional texts), в котором представлены тексты, содержащие дополнительную информацию о строительстве автомобильных дорог, тоннелей и мостов. Эти тексты предназначены как для переводов, так и для использования в процессе подготовки докладов и презентаций.

Учебное пособие может быть использовано как для работы в аудитории, так и для самостоятельной работы.

1

CONSTRUCTION

1A. CONSTRUCTION WORK

1. Read, translate and learn by heart following words and word combinations to be able to speak about building operations.

To draw the plans, building operations, stage, to define the size, beam, girder, clearing, grading, bulldozer, scraper, to dig an excavation, excavator, earth moving, to carry out, foundation, below ground level, to carry the weight, basement, to transfer, brick, stone, reinforced concrete, slab, framework, to raise, to infill, brickwork, window-frame, to enclose, to support, exterior, bricklayer, to lay down courses of brick, to bond, mortar, trowel, hammer, chisel, opening, door-frame, to place in position, partition, to divide, storey, to assemble, prefabricated units, to manufacture, to deliver to the site, lorry, trailer, team, tower crane, assembly worker, interior, decoration, complete, plumber, electrician, gas-man, installation of services.

2. Read and translate the text to learn about construction of houses.

Construction work

Construction is growing from year to year in our great country. Millions of people get new flats and houses built by modern methods and materials.

How are the houses built? What are the main strategies in building operations?

The first step in any building is the designing and complete planning of all the operations. If a house is to be built architects and designers draw the plans and define the size of the walls, floor joists, beams, girders and other parts which make up the framework. All the parts of the building should be correctly designed and well proportioned.

Building operations on the site begin with the clearing and grading the site area. This work is done by the bulldozers and scrapers.

The traditional way of building a house is to dig an excavation for the basement. Earth moving is carried out by excavators. After this foundations are built. Foundations carry the weight of the building and transfer it to the basement. Foundation walls are constructed below the ground level. They may be constructed of brick, stone or concrete panels and slabs.

The part upon which the stability of the structure depends is the framework. Its ability is to carry the loads which will be imposed upon it. The framework is raised upon the foundation and infilled with brickwork, window-frames, panels and so on.

Walls are constructed to enclose areas and to support the weight of floors and the roof. Exterior walls are usually made of brick, stone, concrete blocks or large panels. In the case of a brick structure raising the walls follows directly the foundation work. Making brick walls, bricklayers lay down courses of brick and bond them together with mortar. The instruments used by bricklayers are a trowel, a brick chisel and a hammer. For windows and doors openings are left in the walls.

Window-frames and door-frames are placed in position but later. Walls and partitions are made to divide the floor space into rooms.

Floors divided the building into stories. Stairs are provided for going up and down.

The whole structure is covered by the roof.

Most of the blocks of the flats are assembled on the site from prefabricated units. All the units for houses are manufactured at house building plants and delivered to the construction site by powerful lorries and trailers. Efficient cranes pick up the prefab units from the lorries and install them into position. Erection is simple. A team of assembly workers complete erection in a short time.

Nowadays a lorry brings to the site a complete flat with interior decoration. A powerful gantry crane lifts the 29ton flat, carefully sets it on the foundation. The electricians, plumbers and gas men begin their work on the installation service.

3. Answer the following questions.

1. What is the first step in any building?
2. What work is done by architects and designers?
3. How do building operations begin on the site?
4. What work is done by bulldozers and scrapers?
5. What work is carried out by excavators?
6. What is the function of the foundations?
7. What materials are foundation walls made of?
8. What does the stability of the structure depend on?
9. What is the framework infilled with?
10. What are walls constructed for?

11. What materials are exterior walls made of?
12. What specialists lay down courses of brick?
13. What instruments do they use?
14. What is the function of partitions, floors and stairs?
15. What is the crowning part of a house?
16. What units are block flats assembled from?
17. How are they delivered to the site?
18. How are they hoisted into position?
19. What specialists carry out erection?
20. Whom is the installation of services done by?

4. Put building operations in the correct order according to the text.

1. ____ 2. ____ 3. ____ 4. ____ 5. ____ 6. ____ 7. ____ 8. ____ 9. ____ 10. ____

- A. Foundation is raised.
- B. Architects and designers draw the plans.
- C. Installation of services is carried out.
- D. Clearing and grading of the site area is done by bulldozers and scrapers.
- E. Excavation is dug.
- F. Framework is raised.
- G. The building is covered with the roof.
- H. Framework is infilled with brickwork, panels, window-frames and so on.
- I. Earth moving is carried out.
- J. Walls and partitions are raised to divide the storey into rooms.

1B. CONSTRUCTION METHODS

1. Read and translate the text to learn about methods of houses construction.

Construction methods

Russian builders use both traditional and industrial methods of construction. Building methods are being constantly improved. Within a short period of time, brick work was replaced with blocks, blocks with panels, and panels with three-dimensional sections. New blocks of flats, public buildings and factories are now constructed mainly from prefabricated concrete units with ready interior and exterior finishes.

Prefabrication is the most important trend in modern housing construction. What is prefabrication? Prefabrication means that the structures are assembled entirely from factory-made units and parts.

Most of the parts of a prefabricated building are made at the factory. The external finishes are also applied in the factory. Each design unit is in most cases a completely finished product ready for transportation to the building site and assembly by a crane. Thus prefabrication is preassembly in the factory so that the building can be more quickly erected on the site. This process makes building much quicker and considerably cuts costs. Modern gigantic buildings can be constructed within a year or even much less. Small prefabricated buildings with their factory made parts can be erected by assembly methods within a day or two. Hundreds of factories are built in many towns of our country for the manufacture of building components. In Moscow two new plants are in operation producing floor and wall slabs for multi-story blocks of flats. The other units for these structures are made in other factories in Moscow. Similar large plants are built in other large cities.

While the units are being manufactured at the factory, work is done on the site of the structure. The site is leveled and the foundations are constructed. The work on the site is mechanized. Excavators and bulldozers are in operation on our sites. Powerful cranes handle the heavy units and carefully put them into position. The number of highly trained workers is increased. Carpenters and bricklayers are less seen now. Their place is taken by crane operators and assembly workers. Large panel construction is most popular among industrial methods. And the block-unit method is even more economical. A five-storey block of flats can be assembled by this method within a week.

In Moscow a number of experimental blocks are being assembled now with three-dimensional sections. The advantages of using factory-made units over traditional methods are immense. The main advantages of using prefabricated parts are the following:

1. economy of formwork and scaffolding;

2. economy of labour force;
3. the production of prefab parts in the factory is independent on weather conditions;
4. speed of construction is greatly increased.

2. Answer the following questions.

1. What does it mean that traditional methods have been replaced by industrial methods?
2. What is prefabrication?
3. How much time does it take to erect a building using prefabrication?
4. Why are bricklayers and carpenters less seen now at the construction site?
5. What are the advantages of using prefabrication?

3. Put building operations in the correct order according to the text.

1. ____ 2. ____ 3. ____ 4. ____ 5. ____ 6. ____ 7. ____ 8. ____ 9. ____ 10. ____

- A. Prefabrication means that the structures are assembled entirely from factory-made units and parts.
- B. Their place is taken by crane operators and assembly workers.
- C. Within a short period of time, brick work was replaced with blocks, blocks with panels, and panels with three-dimensional sections.
- D. While the units are being manufactured at the factory, work is done on the site of the structure.
- E. The main advantages of using prefabricated parts are the following: economy of formwork and scaffolding, economy of labour force, the production of prefab parts in the factory is independent on weather conditions, speed of construction is greatly increased
- F. Prefabrication is the most important trend in modern housing construction.
- G. Russian builders use both traditional and industrial methods of construction.
- H. Blocks of flats, public buildings and factories are now constructed mainly from prefab concrete units with ready interior and exterior finishes.
- I. The work on the site is mechanized.
- J. Carpenters and bricklayers are less seen now.

4. Translate following words and word combinations from the text into English.

Преимущества		Внутренняя отделка	
Наружная отделка		Каркас	
Сборное строительство		Устанавливать на место	
Плотник		Увеличивать	
Традиционные методы		Жилищное строительство	
Завод		Условия	
Строительная площадка		Промышленные методы	
Объемные секции		Монтажник	
Скорость строительства		Короткий период времени	



1C. HIGHWAY CONSTRUCTION

1. Read the words and learn them by heart.

right-of-way – полоса отвода	sub-grade – грунт земляного полотна
carriageway – проезжая часть	rigid – жесткий
road shoulder – обочина	flexible – нежесткий, гибкий
outer slope – внешний откос	concrete – бетон
inner slope – внутренний откос	crack – трещина
side ditch – кювет	slab – плита
pavement – дорожное полотно	sub-base – дополнительный слой основания
earthwork – земляные работы	base – основание
layer – слой	abrasion – износ
landscaping – озеленение	pavement marking – дорожная разметка

2. Read and translate the text to learn more about highway construction.

Highway construction

Development of a country depends on the connectivity of various places with adequate road network. Roads are the major channel of transportation for carrying goods and passengers.

The zone which is marked to lay the road is called the right-of-way or road zone which includes such parts of a road as a carriageway, road shoulders, inner and outer slopes, side ditches and other parts. The carriageway is covered with a pavement which resists traffic stresses and climatic factors.

The main steps in the road construction process are planning, design, earthworks, pavement construction and finally open to traffic. A road project begins with evaluating the information about our roads, including road conditions, traffic volumes, crash statistics. Land survey is step two. Recently, Global Positioning Systems and other technologies have sped up the process and improved accuracy.

The next step is earthwork which is one of the most important elements in road construction because it establishes a stable foundation. The aim of the earthworks phase is to position the sub-grade underlying the pavement layers in the right location and at the correct level. The center of the road must be higher than the edges so water will run off into the storm sewers. To complete the earthwork, workers place gravel in layers, then moisten and compact each layer. Layers are added and compacted until the road bed reaches the necessary height.

At last the road bed is ready for paving. Engineers study the cost of maintaining the road, the amount and type of traffic, the cost of paving material. These factors tell engineers what pavement type is required. Pavement can be rigid and flexible. Flexible pavements are those which are surfaced with asphalt materials. These types of pavements are called “flexible” since the total pavement structure “bends” due to traffic loads. Rigid pavements are composed of concrete. Workers place concrete into steel forms. To prevent cracks, workers cut joints between the concrete slabs.

The main layers of the pavement are the sub-grade, sub-base, base and surface course. Workers ensure that the sub-grade level can support the pavement. This requires the dirt in the sub-grade level to be solid. The sub-base is inserted when necessary between the pavement base and the sub-grade. The function of the sub-base is to provide structural support and improve drainage. The base layer protects the pavement from moisture and cold temperatures. The pavement base is not subjected to the direct action of automobile wheels. The surface course endures the most pressure because it’s the top layer. It is thin, but resists well the abrasion and the impacts caused by the wheels, and also the effect of weather conditions.

The final steps are another drainage test, landscaping around the pavement, applying the pavement marking.

3. Answer the following questions.

1. What is right-of-way? What does it include?
2. What are the basic steps in road construction?
3. Why is earthwork so important?
4. Why must the road centre be higher than the edges?
5. What factors influence the choice of pavement type?
6. What is the difference between rigid and flexible pavement?
7. What layers does the pavement consist of?
8. What are the final steps of road construction?

4. Put ✓ for true and ✗ for false statements.

1. The pavement resists only traffic stresses.
2. The sub-base is inserted when necessary between the pavement base and the sub-grade.
3. The pavement base course is subjected to the direct actions of wheels.

4. Road shoulders include carriageway, inner and outer slopes.
5. Rigid pavements are composed of concrete surface course.
6. A road project begins with positioning the sub-grade underlying the pavement layers in the right location.
7. Earthwork establishes a stable foundation.
8. Global Positioning Systems, laser surveys and other technology have slowed down the process of surveying the area.

5. Give English equivalents of the following words and word combinations.

Дорожная сеть, статистика аварий, зависеть от, стекать, устанавливать, необходимая высота, стоимость содержания дороги, нежесткое дорожное покрытие, бетонные плиты, прямое воздействие, тонкий, колеса автомобиля, обеспечить, дорожная разметка.

6. Match the words with their definitions.

1. landscaping	a. the native material underneath a constructed road
2. paving	b. activity of growing plants with the aim of creating a beautiful environment
3. road shoulder	c. a space-based satellite navigation system that provides location and time information in all weather conditions
4. earthwork	d. material used on a road surface in order to provide separation between traffic moving in opposite directions
5. drain	e. a sticky, black and highly viscous liquid or semi-solid form of petroleum
6. asphalt	f. work involving moving quantities of soil
7. side ditch	g. surfacing of roads and walkways
8. sub-grade	h. a collection and transportation system for storm water
9. Global Positioning System	i. a strip of land immediately adjacent to the traffic lane of a road not bordered by kerb
10. pavement marking	j. a narrow channel dug at the side of a road or field, to hold or carry away water

2A. HISTORY OF ROAD-BUILDING MACHINES

1. Read the words and learn them by heart.

vehicle – транспортное средство

combine harvester – зерноуборочный комбайн

steam engine – паровой двигатель

internal-combustion engine – двигатель
внутреннего сгорания

not to be outdone – чтобы не уступать
конкурентам

continuous track – гусеничный ход

diesel engine – дизельный двигатель

forklift – вилочный погрузчик

bucket-wheel excavator – роторный
экскаватор

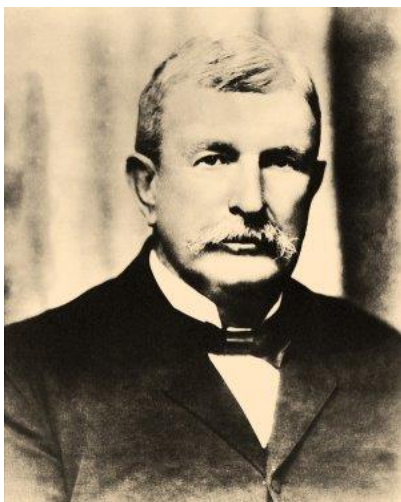
pave the way for – проложить путь

2. Read and translate the text to learn more about history of road building equipment.

History of road-building machines

Take a minute to look at the buildings and roads around you. A specific class of construction machinery, known as heavy equipment, was most certainly integral to the construction of roads and buildings which you can see. Bulldozers, cranes and the people who operate them help to develop the country.

The use of heavy equipment has a long history. The ancient Roman engineer Vitruvius (1st century BC) gave descriptions of heavy equipment and cranes in ancient Rome in his treatise *De Architectura*.



Benjamin Holt

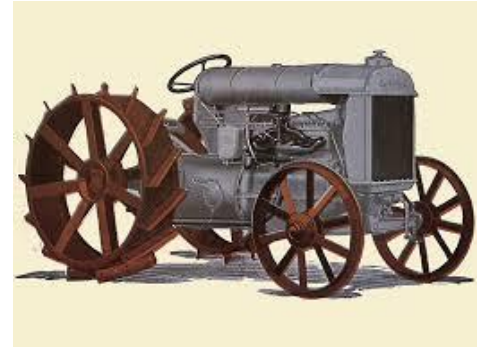
Until the 19th century heavy machines were drawn under human or animal power. In 1886 Benjamin Holt created his first combine harvester, followed by a steam engine tractor four years later in 1890. Not to be outdone, John Froelich invented the gas-powered tractor soon after that in 1892. These inventions would help pave the way for heavy equipment.

During the 20th century internal-combustion engines became the major power source of heavy equipment. Kerosene and ethanol engines were used, but today diesel

engines are dominant. Mechanical transmission was in many cases replaced by hydraulic machinery. The early 20th century also saw new electric-powered machines such as the forklift. Caterpillar Inc. is a present-day brand from these days, starting out as the Holt Manufacturing Company. The first mass-produced heavy machine was the Fordson tractor in 1917.

The first commercial continuous track vehicle was the 1901 Lombard Steam Log Hauler. The use of tracks became popular for tanks during World War I, and later for civilian machinery like the bulldozer. The largest engineering vehicles and mobile land machines are bucket-wheel excavators, built since the 1920s.

As technology becomes increasingly advanced and other kinds of engines become commonplace, the heavy equipment industry may likely implement such important innovations just as it has in the past.



Fordson tractor

Sources: https://en.wikipedia.org/wiki/Heavy_equipment,

<https://heavyequipmentcollege.com/the-history-of-heavy-equipment-a-timeline/>

3. Answer the following questions.

1. What did Vitruvius describe in his treatise De Architectura?
2. Did Benjamin Holt or John Froelich create the first combine harvester?
3. When was a gas-powered tractor invented?
4. When did the use of tracks become popular?
5. How are Caterpillar and the Holt Manufacturing Company connected?
6. What was the first commercial continuous track vehicle?
7. What types of engine are mentioned in the text?

4. Put ✓ for true and ✗ for false statements.

1. Forklift is an electric-powered machine.
2. The first mass-produced heavy machine was Lombard Steam Log Hauler.
3. Until the 20th century heavy machines were drawn under human or animal power.
4. During the 20th century internal-combustion engines were used.
5. Hydraulic machinery was in many cases replaced by mechanical transmission.
6. The use of tracks became popular for bulldozers.

5. Match the types of heavy machinery and pictures.

forklift

bucket-wheel excavator

bulldozer

combine harvester

crane



1. _____



2. _____



3. _____



4. _____



5. _____

6. Give English equivalents to the following words and word combinations.

Описывать, трактат, римский, трактор с паровым двигателем, источник энергии, дизельный двигатель, нынешний, транспортное средство на гусеничном ходу, первая мировая война, внедрять, обыденный.

7. Make a presentation on the following topics:

1. Vitruvius
2. Benjamin Holt
3. John Froelich
4. Lombard Steam Log Hauler

8. Translate the following text about the history of engineering vehicles.

Впервые человечество попробовало механизировать ручной труд при проведении дорожно-строительных работ еще в начале XIX века. Эти попытки стали результатом появления первой машины.

Facts In Brief

В 1835 году в Петербурге была предложена конструкция парового экскаватора. Тем не менее, развитие дорожно-строительной техники шло медленно. В 1839 году во всем мире насчитывалось только семь экскаваторов (четыре из них использовались на территории России).

В 1875 году общественности был представлен грейдер-элеватор, а в 1887 – грейдер. Данные машины пока работали с использованием конной тяги.



Grader elevator

Новый этап в истории развития дорожно-строительной техники взял свое начало вместе с изобретением гусеничного хода и дизельных двигателей. В 1912 году на дороги вышел первый экскаватор на гусеничном ходу.

С новыми открытиями, произошедшими в XX веке, дорожно-строительные машины совершенствовались. Сегодня большинство из них представляют собой полностью или частично автоматизированные комплексы. Это позволило существенно сократить финансовые затраты и расходы ручного труда при строительстве новых и ремонте существующих автомобильных дорог.

2B. TYPES OF ROAD-BUILDING MACHINERY

1. Read the words and learn them by heart.

hoisting machinery – грузоподъемные
машины

crushing equipment – дробильное
оборудование

to direct – направить

to ensure – обеспечивать

to pave – укладывать дорожное

покрытие, мостить

advancement – прогресс,

совершенствование

incredible – невероятный

2. Read and translate the text to learn more about road construction equipment.

Types of road-building machinery

Equipment used in road construction is an important economic and design factor in road location and subsequent design. Road construction equipment has gone through incredible advancements in recent decades and all of them have been directed towards improving speed, quality, ensure safe work sites and benefit of every worker. The main advantage is that today's machines pave a lot more road in less time, and they do a better job of it. It has also helped to cut costs down.

Road construction equipment is used to construct not only highways, but also bridges, airports and even multi-story buildings. Depending on the functions performed, road-building machines are divided into the following groups:

1. machinery for pre-construction activities;
2. earth-moving equipment;
3. road work machinery;
4. crushing equipment & machines for concrete mix production and transportation;
5. machinery for pavement maintenance;
6. lifting machinery.

Source: <http://www.heavyequipment.com/heavy-equipment/road-highways>

3. Answer the following questions.

1. What are the advancements of road construction equipment directed to?
2. What are the main advantages of road construction machinery?
3. What is road machinery used to construct?
4. Using what principle are road building machines divided into groups?
5. What groups of road building machines can you name?

4. Put ✓ for true and ✗ for false statements.

1. Road construction machinery is unimportant economic factor in road location.
2. Today road building machines can produce large quantities of paved surfaces in record time.
3. Due to road building machinery the speed and quality of construction are increased and safe work sites are ensured.
4. Road construction equipment is used to construct only highways.
5. Road constructin equipment increases the speed of road works.

5. Give English equivalent of the following words and word combinations.

Машины для подготовительных работ, оборудование для дорожного строительства, в последние десятилетия, машины для укладки дорожных покрытий, основное преимущество, обеспечить безопасную работу на строительной площадке, грузоподъемные машины, снижать стоимость, даже многоэтажные здания, невероятный прогресс, землеройные машины, бетонная смесь.

6. Match the words and their definitions.

1. highway	a. to lay or cover with material (such as asphalt or concrete) that forms a firm level surface
2. concrete	b. a structure with walls and a roof, such as a house or factory
3. bridge	c. the way in which something works
4. building	d. a structure that is built over a river, road, or railway to allow people and vehicles to cross from one side to the other
5. function	e. a public road, especially an important road that joins cities or towns together
6. to pave	f. the development or improvement of something
7. advancement	g. a construction material made of a mixture of cement, sand, stone, and water that hardens to a stonelike mass

7. Using the information from the text give general information about road construction equipment.

2C. TRACTOR

1. Read the words and learn them by heart.

blade – отвал

bucket – ковш

ripper – рыхлитель

adhesion – сцепление

wheeled-type tractor – колесный трактор

track-laying tractor – гусеничный трактор

tire/tyre – шина

power unit – двигатель, силовая установка

fan – вентилятор

auxiliary device/equipment – вспомогательное устройство

starter device – пусковой аппарат

axles – оси

fuel tank – бак горючего

transmission – трансмиссия

clutch – сцепление

wire rope – металлический кабель

gearing mechanism – коробка передач

speed control unit – регулятор скорости

tractor frame – рама трактора

steering mechanism/unit – рулевой механизм



2. Read and translate the text to learn more about tractors.

Tractor

Tractor is a motor vehicle with a powerful engine used to pull heavy loads and carry out agricultural, road construction, earth moving and other works. Durability and engine power of tractors made them very suitable for engineering tasks. Tractors can be equipped with engineering tools such as dozer blades, buckets, rippers, etc. The most common attachments for the front of a tractor are dozer blades or buckets. When attached to engineering tools, the tractor is called an engineering vehicle.

The two main types of tractors are wheeled, which is the earliest form, and continuous track.



Wheeled tractor

Caterpillar or track laying tractors run on two continuous tracks, each encircling two wheels on either side of the vehicle. These tractors provide better adhesion and lower ground pressure than the wheeled tractors do. Crawler tractors may be used on heavy, sticky soil or on very light soil that provides poor grip for a tire.

The construction of a tractor includes the following main units:

1. Power unit which includes the engine with all auxiliary devices – a radiator, a fan, a starter device, a fuel tank, etc.
2. Transmission which consists of a clutch, a speed control unit, gearing mechanisms, axles.
3. A steering unit.
4. The tractor frame.
5. Working and auxiliary equipment.

Tractor engines have internal combustion engines as the source of power. Most modern tractors are powered by internal-combustion engines running on gasoline, kerosene, or diesel fuel.

There are a lot of tractor types. For example, a cable tractor is widely used in clearing the site. It is a machine used for pulling cables which either can be an electrical cable or wire ropes.

Sources: <http://www.heavyequipment.com/heavy-equipment/road-highways>
<https://en.wikipedia.org/wiki/Tractor>

3. Answer the following questions.

1. Where are tractors widely used?
2. What is the function of tractors?
3. What tools can tractors be equipped with?
4. When is a tractor called an engineering vehicle?
5. What basic types of tractors do you know?
6. What are the main units of a tractor?
7. What is the advantage of a track laying tractor?

4. Put ✓ for true and ✗ for false statements.

1. Power unit which includes a clutch, speed control unit, gearing mechanisms, axles.
2. Tractors may be either wheeled-type or track-laying type.
3. Tractor engines have a frame as the source of power.
4. A fan and fuel tank are elements of a power unit.
5. A cable tractor is used for pulling cables.

5. Match the words and their definitions.

1. tracks	a. an endless metal belt on which tracked vehicles move over the ground
2. equip	b. available to provide extra help, power, etc.
3. fan	c. a device that starts the engine
4. wheel	d. a circular object which forms a part of a machine, usually a moving part
5. auxiliary	e. a piece of electrical or mechanical equipment with blades that go round and round; it keeps a machine cool or gets rid of unpleasant smells
6. engine	f. a machine that converts energy into mechanical force
7. starter device	g. to provide with necessary materials or supplies

6. Give English equivalents of the following words and word combinations.

Двигатель внутреннего сгорания, вспомогательное оборудование, электрический кабель, металлический кабель, тяжелый груз, рулевой механизм, коробка передач, пусковой аппарат, прочность, дизельное топливо, лучшее сцепление.

7. Describe the main types and components of tractor.

8. Translate the following text about the history of tractors.

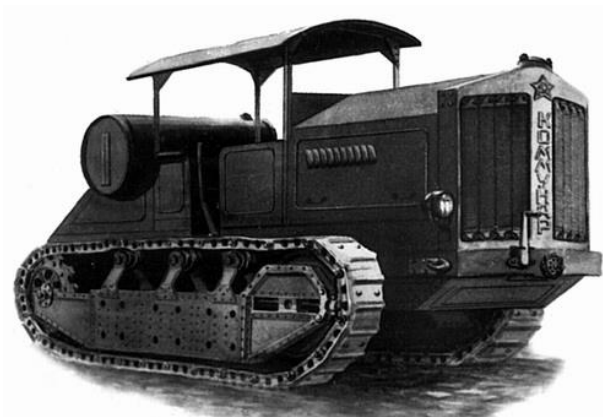
Первые подобные тракторам машины появились в XIX веке и были паровыми. В 1892 году американец Джон Фролих (John Froelich)

изобрел и построил первый трактор, работающий на нефтепродуктах.

Первой признанной практической гусеничной машиной стал Lombard Steam Log Hauler изобретателя Alvin Orlando Lombard в 1901 году.

По недостоверным источникам, первый русский паровой гусеничный трактор был построен крестьянином Фёдором Блиновым. Писатель Лев Давыдов утверждал, что постройка трактора была закончена Блиновым в 1888 году.

Facts In Brief



“Kommunar” Tractor

Несмотря на распространенность мнения о постройке Блиновым трактора, нет ни одного документального свидетельства об этом.

В 1896 году Чарльз В. Харт и Чарльз Парр разработали двухцилиндровый бензиновый двигатель. В 1903 году их фирма построила 15 тракторов.

В 1912 году фирма «Холт-Парр» начала выпуск гусеничных тракторов.

Советский Союз осознал важность тракторов только после 1917 года, выделив деньги на постройку тракторов. В 1922 г. начинают выпускаться тракторы «Коломенец-1». В 1924 году начал выпускаться трактор «Коммунар». Общий выпуск отечественных тракторов составил 40% их мирового производства.



2

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

advancement, not to be outdone, forklift, combine harvester, ensure, cable tractor, pave, vehicles, bridge, cut costs, internal combustion engine

1. Electric vehicles drive differently than those powered by an _____.
2. _____, other computer manufacturers are also donating machines to schools.
3. The driveway is _____ with concrete.
4. All she was interested in was the _____ of her own career.
5. Road _____ include cars, buses, and trucks.
6. In 1886 Benjamin Holt created his first _____.
7. The use of road construction machinery significantly _____.
8. The airline is taking steps to _____ safety on its aircraft.
9. A _____ is an industrial truck used to lift and move materials over short distances.
10. They're building a new _____ across the river.
11. A _____ is used for pulling cables.

2. Translate the following sentences using the vocabulary of Unit 2.

1. Все усилия были направлены на совершенствование дорожно-строительных машин.
2. Чтобы не уступать конкурентам, они постоянно внедряли инновации.
3. Бенджамин Холт, американский инженер, изобрел первый трактор на гусеничном ходу.
4. Трактор оснащен двигателем, трансмиссией, коробкой передач, рулевым механизмом, рамой, баком горючего и т.д.
5. Двигатель внутреннего сгорания – самый популярный тип двигателя, который устанавливается на транспортные средства.
6. Роторный экскаватор широко используется для множества видов работ.
7. Современный вилочный погрузчик появился в конце 1920-х годов.
8. Кран является грузоподъемной машиной.
9. Дизельный двигатель был изобретен Рудольфом Дизелем в 1890-е гг.

10. Каждый паровой двигатель имеет два цилиндра.
11. Тракторы делятся на гусеничные и колесные.
12. Оборудование для дорожного строительства обеспечивает высокую скорость и качество строительства.
13. Родиной современного зерноуборочного комбайна является США.

3. Compile as many words as you can with the letters of the word.

ADVANCEMENT

Heavy Equipment



3A. LAND-CLEARING RAKE, ROOT-PULLER, RIPPER

1. Read the words and learn them by heart.

land-clearing rake – кусторез

root-puller – корчеватель

ripper – рыхлитель

blade – отвал

debris – отходы, мусор, обломки

shrubs – кустарник

ripping – рыхление



2. Read and translate the text to learn more about machinery for pre-construction activities.

Land-clearing rake, root-puller, ripper



Land-clearing rake

which is removed in clearing a construction site. This machine allows sorting debris out from soil, lifting and moving objects, breaking up hard, top soil, rooting out or carrying shrubs.

A root-puller is an implement or machine for extracting the roots of plants or trees from the soil.

A ripper-dozer is a machine designed for preliminary ripping of heavy, stony and frozen soils.

The main function of machinery for pre-construction activities is to prepare the site for construction. This type of machinery includes land-clearing rakes, root-pullers and rippers.

A land-clearing rake is a blade like device which is attached to the front of a tractor; used to cut and collect brush



Ripper-dozer



Root-puller

There are two main types of rippers:

- rippers of general purpose, which have the ripping depth up to 1000 mm;
- rippers of special purpose, used for deeper ripping.

Sources:

<https://en.oxforddictionaries.com/definition/root-puller>

<https://www.digbits.co.uk/rakes.html>

3. Answer the following questions.

1. What types of machinery for pre-construction activities do you know?
2. Where is a land-clearing rake attached?
3. What is the function of a land-clearing rake?
4. What does a root-puller extract?
5. What is a ripper-dozer designed for?

4. Put ✓ for true and ✗ for false statements.

1. A ripper-dozer extracts the roots of plants or trees from the soil.
2. A land-clearing rake cuts and collects brush removed in clearing a construction site.
3. There are several types of rippers.
4. The main function of a root-puller is ripping heavy, stony and frozen soils.
5. Land-clearing rakes, root-pullers and rippers are machines for construction activities.

5. Combine the given words into sentences. Translate them into Russian.

1. debris, A land-clearing, from, sorts, rake, out, soil.
2. the roots, extracts, of, A root-puller, from, plants, the soil, or, trees.

3. soils, designed for, A ripper-dozer, heavy, ripping, frozen, preliminary, and, stony, of.
4. This, land-clearing, of, includes, ripper-dozers, and, rakes, root-pullers, type, machinery.
5. general, have, the ripping, purpose, Rippers, mm, of, up to, depth, 1000.

6. Find in the text synonyms to the following words and word-combinations.

1. equipment	
2. hoisting	
3. consist of	
4. gather	
5. fundamental	
6. area	
7. solid	

7. Translate the article to learn more about some machines for pre-construction activities.

Кусторез расчищает строительную площадку от кустарника. Основным элементом кустореза является отвал. Кустарники и деревья срезаются ножами, которые находятся в нижней части отвала.

Facts In Brief

Рыхлители облегчают последующую работу землеройно-транспортных машин. Рыхлители применяют также для удаления из грунта корней, камней после работы корчевателя и для разрушения старых дорожных покрытий.

8. Summarize the text in 3-5 sentences.

3

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

debris, soil, to root out, machinery, ripper-dozer, construction site.

1. The main function of a _____ is ripping the soil.
2. The workmen were clearing the roads of the _____ from shattered buildings.
3. Dozer can excavate _____ of any type.
4. Concrete was delivered to the _____ yesterday.
5. He was told _____ the plants immediately.
6. Land-clearing rakes, root-pullers and rippers are _____ for pre-construction activities.



2. Look at the words given below. Write down any five words or word-combinations from the list. Listen to the teacher calling out words from the list in random order in Russian. If you hear one of your words, cross it out. The first student to cross

out all five of his words or word-combinations calls out “BINGO” and reads out the words to prove his claim.

blade	bridge	vehicle	root-puller
ripper	to pave	soil	steam engine
pavement	debris	land clearing rake	continuous track
machine	forklift	to ensure	shrubs

4

EARTH-MOVING EQUIPMENT

4A. BULLDOZER

1. Read the words and learn them by heart.

heavy-duty vehicle – большегрузное

транспортное средство

to dig – рыть, копать

application – применение

reliable – надежный

crawler – машина на гусеничном ходу

rubble – щебень

at the rear – в задней части

to loosen – разрыхлить

densely – плотно

plow – вспахивать

capability – способность

sophisticated – изощренный, тщательно разработанный

densely compacted – компактно

уплотненный

metal plate – металлическая пластина

muddy – илистый

tracked – на гусеничном ходу

rough – неровный

to sink – тонуть

to evolve – развиваться

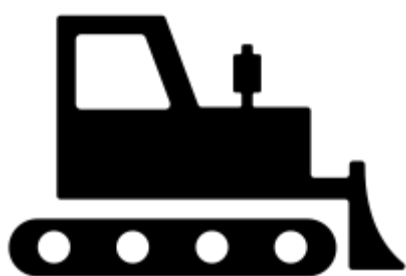
calldozer – малогабаритный бульдозер

mine – шахта

to level – выравнивать

deforestation – вырубка леса

angledozer – бульдозер с поворотным отвалом



2. Read and translate the text to learn more about bulldozers used for earthmoving.

Bulldozer

Earthmoving equipment is heavy equipment, typically heavy-duty vehicles designed for construction operations which involve earthworks. They are used to move large amounts of earth, to dig foundations for landscaping and so on. A variety of earthmoving equipment is available on the market and it's essential to know the applications and features of each of them so that you can make a good choice when it comes to using heavy duty machinery. The main types of earth-moving equipment are bulldozers, excavators, scrapers, graders, etc.

Bulldozers are considered one of the strongest and most reliable heavy equipment used in the construction industry. A bulldozer is a crawler equipped with a metal plate (known as a blade) used to push large quantities of soil, sand, rubble, and other materials during construction work and typically equipped at the rear with a ripper to loosen densely compacted materials.



Bulldozer

The first bulldozers were adapted from farm Holt tractors that were used to plow fields. Later they were used as tanks during the First World War. By the 1920s, tracked vehicles became common. Over the years, when engineers needed equipment to complete large-scale earthworks, a number of firms started to manufacture large, tracked-type earthmoving machines. They were large, noisy, and powerful, and therefore nicknamed “bulldozers”. Through the years, bulldozers got bigger, more powerful, and more sophisticated. Important improvements include more powerful engines, better tracks, and raised cabins.

Bulldozers can be found on a wide range of sites, including road construction site. The tracks give them excellent ground holding capability and mobility through very rough terrain. Wide tracks help distribute the bulldozer’s weight over a large area, thus preventing it from sinking in sandy or muddy ground.

Bulldozers have been further modified over time to evolve into new machines which can work in ways that the original bulldozer cannot.



Calfdozer

A very small bulldozer, sometimes called a calfdozer, is useful for operation in small work areas such as mines. Nevertheless, the original, earthmoving bulldozers are still irreplaceable, as their tasks are concentrated in deforestation, earthmoving, ground leveling.

An angledozer has a blade at an angle which can be pushed forward at one end to make it easier to push material away to the side.

Source: <http://www.newworldencyclopedia.org/entry/Bulldozer>

3. Answer the following questions.

1. What earthmoving equipment do you know?
2. What is the function of an earthmoving equipment?
3. What is a bulldozer?
4. What are the main elements of a bulldozer? Describe their functions.
5. What was the main function of farm Holt tractors?
6. Where can bulldozers be found?
7. What is the main advantage of tracks?
8. What is a calfdozer?
9. What is an angledozer?

4. Put ✓ for true and ✗ for false statements.

1. Excavator is a machine for pre-construction activities.
2. A bulldozer is equipped with a blade and tracks.
3. Bulldozers are large and powerful tracked heavy equipment.
4. Wide tracks prevent a bulldozer from sinking in sandy or muddy ground.
5. An angledozer is a very small bulldozer which is used for operation in small areas such as mines.

5. Match the English words and word combinations on the left with their Russian equivalents on the right.

1. large-scale	a. улучшение
2. leveling	b. изощенный, тщательно разработанный
3. improvement	c. полезный
4. distribute	d. крупномасштабный
5. landscaping	e. распределять
6. tracked	f. мощный
7. powerful	g. гусеничный
8. irreplaceable	h. выравнивание
9. sophisticated	i. незаменимый
10. useful	j. озеленение

6. Match the numbers (1-5) and the elements of a bulldozer.

blade, track chain, ripper, cutting edge, cab



7. Complete the text by adding the missing words and phrases.

sink, plowing, approved, founded, horses, invented, vehicles, front

The first bulldozer was _____¹ by James Cummings and J. Earl McLeod in Morrowville, Kansas in 1923. They created a large, dirt-pushing blade that could attach to the _____² of a tractor. The tractor they used was designed for _____³ fields, and had endless chain treads. Their patent for this "Attachment for Tractors" was _____⁴ in 1925.

Facts In Brief

The large blade of a bulldozer existed before motorized vehicles. They were originally pulled by _____⁵, and were commonly used on farms to move dirt.

Tractors with endless chain treads were invented by Benjamin Holt in 1904. These "crawler" tractors were less likely to _____⁶ in loose soil or sand.

Benjamin Holt _____⁷ the Holt Manufacturing Company to produce tractors with treads for farming and agriculture. These _____⁸ were eventually nicknamed "caterpillars", and he renamed his company the Holt Caterpillar Company in 1910.

Source: http://www.softschools.com/inventions/history/bulldozer_history/355/

4B. SCRAPER

1. Read the words and learn them by heart.

bowl – ковш

apron – заслонка

elevator – подъемник

pull-type scraper – прицепной скрепер

ejector – устройство для разгрузки грунта

elevating scraper – скрепер с элеваторной загрузкой



2. Read and translate the text to learn more about scrapers used for earthmoving.

Scraper

A scraper is a large motorized machine that can move dirt and aggregates within the site easily and without the needs of additional equipment. However, they are not meant to be used for all construction sites. This type of heavy equipment is used in large open areas when they can run at higher speeds and facilitate the cut and fill activities.

The rear part has a vertically moveable bowl with a sharp horizontal front edge. The bowl can be hydraulically lowered and raised. When the bowl is lowered, the front edge cuts into the soil or clay and fills the bowl. When the bowl is full it is raised, and closed with a vertical blade (known as the apron). The scraper can transport its load to the fill area where the blade is raised, the back panel of the bowl, or the ejector, is hydraulically pushed forward and the load tumbles out. Then the empty scraper returns to the cut site and repeats the cycle.

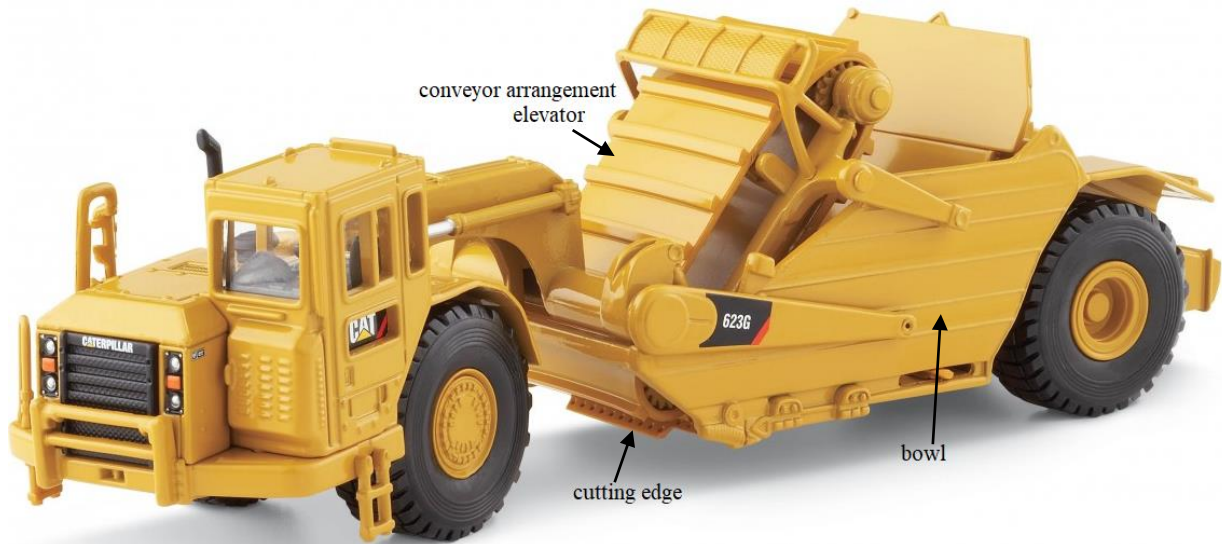


Wheel tractor-scraper

The basic configurations of a scraper are:

1. Open bowl: usually requires a bulldozer or similar to assist in loading.

2. Elevating scraper: self-loading as it uses an elevator to load material. On the elevating scraper the bowl is filled by a type of conveyor arrangement to move the material engaged by the cutting edge into the bowl as the machine moves forward. Elevating scrapers do not require assistance from push-tractors. The pioneer developer of the elevating scraper was Hancock Manufacturing Company of Lubbock, Texas USA.



Elevating scraper



Pull type scraper

3. Pull type scrapers are not motorized and must therefore be pulled by another vehicle. This is a slower option but suitable for medium-sized sites with poor ground conditions.

Sources: https://en.wikipedia.org/wiki/Wheel_tractor-scraper
https://www.designingbuildings.co.uk/wiki/Earthmoving_equipment

3. Put ✓ for true and ✗ for false statements.

1. Bulldozers can be elevating and pull type.
2. Pull type scrapers have elevators.
3. Scrapers quickly move large quantities of soil around a construction site.
4. A scraper consists of a bowl, apron and ejector.
5. When the bowl of a scraper is full, it is raised and closed with a vertical blade (known as the ejector).
6. A pull type scraper is not a motorized vehicle.

4. Answer the following questions.

1. What is a scraper?
2. Where is a scraper used?
3. What elements does a scraper consist of?
4. What is the function of an apron?
5. What is the difference between wheel tractor-scraper and elevating scraper?
6. Where are pull scrapers used?

5. Circle the odd word.

1.	ripper	blade	soil	track
2.	tractor	scraper	angledozer	concrete
3.	soil	sand	quantity	stone
4.	bowl	site	apron	ejector
5.	weight	to cut	to fill	to load

6. Give English equivalents of the following words and word combinations.

Вертикально двигающийся ковш, более высокие скорости, дополнительное оснащение, погрузка, открытый участок, наполнять ковш, пустой скрепер, самозагружающийся, трактор-толчок, разработчик, другое транспортное средство, площадки средних размеров, требовать помощь.

7. Translate the facts to learn more about scrapers.

Скрепер является землеройно-транспортной машиной для срезания грунтов, перевозки, уплотнения.

Facts In Brief

В 70-х гг. XVIII в. появились первые колесные скреперы, которые передвигались с помощью лошадей.

Примерно в конце XIX в. скреперы были установлены на ось с металлическими колесами.

В 1922 г. был построен первый четырехколесный скрепер «Гон-Дола». Скреперы того времени представляли собой открытый спереди ковш на двух или четырех колесах.

В 1947 г. появился полуприцепной скрепер.

В нашей стране отмечалось применение скреперов на конной тяге при строительстве Турксиба (Turkestan–Siberian Railway) в 20-х гг. прошлого столетия – там работали конные скреперы «Коламбус». Массовое применение прицепных скреперов имело место при строительстве канала Волго-Дон им. В. И. Ленина в 1948 – 1950 гг.

Основными преимуществами скрепера являются:

- 1) универсальность применения. Скрепер можно использовать на любом цикле дорожного строительства;
- 2) высокая транспортная скорость. Среднестатистический скрепер способен развивать 40–50 км/ч;
- 3) простота обслуживания.

8. Are there any other types of scrapers? (Use the Internet for additional information)



4C. EXCAVATOR

1. Read the words and learn them by heart.

dipper arm – рукоять

boom – стрела

bucket – ковш

rotating platform – поворотная платформа

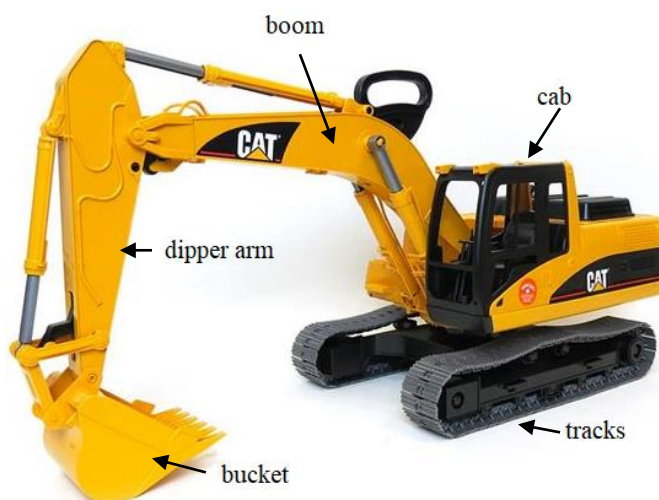


2. Read and translate the text to learn more about excavators.

Excavator

An excavator is a construction vehicle used to dig or move large objects. Excavators are most commonly found on road construction sites.

An excavator consists of a boom, dipper arm (or stick), bucket and cab on a rotating platform known as the “house”. The cab can rotate a full 360 degrees. The operator sits in the cab and from there he can have visibility of the site. The boom can move only up and down, or in addition also shift towards the left and right of the machine. A dipper arm is attached to



Crawler excavator

the boom end and it provides the digging force needed to pull the bucket through the ground. A bucket is fixed at the dipper arm end for carrying the soil. Buckets have numerous shapes and sizes for various applications. In addition, there are numerous other categories of attachments with the excavator that are used for boring, crushing, lifting, and ripping.

Excavators come in numerous sizes depending on bucket size, length of boom, length of arm, and operation speed.

There are crawler and wheel excavators.

A crawler excavator runs on two endless tracks. These types of excavators are used in hilly areas where there is a risk of sliding of machinery. Crawler excavator has low ground pressure because it spreads the load on large area.

Wheel excavator runs on wheels. It is used only for simple earthwork operations because of the absence of tracks. Thus, it is not suitable for hilly areas.



Wheel excavator

Modern hydraulic excavators come in a wide variety of sizes. The smaller ones are called mini or compact excavators. For example, Caterpillar's smallest mini-excavator weighs 2,060 pounds (930 kg); their largest model is the largest excavator available, the CAT 6090, which weighs 2,160,510 pounds (979,990 kg), and a bucket as large as 52.0 m³.

Hydraulic excavator capabilities have expanded far beyond excavation tasks with buckets. Due to modern technologies an excavator is frequently used in many applications other than excavation.

Sources: <http://www.engineeringintro.com/all-about-construction-equipments/>
<https://en.wikipedia.org/wiki/Excavator>

3. Choose the correct answer.

1. Excavator consists of _____.
 - a) elevator, ripper, boom;
 - b) boom, dipper arm, bucket;
 - c) apron, blade, ripper.
2. A cab on a rotating platform known as _____.
 - a) home;
 - b) structure;
 - c) house;
 - d) room.
3. A bucket is attached to _____.
 - a) tracks;
 - b) dipper arm;
 - c) cab.
4. There are _____ and _____ excavators.
 - a) crawler and elevating;
 - b) wheel and pull type;
 - c) crawler and wheel.

5. _____ provides the digging force needed to pull the bucket through the ground.
- a) a dipper arm;
 - b) a boom;
 - c) tracks;
 - d) a cab.
6. Due to modern technologies an excavator is _____ used in many applications other than excavation.
- a) rarely;
 - b) frequently;
 - c) never;
 - d) sometimes.

4. Name all the elements of an excavator you know.



5. Give English equivalents of the following words and word combinations.

Вращаться, видимость (обзор), вдобавок, обеспечивать, многочисленные формы, различные применения, рыхление, дробление, в зависимости от, экскаватор на гусеничном ходу, риск скольжения, давление на грунт, широкое разнообразие, отсутствие гусеничной ленты.

6. Complete the text about compact excavators by adding the missing words and phrases.

support, adapted, rotation, excavator, steel, water, excavator engine

An amphibious excavator (экскаватор-амфибия) is a type of _____¹ that can perform dredging (выемка грунта) while afloat in shallow water. An amphibious excavator is better _____² for removing silty clay (илистая глина) and clearing silted trenches.

Facts In Brief



Amphibious excavator

The amphibious excavator can walk or work in _____³, because the chassis crawler floats on pontoons. It may swing when excavating with no _____⁴ underneath. Its upper structure is a modified excavator that allows 360° full _____⁵ and hydraulic operation.

The pontoons are manufactured from _____⁶ and they are saltwater-resistant. The bottoms of the pontoons are reinforced for rough terrain operation. The power for the pontoon tracks is provided by an _____⁷.

Source: https://en.wikipedia.org/wiki/Amphibious_excavator

7. There are many other types of excavators such as a trencher, front shovel, steam shovel. Choose any excavator type and make a presentation.



8. Here are some words but the letters are mixed up. Fill in the table:

Letters	Correct word	Translation
ractvxevao	excavator	экскаватор
ainhmec		
reppdi mar		
orapreto		
cvleeih		
oomb		
lwehe		
weortkahr		
warrelc		



4D. DRAGLINE

1. Read the words and learn them by heart.

rope – канат

drag rope – тяговой канат

drag – тащить, тянуть

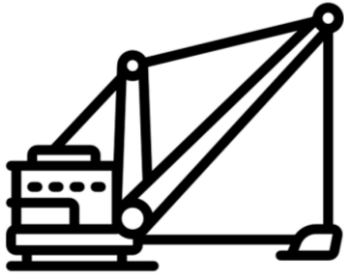
hoist rope – подъемный канат

surface mining – открытая разработка месторождений

coupler – соединительный прибор

to suspend – вешать, подвешивать

dragline excavator – драглайн, канатно-скребковый экскаватор



2. Read and translate the text to learn more about dragline excavators.

Dragline

A dragline excavator is a piece of equipment used in civil engineering and surface mining. In civil engineering the smaller types are used. It has the ability to excavate very deep down the

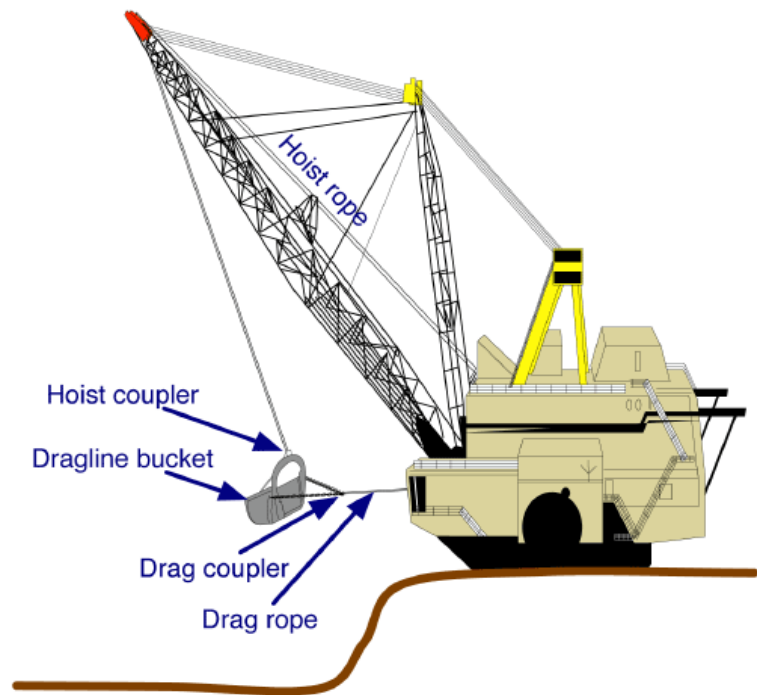
earth. Dragline is the largest equipment ever built on this planet. The smallest and most common of the heavy type weigh around 8,000 tons while the largest built weighed around 13,000 tons.

The word “drag” is used because it has the ability to drag material at far distance from the machine.

The dragline was invented in 1904 by John W.

Page for use in digging the

Chicago Canal. By 1912, Page created the Page Engineering Company to build draglines. A dragline consists of drag rope, large bucket, boom, hoist rope and driving motors. A dragline bucket system consists of a large bucket which is suspended from a boom with wire ropes. The bucket is controlled by means of a number of ropes and chains. The hoist rope, powered by large diesel or electric motors, supports the bucket and hoist coupler from the boom. The



Dragline

drag rope is used to draw the bucket horizontally towards the machine. By skillful operation of the hoist and the drag ropes the bucket is controlled for various operations.

Sources: https://en.wikipedia.org/wiki/Dragline_excavator

<http://www.engineeringintro.com/all-about-construction-equipments/dragline-excavator/>

3. Answer the following questions.

1. Where is a dragline used?
2. What ability does a dragline have?
3. Who invented a dragline?
4. What does a dragline consist of?
5. What does a hoist rope support?
6. What is the function of a drag rope?

4. Put ✓ for true and ✗ for false statements.

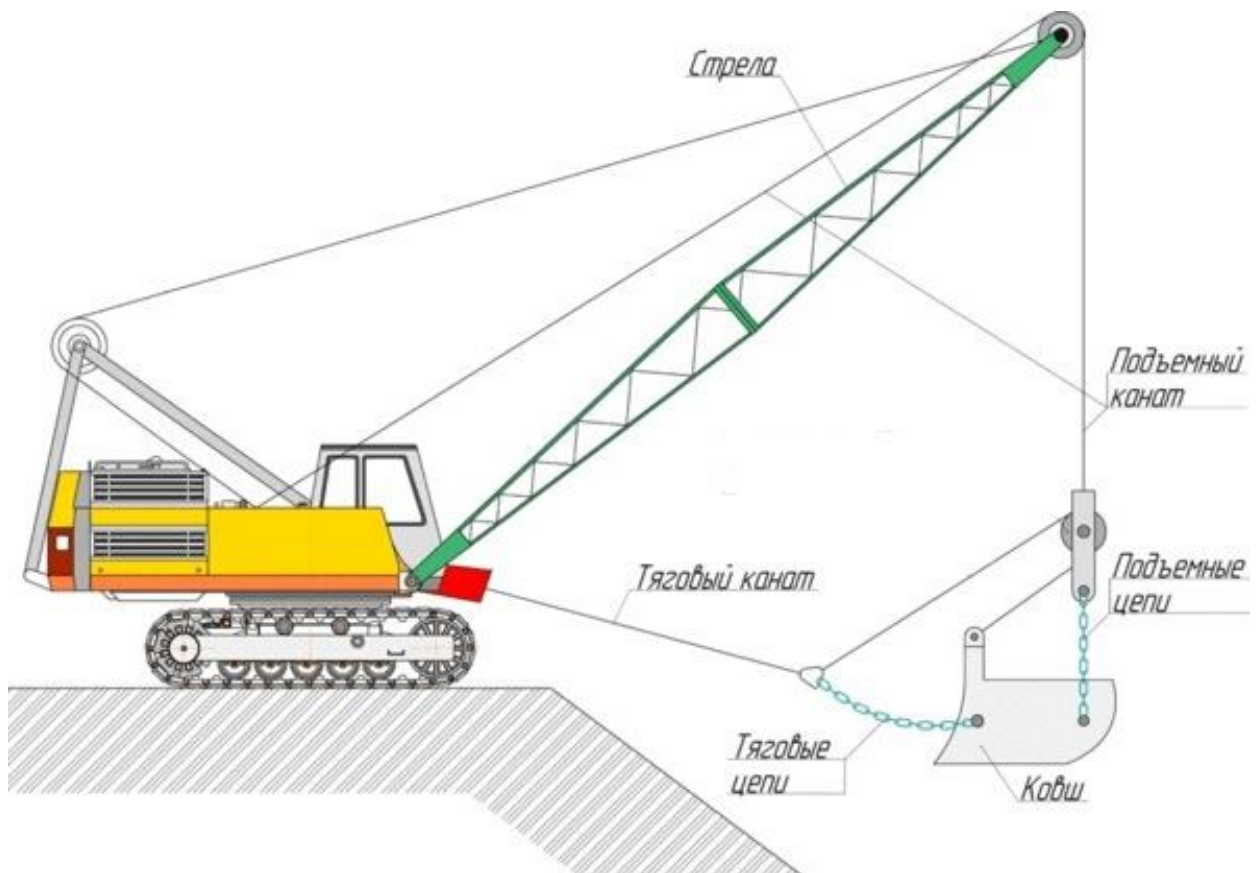
1. A dragline is also used in surface mining.
2. A dragline is the largest mobile equipment.
3. A typical dragline consists of drag rope, large bucket, boom, hoist rope and driving motors.
4. The drag rope is used to draw the bucket vertically.
5. The dragline was invented in 1914 by John W. Page.

5. Combine the given words into sentences. Translate them into Russian.

1. civil, A, used, excavator, surface, engineering, mining, dragline, is, in, and.
2. hoist, supports, bucket, rope, The, the.
3. by, controlled, The, ropes, and, bucket, chains, is.
4. wire, A, boom, is, from, a, with, bucket, suspended, ropes.
5. excavate, It, the, earth, the, very, ability, to, deep, has, down.

6. The idea of creating excavator belongs to Leonardo da Vinci. William Smith Otis invented excavator. John W. Page invented dragline. Find more information about them and discuss with your groupmates.

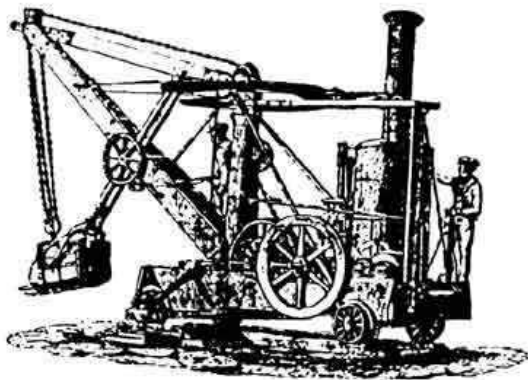
7. Find the English equivalents for the following elements of a dragline.



8. Translate the facts to learn more about the history of excavators.

Официально идея создания землеройной машины принадлежит Леонардо да Винчи, он в начале XVI века разработал схему прототипа современного экскаватора-драглайна.

Facts In Brief



The Otis Steam Excavator

Венеция активно развивала экскаваторное дело – машины были необходимы для очистки венецианских каналов. Далее изобретение развивали во Франции и Америке.

Активное строительство железных дорог в 1830-х годах и нехватка рабочих сподвигла американца Уильяма Смита Отиса в 1832-1836 годах изобрести первый

одноковшовый экскаватор. Экскаватор Отиса был неполноповоротным и передвигался по рельсам. До 1840 года было построено 7 экскаваторов Отиса, из которых 4 в 1842 г. были проданы в Россию для строительства железной дороги Петербург-Москва.

Первый русский экскаватор был построен в 1902 г. на Путиловском заводе. Позднее появились многоковшовые экскаваторы, которые имели огромные размеры и передвигались по рельсам.



9. Compile as many words as you can with the letters of the word.

DRAGLINE

4E. GRADER

1. Read the words and learn them by heart.

flat – плоский

dirt roads – грунтовые дороги

base course – слой основания

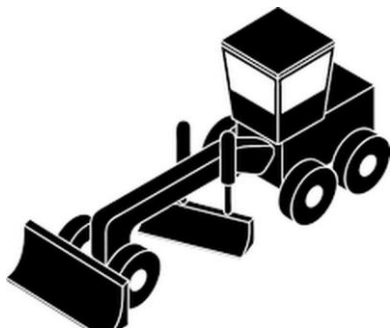
sideslope – уклон

compactor – уплотнитель

scrubland – кустарниковая местность

grassland – район лугов и пастбищ

snowplowing – очистка снега



2. Read and translate the text to learn more about graders.

Grader

A grader, also known as a road grader, motor grader, is a construction machine with a long blade used to create a flat surface. Graders are commonly used in the construction and maintenance of dirt roads and gravel roads. In the construction of paved roads they are used to prepare the base course to create a wide flat surface for the asphalt to be placed on. Graders can produce inclined surfaces, to give sideslope to roads.

Although the earliest models were moved by horses or other powered equipment, most modern graders contain an engine so are known as “motor graders”.



Motor grader

Many graders also have optional attachments for the rear of the machine which can be ripper, blade, or compactor. In certain countries, for example in Finland, almost every grader is equipped with a second blade that is placed in the front of the vehicle. For snowplowing and some dirt grading operations, a side blade can also be mounted. Grader blades usually range in width from 2.5m to 7.3m.

In Northern Europe, Canada, and some regions in the United States, graders are often used in municipal snow removal. In scrubland and grassland areas of Australia and Africa,

graders are often an essential piece of equipment on large farms and plantations to make dirt tracks where the absence of rocks and trees means bulldozers are not required.

Sources: <https://en.wikipedia.org/wiki/Grader>

<https://www.nti.com.au/truck-trailer-equipment-guide/display-item.php?category=53&id=19>

3. Look at the picture of a motor grader and name all the elements you know.

4. Choose the correct answer (multiple correct answers are possible).

1. A grader can be referred to as _____.
 - a) motor grader;
 - b) vehicle grader;
 - c) road grader;
 - d) tree grader.
2. Early graders were drawn by_____.
 - a) dogs;
 - b) wolves;
 - c) horses;
 - d) cats.
3. A grader is equipped with _____.
 - a) a boom;
 - b) blade;
 - c) ripper;
 - d) bucket
 - e) dipper arm;
 - f) compactor.
4. In _____ graders are often used in municipal snow removal.
 - a) Australia;
 - b) Canada;
 - c) the United States;
 - d) Northern Europe;
 - e) Africa;
 - f) Brazil.

5. Graders can _____.

- a) produce inclined surfaces;
- b) produce flat surfaces;
- c) dig an excavation;
- d) lift the load.

5. Put ✓ for true and ✗ for false statements.

- 1. The key working element of a grader is a blade.
- 2. A grader is used for digging and loading earth or fragmented rock and for mineral extraction.
- 3. In road construction graders are used to prepare the sub base course.
- 4. A side blade can also be mounted for snowplowing and some dirt grading operations.
- 5. A grader is a construction machine with a short blade.

6. Complete the text about the history of graders by adding the missing words and phrases.

graders, made, attachment, size, wheels

Early _____¹ were drawn by people and draft animals. The era of motorization by steam tractors, motor trucks and tractors saw such graders grow in _____² and productivity.

Facts In Brief

The first self-propelled grader was _____³ in 1920 by the Russell Grader Manufacturing Company, which called it the Russell Motor Hi-Way Patrol. These early graders were created by adding the grader blade as an _____⁴ to a general tractor unit. After purchasing the company in 1928, Caterpillar went on to integrate the tractor and grader into one design – at the same time replacing crawler tracks with _____⁵ to produce the first rubber-tire self-propelled grader, the Caterpillar Auto Patrol, released in 1931.

7. Match the words and their definitions.

1. blade	a. a large area of land covered with grass
2. flat	b. a machine, usually with wheels and an engine, used for transporting people or goods on land, especially on roads
3. vehicle	c. a machine that levels earth, rubble, etc, as in road construction
4. grassland	d. a wide, flat part on a machine with a very thin edge used for cutting
5. asphalt	e. an area of land which is covered with low trees and bushes
6. grader	f. level, smooth, or even
7. scrubland	g. a black substance used to make the surfaces of things such as roads

8. Translate some facts about graders.

Первые автогрейдеры в СССР были выпущены в 1947 году Пайдеским заводом дорожных машин. Конструктором грейдера был Арнольд Вольберг (эст. Arnold Volberg), основой для него послужил грузовой автомобиль ГАЗ-АА.



Acco Grader

Длина ножей грейдеров, выпускаемых в СССР, а впоследствии и в России – 2,5-4,5 м; производительность 45 м³/ч.

Самый большой из когда-либо созданных в мире грейдеров – Acco Grader итальянской

компании Umberto Acco Company. Был выпущен в единственном экземпляре и весил 160 тонн.

4

WHAT DO YOU REMEMBER?

1. Explain the meaning of the following words and word combinations in English.

blade, boom, scraper, elevator, cab, tracks, wheels

2. Complete the chart with ✓ or ✗.

Elements	Construction machinery				
	Bulldozer	Scraper	Excavator	Dragline	Grader
bucket					
boom					
cab					
tracks					
apron					
blade					
hoist rope					
ejector					
wheels					
bowl					
dipper arm					
drag rope					
cutting edge					
ripper					

3. Translate the following sentences using the Vocabulary of Unit 4.

1. Грейдер используется для создания ровной поверхности.
2. Экскаватор оснащен ковшом, стрелой и поворотной платформой.
3. Бульдозер – это гусеничный или колесный трактор, оснащенный отвалом.
4. Слово «бульдозер» появилось в конце XIX века – оно означало любую силу, способную сдвинуть большую массу.
5. Драглайн является одним из самых мобильных оборудований.

6. Для копания и перемещения грунта используются тракторы, бульдозеры, грейдеры, драглайны и т.д.
7. Экскаваторы подразделяются на электрические и гидравлические.
8. Ковш подвешен на стрелу при помощи металлического кабеля.
9. Драглайн имеет сложную систему канатов.
10. Скрепер включает в себя ковш, заслонку, устройство для разгрузки грунта.
11. Часто прицепные скреперы используются вместе с гусеничными тракторами.
12. Рабочими инструментами бульдозера являются отвал и рыхлительные зубья.

4. Imagine that you are going to buy earthmoving equipment. Compare foreign and Russian manufacturers of this equipment and say which of them is more advantageous. Make a list of advantages and disadvantages.



5. Find all the words related to earthmoving equipment (direction of letters – ↕ and →) and give their translation.

A	P	R	O	N	B	O	O	M	P
E	W	O	T	R	O	P	E	U	I
D	I	P	R	A	W	H	E	E	L
A	D	R	A	G	L	I	N	E	E
L	E	X	C	A	V	A	T	O	R
B	U	C	K	E	T	S	O	I	L
C	A	B	S	C	R	A	P	E	R

5A. MILLING MACHINE

1. Read the words and learn them by heart.

paver – асфальто/бетоноукладчик

roller – каток

recycling – повторная переработка

ground up – измельчать, разламывать

reclaimed asphalt pavement (RAP) –

регенерированное асфальтовое дорожное
покрытие

milling machine/cold planer – дорожная фреза

rotating – вращающийся

drum – барабан

cutter – резец

drive wheel – ведущее колесо

pavement milling/ cold planing/ asphalt

milling/ profiling – срезание/ фрезерование
дорожного покрытия2. Read and translate the text to learn more about
such road work machinery as milling machine.**Milling Machine (Cold Planer)**

Road construction machinery is found in a wide variety ranging from the very heavy equipment to

portable and lighter equipment. This modern construction equipment makes the construction easier and quicker. This type of machinery usually includes milling machines, pavers and rollers.

Pavement milling (cold planing, asphalt milling, or profiling) is the process of removing at least a part of the surface of a paved area such as a road, bridge, etc.

Milling is widely used for pavement recycling today, where the pavement is removed and ground up to be used as the aggregate in new pavement. For asphalt surfaces the product of milling is called “reclaimed asphalt pavement” (RAP). This reduces the impact that resurfacing has on the environment.

It can also be used to control or change the height of part or all of the road.

Milling is performed by construction equipment called milling machines or cold planers. These machines use a large rotating drum to remove and grind the road surface.

There are cutters on the drum. The cutters can be removed and replaced as they wear out. The amount of wear varies with the type and consistency of the material being milled; intervals can range from a few hours to several days.



Milling Machine

The majority of milling machines use a special system according to which the drum rotates in the direction opposite that of the drive wheel or tracks. The speed of the rotating drum should be slower than the speed of the machine.

Modern machines generally use a front loading conveyor system that have the advantage of picking up any material that falls off the conveyor as milling progresses. Water is generally applied to the drum, because of the heat generated during the milling process. Additionally, water helps control the dust. In order to control the depth, slopes, and profile of the final milled surface many millers now have automatic depth control using lasers.

Source: https://en.wikipedia.org/wiki/Pavement_milling

3. Answer the following questions.

1. What machines does road construction machinery include?
2. What is pavement milling?
3. How is the product of milling called?
4. What tool does a milling machine use to remove and grind the road surface?
5. Where are cutters located?
6. Why is water applied to the drum?

4. Give English equivalents of the following words and word combinations.

Пыль, регенерированное асфальтовое дорожное покрытие, уклон, автоматический контроль глубины, уменьшать воздействие, вращающийся барабан, погрузочный

конвейер, поднятие любого материала, окружающая среда, высота части или всей дороги, выпасть из конвейера.

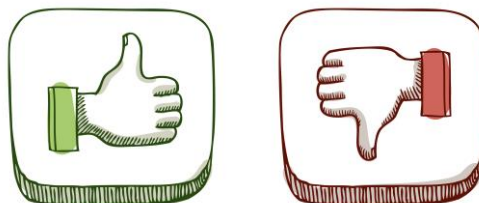
5. Complete the sentences about milling.

1. Milling is widely used ...
2. Milling reduces the impact ...
3. To remove and grind the road surface milling machines use ...
4. The amount of wear depends on ...
5. The speed of the rotating drum is slower than ...
6. Water helps to control ...

6. Here are some words but the letters are mixed up. Fill in the table:

Letters	Correct word	Translation
icemahn	machine	машина
nemvpate		
etctur		
urmd		
orcenvyo		
niligl		
ogtritan		
nycerclgi		
udogr		

7. Discuss advantages and disadvantages of modern milling machines.



8. Translate the text about the peculiarities of milling machines.

Дорожная фреза относится к группе дорожных машин, которые используются для разрушения дорожного покрытия (асфальта, бетона и пр.), его измельчения и погрузки в транспортное средство.

Facts In Brief

Фреза подходит для работы, как на небольших узких территориях, так и на широких дорогах, а также используется при ремонтных работах на мостах. Срезанный верхний слой грунта после измельчения выгружается в грузовик для дальнейшей транспортировки.

Эти машины впервые начали использоваться на рубеже 60-70х годов прошлого века. В это время была популярна идея повторного использования материалов. В связи с этим, Министерства транспорта многих стран заинтересовались новыми машинами. С помощью этой техники удавалось эффективно и быстро избавляться от старых асфальтобетонных покрытий и создавать площадку для строительства новых.



5B. PAVER

1. Read the words and learn them by heart.

paver – асфальто/бетоноукладчик

width – ширина

compaction – уплотнение, прессование

smooth – гладкий, ровный

dump truck – самосвал

grade sensor – датчик уклона

hopper – бункер, дозаторный бак

constant – постоянный

auger – шенк

layer – слой

free floating screen – выглаживающая

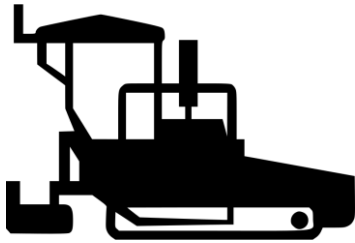
material transfer unit – машина для подачи

плита

материала

screed – трамбующий брус, ровняльная

доска

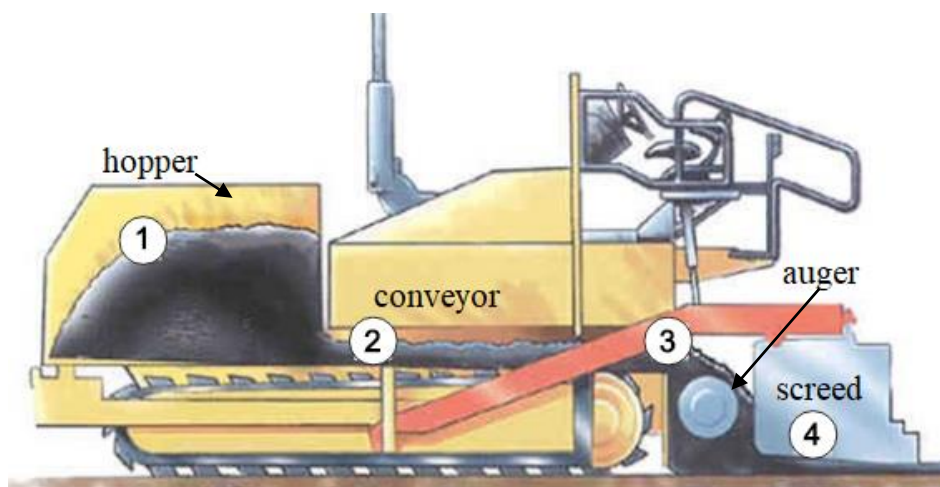


2. Read and translate the text to learn more about such road work machinery as a paver.

Paver

A paver (paver finisher, asphalt finisher, paving machine) is a vehicle used to lay hot asphalt on roads, bridges, etc. It lays the asphalt and provides minor compaction before it is compacted by a roller. Pavers can have wheels or tracks and vary in size depending on the scale of the job.

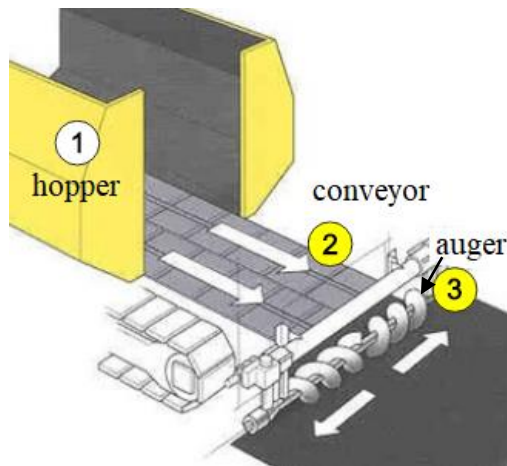
The asphalt is delivered into the paver's hopper. The material flow is regulated by the conveyor and the auger. The conveyor then carries the asphalt from the hopper to the auger. The auger places the material in front of the screed. The screed takes the material and distributes it over the width of the road and provides initial compaction.



Paver

A paver should provide a smooth uniform surface. In order to provide a smooth surface a free floating screen is used.

To control the elevation changes of the road modern pavers use automatic screed controls, which generally control the angle of the screed from information gathered from a grade sensor.



In order to provide a smooth surface the paver should move at a constant speed and have material in front of the screed. If the amount of the material or paver speed increase, the screed will rise, and more asphalt will be placed. It will result in a thicker layer of asphalt and uneven final surface. If the amount of the material or paver speed decrease, the screed will fall and the layer will be thinner.

The need for constant speed and material supply is one of the reasons for using a material transfer unit in combination with a paver. A material transfer unit supplies constant material without contact, providing a better final surface. When a dump truck is used to fill the hopper of the paver, it can make contact with the paver or change speed and affect the screed height.

Sources: [https://en.wikipedia.org/wiki/Paver_\(vehicle\)](https://en.wikipedia.org/wiki/Paver_(vehicle))

<https://slideplayer.com/slide/8675813/>

3. Answer the following questions.

1. What is the main function of a paver?
2. What types of pavers do you know?
3. What are the main parts of a paver?
4. Describe the function of a screed.
5. What will happen if the amount of the material or paver speed increase?
6. Why is a material transfer unit used?

4. Put ✓ for true and ✗ for false statements.

1. A paver provides minor compaction before it is compacted by a roller.
2. Constant speed and material supply is one of the reasons for using a material transfer unit in combination with a paver.

3. The material flow is regulated by the hopper and the auger.
4. For the surface to be smooth and flat a paver should work at different speeds.
5. If the amount of the material or paver speed decrease, the screed will rise, and more asphalt will be placed.
6. A material transfer unit supplies constant material with contact.

5. Find in the text antonyms to the following words and word-combinations.

1. increase	
2. starting	
3. thicker	
4. fall	
5. even	
6. temporary	
7. worse	

6. Match the words given below and the numbers (1-4).

auger	hopper	screed	tracks
-------	--------	--------	--------



7. Complete the text about the history of pavers by adding the missing words and phrases.

received, features, developed, asphalt, mixed

The asphalt paver was _____¹ by Barber Greene Co., that originally manufactured material handling systems.

Facts In Brief

In 1929 the Chicago Testing Laboratory approached them to use their material loaders to construct _____² roads. This did not result in a partnership but Barber Greene did develop a machine based on the concrete pavers of the day that _____³ and placed the concrete in a single process. It was not as effective as desired and the processes were separated. In 1933 the independent screed was invented. Harry Barber _____⁴ patent in 1938. The main _____⁵ of the paver developed by Barber Greene Co. were incorporated into most pavers.

5C. ROLLER

1. Read the words and learn them by heart.

vibratory roller – вибрационный каток

smooth wheel roller – гладкий каток

pneumatic tire roller – пневмоколёсный каток

drum – валец

rearrangement – перестановка

particles – частицы

air voids – воздушная пустота

densification – уплотнение

density – плотность

contractor – подрядчик



2. Read and translate the text to learn more about such road work machinery as a road roller.

Road Roller

A road roller (sometimes called a roller-compactor or roller) is an engineering vehicle used to compact soil, concrete, gravel, crushed stone or asphalt in the construction of roads. They rely on their weight to compress the surface they are working on.

Various types of rollers are used in compaction works depending on the job and material to be compressed. Road rollers use the weight of the vehicle to compress the surface being rolled (static) or use mechanical advantage (vibrating). The most common types are vibratory rollers, smooth wheel rollers, pneumatic tire rollers, etc.



Vibratory roller

Vibratory rollers have two smooth wheels/ drums (cylinder located instead of a wheel). One is fixed at the front and the other one is on the rear side of vibratory roller. Both wheels/drums are of the same diameter, length and weight. Vibratory roller covers the full area under wheel. Vibratory rollers have better compaction capability compared to the static rollers

because the vibration causes the rearrangement of particles closer together, as a result air voids reduce and densification of the surface increases. Vibratory rollers are widely used for compacting asphalt pavements because they achieve the required densities faster.

Smooth wheel roller and vibratory rollers are the same. Both have the same characteristics. The only difference is that a smooth wheel roller doesn't have vibratory

equipment. Compaction of clay or sand is not a good choice for a smooth wheel roller, because there are many voids in clay soil and sand, which cannot be minimized without vibrations.



Pneumatic tire roller

Pneumatic tire roller has a number of rubber tires at the front and at the rear end. Empty spaces left in between the two tires make 80% coverage area under the wheels. Pneumatic tire rollers are used on small to medium size compaction jobs, primarily on granular base materials. The main advantage is that pneumatic tire rollers can be used on both soil and asphalt so a road building contractor can save by having one compactor for both stages of construction – base and asphalt.

Source: <http://www.engineeringintro.com/all-about-construction-equipments/rollers-types-of-roller-characteristics/>

3. Put ✓ for true and ✗ for false statements.

1. Vibratory rollers are used on small to medium size compaction jobs, primarily on granular base materials.
2. Pneumatic rollers can be used on both soil and asphalt.
3. Various types of rollers are used depending on the job and material to be compressed.
4. Vibrating rollers use mechanical advantage.
5. Smooth wheel roller and pneumatic tire rollers are the same.

4. Choose the correct answer (multiple correct answers are possible).

1. Rollers have _____.

- a) a boom;
- b) wheels;
- c) a bucket;;
- d) drums;
- e) a blade.

2. Rollers rely on their _____ to compress the surface they are working on.
- weight;
 - height;
 - width;
 - length.
3. A roller is an engineering vehicle used to compact _____.
- soil;
 - concrete;
 - gravel;
 - water;
 - crushed stone;
 - asphalt.
4. Vibratory roller covers _____ under wheel.
- 80% of the area;
 - the full area;
 - 50% of the area.
5. Using a pneumatic roller a road building contractor can save by having one compactor for the following stages of construction – _____.
- earthwork;
 - asphalt;
 - base;
 - clearing.

5. Find in the text synonyms to the following words and word-combinations.

1. plus	
2. phases	
3. compact	
4. reach	
5. needed	
6. features	
7. first of all	

6. Combine the given words into sentences. Translate them into Russian.

1. of, located, cylinder, instead, Drum, is, a, wheel, a.
2. asphalt, concrete, A, or, roller, crushed, soil, gravel, compacts, stone.
3. have, two, rollers, wheels, smooth, Vibratory, drums.
4. tire, small, rollers, medium, are, compaction, Pneumatic, used, size, to, jobs, on.
5. have, A, roller, wheel, vibratory, doesn't, equipment, smooth.
6. Pneumatic, soil, asphalt, rollers, tire, be, can, both, on, used, and.
7. of, or, clay, good, wheel, sand, smooth, Compaction, isn't, for, a, choice, a, roller.

7. Complete the text about the history of pavers by adding the missing words and phrases.

horse- drawn, popular, rollers, replaced, diesel, compaction

The first road _____¹ were horse-drawn. Since the effectiveness of rollers depend mainly on their weight, self-powered vehicles replaced _____² rollers in the mid-19th century. The first such vehicles were steam rollers. Single-cylinder steam rollers were generally used for base _____³. Double cylinder steam rollers became _____⁴ in 1910 and were used mainly for the rolling of hot-laid surfaces.

Facts In Brief

As internal combustion engine technology improved during the 20th century, kerosene-, petrol and diesel-powered rollers gradually _____⁵ the steam-powered ones. Nearly all road rollers use _____⁶ power now.

8. There are many other types of rollers, choose any of them and describe. (Use the Internet for additional information)

5

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

cutters, layer, recycling, hopper, screed, wheel, weight, vehicle

1. A roller is an engineering _____ used to compact soil, gravel, concrete, or asphalt in the construction of roads and foundations.
2. Shall I take the empty bottles for _____?
3. The _____ rotates around an axle.
4. Road rollers use the _____ of the vehicle to compress the surface being rolled or use mechanical advantage.
5. The drum of the milling machine has _____.
6. The conveyor then carries the asphalt from the _____ to the auger.
7. A grade sensor is used to control the angle of the _____.
8. Asphalt is the upper _____ of a road.

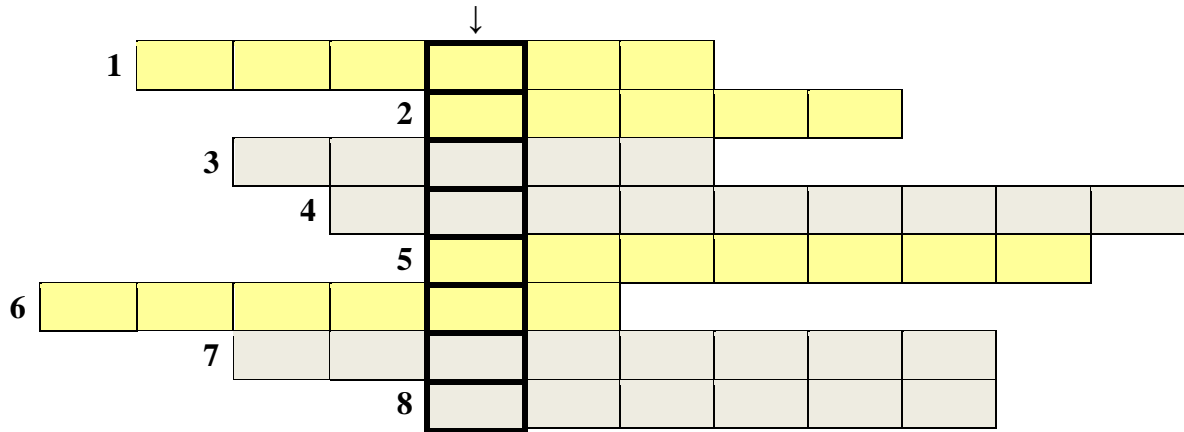
2. Translate the following sentences using the vocabulary of Unit 5.

1. Каток спрессовывает гравий и песок при строительстве дорог и обеспечивает ровную поверхность.
2. Подрядчик может сэкономить, т.к. пневмоколесный каток используется на нескольких стадиях строительства.
3. Машина для подачи материала позволяет асфальтоукладчику работать без снижения скорости.
4. Материалы должны быть переработаны или вывезены с площадки.
5. Уплотнение асфальта осуществляется трамбующим брусом.
6. Выглаживающая плита делает покрытие ровным по всей ширине дороги.
7. Дорожная фреза разрушает и измельчает дорожное покрытие.
8. Бетон состоит из цемента, воды, песка и минерального наполнителя.

3. What road building equipment is better? Russian or foreign? Why?



4. Complete the crossword.



1. A device in the paver into which asphalt can be put.
2. A device in the paver which is used to bore holes in the ground.
3. A vehicle used to lay asphalt on the road.
4. The act of processing used materials into new products for further use.
5. The process of removing at least a part of the surface of a paved area such as a road.
6. A vehicle used to compact soil, concrete, gravel, crushed stone or asphalt.
7. The element of a paver which controls the material flow.
8. Two endless belts instead of wheels on which a vehicle travels.
9. _____

6A. CONCRETE TRANSPORT TRUCKS

1. Read the words and learn them by heart.

concrete transport trucks – автобетоносмеситель

drum – барабан

aggregate – заполнитель

spiral blade – спиральное лезвие



2. Read and translate the text to learn more about concrete transport trucks.

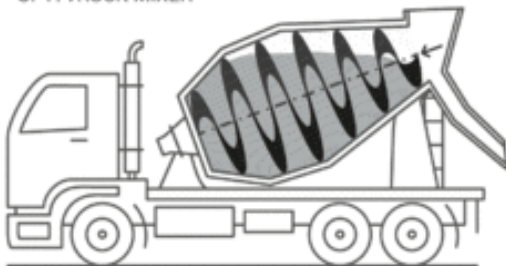
Concrete transport trucks

A concrete mixer is a device that combines cement, aggregate such as sand or gravel, and water to form concrete.

A typical concrete mixer uses a rotating drum to mix the components.

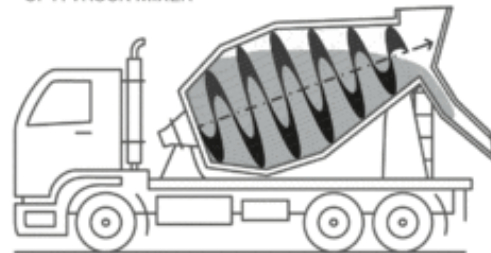
Special concrete transport trucks are made to mix concrete and transport it to the construction site. They can be loaded with dry materials and water, as a result mixing is achieved during transport. They can also be loaded from a plant; in this case the material has already been mixed before loading.

OPERATION
OF A TRUCK MIXER



Concrete is pushed deeper into the drum

OPERATION
OF A TRUCK MIXER



Concrete is forced out of the drum

The interior of the drum on a concrete mixing truck is equipped with a spiral blade. When the drum rotates in one direction, the concrete is pushed deeper into the drum. This is the direction while the concrete is being transported to the building site. When the drum rotates in the other direction, the concrete is forced out of the drum.



Concrete mixing truck

The drum is traditionally made of steel.

Concrete mixers generally do not travel far from their plant, as the concrete begins to set as soon as it is in the truck. Many contractors require that the concrete be in place within 90 minutes after loading.

Source: https://en.wikipedia.org/wiki/Concrete_mixer

3. Choose the correct answer.

1. A typical concrete mixer uses a _____ to mix the components.
 - a) boom;
 - b) bucket;
 - c) drum;
 - d) wheels.
2. Special concrete transport trucks are made to mix _____.
 - a) soil;
 - b) concrete;
 - c) rock.
3. Many contractors require that the concrete be in place within _____ after loading.
 - a) 90 minutes;
 - b) 2 hours;
 - c) 30 minutes.
4. The interior of the drum on a concrete mixing truck is equipped with a spiral _____.
 - a) blade;
 - b) ripper;
 - c) rope.
5. The drum is traditionally made of _____.
 - a) glass;
 - b) concrete;
 - c) steel;
 - d) stone.

4. Put ✓ for true and ✗ for false statements.

1. Concrete transport trucks can be loaded with dry materials and water, as a result mixing is achieved during transport.
2. Concrete mixers generally travel far from their plant.
3. A concrete mixer combines asphalt, sand or gravel, and water to form concrete.
4. Concrete transport trucks can be loaded from a plant; in this case the material has already been mixed before loading.
5. There is a spiral blade inside a drum.

5. Match the English words and word combinations on the left with their Russian equivalents on the right.

1. gravel	a. требовать
2. before loading	b. подрядчик
3. concrete transport truck	c. гравий
4. to be equipped with	d. быть оснащённым чем-либо
5. in the other direction	e. в другом направлении
6. spiral blade	f. во время транспортировки
7. contractor	g. в этом случае
8. during transport	h. до загрузки
9. require	i. спиральное лезвие
10. in this case	j. автобетоносмеситель

6. Here are some words but the letters are mixed up. Fill in the table:

Letters	Correct word	Translation
limratea		
rgagetaeg		
naotcorctr		
tstrraonp		
rceotnec		

7. Complete the text about a concrete pump by adding the missing words and phrases.

labor, locations, accurately, cranes, concrete, distance, cement mixer

If the _____¹ truck cannot get close enough to the site, the concrete may be discharged into a concrete pump (бетононасос). A pump provides the means to move the material to exact _____².



Boom concrete pump

boom) to place concrete _____⁷. Boom pumps are used on most of the larger construction projects as they are capable of pumping at very high volumes.

Facts In Brief

Until the early 20th century, _____³ was mixed on the job site and transported to the formwork, either in wheelbarrows or in buckets lifted by _____⁴. This required a lot of time and _____⁵. In 1927 the German engineers Max Giese and Fritz Hull came upon the idea of pumping concrete through pipes. They pumped concrete to a height of 38 meters and a _____⁶ of 120 meters.

A boom concrete pump uses a remote-controlled robotic arm (called a

8. What other types of concrete pumps and trucks do you know?

6B. CRUSHER

1. Read the words and learn them by heart.

crusher – дробильная установка, дробилка

rock – скальная порода, скальный грунт

gravel – гравий

rock dust – каменная пыль

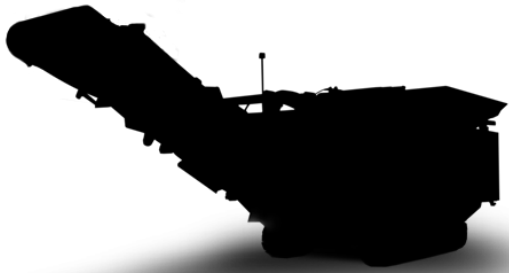
to dispose of – избавляться, удалять
(отходы)

waste materials – вынутый грунт, отходы

to deposit – наносить

to haul – передвигать, транспортировать

crushing chamber – камера дробления



2. Read and translate the text to learn more about crushing machinery.

Crusher

A crusher is a machine designed to reduce large rocks into smaller rocks, gravel, or rock dust.

Crushers may be used to reduce the size or change the form of waste materials so they can be more easily disposed of or recycled, or to reduce the size of a solid mix of raw materials.

Each crusher is designed to work with a certain maximum size of raw material. Some crushers are mobile and can crush rocks as large as 60 inches. In a mobile road operation these crushed rocks are directly combined with concrete and asphalt which are then deposited on to a road surface. Therefore there is no need for hauling over-sized material to a stationary crusher and then back to the road surface.



Crusher

Crushing devices hold material between two parallel solid surfaces, and apply sufficient force to bring the surfaces together to generate enough energy within the material being crushed.

For the most part advances in crusher design have moved slowly. The largest advance in crusher reliability was in the use of hydraulics to protect crushers from being damaged when uncrushable objects enter the crushing chamber. Foreign objects, such as steel, can cause extensive damage to a crusher. The advance of hydraulic systems has greatly improved the life of these machines.

Source: <https://en.wikipedia.org/wiki/Crusher>

3. Answer the following questions.

1. What is a crusher?
2. Why is there no need for hauling over-sized material to a stationary crusher?
3. What was the largest advantage in crusher reliability?
4. What can cause extensive damage to a crusher?
5. What is the size of material is each crusher is designed to work with?

4. Complete the sentences about crushing machinery.

1. Crushers reduce ...
2. Advances in crusher design ...
3. In a mobile road operation crushed rocks ...
4. The advance of hydraulic systems has greatly ...
5. Crushing devices hold material ...

5. Give English equivalents of the following words and word combinations.

Стационарная дробилка, посторонний предмет, улучшить срок службы, сырьевые материалы, камера дробления, твердые поверхности, надежность.

6. Circle the odd word. Make up a sentence with any word from each line.

1.	smaller rocks	sand	gravel	rock dust
2.	form	shape	damage	size
3.	truck	crusher	roller	machine
4.	blade	rope	bucket	ripper

7. Find in the text synonyms to the following words and word-combinations.

1. cut down	
2. firm	
3. put	
4. keep	
5. create	
6. progress	
7. large	

8. Translate the text about the peculiarities of a crushing machine.

Дробилка – это машина для дробления минерального сырья и других твердых материалов. Среди современных дробилок выделяют машины крупного (до 100-350 мм), среднего (40-100 мм) и мелкого (5-40 мм) дробления.

Facts In Brief

Камеры дробления дробилки сужаются. Материал в дробилке непрерывно перемещается в камере дробления, мелкие фракции поступают в более узкую ее часть и вновь дробятся.

Совершенствование дробилок направлено на увеличение их мощности, срока службы, снижение уровня шума и запыленности. Разрабатываются дробилки с электрическим, взрывным и другими способами дробления.

6

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

crushing chamber, drum, aggregate, rock dust, recycle, crusher, steel

1. Concrete transport trucks are equipped with a _____.
2. You need a _____ to break large pieces of rock into smaller ones.
3. For your production to be environmentally friendly it is necessary to _____ all waste materials.
4. The drum is traditionally made of _____.
5. The material for crushing is located in the _____.
6. A concrete mixer combines cement, _____ and water.
7. _____ consists of finely crushed rock processed by natural or mechanical means.

2. Translate the following sentences using the vocabulary of Unit 6.

1. Внутри барабана находятся спиральные лезвия.
2. Прообраз дробилки появился в 15-16 вв.
3. При строительстве дорог дробилка нужна для измельчения скалистой породы для ее дальнейшего использования в изготовлении асфальта.
4. Автобетононасосы имеют бетонораспределительные стрелы.
5. Гравий может быть горным, речным и морским.
6. Существуют дробилки крупного, среднего и мелкого дробления.
7. Автобетононасосы применяются при укладке бетона, строительстве мостов, дорог.



3. Find all the words related to Unit 6 (direction of letters – ↕ and →) and give their translation.

V	W	A	T	E	R	T	E	Q
A	G	G	R	E	G	A	T	E
S	D	O	A	T	R	O	C	K
D	L	T	N	E	A	F	R	C
R	O	R	S	R	V	B	U	E
U	A	U	P	C	E	L	S	M
M	D	C	O	N	L	A	H	E
I	S	K	R	O	K	D	E	N
X	E	I	T	C	X	E	R	T

7A. WINTER SERVICE VEHICLES

1. Read the words and learn them by heart.

chassis – ходовая часть, шасси

water tanks – водоцистерна

broom – метла

street sweeper – подметально-уборочная
машина

snow removal equipment –
снегоочистительная техника

de-icer – противообледенительные
устройство

snow groomer – снегоукладчик

sidewalk – тротуар

snowplow – плужный снегоочиститель

front-end loader – фронтальный
одноковшовый погрузчик

gritter – машина для рассыпки (песка,
каменной мелочи)

snow sweeper – дорожная щетка-
снегоочиститель



2. Read and translate the text to learn more about machinery for pavement maintenance.

Winter Service Vehicles

A street sweeper is a vehicle for summer road maintenance. It cleans the streets, usually in an urban area.

These machines were created in the 19th century to do the job more efficiently. Newer street sweepers are capable of collecting small particles of debris. Many modern street sweepers are equipped with water tanks and sprayers used reduce dust. Despite advancements in street sweeping technology, the mechanical broom type street sweeper accounts for approximately 90 percent of all street sweepers used in the United States today.



Street sweeper

Winter Service Vehicle is a vehicle for winter road maintenance. It is used to clean roads from ice and snow. Winter service vehicles are usually based on a dump truck chassis,

with adaptations allowing them to carry specially designed snow removal equipment. Generally, they are equipped with the following elements:



Snowplow vehicle

De-icers spray heated de-icing fluid, often propylene glycol or ethylene glycol, onto icy road surfaces, airport runways.

Front-end loaders are commonly used to remove snow especially from sidewalks, parking lots, and other areas too small for using heavy equipment.

A gritter (also known as a sander, salt spreader or salt truck) is found on most winter service vehicles. Gritters are used to spread grit (rock salt) onto roads.

A snow groomer is a machine designed to smooth and compact the snow, rather than removing it altogether.

Many winter service vehicles can be equipped with snowplows, to clear roads which are blocked by deep snow. When specially designed winter service vehicles are not available for plowing, other construction vehicles can be used instead: graders, bulldozers, etc. A snowplow works by using a blade to push snow to the side to clear it from a surface.

A snow sweeper uses brushes to remove thin layers of snow from the pavement surface.

*Sources: https://en.wikipedia.org/wiki/Street_sweeper
https://en.wikipedia.org/wiki/Winter_service_vehicle*

3. Put ✓ for true and ✗ for false statements.

1. A snow sweeper works by using a blade to push snow to the side.
2. Generally, winter service vehicles are based on a dump truck chassis.
3. Newer street sweepers can collect small particles of debris.
4. Snow groomers are used to spread grit (rock salt) onto roads.
5. Graders and bulldozers can be used when specially designed winter service vehicles are not available for plowing.

4. Choose the correct answer (multiple correct answers are possible).

1. A street sweeper usually cleans streets in _____.
 - a) rural area;
 - b) urban area.
2. Street sweepers were invented in the _____ century.
 - a) 21;
 - b) 20 ;
 - c) 19;
 - d) 18.
3. Modern street sweepers are equipped with _____ to reduce dust.
 - a) booms;
 - b) water tanks;
 - c) rippers;
 - d) sprayers.
4. _____ spray heated de-icing fluid onto icy road surfaces, airport runways.
 - a) gritters;
 - b) snow groomers;
 - c) de-icers;
 - d) snowplows.
5. Winter service vehicles equipped with snowplows _____.
 - a) spread grit (rock salt) onto roads;
 - b) clear roads which are blocked by deep snow;
 - c) brush to remove thin layers of snow from the pavement surface.

5. Circle the odd word.

1.	groomer	sweeper	de-icer	sidewalk
2.	water tank	grader	loader	bulldozer
3.	parking lot	sidewalk	airport runway	grit
4.	remove	compact	clean	ejector
5.	snow	ground	ice	rain

6. Give English equivalents of the following words and word combinations.

Городская местность, эффективно, уменьшать, пыль, самосвал, противообледенительная жидкость, взлетно-посадочная полоса, парковочное место, тонкий слой, щетка.

7. Translate the text about the history of winter service vehicles.

До появления моторизованного транспорта вывоз снега не был проблематичным; грунтовые дороги в сельской области были опасные и неровные.

Facts In Brief

Снег и лед делали их поверхность более гладкой. Однако количество дорог с твердым покрытием и размеры городов увеличивались, поэтому скользкая поверхность тротуаров представляла собой опасность для пешеходов и транспорта. Первая снегоуборочная машина была построена Гербертом Фрицем в начале 80-х годов XIX века. Она не имела мотора. Машина могла сметать снег лишь на полтора метра в сторону, потому не завоевала особой популярности в тогдашней Австрийской империи.

Спустя несколько лет, коллега Фрица академик Писерман установил на снегоуборочную машину паровой двигатель. Это произошло 23 января 1885 года. Эту дату можно официально считать датой изобретения первой снегоуборочной машины.

7

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

snowplow, chassis, brooms, sidewalks, water tanks, vehicles

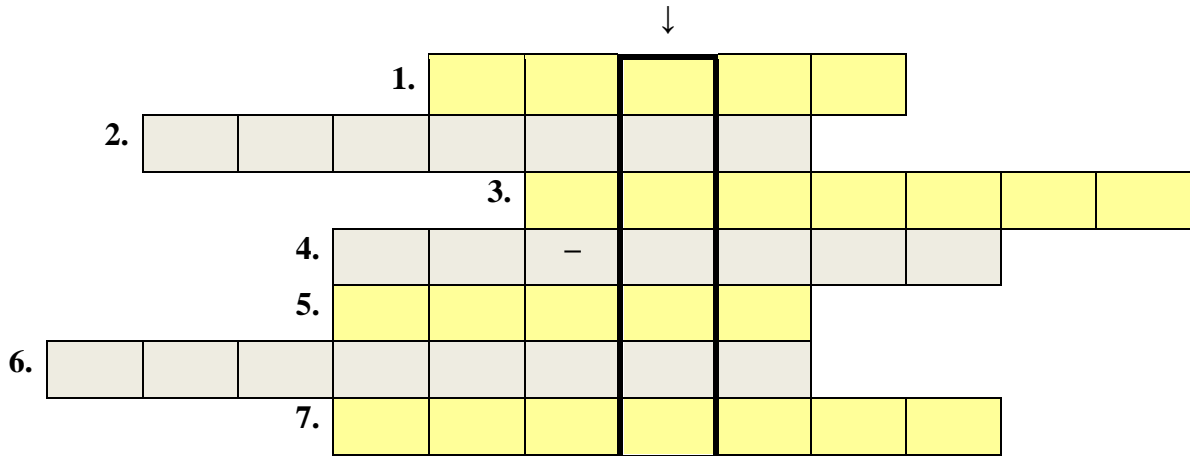
- _____ are used to provide storage of water for use in many applications.
- _____ is a vehicle for clearing roads of thick snow by pushing it aside.
- The _____ are for pedestrians and the streets are for _____.
- The _____ engine, transmission and must be efficient and also suit the drivers.
- We cleaned with _____, dusters, buckets, and scrubbing brushes.

2. Complete the chart with ✓ or ✗.

	Elements of a winter service vehicle					
	De-icer	Front-end loader	Gritter	Snow groomer	Snowplow	Snow sweeper
de-icing fluid						
sidewalks						
grit						
brush						
parking lots						
blade						
deep snow						
grader						
compact						



3. Complete the crossword.



1. A vehicle used to lay hot asphalt on roads, bridges, etc.
2. A special vehicle that spreads grit, sand or salt on the roads when they are covered with ice.
3. The frame of a vehicle, usually including the wheels and engine, onto which the metal covering is fixed.
4. Sprays heated de-icing fluid onto icy road surfaces, airport runways.
5. Winter service vehicles are usually based on a dump _____ chassis.
6. A path with a hard surface that people walk on.
7. A street _____ is a vehicle for summer road maintenance.
8. _____.

8A. MOBILE CRANE

1. Read the words and learn them by heart.

sheave – шкив

cast iron – чугун

truck-mounted crane – автомобильный кран

rough terrain crane – вездеходный кран

undercarriage – ходовое устройство

outriggers – аутригеры, выносные опоры

to mount – устанавливать

floating crane – плавучий кран



Sheave



2. Read and translate the text to learn more about cranes and their types.

Mobile crane

A crane is a type of machine, generally equipped with a hoist rope, wire ropes or chains, and sheaves, that can be used

both to lift and lower materials and to move them horizontally. It is mainly used for lifting heavy things and transporting them to other places.

The first known construction cranes were invented by the Ancient Greeks and were powered by men or draft animals, such as donkeys. These cranes were used for the construction of tall buildings. In the Middle Ages, harbour cranes were introduced to load and unload ships and assist with their construction – some were built into stone towers for extra strength and stability. The earliest cranes were constructed from wood, but cast iron, iron and steel took over with the coming of the Industrial Revolution.

The earliest steam crane was introduced in the 18th or 19th century, remaining in use into the late 20th century. Modern cranes usually use internal combustion engines or electric motors and hydraulic systems to provide a much greater lifting capability than was previously possible.

Cranes exist in a variety of forms and sizes. The basic types are mobile and fixed cranes. Mobile cranes are subdivided into truck mounted, rough-terrain, crawler, and floating.



Truck-mounted crane

they provide great mobility. Outriggers extend vertically or horizontally to level and stabilize the crane while working.

A rough terrain crane is a crane that is mounted on an undercarriage with four rubber tires, designed for operations off road. This type also has outriggers. These cranes are ideal for constructions sites that have uneven, dirt and rocky terrain.



Rough terrain crane



Crawler crane

A crawler crane has its boom mounted on an undercarriage fitted with crawler tracks that provide both stability and mobility. The main advantage of a crawler crane is its ready mobility and use, since the crane is stable on its tracks without outriggers. Wide tracks spread the weight out over a great area and are far better than wheels. A crawler crane is also capable of traveling with a load. Floating cranes are used mainly in bridge building and port construction.

Source: [https://en.wikipedia.org/wiki/Crane_\(machine\)](https://en.wikipedia.org/wiki/Crane_(machine))

3. Choose the correct answer (multiple correct answers are possible).

1. A crane is equipped with _____.
 - a) a ripper;
 - b) a hoist rope;
 - c) a blade;
 - d) sheaves.
2. Cranes are used to _____.
 - a) dig an excavation;
 - b) level the site;
 - c) lift heavy things.
3. The first known construction cranes were invented in _____.
 - a) Ancient Greece;
 - b) Ancient Rome;
 - c) Ancient Egypt.
4. Which of the following cranes has outriggers?
 - a) truck mounted crane;
 - b) rough-terrain crane;
 - c) crawler crane;
 - d) floating crane.
5. _____ used mainly in bridge building.
 - a) truck mounted crane;
 - b) rough-terrain crane;
 - c) crawler crane;
 - d) floating crane.

4. Put ✓ for true and ✗ for false statements.

1. The boom of a rough terrain crane is mounted on an undercarriage fitted with crawler tracks.
2. Rough terrain cranes are ideal for construction sites that have uneven, dirt and rocky terrain.
3. A crawler crane can travel with a load.
4. The basic types are mobile and fixed cranes.
5. Harbour cranes were introduced in the 20th century.

5. Match the words and their definitions.

1. outrigger	a. a grooved wheel for holding a belt, wire rope, or rope
2. crane	b. a long extending beam used to lift or carry something
3. sheaves	c. support extending out from a crane
4. crawler crane	d. a hoop of iron or rubber around the wheel of a vehicle
5. boom	e. machine used to lift and lower materials and to move them horizontally
6. tire	f. the framework that supports the body of a vehicle
7. undercarriage	g. the boom of this machine is mounted on an undercarriage fitted with crawler tracks that provide stability and mobility

6. Match the English words and word combinations on the left with their Russian equivalents on the right.

1. lifting capacity	a. каменистая местность
2. mounted	b. грузоподъёмность
3. donkey	c. чугун
4. wood	d. доминировать
5. take over	e. установленный
6. fitted with	f. под управлением
7. powered by	g. осел
8. heavy	h. тяжёлый
9. rocky terrain	i. древесина
10. cast iron	j. оснащённый

7. Find more information about a floating crane and discuss in groups.



Floating crane

8. Translate the text about the crawler cranes.

Существует вид кранов, который перемещается на гусеничном шасси – гусеничный кран. Конечно, доставлять такой

Facts In Brief

кран – достаточно трудоемкая задача, но гусеничный кран оправдывает затраты. С его помощью можно достичь большей высоты подъема и гусеничный кран обладает большой грузоподъемностью. Работают гусеничные краны, как от дизель-электрического агрегата, так и от электрической сети. В конструкцию гусеничных кранов включено большое количество различного оборудования, что повышает производительность и мощность этих кранов. Транспортировка гусеничного крана происходит при помощи специального транспорта.



8B. FIXED CRANE

1. Read the words and learn them by heart.

mast – мачта

slewing unit – поворотная часть

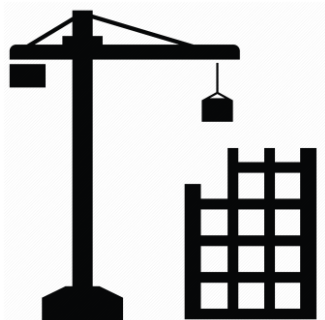
jib – балочная стрела

articulated arm – шарнирная рука,
шарнирная консоль

hook – крюк

counterweight – противовес, балласт крана

counter-jib – стрела противовеса



2. Read and translate the text to learn more about fixed cranes.

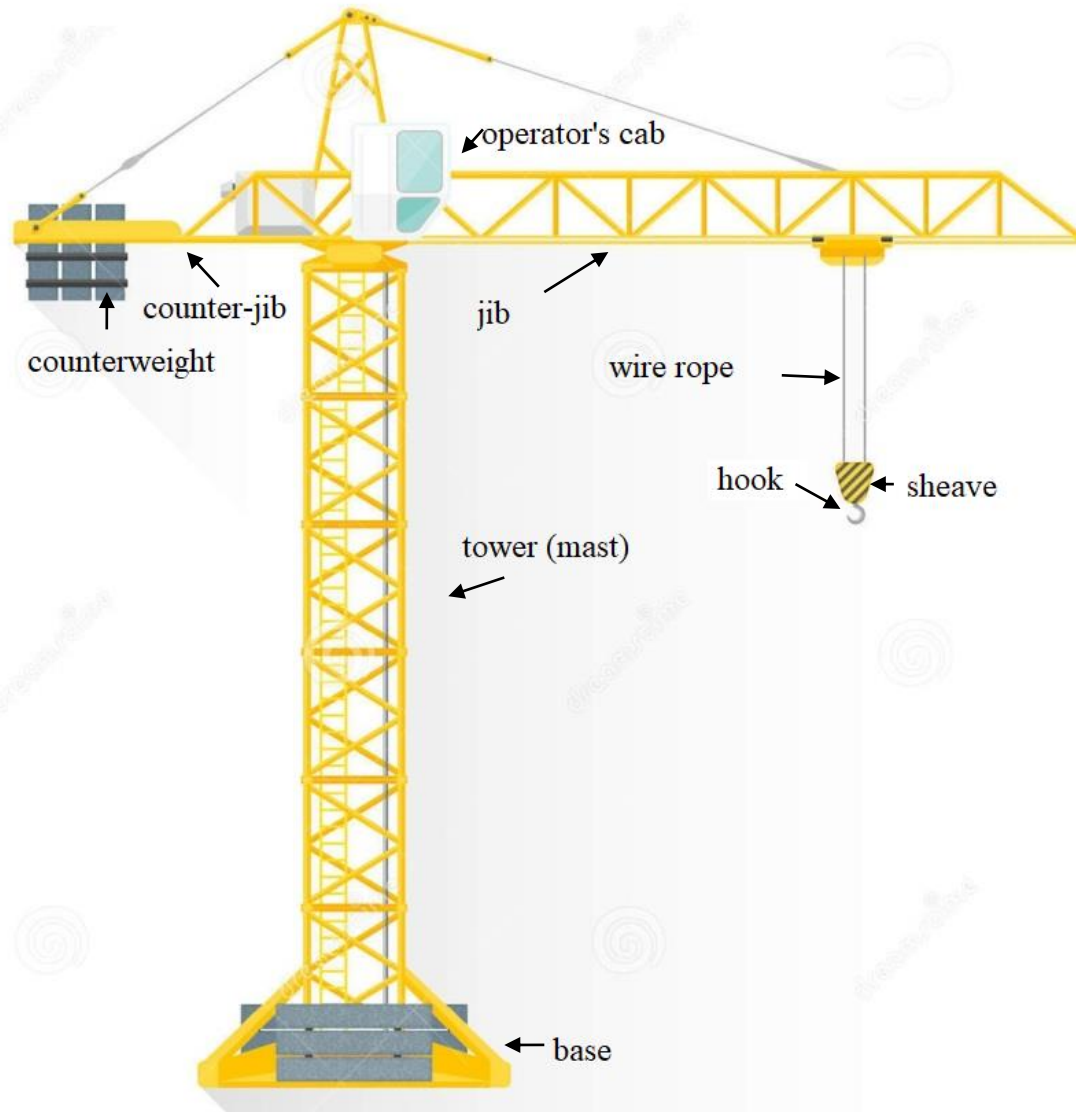
Fixed crane

Fixed types of cranes are characterised by the fact that their main structure does not move during the period of use. However, many can still be assembled and disassembled. The structures are fixed in one place. Tower cranes are fixed to the ground on a concrete slab. Tower cranes often give the best combination of height and lifting capacity and are used in the construction of tall buildings. The base is attached to the mast which gives the crane its height. Further, the mast is attached to the slewing unit that allows the crane to rotate. On top of the slewing unit there are three main parts which are: the long horizontal jib, shorter counter-jib, and the operator's cab.

The long horizontal jib is the part of the crane that carries the load. The counter-jib carries a counterweight, usually of concrete blocks, while the jib suspends the load to and from the center of the crane. The crane operator either sits in a cab at the top of the tower or controls the crane by radio remote control from the ground. In the first case the operator's cab is most usually located at the top of the tower. The lifting hook is operated by the crane operator using electric motors to manipulate wire rope through a system of sheaves. The hook is located on the long horizontal jib to lift the load.

Tower cranes are used extensively in construction and other industry to hoist and move materials. There are many types of tower cranes depending on its base, tower type and jib.

Source: [https://en.wikipedia.org/wiki/Crane_\(machine\)](https://en.wikipedia.org/wiki/Crane_(machine))



Tower crane

3. Answer the following questions.

1. What is the difference between fixed and mobile cranes?
2. In what construction are tower cranes used?
3. What does a counter-jib carry?
4. How is the lifting hook operated?
5. What parts are located on the top of the slewing unit?

4. Give English equivalents of the following words and word combinations.

Дистанционное радиоуправление, подвешивать, разгрузка, бетонная плита, высота, период использования, высокие здания.

5. Complete the sentences about tower cranes.

1. Tower cranes give the best combination of _____.
2. The crane operator sits _____.
3. The hook is located _____.
4. A counterweight is usually made of _____.
5. Tower cranes are fixed to the ground _____.

6. Look at the picture of a tower crane and try to explain the function of the following parts.

jib	
operator's cab	
hook	
tower	
counterweight	
counter-jib	
wire rope	



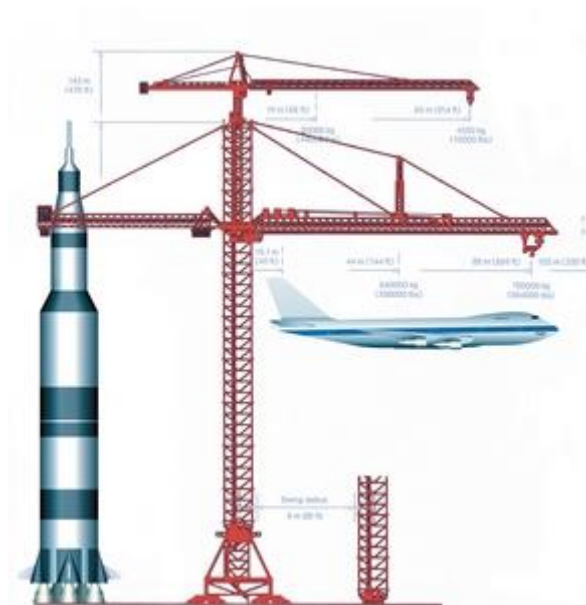
7. Compile as many words as you can with the letters of the word.

COUNTERWEIGHT

8. Translate the text about the biggest tower crane in the world.

Башенные краны, размещаемые как на земле, так и на самом сооружении, способны поднимать материалы на значительную высоту и подавать грузы в любую точку здания.

Facts In Brief



Kroll K-10000

80-х гг. Несмотря на это, отдельные экземпляры продолжают использовать в ряде стран мира, и каждый из них имеет свою собственную богатую историю.

Среди рекорсменов в ряду башенных кранов значится Kroll K-10000 – машина, ставшая уже исторической. Эти краны используются не в строительстве домов, а в энергетическом строительстве, в основном, при возведении атомных электростанций. Высота конструкции из двух (основного и вспомогательного) кранов – 143 метра.

Производство K-10000 было остановлено после прекращения строительства атомных станций в конце

8C. LOADER

1. Read the words and learn them by heart.

front loader – фронтальный погрузчик

pivot point – шарнирный узел

skid loader – погрузчик с бортовым поворотом

backhoe loader – экскаватор-погрузчик

lift arms – рычаг подъема

trenches – траншеи



2. Read and translate the text to learn more about loaders.

Loader

A loader is a machine often used in construction, primarily used to load material (asphalt,

dirt, snow, gravel, etc.) into another type of machine, such as a dump truck.

There are many types of loaders depending on design and application. A loader is not the most efficient machine for digging as it cannot dig very deep below the level of its wheels.

A loader is a type of tractor, usually wheeled, sometimes on tracks, that has a front square wide bucket connected to the end of two booms to take loose material from the ground, and move it from one place to another without pushing the material across the ground.



Front loader

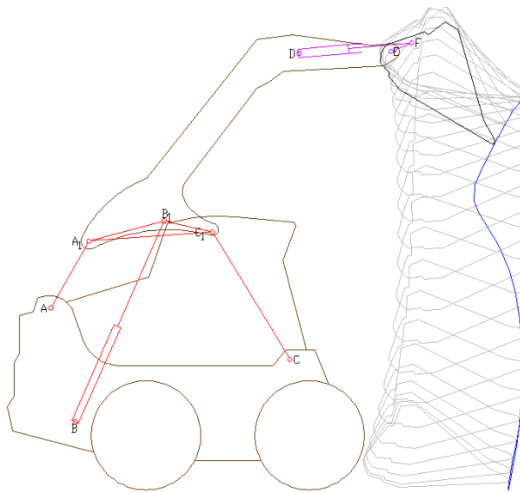
Tracked loaders are successful where sharp edged materials would damage rubber wheels, or where the ground is soft and muddy. Wheels provide better mobility and speed and do not damage paved roads as much as tracks.

Front loaders are commonly used to remove snow especially from sidewalks, parking lots, and other areas too small for using other heavy equipment.

Unlike in a front loader, a skid loader has the lift arms alongside the driver with the pivot points behind the driver's shoulders. The main peculiarity of a skid loader is that the left-side drive wheels can be driven independently of the right-side drive wheels.

Because of the operator's proximity to moving booms, early skid loaders were not as safe as front loaders during entry and exit of the operator. Modern skid loaders have fully enclosed cabs and other features to protect the operator. Like other front loaders, it can push

material from one location to another, carry material in its bucket or load material into a truck or trailer.



Skid loader



Backhoe loader

Backhoe loaders are very similar to tractors with a slight difference: they have a shovel in front of the equipment and a small bucket in the back of the loader used for digging. Backhoe loaders are considered medium-sized construction equipment for smaller jobs, and with limited space to perform the operations. They can move dirt, dig trenches and place smaller pipes into place. One of the

best attributes of backhoe loaders is that they have tires and can be used in urban areas. The bucket in the back can be modified using different attachments.

Sources: [https://en.wikipedia.org/wiki/Loader_\(equipment\)](https://en.wikipedia.org/wiki/Loader_(equipment))

<https://www.thebalancesmb.com/must-have-earth-moving-construction-heavy-equipment-844586>

3. Give English equivalents of the following words and word combinations.

Закрытая кабина, самосвал, широкий ковш, заостренный, резиновое колесо, строительная техника средних размеров, рыхлый материал.

4. Answer the following questions.

1. What is the function of a loader?
2. What is the advantage of a tracked loader?
3. What is the difference between a backhoe loader and a tractor?
4. What is the function of a front loader?
5. What is the advantage of a backhoe loader?
6. Why skid loaders were not safe?
7. What is the function of a skid loader?

5. Combine the given words into sentences. Translate them into Russian.

1. in, bucket, Backhoe, a, back, loaders, have, the.
2. has, arms, driver, A, skid, lift, the, alongside, the, loader.
3. speed, and, provide, Wheels, mobility, better.
4. move, trenches, Backhoe, can, loaders, dirt, dig, and.
5. loaders, of, There, application, on, types, design, depending, are, and, many.

6. Here are some words but the letters are mixed up. Fill in the table:

Letters	Correct word	Translation
obehack		
napitiplcao		
ramtleia		
nerstech		
bitmyoli		

7. Translate the text about some facts about loaders.

Погрузчики были изобретены во времена Первой мировой войны. Больше стали развиваться уже во времена Второй мировой войны. Все из-за недостатка рабочей силы.

Facts In Brief

По типу двигателей погрузчики можно разделить на бензиновый, дизельный, электрический и газовый.

Фронтальные погрузчики имеют большой ковш, который подходит для таких стройматериалов, как: гравий, песок, щебень, а также снег. Фронтальные погрузчики используются при строительстве дорог.

Экскаваторы-погрузчики также очень популярны, ведь такая техника способна не только погрузить груз, но и выкопать яму и доставить его до места назначения. Интересным фактом является то, что ковш у фронтального погрузчика гораздо больше, чем у обычного экскаватора, в зависимости от модификации объем ковша составляет от 0,3 до 36 м3.



8. Compile as many words as you can with the letters of the word.

CONSTRUCTION

8D. DUMP TRUCK

1. Read the words and learn them by heart.

dump truck – самосвал

open-box bed – открытый кузов

hydraulic piston – гидравлический поршень

low center of gravity – низкий центр тяжести

off-highway dump truck – внедорожный самосвал

articulated hauler – сочлененный самосвал

all-wheel drive – полноприводный

collision – столкновение

ground clearance – клиренс, дорожный просвет

to dump – опрокидывать, разгружать



2. Read and translate the text to learn more about dump trucks.

Dump truck

A dump truck (UK dumper truck) is a truck used for transporting material (such as sand, gravel or dirt) to construction site. A typical dump truck is equipped with an open-box bed, which has hydraulic pistons to lift the front, allowing the material in the bed to be dumped on the ground behind the truck at the site of delivery. Many winter service vehicles are based on dump trucks. A dump truck has a variety of configurations each designed to do a specific task in the construction material supply.



Dump truck

Off-highway dump trucks are heavy construction equipment. Bigger off-highway dump trucks are used for mining or in situations where large amounts of aggregate need to be transferred. Their big size and heavy load make them ideal for off-road situations (rough terrain) and they are among the best when transferring for long distances. They can handle loads up to 60 tons.

An articulated hauler is an all-wheel drive off-road dump truck. Together with all-wheel drive and low center of gravity, it is highly adaptable to rough terrain. Major manufacturers include Volvo CE, Terex, John Deere and Caterpillar.

Dump trucks are normally built for off-road or construction site driving; as the driver is protected by the chassis and height of the driver's seat, bumpers are either placed high or omitted for added ground clearance. The disadvantage is that in a collision with a standard car, the motor section goes under the



Off-highway dump truck

truck. Thus, the passengers in the car could be more severely injured than would be common in a collision with another car. Several countries have made rules that new trucks should have bumpers approximately 40 cm above ground in order to protect other drivers.

Source: https://en.wikipedia.org/wiki/Dump_truck

3. Answer the following questions.

1. What is a dump truck?
2. What is a dump truck equipped with?
3. What are off-highway dump trucks used for?
4. What vehicles are based on dump trucks?
5. What is an articulated hauler?
6. How is a driver protected in the dump truck?
7. What rules did several countries make?

4. Complete the sentences about dump trucks.

1. Off-highway dump trucks are _____.
2. _____ make them ideal for off-road situations (rough terrain).
3. Major manufacturers of an articulated hauler include _____.
4. The disadvantage is that _____.
5. Together with _____ an articulated hauler is highly adaptable to rough terrain.

5. Give English equivalents of the following words and word combinations.

Определенная задача, поставка строительных материалов, серьезно пострадавший, столкновение с другой машиной, высота сидения водителя, приблизительно, неровный грунт, защищать других водителей, разработка поелзных ископаемых.

6. Circle the odd word.

1.	open-box bed	collision	chassis	bumper
2.	vehicle	grader	loader	bulldozer
3.	sand	gravel	dirt	air
4.	wheels	driver	open-box bed	cab
5.	articulated hauler	dump truck	off-highway dump truck	mining

7. Translate the text about the history of dump trucks.

В Советском Союзе первые самосвалы начали производить в 1935 году на Ярославском автозаводе. Эта модель могла перевозить 3.5

тонны и передвигаться со скоростью до 40 км/ч. Кузов был деревянный.

Спустя некоторое время отечественные разработчики создали самосвал для широкого использования в процессе строительных работ на дорожно-строительных площадках. И появилась новая модель самосвала, оснащенная гидравлическим приводом, что делало возможным самостоятельную разгрузку путем автоматического откидывания кузова. Однако эта модель не сразу стала популярной из-за дороговизны.



First Soviet dump truck

Facts In Brief

Во второй половине XX века самосвалы были чрезвычайно популярны. В СССР они выпускались на Саранском заводе и Мытищинском машиностроительном заводе. Но и сегодня два этих завода остаются главными производителями этого вида грузовиков в Российской Федерации.

8

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

skid loaders, cast iron, dump truck, backhoe loaders, outriggers, tower cranes

- _____ carries asphalt to the construction site.
- _____ are fixed on the ground on a concrete slab.
- _____ are very similar to tractors.
- Early _____ were not safe during entry and exit of the operator.
- A crawler crane is stable on its tracks without _____.
- The earliest cranes were constructed from wood, but _____ and steel took over with the coming of the Industrial Revolution.

2. Complete the chart with ✓ or ✗.

Elements	Machinery		
	Crane	Loader	Dump truck
counter-jib			
open-box bed			
hook			
bucket			
operator's cab			
jib			
wire rope			
wheels			
tower (mast)			
outriggers			

3. Discuss with your group-mates modern companies producing road building machinery. Make a presentation about one of the companies and create a new commercial for it.

4. Translate the following sentences using the vocabulary of Unit 8.

1. Самосвалы используются, чтобы транспортировать асфальт на строительную площадку.
2. Автомобильные краны могут передвигаться по грунтовым дорогам.
3. Экскаватор-погрузчик сочетает в себе свойства двух видов спецтехники – фронтального погрузчика и экскаватора.
4. Внедорожные самосвалы используются на открытой разработке полезных ископаемых.
5. Так как колеса левой и правой стороны приводятся в движение отдельными моторами, погрузчик с бортовым поворотом может поворачиваться практически на «одной точке».
6. Первые советские башенные краны были изготовлены в 1936 году.



5. Find all the words related to Unit 8 (direction of letters – ↕ and →) and give their translation.

T	O	W	E	R	D	U	M	P	T	R	U	C	K
R	U	N	D	E	R	C	A	R	R	I	A	G	E
M	J	K	O	U	T	R	I	G	G	E	R	S	H
O	I	B	O	L	O	A	D	E	R	B	E	D	O
O	B	A	T	R	E	N	C	H	E	S	A	P	O
B	A	C	K	H	O	E	B	U	C	K	E	T	K

EXAMINATION TEXT.

ROAD BUILDING MACHINERY

1. Read and translate the text which summarizes all the information about road-building machinery.

Equipment used in road construction is an important factor in road location and design. Road construction equipment has gone through advancements in recent decades and all of them have been directed towards improving speed, quality, ensure safe work sites and benefit of every worker. The main advantage is that today's machines pave a lot more road in less time. It has also helped to cut costs down.

Road construction equipment is used to construct not only highways, but also bridges, airports and even multi-story buildings. The majority of road construction equipment is wheeled or tracked. Depending on the functions performed, road-building machines are divided into the following groups:

1. **Machinery for pre-construction activities** such as root-pullers, rippers, etc.
2. **Earth-moving equipment** is used to move earth, dig foundations, etc. The main types of earth-moving equipment are bulldozers, excavators, scrapers, graders, etc.

A **bulldozer** is a crawler equipped with a blade used to push soil, sand, rubble, and other materials during construction work and typically equipped at the rear with a ripper to loosen densely compacted materials.

A **scraper** is a machine that can move dirt and aggregates within the site easily. It is used in large open areas where they can run at higher speeds. The rear part has a vertically moveable bowl with a sharp horizontal front edge. When the bowl is lowered, the front edge cuts into the soil and fills the bowl. When the bowl is full it is raised, and closed with a vertical blade – apron.

An **excavator** is used to dig or move large objects. There are crawler and wheel excavators. An excavator consists of a boom, dipper arm (or stick), bucket and cab on a rotating platform. The cab can rotate a full 360 degrees.

A **grader** is a construction machine with a long blade used to create a flat surface. Graders can also be equipped with a ripper, blade or compactor.

3. **Road work machinery** includes milling machines, pavers and rollers.

Pavement milling is the process of removing a part of the surface of a paved area such as a road, bridge, etc. Milling is performed by **milling machines**. These machines use a large rotating drum to remove and grind the road surface.

A **paver** is used to lay hot asphalt on roads, bridges, etc. The asphalt is delivered into the paver's hopper. The material flow is regulated by the conveyor and the auger. The auger places the material in front of the screed. The screed takes the material and distributes it over the width of the road and provides initial compaction.

A road **roller** is used to compact soil, concrete, gravel, crushed stone or asphalt in the construction of roads. They rely on their weight to compress the surface they are working on. The most common types are vibratory rollers, pneumatic tire rollers, etc.

4. **Lifting machinery.** A **crane** is used for lifting heavy things and transporting them to other places. The basic types are mobile and fixed cranes. A truck-mounted crane is a mobile crane which can travel on highways. Fixed types of cranes do not move during the period of use. Tower cranes are used in the construction of tall buildings. The mast is attached to the slewing unit that allows the crane to rotate. On top of the slewing unit there are three main parts which are: the long horizontal jib, shorter counter-jib, and the operator's cab.

A **loader** is used to load material (asphalt, dirt, snow, gravel, etc.) into another type of machine, such as a dump truck. A loader has a front square wide bucket connected to the end of two booms to take loose material from the ground, and move it from one place to another without pushing the material across the ground.

A **dump truck** is a truck used for transporting material (such as sand, gravel or dirt) to construction site. A dump truck is equipped with an open-box bed, which has hydraulic pistons to lift the front, allowing the material in the bed to be dumped on the ground. Many winter service vehicles are based on dump trucks.

2. Choose the correct answer (multiple correct answers are possible).

1. A paver is _____.
 - a) lifting machinery;
 - b) road work machinery;
 - c) earth-moving machinery.
2. A hopper is a part of _____.
 - a) a scraper;
 - b) a grader;

c) a paver.

3. Tower crane is a _____ type of cranes.

a) mobile;

b) fixed;

c) truck mounted.

4. A road roller is used to _____.

a) transport material;

b) compact soil, concrete, gravel, etc.;

c) remove a part of the surface of a paved area.

3. Look at the parts of road building machinery and say what machine has these parts.

bucket	
auger	
apron	
hook	
cab	
blade	
counter-jib	
conveyor	
ripper	
ejector	
boom	
open-box bed	
screed	
jib	
hoist rope	
drum	
hopper	
outriggers	
bowl	

4. Look at the pictures and name the machinery.



1. _____



2. _____



3. _____



4. _____



5. _____



6. _____



7. _____



8. _____



5. Look at the words given below. Write down any seven words or word-combinations from the list. Listen to the teacher calling out words from the list in random order in Russian. If you hear one of your words, cross it out. The first student to cross out all five of his words or word-combinations calls out “BINGO” and reads out the words to prove his claim.

bulldozer	milling machine	roller	scarper	excavator
tower crane	bucket	tracked	truck mounted crane	wheel
blade	loader	dump truck	operator’s cab	grader
paver	vehicle	ripper	boom	concrete mixer
sidewalk	crusher	rope	asphalt	drum

9

ROAD SAFETY.

9A.WHAT IS ROAD SAFETY

1. Read the words and learn them by heart.

Road traffic safety – дорожная
безопасность

Human fallibility – человеческая
погрешность

Road network – дорожная сеть

To injure - поранить, пострадать

Pedestrian – пешеход

Cyclist – велосипедист

Motorcyclist – водитель мотоцикла

To reduce – сокращать

Steering – рулевой механизм

Sight distance – расстояние видимости

Human tolerance – предельная устойчивость человека (переносимость человека)

On-road public transport – наземный
общественный транспорт

Failure – неудача, провал, *здесь*: поломка

Crash – авария, столкновение

Road design – проектирование дороги

To provide – обеспечивать

Vehicle – автотранспортное средство

Speed – скорость

Roadside clear zone – обочина

To relate to – относить, относиться к

Lack of – нехватка чего-то

2. Read and translate the text to learn more about road traffic safety.

Road traffic safety



Road traffic safety refers to methods and measures for reducing the risk of a person using the road network being killed or seriously injured. The users of a road include pedestrians, cyclists, motorcyclists, their passengers, and passengers of on-road public transport, mainly buses and trams.

Traffic safety has been studied as a science for more than 75 years. Best-practice road safety strategies focus upon the prevention of serious injury and death crashes in spite of human fallibility. Safe road design is now about providing a road environment which ensures vehicle speeds will be within the human tolerances for serious injury and death wherever conflict points exist.

Other factors contributing to highway crashes may be related to the driver (such as driver error, illness, or fatigue), the vehicle (brake or steering failures), or the road itself (lack of sight distance, poor roadside clear zones, etc.). Interventions may seek to reduce or compensate for these factors, or reduce the severity of crashes.

Sources: https://en.wikipedia.org/wiki/Road_traffic_safety

3. Answer the following questions.

1. How long has traffic safety existed as a science?
2. What is road safety?
3. What does road safety design provide?
4. What categories of road users do you know?
5. What are the main reasons of highway crashes?

4. Put ✓ for true and ✗ for false statements.

1. Well-maintained roadside clear zone is one of the reasons for car crash.
2. One of the important factors of safe road design is providing appropriate speed limit.
3. Animals are considered as road users.
4. Road safety provides measures for vehicles not to get into potholes.
5. Traffic safety has been a science for 75 years.
6. The driver cannot cause a car crash.
7. Vehicle speed limit must be within animal tolerance.
8. Road users include cyclists and pedestrians.

5. Give antonyms to the following words.

1. brake	a. increase
2. sight distance	b. underground public transport
3. lack of	c. speed
4. to reduce	d. bad visibility
5. on-road public transport	e. plenty

6. Match the word or phrase with the picture.



1.

a) Cyclist



2.

b) Car crash



3.

c) Motorcyclist



4.

d) On-road public transport



5.

e) Road network



6.

f) Pedestrian



7.

g) Vehicle



8.

h) Roadside clear zone



9.

i) Steering

7. Match the word and the definition

1. road traffic safety	a. buses, trains etc. that everyone can use
2. road network	b. the equipment in a car, bicycle, or other vehicle that you use for slowing down or stopping
3. pedestrian	c. the parts of a vehicle that allow you to control its direction
4. on-road public transport	d. to give someone something that they need
5. roadside clear zone	e. a machine, usually with wheels and an engine, used for

	transporting people or goods on land, especially on roads
6. sight distance	f. someone who is walking, especially in a town or city, instead of driving or riding
7. failure	g. the area at the edge of a road
8. steering	h. how fast something moves
9. brake	i. methods and measures for reducing the risk of a person using the road network being killed or seriously injured
10. vehicle	j. a lack of success in achieving or doing something
11. speed	k. the system of roads
12. to provide	l. how far you can see on the road

8. Write an essay (150 words) on the following topic:

Is road safety important and what measures of road safety do you personally take?

9. Translate the following text about the influence of the road type to the road safety.

Facts In Brief

На простейшей дороге с одной полосой движения в каждую сторону велика вероятность самых тяжелых аварий, например, лобовых столкновений при обгоне или выезде на встречную полосу по причине неисправности автомобиля или потери контроля со стороны водителя, из-за нездоровья или засыпания. Однако следует заметить, что интенсивность дорожного движения на таких дорогах, как правило, невелика.

Конструкция дороги, исключая появление людей или животных на проезжей части, резко снижает вероятность столкновений с ними. В первую очередь это касается автомагистралей, на которых исключены пешеходные переходы в одном уровне с проезжей частью.

Оборудование перекрестков светофорами снижает вероятность столкновения автомобилей пересекающихся направлений и упрощает переход проезжей части пешеходами.

9B. TRAFFIC ENGINEERING

1. Read the words and learn them by heart.

Traffic engineering – организация движения

Traffic engineer – инженер-транспортник

Direction – направление

To aid – помогать, способствовать

Designation – обозначение, разграничение

One-way street – улица с односторонним движением

Lighting – освещение

Responsibility – ответственность

Fall within the province – входить в компетенцию

Traffic stream – транспортный поток

Accident – авария, несчастный случай

Hourly pattern – часовой расчет интенсивности движения

Dual highway – двухполосная дорога

Median – разделительная полоса

Head-on collision – лобовое столкновение

Sideswipe accident – боковое столкновение

Curb-parking – стоянка у тротуара

Traffic lane – полоса движения

Roadway – дорожное полотно

Vehicular traffic – движение транспорта

Pedestrian traffic – пешеходное движение

Pavement markings – разметка на покрытии (дорог)

Traffic markers – дорожные указатели

Sign – знак

Off-centre lane – центральная разделительная полоса

Integration – слияние, сведение воедино

Assign – назначать, поручать

Traffic volume – интенсивность движения

Arterial route – магистральная дорога

Ordinance – постановление

Right-of-way – полоса отвода дороги

2. Read and translate the text to learn more about the job of traffic engineer.

Traffic engineering

Traffic engineering deals with the direction and control of vehicular and pedestrian traffic on existing highways and streets. Thus it is concerned with the planning, design, and operation of all devices that aid traffic flow. Among these are pavement markings, traffic markers, signs, and traffic signals. Traffic engineering also deals with means for improving the efficiency of the existing system by the designation of arterial routes and one-way streets, and by controlling the use of these and other facilities. The integration of street and highway lighting



into the over-all highway plan generally is considered a traffic engineering responsibility too. Parking likewise falls within the province of the traffic engineer because of the impact that parking problems have on street and highway operation.

The scope of aspects the traffic engineer deals with: traffic characteristics, traffic regulations, traffic-control devices, and environmental improvements. Traffic characteristics include such aspects as: physical factors, traffic volume, volume counting, speed characteristics, traffic stream flows, accidents, vehicular limitations and human characteristics.



As for traffic volume, the traffic engineer must be acquainted with some volume characteristics: hourly pattern, day-of-week variation, classification of vehicles, trends in volumes and the methods of volume counting. Traffic regulations cover traffic laws and ordinances, various types of traffic controls: speed control and curb-parking control. Traffic-control devices consist of traffic signs, markings, signals, islands and street and highway lighting.

Traffic regulations contribute to safety and decrease accidents. A most favourable effect on efficiency and the incidence of traffic accidents is dual highway. A dual highway separates opposite-direction traffic by a median divider. The separation of opposite-direction traffic by a median reduces the possibility of head-on collisions and sideswipe accidents. The width of the dual highway is varied for reasons of topography. Of necessity, the dual highway has not less than four traffic lanes. This number is efficient for traffic safety, because the driver has only one car alongside to watch.

Although the traffic engineer is concerned primarily with the traffic regulation and control, he must take into account the roadway elements, because sometimes, traffic-engineering functions are expanded to deal with problems in geometric design and highway planning.

3. Answer the following questions.

1. What does traffic engineering deal with?
2. What is traffic engineers assigned?
3. What falls within the province of the traffic engineer?
4. What do traffic characteristics include?

5. What are traffic volume characteristics?
6. What do traffic regulations cover?
7. What does traffic engineer supervise?
8. What do traffic-control devices consist of?
9. What is the role of traffic regulation?
10. What must every traffic engineer take into account?

4. Finish the sentences.

1. Traffic engineering deals with ...
2. It is concerned with ...
3. Traffic engineering usually are assigned ...
4. Traffic characteristics include ...
5. Traffic engineer must be acquainted with some volume characteristics ...
6. Traffic regulations cover various types of traffic controls ...
7. Traffic-control devices consist of ...
8. Traffic regulations contribute to ...
9. Traffic engineer must take into account ...

5. Match the English word with its Russian translation.

1. hourly pattern	a. интенсивность движения
2. off-centre lane	b. полоса отвода дороги
3. right-of-way	c. центральная разделительная линия
4. one-way street	d. часовой расчет интенсивности движения
5. traffic volume	e. пешеходное движение
6. arterial route	f. движение транспорта
7. vehicular traffic	g. разметка на покрытии дороги
8. traffic markers	h. дорожные указатели
9. pavement markings	i. магистральная дорога
10. pedestrian traffic	j. улица с односторонним движением

6. Using information from the text find the odd word in each line.

1. planning, design, operation, cleaning of all devices that aid the flow of traffic;
2. physical factors, traffic volume, speed characteristics, traffic stream flows, automobile characteristics, accidents, vehicular limitations, human characteristics;
3. hourly pattern, day-of-week variation, parking problems, classification of vehicles, trends in volumes, the methods of volume counting;
4. traffic laws and ordinances, speed control, traffic signs, curb-parking control.

7. Translate the text from English into Russian using dictionary.

Safety policy

The continuing acquisition and analysis of accident statistics confirm great need to reduce accidents. A potential overall reduction is

Facts In Brief

possible with road environment features: improvements at road junctions and intersections provide major opportunities for accident savings. On current sections the use of rumble strips and edge lining seems to improve driver's behaviour. A check on driving in foggy conditions shows that drivers reduce speed but not down to that indicated to them on signs.

To study drivers' behaviour in fog in relation to vehicle speed and visibility, equipment was installed on a dual 3-lane motorway during the winter which photographed vehicles from the rear and recorded their speed. A fog detector was used to switch on the equipment when the visibility dropped below 200 m and all vehicles in a selected lane passing the equipment at more than 8km/h were then photographed.

The results show that drivers did not reduce speed a great deal until visibility dropped to 100-150 m. At 50 m visibility, although speeds were substantially lower, more than half the drivers were exceeding the speed at which they could stop within this visibility distance.

8. Prepare a speech for 1.5 minutes describing the work of traffic engineer: its difficulties and interesting sides.



9

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

road design, head-on collision, pedestrians, failure, sideswipe accident, right-of-way, sight distance, curb-parking, traffic volume, on-road public transport

1. Steering _____ can cause a car crash.
2. If there are no cars in the _____ you may start overtaking (обгонять).
3. The _____ should be very well thought and carefully implemented.
4. _____ includes buses, trams and trolley-buses.
5. When crossing the road _____ should first look to the left and then to the right.
6. _____ includes roadside clear zone, inner slope, outer slope and other parts.
7. _____ is a very dangerous type of car crashes.
8. To count _____ you need to know hourly pattern.
9. If a driver moves from one traffic lane to another without looking around there can be a _____.
10. In some narrow one-way streets _____ is forbidden.

2. Translate the following sentences using the vocabulary of Unit 9.

1. Если соблюдать правила безопасности дорожного движения, можно значительно сократить число аварий.
2. При аварии пострадал водитель мотоцикла.
3. Процесс проектирования дороги должен быть хорошо продуман, чтобы обеспечить город хорошей дорожной сетью.
4. Он неожиданно нажал на тормоз (hit the brake pedal) и остановился на обочине.
5. Поломка транспортного средства привела к аварии, в которой пострадал водитель.
6. Предотвращение аварии – дело, как водителя, так и пешехода.
7. Разделительная полоса помогает избежать лобового столкновения.
8. Чем больше город, тем выше интенсивность движения на дорогах.
9. Магистральная дорога не может быть улицей с односторонним движением.
10. Лобовое столкновение гораздо более опасно, чем боковое.

11. Плохое дорожное покрытие и отсутствие освещения стали причиной аварии, в которой пострадал пешеход.
12. Инженер-транспортник несет ответственность за спроектированную им схему дорожного движения.
13. Движение транспорта осуществляется по двухполосной дороге.
14. Ориентируясь по дорожным указателям, ты легко найдешь дорогу до университета.
15. Если дорога очень узкая, то стоянка у тротуара запрещена.

3. GAME TIME. Compile as many words as you can with the letters of the word.

TRAFFIC ENGINEERING



10

ROAD TRAFFIC SAFETY IN BUILT-UP AREAS

10A. TRAFFIC SAFETY MEASURES IN BUILT-UP AREAS

1. Read the words and learn them by heart.

built up area – застроенная городская территория

traffic circle – круговой перекресток;

intersection - перекресток

collision - столкновение

traffic flow – транспортный поток

shared space – общее пространство

carriageway – проезжая часть дороги

footway – пешеходная дорожка; тротуар

Fused Grid – здесь: объединенная сеть

loop – разворот в форме петли

dead-end street – тупиковая улица

shortcut – короткий путь, сокращение дороги

safety barrier – защитное ограждение

to absorb – поглощать; впитывать

impact energy – энергия удара

bystander – *здесь*: прохожий

siderail – *здесь*: боковое ограждение

to anchor – закреплять

to skewer – пронзить

light pole – осветительный столб

road sign – дорожный знак

road pattern – дорожная схема

2. Read and translate the text to learn more about measures of traffic safety.

Traffic safety measures in built-up areas

Road safety in built up areas is extremely important because exactly here many vulnerable road users, such as pedestrians and bicyclists can be found. Let's consider some measures to improve road trafficsafety in such areas.

1) A **traffic circle** applied to a four-way intersection. This device, with a proven record of collision reductions and traffic flow improvement, turns the cross-intersection into four virtual three-way intersections.



2) **Mini-traffic circles** implanted in normal intersections have been shown to reduce collisions at intersections dramatically.

3) **Shared space schemes**, which rely on human instincts and interactions, such as eye contact, and are characterized by the removal of traditional traffic signals and signs, and even by the removal of the distinction between carriageway (roadway) and footway (sidewalk), are also becoming increasingly popular.

4) **Fused Grid**. These layout models organize a neighbourhood area as a zone of no cut-through traffic by means of loops or dead-end streets. They also ensure that pedestrians and bicycles have a distinct advantage by introducing exclusive shortcuts by path connections through blocks and parks.

5) Modern **safety barriers** are designed to absorb impact energy and minimize the risk to the occupants of cars and bystanders. For example, most side rails are now anchored to the ground, so that they cannot skewer a passenger compartment. Most light poles are designed to break at the base rather than violently stop a car that hits them. Some road fixtures such as signs and fire hydrants are designed to collapse on impact. Authorities have removed trees in the vicinity of roads. Safety barriers can provide some combination of physical protection and visual protection depending on their environment. Physical protection is important for protecting sensitive buildings and pedestrian areas. Visual protection is necessary to alert drivers to changes in road patterns.



Source: https://en.wikipedia.org/wiki/Road_traffic_safety#Built-up_areas

3. Answer the following questions

1. What kinds of vulnerable users can you meet in built up areas?
2. What happens to the four-way intersection if a traffic circle is applied?
3. What is a shared scheme?
4. How does the shared scheme differ from usual traffic safety scheme?
5. What means are used in a fused grid to organize the area?
6. What is the purpose of safety barriers?
7. Why are safety barriers anchored to the ground?
8. What other measures are taken to prevent car occupants and bystanders from being hurt by the road environment?

9. How is safety barriers visual protection provided?
10. What is physically protected by safety barriers?

4. Put ✓ for true and ✗ for false statements.

1. Built up area is a remote, empty place with little number of road users.
2. Traffic circle is not very useful measure for traffic safety improvement.
3. Shared spaces represent an area with many traffic signs and other means of traffic regulation.
4. Mini-traffic circles decrease the amount of car crashes dramatically.
5. There are special safety barriers in the shared spaces.
6. Fused grid provides special walkways for cyclists and pedestrians.
7. In fused grids traffic safety is provided by non-signalised intersections.
8. The purpose of safety barriers is to absorb impact energy.
9. Visually safety barriers warn drivers about the changes in road direction.
10. Hydrants and road signs are anchored to the ground for them not to break in case of collision.

5. Match the word and the definition.

1. shared space	a. a road or passage from which no exit is possible
2. carriageway	b. take up and reduce the effect or intensity
3. dead-end street	c. a street network pattern
4. impact energy	d. the part of a road intended for vehicles rather than pedestrians
5. to absorb	e. the total number of vehicles passing a given point in a given time
6. to anchor	f. an urban design approach that minimises the segregation between modes of road user
7. Fused Grid	g. secure firmly in position
8. traffic flow	h. the amount of energy necessary to destroy something

6. Give synonyms to the following words

1. intersection	
2. collision	
3. carriageway	
4. footway	

5. side rail	
6. roadside clear zone	

7. Match the word and the picture and explain what the word means



1.

a) built up area



2.

b) traffic circle



3.

c) intersection



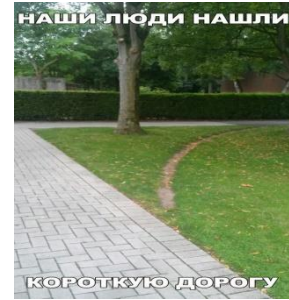
4.

d) dead-end street



5.

e) light pole



6.

f) road sign



7.

g) shortcut



8.

h) carriageway



9.

i) footway

8. Translate the article to learn more about shared space scheme.

Термин «общее пространство» придумал Тим Фароа по отношению к неписаным законам улиц, на которых нет



разметки. Позднее термин распространился на сходные концепции улиц, перекрёстков и площадей. Цель общего пространства – повысить безопасность дорожного движения, заставляя участников осознанно выбирать скорость и направление движения, руководствуясь простейшими правилами.

В концепции общего пространства отмечается, что дороги становятся безопаснее при уменьшении количества правил благодаря компенсации риска: «Общее пространство успешно потому, что понимание риска становится средством и даже необходимым условием для повышения безопасности дорог. Потому что, когда ситуация кажется опасной, люди всегда начеку и меньше попадают в аварии».

9. GAME TIME. Connect letters vertically or horizontally and find 8 words from the vocabulary.

F	Q	W	B	A	R	R	I	E	R
O	R	E	G	S	T	R	E	E	T
O	T	R	A	F	F	I	C	T	Y
T	C	O	L	L	I	S	I	O	N
W	U	I	O	P	A	S	D	F	A
A	R	O	A	D	G	S	H	F	B
Y	J	K	L	Z	X	I	C	L	S
A	N	C	H	O	R	G	V	O	O
B	N	M	Q	W	E	N	R	W	R
D	E	A	D	E	N	D	T	Y	B

Russian translation will help you.

1. тротуар	
2. ограждение	
3. закреплять	
4. поглощать	
5. тупиковая улица	
6. столкновение	
7. транспортный поток	
8. дорожный знак	

1. Read the words and learn them by heart.

oncoming traffic – встречный транспорт

road surface marking – дорожная разметка

rear-end collision – наезд сзади

counter measure – контрмера

roundabout – круговой перекресток

segregation – разделение

kerb – бордюр

built environment – окружающая среда

города

traffic light – светофор

regulations – правила

vibrancy – динамизм

negotiation – переговоры, обсуждение

fatalities – гибель, смертельный случай

conventional – традиционный

device – устройство

casualty rate – количество несчастных

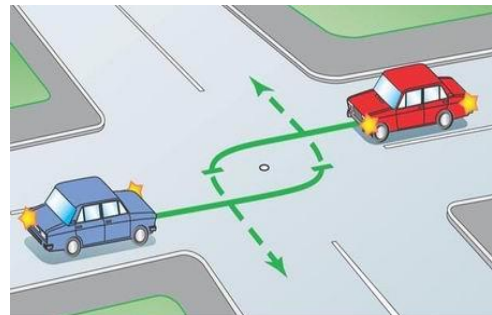
случаев

2. Read and translate the text to learn more about traffic safety on the city roads.

Traffic safety on the city roads

Turning across traffic

Turning across traffic (i.e. turning left in right-hand drive countries, turning right in left-hand drive countries) causes several risks. The more serious risk is a collision with oncoming traffic. Since this is nearly a head-on collision, injuries are common. It is the most common cause of fatalities in a built-up area. Another major risk is involvement in a rear-end collision while waiting for a gap in oncoming traffic.



Countermeasures for this type of collision include addition of left turn lanes, converting conventional intersections to roundabouts. In the absence of these facilities a turning driver should do the following:

- Keep your wheels straight, so that in the event of a rear end collision, you are not pushed into on-coming traffic.
- When you think it is clear, look away, to the road that you are entering. There is an optical illusion that, after a time an oncoming vehicle is further away and travelling slower. Looking away breaks this illusion.

Shared spaces

Shared space is an urban design approach that minimises the segregation between modes of road user. This is done by removing features such as kerbs, road surface markings, traffic signs, and traffic lights. Traffic engineers have suggested that, by creating a greater sense of uncertainty and making it unclear who has



priority; drivers will reduce their speed, in turn reducing the dominance of vehicles, reducing road casualty rates, and improving safety for other road users.

The goal of shared space is to improve the road safety and vibrancy of roads and junctions, particularly ones with high levels of pedestrian traffic, by encouraging negotiation of priority in shared areas between different road users. Traffic engineers suggested that an individual's behaviour in traffic is more positively affected by the built environment of the public space than by conventional traffic control devices and regulations.

Sources: https://en.wikipedia.org/wiki/Road_traffic_safety#Turning_across_traffic
https://en.wikipedia.org/wiki/Road_traffic_safety#Shared_space

3. Answer the following questions.

1. What is turning across traffic?
2. What kinds of risks can it cause?
3. What measures can be taken to prevent rear end collision?
4. What should the driver turning across do before entering the road? Why?
5. What differs shared space from a usual street?
6. Who regulates the traffic rules in the shared space?
7. Why is shared space effective from the point of view of traffic engineers?
8. What is the shared space goal?

4. Put ✓ for true and ✗ for false statements.

1. Turning across traffic is as safe as turning along traffic.
2. Collision with oncoming traffic is usually a head-on collision.
3. In shared spaces there are safety barriers, kerbs and road surface markings.
4. Shared space creates the sense of uncertainty in road users.

5. Drivers increase speed in shared spaces.
6. Additional lanes for left turn help to prevent head-on collision.
7. The wheel should be kept diagonally when a driver is turning across.
8. A driver can have optical illusion when he looks at the oncoming traffic for a long time.

5. Combine the given words into sentences. Translate them into Russian.

1. collision, suddenly, stops, Rear-end, a driver, when, happen, may.
2. flows, regulate, to, Road-surface, helps, traffic, marking.
3. to, a kerb, In, it, is, drive, the built environment, forbidden, on.
4. follow, rate, users, if, traffic, road, regulations, all, Casualty, reduces, regulations.
5. vehicular, on, lights, regulate, pedestrian, the intersections, Traffic, traffic, and.
6. helps, prevent, to, Roundabout, jams, traffic.
7. were, on, a, Negotiations, successful, construction, of, road, new.

6. Give English equivalents to the following words and word combinations.

Круговой перекресток, устройство, встречный транспорт, смертельный случай, бордюр, светофор, дорожная разметка, наезд сзади, правила, количество несчастных случаев.

7. Translate the article to learn more about roundabouts.

Круговой перекресток – это перекресток, где приближающиеся транспортные средства замедляются и начинают круговое движение

Facts In Brief

вокруг центрального «острова» в направлении против часовой стрелки на дорогах с правосторонним движением либо по часовой стрелке на дорогах с левосторонним движением, до выезда на одном из поворотов (ответвлений) с кругового перекрестка.

Такой перекресток обычно не оборудован светофорами и является нерегулируемым. В этом случае приоритет движения транспортных средств может определяться установленными дорожными знаками и/или дорожной разметкой, а также другими правилами проезда перекрестков.

8. Think about advantages and disadvantages of traffic safety measures suggested in the unit. Make up some of your own.

1. Read the words and learn them by heart.

vulnerable – уязвимый

to aim – стремиться

desire line – протоптанная тропинка,
«народная тропа»

pedestrian crossing – пешеходный переход

sidewalk – тротуар

chicane – крутой поворот

underpass – подземный уличный переход

over-bridge – путепровод, *здесь:*
надземный переход

speed hump – лежащий полицейский

to alter – изменять

road layout – проектирование трассы
дороги

retard – замедленный

cognitive load – познавательная нагрузка

speed limit – ограничение скорости

curb extension – расширение тротуара

traffic calming – замедление скорости
(«успокоение») дорожного движения

2. Read and translate the text to learn more about traffic safety measures for pedestrians and cyclists.

Designing for pedestrians and cyclists

Pedestrians and cyclists are among the most vulnerable road users and in some countries constitute over half of all road deaths. Interventions aimed at improving safety of non-motorised users are:

- sidewalks of suitable width for pedestrian traffic;
- pedestrian crossings close to the desire line which allow pedestrians to cross roads safely;
- segregated pedestrian routes and cycle lanes away from the main highway
- over-bridges (tend to be unpopular with pedestrians and cyclists due to additional distance and effort);
- underpasses (these can pose heightened risk from crime if not designed well, can work for cyclists in some cases)
- traffic calming and speed humps (Traffic calming uses physical design and other measures to improve safety for drivers, pedestrians and cyclists. It aims to encourage safer, more responsible driving and potentially reduce traffic flow. Engineering measures involve



speedhump

physically altering the road layout or appearance to actively or passively retard traffic by increasing the cognitive load of driving, in other words, making driving more difficult. Measures include speed humps, chicanes, curb extensions, and shared space type schemes).



cycle lane

- low speed limits that are rigorously enforced, possibly by speed cameras;
- shared space schemes giving ownership of the road space and equal priority to all road users, regardless of mode of use;
- pedestrian barriers to prevent pedestrians crossing dangerous locations;

- cycling infrastructure;
- protected intersection.

Successful pedestrian schemes tend to avoid over-bridges and underpasses and instead use at-grade crossings (such as pedestrian crossings) close to the intended route. Successful cycling schemes by contrast avoid frequent stops even if some additional distance is involved, because cyclists expend more energy when starting off.

3. Answer the following questions.

1. What are the most vulnerable road users? Why?
2. How should pedestrian crossing be located?
3. Why are over-bridges not so popular among pedestrians?
4. What kind of risk do underpasses cause?
5. What are the traffic calming measures?
6. What are the aims of traffic calming?
7. What are the successful cycling schemes?
8. What is used instead of over-bridges and underpasses?
9. How are low speed limits controlled?
10. Why do we need pedestrian barriers?

4. Put ✓ for true and ✗ for false statements.

1. Pedestrians and cyclist are very dangerous for drivers?
2. In some countries the greatest amount of deaths on the road are animals.

3. Pedestrian crossings should be close to the places where people want to cross the street.
4. Cycle lanes should go along the main highway.
5. Underpasses should be well-lit in order to prevent crimes.
6. Traffic calming measures are aimed at helping traffic move faster.
7. Traffic calming measures are speed humps, chicanes and curb extension.
8. The driver decides himself if he should follow the low speed limit or not.
9. Shared space says that pedestrians on road are more important than drivers.
10. It is better to organize over-bridges and underpasses for pedestrians to cross the road safely.

5. Match English words and word combinations on the left with their Russian equivalents on the right.

1. desire line	a. крутой поворот
2. sidewalk	b. уязвимый
3. speed hump	c. стремиться
4. curb extension	d. проектирование трассы дороги
5. speed limit	e. протоптанная тропинка
6. chicane	f. познавательная нагрузка
7. to aim	g. лежащий полицейский
8. vulnerable	h. ограничение скорости
9. cognitive load	i. расширение тротуара
10. road layout	j. тротуар

6. Find the odd word in each line and say what unites the rest. Make up a sentence with any word from each line.

1. sidewalk, pavement, carriageway, footway.
2. speed hump, highway, chicane, curb extension.
3. road surface marking, over-bridge, underpass, pedestrian crossing.
4. desire line, shortcut, path, road.
5. roundabout, intersection, dead-end street, traffic circle.



7. Match the word and the picture and explain what the word means



1.

a) Pedestrian crossing



2.

b) Speed hump



3.

c) Over-bridge



4.

d) Chicane



5.

e) Speed limit



6.

f) Underpass



7.

g) Desire line



8.

h) Rear-end collision



9.

i) Traffic light

8. Are you a law-abiding pedestrian? Think and fill in the table saying what pedestrian should and shouldn't do.

YES	NO



10

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

traffic calming, vulnerable, desire line, rear-end collision, traffic light, regulations, safety barriers, road surface marking, roundabout, speed limit

1. Animals are especially _____ to the traffic because they don't know where it is safe to cross the road.
2. In spite of the fact that there is a sidewalk people still use a _____ to cut their way to the bus stop.
3. If the driver doesn't keep the appropriate distance there is a risk of _____.
4. At the intersection without a _____ road users must be especially careful.
5. Cyclists must follow the _____ and get off the bike when they cross the road on a pedestrian crossing.
6. _____ protect vehicle users from falling down to the side ditch in case of collision.
7. Segregation of a carriageway is done with the help of _____.
8. _____ helps to reduce the number of car crashes because drivers decrease speed before obstacles.
9. In the built-up areas drivers must especially careful in following the _____.
10. At the _____ the priority goes to the drivers who move in the circle.

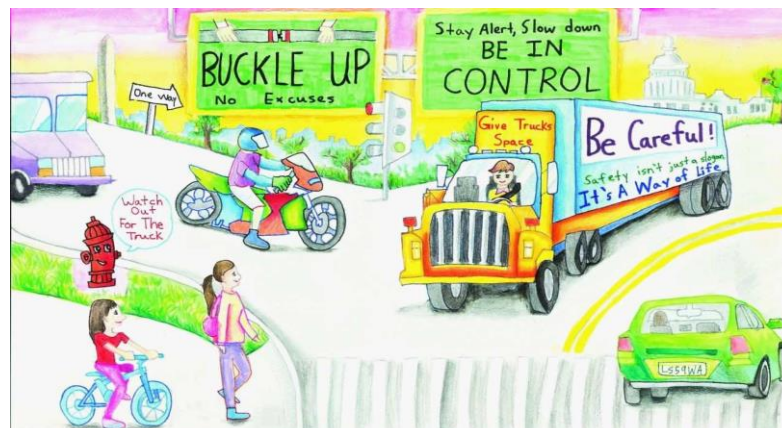
2. Translate the following sentences using the Vocabulary of Unit 10.

1. Инженер-транспортник должен стремиться к созданию безопасной и комфортной транспортной схемы города.
2. Количество несчастных случаев на дорогах сократилось, благодаря применению мер замедления скорости дорожного движения.
3. Несмотря на плотный транспортный поток, пробки не образовались.
4. Проезжая часть дороги состоит из четырех полос: двух в одну сторону и двух в другую.

5. Камеры на дорогах используются в качестве устройства, фиксирующего скорость транспортных средств.
6. Светофоры на традиционных перекрёстках помогают регулировать транспортные потоки.
7. Если воитель резко останавливается, есть риск наезда сзади.
8. В общем пространстве пешеходы и водители имеют равные права.
9. При повороте налево необходимо пропустить встречный транспорт.
10. Ник не знал дорогу, поэтому заехал на тупиковую улицу.
11. Защитные ограждения на дороге поглощают энергию удара, образовавшуюся при столкновении.
12. Заезжать на бордюр запрещено.
13. Лежачих полицейских часто устанавливают около школ и детских садов, чтобы заставить водителей снизить скорость.
14. Надземный переход снижает нагрузку на перекресток по сравнению с наземным пешеходным переходом.
15. Перед крутым поворотом обязательно устанавливают специальный знак, чтобы водитель успел вовремя снизить скорость.

3. GAME TIME. Compile as many words as you can with the letters of the word.

NEGOTIATION



11

TRAFFIC SIGNS

1. Read the words and learn them by heart.

traffic (road) sign – дорожный знак

milestone – камень с указанием расстояния
в милях, мильный камень

intersection – перекресток, пересечение

directional arm – *здесь*: указатель

sheet aluminium – листовый алюминий

to enhance – увеличивать

cast iron – чугун

fingerpost – указательный столб на
развилке дорог

adhesive coating – клейкое покрытие

metric standard – эталон единицы
измерительной системы

visibility – видимость

to set into – вставлять, вмонтировать

measurement system – система измерения

retro-reflective – светоотражающий

metric distance – метрическое расстояние

coating – покрытие

Major international traffic signs:

Right bend – опасный поворот направо	Roadwork ahead – дорожные работы
double bend – извилистая дорога	Slippery road – скользкая дорога
Stop at intersection – проезд без остановки запрещен	Railroad crossing – железнодорожный переезд со шлагбаумом
Roadway narrows – сужение дороги	Deer crossing – дикие животные
No entry – въезд запрещен	Steep hill – крутой спуск / крутой подъем
No U-turn – разворот запрещен	Passing prohibited – обгон запрещен
Bumps – неровная дорога / искусственная неровность	Closed to trucks – движение грузовых автомобилей запрещено
Direction to be followed – обязательное направление движения	Closed to pedestrians – движение пешеходов запрещено
One-way traffic – одностороннее движение	Passing prohibited – обгон запрещен
Yield – уступите дорогу	Customs – таможня
Priority intersection – примыкание второстепенной дороги	Oncoming vehicles priority – преимущество встречного движения
Minimum safety space – ограничение	Sound signals prohibited – подача

минимальной дистанции	звукового сигнала запрещена
Overhead clearance – ограничение высоты	Falling rocks – падение камней
Signal ahead – регулируемое пересечение	End of all bans – конец всех ограничений
School zone – дети	Facilities for handicapped – инвалиды
Pedestrian crossing – пешеходный переход	No parking – стоянка запрещена
Mandatory right turn ahead – обязательный поворот (направо)	Stopping and parking prohibited – остановка запрещена
Snow chains obligatory – цепи противоскольжения обязательны	Garage – техническое обслуживание автомобилей
No through road – тупик	

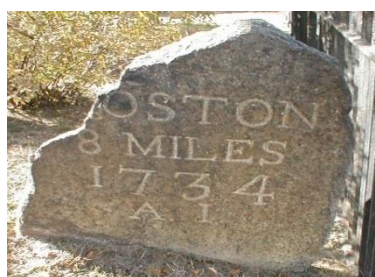
2. Read and translate the text and learn more about road signs.

Road signs

Traffic signs or road signs are signs erected at the side of or above roads to give instructions or provide information to road users. The earliest road signs were milestones, giving distance or direction; for example, the Romans erected stone columns throughout their empire giving the distance to Rome.



In the Middle Ages, multidirectional signs at intersections became common, giving directions to cities and towns.



The first modern road signs erected on a wide scale were designed for riders of high or “ordinary” bicycles in the late 1870s and early 1880s. With traffic volumes increasing since the 1930s, many countries have adopted pictorial signs or otherwise simplified and standardized their signs to overcome language barriers, and enhance traffic safety. Such pictorial signs use symbols in place of words and are usually based on international protocols. Such signs were first developed in Europe, and have been adopted by most countries to varying degrees. Pre-industrial signs were stone or wood. In the late 18th and 19th centuries painted cast iron became popular. Since 1945 most signs have been made from sheet aluminium with adhesive plastic coatings, these are normally retro-reflective for night-time and low-light visibility. Before the development of reflective plastics, reflectivity was provided by glass reflectors set into the lettering and symbols.

New generations of traffic signs based on electronic displays can also change their text (or, in some countries, symbols) to provide for “intelligent control” linked to automated traffic sensors.

Traffic signs can be grouped into several types. For example, Annexe 1 of the Vienna Convention on Road Signs and Signals (1968), which on 30 June 2004 had 52 signatory countries, defines eight categories of signs:

- A. Danger warningsigns
- B. Priority signs
- C. Prohibitory or restrictive signs
- D. Mandatory signs
- E. Special regulation signs
- F. Information, facilities, or service signs
- G. Direction, position, or indication signs
- H. Additional panels



Units

Distances on traffic signs generally follow the measurement system in use by the country. Most US road signs use miles or feet, although the Federal Department of Transportation has developed metric standards for all signs. The United Kingdom signs also display distances in miles. Elsewhere, metric distances are in very wide use, though not universal.

Languages

Where signs use a language, the recognized languages of the area is normally used. Signs in most of the US, Canada, Australia, and New Zealand are in English. Quebec uses French, while, in Montreal and some other Canadian provinces use both English and French, a territory of the US, Mexico, and Spain use Spanish. Within a few miles of the US–Mexico border, road signs are often in English and Spanish in places like San Diego.

Source: http://en.wikipedia.org/wiki/Traffic_sign

3. Answer the following questions.

1. What is a road sign?
2. What were early road signs made of?
3. When did multidirectional signs become common?
4. Why did pictorial signs appear?
5. What material was used for road signs in 18th and 19th centuries?

6. What were road signs like in XX century?
7. What categories of signs do you know?
8. What measurement systems are used for road signs?
9. Who has developed the metric standards for all signs?
10. What languages are used for road signs?

4. Put ✓ for true and ✗ for false statements.

1. Greeks were first to introduce milestones.
2. In Stone Age multidirectional signs became common to show directions to country borders.
3. First modern road signs were created for bicycles.
4. With the development of water transport there was a necessity to introduce understandable road signs.
5. Pictorial signs use words to give information.
6. Modern signs were made retroreflective for them to be well seen in the day-time.
7. There are eight common categories of road signs.
8. Meter is used all over the world as the measurement of distance on road signs.
9. Each country uses its national language to give information on road signs.
10. Most US road signs use miles or feet as a measurement system.

5. Find the odd word in each line and say what unites the rest. Make up a sentence with any word from each line.

1. cast iron	sheet aluminium	stone	glass
2. measurement system	Metric standard	mandatory sign	metric distance
3. traffic (road) sign	directional arm	fingerpost	direction
4. visibility	traffic volume	road quality	retro-reflective
5. roadwork ahead	right bend	roadway narrows	no parking
6. passing prohibited	no U-turn	yield	falling rocks

6. Give English equivalents of the following words and word combinations.

Предписывающий дорожный знак, перекресток, преодолеть языковой барьер, отражающая пластмасса, дорожные знаки с электронным дисплеем, видимость в ночное время, увеличить дорожную безопасность, запрещающие и ограничивающие

знаки, знаки, предупреждающие об опасности, система измерения, графические знаки, новое поколение дорожных знаков, чугун.

7. Match the words with their definitions.

1. sheet aluminium	a. tables at the side of or above roads to give instructions or provide information to road users
2. traffic volume	b. the number of cars on the road
3. visibility	c. to give someone something that they need
4. measurement system	d. a type of hard iron that will not bend easily and is made into shapes by being poured into a mould when melted
5. road sign	e. a chemical element that is a light, silver-coloured metal, having a form of thin flat plate
6. cast iron	f. the amount of space between two places
7. distance	g. how clearly objects can be seen, or how far you can see clearly, usually because of the weather conditions
8. to provide	h. a set of units of measurement which can be used to specify anything

8. Make up a Power Point presentation about strange road signs.



UK: Deer



Sweden: Elk

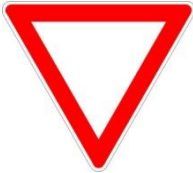


Australia: Kangaroo

9. Match the image of the road sign with its name.

right bend, passing prohibited, one-way, yield, pedestrian crossing, deer crossing, stopping and parking prohibited, garage, no entry, parking

1. _____



2. _____



3. _____



4. _____



5. _____



6. _____



7. _____



8. _____



9. _____



10. _____



11

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

road signs, intersection, traffic volume, retro-reflective, sheet aluminum, visibility, distance, stone and wood, mandatory sign, prohibitory signs

1. _____ were used as materials for first road signs.
2. If the _____ on the road is bad you should be very careful while driving.
3. Road signs may be done of _____.
4. _____ are necessary to regulate traffic flows.
5. In Russia the _____ between cities is usually given in kilometres.
6. To avoid car accidents it is better to place a traffic-light at the road _____.
7. _____ tells us how to behave on the road.
8. _____ say what is not allowed to do on the road.
9. Nowadays cars become more available and _____ increases.
10. Road signs must be _____ for them to be well seen at night.

2. Translate the following sentences using the vocabulary of Unit 11.

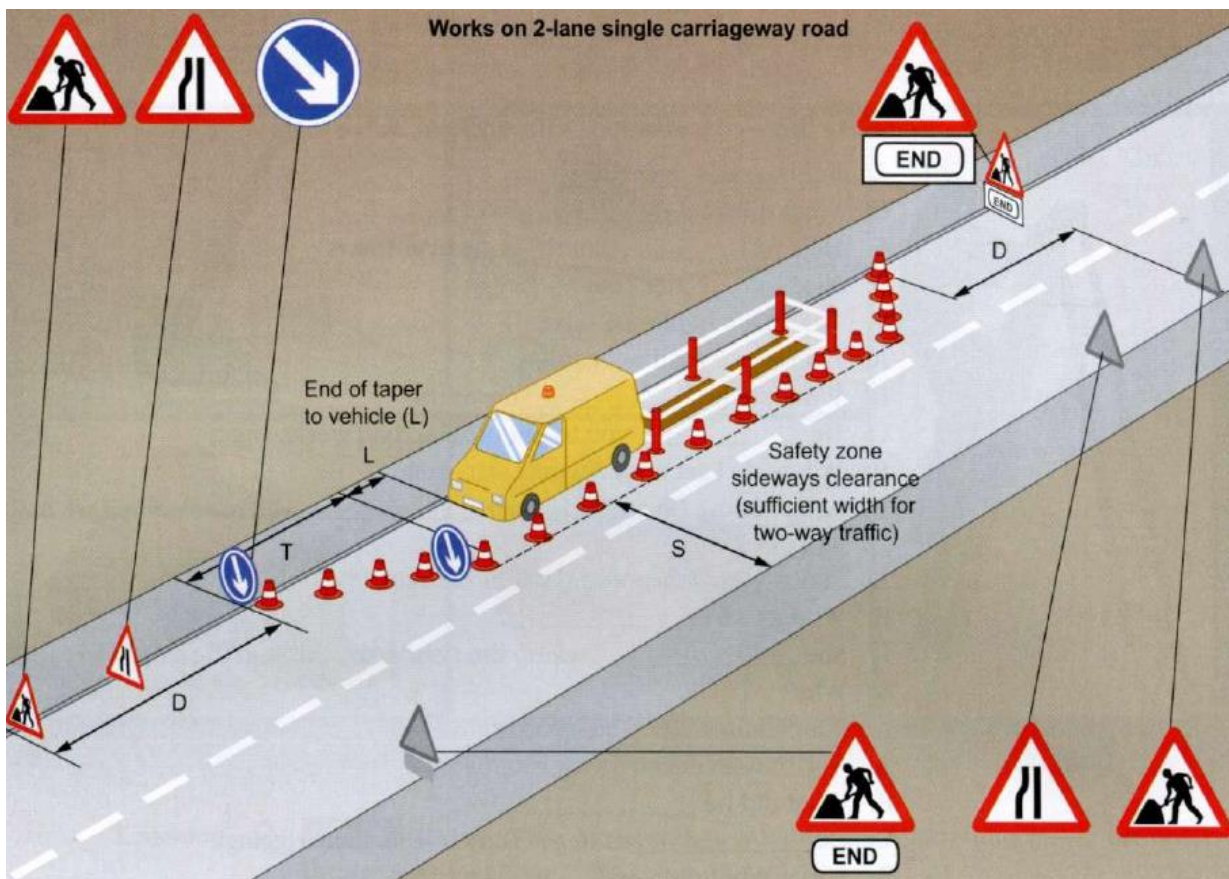
1. Дорожные знаки обеспечивают безопасность дорожного движения.
2. Римляне ставили столбы-указатели, чтобы показать расстояние до Рима.
3. В туман видимость ухудшается.
4. В деревне еду готовят в чугунных горшках.
5. Дети должны носить одежду со светоотражающими элементами, чтобы быть хорошо заметными на дороге.
6. Предписывающие дорожные знаки – это одностороннее движение, пешеходный переход и т.д.
7. Листовой алюминий – легкий многофункциональный материал.
8. С каждым годом машин в Казани становится больше, и интенсивность движения сильно увеличивается.
9. Указательный столб на развилке дорог показывает направление и расстояние.
10. Увидев знак «пешеходный переход», водитель должен снизить скорость и пропустить пешеходов.

11. Дорожные знаки служат источником информации для участников дорожного движения.
12. В центре города стоянка запрещена.
13. Первые дорожные знаки были созданы для велосипедистов.

3. Discuss in groups road traffic regulations in Russia. Are they necessary? What would you like change?

4. Look at the illustration from the UK Department for Transport road safety guidelines. Label it with the words given below.

barrier, "end of road works" sign, hazard, "keep right" sign, kerb, lane, "road narrows ahead" sign, "road works" sign, single carriageway, traffic cone, vehicle.



FrendoE.English for construction 2/ Pearson Education Limited, 2012. – P. 63.

12

ROAD SURFACE MARKING

1. Read the words and learn them by heart.

uniformity – единообразие

cat's eyes – дорожный световозвращатель
«кошачий глаз»

to mount – устанавливать

rubber – резина, каучук

housing – установка

fore – вперед

aft – назад

Botts' dots – точки Боттса

эпоху – эпоксидная смола

HOV (high-occupancy vehicle) lane – полоса
для автомобилей с пассажирами

rumble strips – предохранительная полоса

retro-reflectivity – ретроотражение,
световозвращающее отражение

crossing – перекресток

to assist – помогать

striper – машина для нанесения разметки

drum – цилиндр

to warn – предупредить

stop bar – стоп линия

pylon – дорожный конус

snow plow – снегоочиститель

2. Read and translate the text to learn more about the basic types of road surface markings.

Road surface markings

Road surface marking is a kind of device or material used on a road surface in order to convey official information. They can also be applied to mark parking spaces or areas for other uses.

Road surface markings provide guidance and information to drivers and pedestrians. Uniformity of the markings is an important factor in minimizing confusion about their meaning. However, countries and areas categorize and specify road surface markings in different ways.

Road surface markings can be mechanical, non-mechanical, or temporary.

Mechanical devices may be raised into the road surface. They are either reflective or non-reflective. Most are permanent; some are movable.



Cat's eyes equip most major routes in the British Isles. They consist of four reflective lenses mounted in durable white rubber housing, two facing fore and two facing aft. The lenses are available in a variety of different colours, mainly white, yellow, orange, green, red and blue.

Botts' dots are round non-reflective raised pavement markers named after California Department of Transportation engineer Elbert Botts, who invented the epoxy that keeps them glued down. Generally they are used to mark the edges of traffic lanes often together with reflective raised pavement markers. They are used only in warm climates since snow plows usually remove them along with the snow.



A *rumble strip* is usually either applied in the direction of travel along an edge- or centerline to alert drivers when they drift from their lane, or in a series across the direction of travel to warn drivers of a stop ahead or nearby danger spot. In favorable circumstances rumble strips are effective (and cost-effective) at reducing accidents due to inattention.

Reflective markers are used as lane dividers to mark the central reservation. They are typically more visible at night than standard road marking lines. The color of markers varies depending on the country of use. Reflective markers are also referred to as raised pavement markers. In the United Kingdom and elsewhere, raised markers are used to mark crossings to assist the blind in crossing streets. In colder climates reflective markers may be installed below ground.



Non-mechanical markers

Paint is generally used to mark traffic lanes, spaces in parking lots or special purpose spaces for disabled parking. Colours for these applications vary by locality. Paint is usually applied right after the road has been paved. The road is marked commonly by a truck called a “striper”. These trucks contain hundreds of gallons of paint stored in huge drums. The markings are controlled manually or automatically by the controller.

Thermoplastic is one of the most common types of road marking. The main advantages of thermoplastic are durability and retro-reflectivity. Most thermoplastic is produced in white and yellow colours.

Plastic is used to mark crossroads, stop bars, and traffic guidance such as turn lanes, train crossings, pedestrian crossings, taxi lanes, bus and bike lanes.

Pylons are sometimes used to separate HOV lanes from regular traffic lanes.

Source: http://en.wikipedia.org/wiki/Road_surface_marking

3. Answer the following questions.

1. What is the function of road surface marking?
2. Why is uniformity of markings important?
3. What types of markings are distinguished?
4. What type of mechanical devices is used on major routes in the British Isles?
5. Why are Bott's dots called so?
6. Why aren't Bott's dots used in cold climates?
7. Where is a rumble strip applied?
8. What is function of reflective markers?
9. What is function of raised markers in the UK?
10. What non-mechanical markers do you know?
11. What are the advantages of thermoplastic?
12. What type of road surface markings do you think the most common in your country?

4. Put ✓ for true and ✗ for false statements.

1. All countries have uniform markings.
2. Road surface markings provide official information.
3. There are only non-reflective mechanical markers.
4. Cat's eyes consist of six lenses mounted in durable white paint.
5. Elbert Botts invented a rumble strip.
6. Bott's dots are used together with reflective markers.
7. Non-reflective markers are also referred to as raised pavement markers.
8. In cold climates reflective markers are installed below ground.
9. A striper is a machine which marks the road surface.

10. Most thermoplastic is produced in red and white colours.
11. Paint is used to mark traffic lanes, spaces in parking lots or special spaces for disabled parking.
12. Reflective markers are more visible at night than standard road marking lines.

5. Find the odd word in each line and say what unites the rest. Make up a sentence with any word from each line.

1. Bott's dots	Uniformity	cat's eyes	rumble strip
2. mechanical	non-mechanical	temporary	route
3. striper	Pedestrian	driver	bicyclist
4. paint	Plastic	thermoplastic	confusion
5. bus lane	pedestrian crossing	turn lane	durability

6. Give English equivalents of the following words and word combinations.

Предоставить официальную информацию, единообразие разметок, отражающие линзы, разнообразие различных цветов, края полос движения, вместе со снегом, при благоприятных обстоятельствах, снижение несчастных случаев, разделитель полосы движения, более заметный, место для парковки, сотни галлон, контролироваться вручную, один из самых распространенных типов разметки, пешеходный переход.

7. Translate the article to learn more about types and colours of road surface marking.

Виды и цвета современной разметки

Facts In Brief

Разметка может быть постоянной или временной.

Для постоянной разметки во всех странах используется белая краска. Исключение составляет постоянная желтая разметка, обозначающая места остановки маршрутных транспортных средств и такси, а также места, где запрещена остановка или стоянка.

Временная разметка может наноситься краской желтого (Германия, Эстония), оранжевого или красного (Австрия, Швейцария) цвета и используется при ремонтных работах и реорганизации дорожного движения. При наличии одновременно постоянной и временной разметки, необходимо руководствоваться временной. Наносится она

обычно недолговечной краской, которая к завершению ремонтных работ стирается сама или удаляется дорожными службами.

Для улучшения видимости разметки часто используются светоотражающие материалы. В ряде случаев для привлечения внимания используется шумовая разметка – на особо аварийных пешеходных переходах, для обозначения краев и разделений полос федеральных трасс. Такой способ разметки позволяет «взбодрить» уставшего водителя, а также напомнить, что необходимо снизить скорость автомобиля.

8. Describe the main types of road surface markings.

9. GAME TIME. Find all the words related to pavement marking (direction of letters – \updownarrow and \rightarrow). Some letters can belong to two words.

R	E	T	R	O	R	A	Q	W	U
S	T	R	I	P	E	P	O	E	N
S	D	C	X	S	F	A	I	R	I
T	S	T	O	P	L	B	A	R	F
R	A	V	Z	D	E	P	P	U	O
I	E	B	L	F	C	Y	L	M	R
P	W	N	K	G	T	L	O	B	M
E	S	N	O	W	I	O	W	L	I
R	Q	M	J	H	V	N	U	E	T
O	R	U	B	B	E	R	Y	T	Y

Russian translation will help you.

машина для нанесения разметки	
стоп линия	
светоотражающий	
снегоочиститель	
резина, каучук	
предохранительная полоса	
единообразие	
дорожный конус	

12

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words below:

road safety, Botts' dots, cat's eye, HOV lanes, paint, colour, line striper, markings, bike lane, machinery

1. _____ are used as a means of guiding and controlling the traffic.
2. Markings ensure _____ and smooth flow of traffic along the lanes.
3. _____ is the material commonly used for marking.
4. The commonly used _____ for road marking are yellow and white.
5. The road marking must be laid using appropriate road marking _____.
6. The name _____ comes from Shaw's inspiration for the device: the eyeshine reflecting from the eyes of a cat.
7. More recently, _____ have been used in the snow-free areas of Alabama, Arizona, Florida, Hawaii, Louisiana, Mississippi, Nevada, Georgia, Washington and Texas.
8. _____ are normally created to increase higher average vehicle occupancy and person with the purpose of reducing traffic congestion and air pollution although their effectiveness is questionable.
9. _____ produces clear, visible lines.
10. _____ is a portion of a road which is separated from traffic lanes by the use of a white stripe on the pavement and has been designated for use by bicyclists.

2. Translate the sentences from Russian into English using the vocabulary list of Unit 12.

1. Световозвращатель «кошачий глаз» состоит из четырех линз, которые доступны в различных цветах.
2. Единообразие дорожной разметки является важным фактором в дорожной безопасности.
3. Стоп линия предупреждает водителей об опасности.
4. Краска для разметки хранится в огромных цилиндрах.
5. Как правило, краска наносится машиной для нанесения разметки.
6. Основным преимуществом термопласта является световозвращающее отражение.

7. Пластик используется для разметки пешеходных переходов и перекрестков.
8. Линии белого цвета были впервые нанесены в Великобритании в 1914 году.
9. Отражающая разметка обычно более заметна ночью по сравнению с другими типами.
10. Разметка предоставляет информацию участникам дорожного движения.
11. Эдвард Н. Хайнз (Edward N. Hines) считается изобретателем дорожной разметки.
12. Дорожная разметка может применяться в сочетании с другими средствами с целью повышения безопасности организации дорожного движения.
13. Данная машина используется для нанесения горизонтальной разметки термопластом на пешеходные переходы.

3. Speaking. Make presentations about road markings in: USA, Great Britain, Russia and Australia.



13A. CONTROLLING TRAFFIC IN WORK ZONES

1. Read the words and learn them by heart.

workzone – зона проведения работ

busy – *здесь*: оживленный

to maintain – поддерживать, осуществлять
техническое обслуживание

safe – безопасный

efficient – эффективный

route – маршрут

merging taper – ситуация сокращения
полос движения из двух в одну

alternate route – альтернативный маршрут

single file – однорядное движение

appropriate – надлежащий

detour – объезд

road closure – закрытие дороги для
движения

cone – дорожный конус

two-way traffic – двустороннее движение

signage – указатели, знаки

shifting taper – ситуация смещения

движения на альтернативный маршрут

to consolidate – объединять, сливаться

to merge – сливаться, соединяться

2. Read and translate the text and learn more about controlling traffic in work zones.

Controlling traffic in work zones

This guide will help you manage traffic when performing construction on busy streets. The most important aspect of traffic control is clear communication. If drivers understand when and where to go, you will maintain safe and efficient traffic flow.

Changing the Route: To keep traffic moving smoothly through any work zone, drivers must be able to clearly see what alternate route to take.

- In the case of a road closure, drivers should see signs directing them to an appropriate detour.

- When two lanes must be reduced to one lane, make sure your merging taper gives drivers enough time to merge into the correct lane.

- Use cones to clearly mark the new route when using a shifting taper.

Signage: Signs are vital to effective work zone communication.

- If two-way traffic is consolidated into a single lane, proper signage helps prevent collisions. A worker with a stop/go board should be posted at each end of the affected area to let drivers know when it is safe to proceed in single file.

- Remember to use reflective signs to make sure drivers can navigate work zones at night.

3. Answer the following questions.

1. What is one the main ways of traffic control while road works?
2. What is necessary to maintain safe traffic flow?
3. What will the purpose of special signs in case of road closure?
4. How should you place merging taper when two lanes must be reduced into one?
5. What measure of traffic organization is used when two-way traffic is consolidated into a single lane?
6. What safety measure should be taken to provide safe traffic control at night?

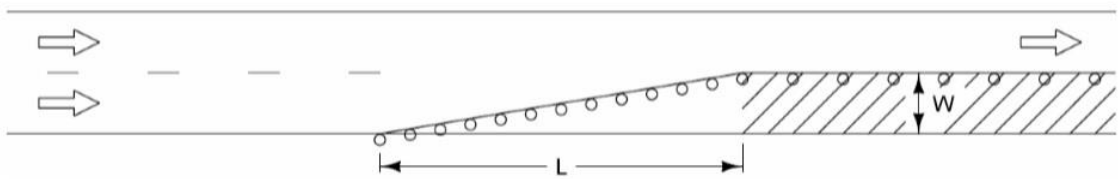
4. Put ✓ for true and ✗ for false statements.

1. To provide appropriate traffic flow in case of road works there should be no signs or other signage.
2. If the road is absolutely closed no signs are necessary – drivers will see everything themselves.
3. In case of road closure there should be an alternate route.
4. Shifting tapers are used to consolidate two lanes into one.
5. If there is no appropriate signage system a collision may happen.
6. There is a robot to control traffic flows when two-way traffic merges into one lane.
7. Reflective sings are better seen in daytime.

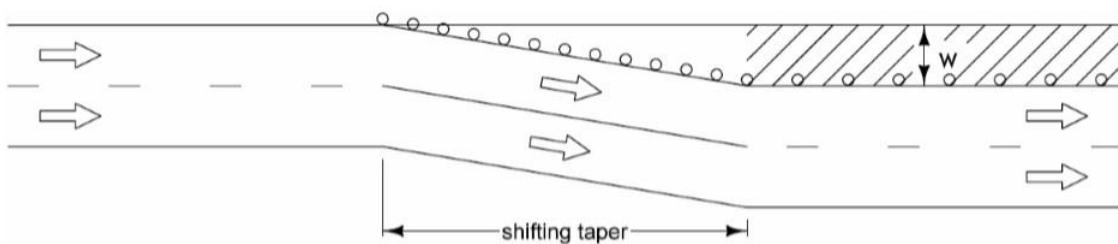
5. Complete the table using information from the text in ex.2.

Situation	Traffic control measure
Road closure	
Reduced lanes	
Two-way traffic in one lane	

6. Study the pictures and explain the difference between merging taper and shifting taper.



Merging taper



Shifting taper

7. Match the words or phrases with the definitions.

1. merge	a. a sign with instructions on both sides
2. closure	b. moving one after another in a line
3. two-way	c. having light bounce (отражаться) easily off something
4. single file	d. to move gradually together
5. reflective	e. a situation in which a road is blocked
6. traffic flow	f. having traffic move in both directions
7. stop/go board	g. the movement of vehicles
8. detour	h. keep (something) at the same level or rate.
9. work zone	i. a plastic object that is used to separate off or close sections of a road
10. maintain	j. an area where a repair takes place
11. cone	k. an alternative route for use by traffic when the usual road is temporarily closed

8. Read the sentence pairs. Choose which word or phrase best fits each blank.

traffic control / detour

1. Drivers must be directed to the _____ since the road is closed.
2. The workers are maintaining excellent _____ in the work zone.

merging taper / shifting taper

1. Use a _____ to move traffic from two lanes into one lane.
2. Use a _____ to move traffic from the normal lane onto the shoulder.

9. Think about the cases of road repair you faced with. What problems and difficulties may appear and how should both traffic engineers and drivers cope with them?



13B

SIGNAGE CHANGES AND GUIDELINES

1. Read the words and learn them by heart.

regulatory sign – дорожный сигнальный знак	reduced speed zone – зона ограничения скорости
orientation – ориентация	pavement – дорожное покрытие
stop sign – знак остановки	hazard – риск, опасность
yield sign – знак “уступи дорогу”	warning sign – предупредительный знак
visibility – видимость	siting – выбор места размещения
guide sign – указательный дорожный знак	mounting height – монтажная высота
interstate – федеральная автострада	colour scheme – цветовое оформление
crossing sign – предупредительный сигнал на перекрестке	approach speed – скорость приближения

2. Read and translate the text and learn more about signage changes and guideline.

Signage Changes and Guidelines

Because of the road works following **regulatory signs** will be placed in the following areas:

- two **crossing signs** in front of Hayes Elementary School
- two **stop signs** at the intersection of Ingrid Street and Willow Avenue
- a **yield sign** on the corner of Juniper Street and Broad Avenue

Minimum visibility for all of the above signs is 60 feet.

Guide signs will be placed on Route 9 before the Interstate 10 connection. Signs should be placed for **approach speeds** with a range of 45 to 65 mph.

A **warning sign** is needed at the Wilson Bridge. The icy pavement during cold weather is a **hazard**. A **reduced speed zone sign** will also be placed.

GUIDELINES

All signs must stand according to the described **placement** and **siting**. Signs must stand at the appropriate **mounting height** of seven feet. The **orientation** of signs on street corners will face oncoming traffic. All signs must have the appropriate **colour scheme** according to the type of sign.

3. Answer the following questions.

1. What is the minimum visibility for placing road signs?
2. What does the range from 45 to 65 miles per hour refer to?
3. Why do we need a warning sign at the Wilson Bridge?
4. What other sign is necessary at this place?
5. What is the required mounting height for placing the signs?
6. How should signs be oriented?

4. Put ✓ for true and ✗ for false statements.

1. Regulatory signs in this text are placed to show that there is a car crash ahead.
2. There is a crossing sign in front of Hayes Elementary School.
3. A yield sign was placed at the intersection of Ingrid Street and Willow Avenue.
4. On the corner of Juniper Street and Broad Avenue two yield signs were placed.
5. Signs should be placed so them to be clear and comprehensible.
6. At the Wilson Bridge we need a guide sign.
7. The sign is necessary at the Wilson Bridge because of the narrowing of the bridge.
8. A reduced speed zone sign on the Wilson Bridge is necessary to prevent car crash because of icy pavement.
9. The signs must be only of blue and white colour.

5. Match the words or phrases with the definitions.

1. range	a. traffic sign which provides information to drivers about possible danger or risks they may encounter on the road
2. approach speed	b. the height at which a sign must be placed above the surface of a road
3. warning sign	c. a sign which provides information to drivers about roads or locations
4. mounting height	d. the determination of where a traffic sign is to be located
5. placement	e. the direction which a sign is facing
6. guide sign	f. the pattern or selection of colors on a traffic sign
7. orientation	g. the speed at which a driver is moving towards a certain destination
8. colour scheme	h. a list of different approach speeds at which different people may be driving

6. What do you know about road signs placement in Russia? Find necessary information using Internet.

7. Choose which word or phrase best fits each blank.

minimum visibility / warning signs

1. _____ determines how far away from a sign drivers must be able to see it.
2. _____ inform drivers of possible dangers they might encounter on the road.

approach speed / hazard

1. Ice is a common _____ on roads.
2. The _____ of traffic on a highway is faster than it is on residential roads.

8. Match the word and the picture.



1.
a) reduced speed sign



2.
b) stop sign



3.
c) mounting height



4.
d) guide sign



5.
e) pavement



6.
f) colour scheme



7.
g) visibility



8.
h) warning sign



9.
i) yield sign

13

WHAT DO YOU REMEMBER?

1. Fill in the gaps using the words given below.

colour scheme, yield sign, be oriented, work zone, alternative route, interstate, warning signs, visibility busy, guide signs

1. In the _____ all road users must strictly follow all kinds of road signs.
2. _____ show direction to the cities and villages ahead. So if you don't want to get lost, follow them.
3. If there are repair works on a _____ street, there may form a traffic jam.
4. _____ inform drivers that there a danger on the road ahead.
5. Road signs must _____ to face oncoming vehicles.
6. _____ varies depending on the type of a road sign and the country.
7. If you see a _____ you should let all other vehicles drive first and only then, when the road is clear, start your movement.
8. If the road is closed there certainly will be an _____.
9. M7 is an _____ connecting Ufa and Moscow.
10. Because of the fog the _____ was bad and Tom had to drive very slowly.

2. Translate the sentences from Russian into English using the vocabulary list of Unit 13.

1. Отсутствие предупредительного знака на въезде в зону проведения работ привело к аварии.
2. При повороте налево необходимо правильно рассчитывать скорость приближения встречного транспорта.
3. При закрытии дороги для движения необходимо предоставить объездной маршрут.
4. Направляющий конус устанавливается для изменения траектории движения транспорта, но с сохранением количества полос движения.
5. Несоблюдение правил в зоне ограничения скорости вызывает риск столкновения или наезда на пешехода.
6. Большинство улиц города – это улицы с двусторонним движением.

7. При слиянии двух полос в одну из-за ремонта или аварии, мы можем наблюдать одностороннее движение.
8. Из-за плохой видимости при обгоне водитель не заметил встречный грузовик, и произошло лобовое столкновение.
9. Дорожное покрытие на федеральных автомагистралях обычно хорошее.
10. Цветовое оформление дорожных знаков зависит от типа знака и страны расположения.
11. Сигнальные и предупредительные знаки обеспечивают безопасное и эффективное движение во время дорожных работ.
12. Выбор места размещения знака и его монтажная высота установлены специальными регулирующими документами.
13. Увидев, что на перекрестке образовалась пробка, Том выбрал альтернативный маршрут.
14. Дорожный конус сделан из пластика, поэтому, в случае столкновения с ним, машина не будет сильно повреждена.
15. Дорога, по которой мы обычно ездим, закрыта. Нам нужно искать пути объезда.



EXAMINATION TEXT.

TRAFFIC SAFETY

1. Read the words and learn them by heart.

to injure – ранить, причинить травму

prevention – предотвращение,
предупреждение

to prevent – предотвращать

fallibility – погрешность

human tolerance – допустимая для человека
нагрузка

urban road – городская дорога

to implant – внедрять

vicinity – окрестность, близость,
соседство

prohibition – запрет

obstacle – препятствие

grade separated junction – развязка дорог
на разных уровнях

traffic circle – кольцевая развязка

2. Read and retell the text about road safety.

Traffic safety

Road traffic safety refers to methods and measures for reducing the risk of a person using the road network being killed or seriously injured. The users of a road include pedestrians, cyclists, drivers, their passengers, and passengers of on-road public transport, mainly buses and trams. Safe road design now provides a road environment which ensures vehicle speeds will be within the human tolerances for serious injury and death not to happen wherever conflict points exist.

On existing urban roads where many vulnerable road users, such as pedestrians and bicyclists can be found, traffic calming can be a tool for road safety. Though not strictly a traffic calming measure, mini-traffic circles implanted in existing, normal intersections of urban streets, reduce collisions at intersections dramatically. Shared space schemes, which rely on human instincts and interactions, such as eye contact, and are characterised by the removal of traditional traffic signals and signs, and even by the removal of the distinction between roadway and footway, are also becoming increasingly popular. Both approaches can be shown to be effective. Other traffic calming measures include speed humps, chicanes and curb extensions.

Major highways are designed for safer high-speed operation and generally have lower levels of injury per vehicle km than other roads.

Safety features include:

- Limited access from properties and local roads.
- Grade separated junctions
- Median dividers between opposite-direction traffic to reduce likelihood of head-on collisions
- Removing roadside obstacles.
- Prohibition of more vulnerable road users and slower vehicles.

Modern safety barriers are designed to absorb impact energy and minimize the risk to the occupants of cars, and bystanders. For example some road fixtures such as road signs and fire hydrants are designed to collapse on impact. Highway authorities have also removed trees in the vicinity of roads. Successful pedestrian schemes tend to avoid over-bridges and underpasses and instead use at-grade crossings close to the intended route.

3. Answer the following questions.

1. What is road safety?
2. What measures can be taken to reduce crashes?
3. What vulnerable road users can you meet on the urban road?
4. Where can traffic circles be introduced?
5. What is shared space scheme?
6. Which of the approaches is more effective?
7. What is the difference between an urban road and a highway?
8. What are safety barriers designed for?
9. What obstacles can be found along roads?
10. Are trees dangerous at roadside?

4. Put ✓ for true and ✗ for false statements.

1. Only drivers and pedestrians can be considered road users.
2. The worst road safety strategy is to prevent possible car crashes.
3. Safe road design limits vehicle speed.
4. Bicyclists and pedestrians are dangerous for other road users.
5. Road safety measures reduced collisions immensely.
6. Shared space gives strict regulations about behavior on the road.
7. Highways are designed for high-speed operation.
8. There are many pedestrian crossings on highways.

9. Median dividers lower the risk of head on collisions.
10. Safety barriers are really useful.

5. Match the words with their definitions.

1. road traffic safety	a. the act of stopping something from happening or of stopping someone from doing something
2. pedestrian	b. how fast something moves
3. prevention	c. the act of building raised areas, small roundabouts, or other similar structures on roads, usually roads where there are houses, so that vehicles are forced to move more slowly along them
4. public transport	d. a motorway in a city or town
5. speed	e. teaching people how to behave safely when driving or crossing the road
6. urban road	f. a system of vehicles such as buses and trains that operate at regular times on fixed routes and are used by the public
7. traffic calming	g. a person who is walking, especially in an area where vehicles go

6. Give English equivalents of the following words and word combinations.

Уменьшать, причинить травму, велосипедист, погрешность, авария, незащищенный, участник дорожного движения, кольцевая развязка, поглощать энергию удара, свидетель, полоса дороги, защитное ограждение, развязка дорог на разных уровнях.

7. Describe the main ideas of traffic safety.

ADDITIONAL TEXTS

Fordson Tractors (Models F and N)

The first prototypes of the new Henry Ford & Son tractor, which would later be called the Fordson, were completed in 1916. World War I was raging in Europe, and the United Kingdom, a net importer of food, was desperate for tractors in its attempt to expand its agriculture enough to feed Britain despite the great shipping disruption of the war. In 1917, the British Ministry of Munitions selected the Fordson for both importation from the U.S. and domestic U.K. production. It was thought that domestic U.K. production was preferable because so much Atlantic shipping was being sunk that exporting tractors from the U.S. would be counterproductive, as many would be lost at sea. This was soon modified to exclude the London area because of concerns about its vulnerability to German attacks. Henry Ford decided to build the tractor at Cork, Ireland (which at the time was still part of the UK.), partly because he wanted to bring jobs to, and foster industriousness in, southern Ireland. But the Cork plant did not begin production until 1919, after the war had ended.

Like many other multifuel machines, the Fordson started on gasoline from a small auxiliary tank (just a few quarts) and then switched over to the main fuel tank once warmed up sufficiently (no more than 5 minutes). To handle the kerosene the intake system had a vaporizer downstream of the carburetor. The mixture coming from the carburetor was intentionally rich, and the vaporizer heated it and mixed it with more air to lean it out to the final ratio before entering the intake manifold. The intake system also had a water-bath air cleaner to filter the dust out of the air inhaled by the engine (an invention that did not originate at Ford but that was still rather novel in 1917). Air cleaning is critical to engine lifespan, even for road vehicles and most especially for farming and construction vehicles (which work in environments where dirt is frequently stirred up into the air). The Fordson carburetor and air cleaner were designed by Holley. In later decades, the water bath would be replaced with an oil bath for better filtering performance.

The ignition system was similar to that of the Model T, with a flywheel-mounted low-tension magneto and trembler coils. The ignition timing was manually advanced or retarded with the spark advance lever mounted near the steering column, which rotated the timer. The cooling was by thermosiphon. The transmission was a three-speed spur gear (the three forward speeds ranged from approximately 21/4 to 61/4mph). The design of the rear was patented for its ease of manufacture and service. Brakes were not provided on early Fordsons. To stop the tractor, the driver depressed the clutch.



Ford engineer Eugene Farkas successfully made the engine block, oil pan, transmission, and rear axle stressed members constituting the frame. By eliminating the need for a heavy separate frame, costs were reduced and manufacturing was simplified. Ford held a patent on a unit-frame tractor.

In 1916 and 1917, the name “Fordson” was not yet used as the tractor’s make or model name, nor was “Model F”. During this period, terms such as “the [real/genuine] Ford tractor” or “the Henry Ford tractor” were used. In early 1918, the name “Fordson” was trademarked, and within a few months it was being marked on the tractors. Published sources vary somewhat on the origin of the name. All agree that the name reflects the contemporary name of the tractor company, “Henry Ford & Son”: Henry and Edsel. The Model F designation (for essentially the same model, with improvements) began in 1919. Sales boomed in 1918 and 1919.

There was nothing about the Fordson's design or farming capabilities that was a "first ever" among tractors. But it was the first tractor that combined all of the following factors: it was small, lightweight, mass-produced, and affordable; it had a large distribution network (dealers nearby in many locales); and it had a widely trusted brand (via Ford). Such factors made it possible for the average farmer to own a tractor for the first time. Thus Henry Ford and colleagues had done again, for the tractor, what they had recently done for the automobile with the Ford Model T. Ford incorporated his private company, Henry Ford and Son Inc, to mass-produce the tractor on July 27, 1917. The Fordson tractor went into mass production in 1917 and debuted for sale on October 8, 1917.

The Fordson succeeded in being cheaper to maintain than horses, as the Ford Model T had previously done. By mid-1918, more than 6,000 Fordson tractors were in use in Britain,

Canada, and the United States. In the U.S., Ford established a policy in 1919 to loan Fordson tractors to educational institutions with vocational training programmes.

By 1925, Ford had built its 500,000th Fordson tractor. Ford was the only automotive firm to sell cars, trucks, and tractors simultaneously from 1917 to 1928, during which time 552,799 Fordson tractors were built.

Source: <https://en.wikipedia.org/wiki/Fordson>

Tractor configurations

Tractors can be generally classified by number of axles or wheels, with main categories of two-wheel tractors and four-wheel tractors. Among four-wheel tractors (two-axle tractors), most are two-wheel drive (usually at the rear); but many are two-wheel drive with front wheel assist, four-wheel drive (often with articulated steering), or track tractors (with steel or rubber tracks).



Tractor

cabs are fitted on almost all modern models, for reasons of operator safety and comfort.

In some localities with heavy or wet soils, notably in the Central Valley of California, the “Caterpillar” or “crawler” type of tracked tractor became popular in the 1930s, due to superior traction and flotation. These were usually maneuvered through the use of turning brake pedals and separate track clutches operated by levers rather than a steering wheel.

Four-wheel drive tractors began to appear in the 1960s. Some four-wheel drive tractors have the standard “two large, two small” configuration typical of smaller tractors, while some have four large, powered wheels. The larger tractors are typically an articulated, center-hinged design steered by hydraulic cylinders that move the forward power unit while the trailing unit is not steered separately. In the early 21st century, articulated or non-articulated, steerable multitrack tractors have largely supplanted the Caterpillar type for farm use. Larger types of modern farm tractors include articulated four-wheel or eight-wheel drive units with one or two power units which are hinged in the middle and steered by hydraulic

clutches or pumps. A relatively recent development is the replacement of wheels or steel crawler-type tracks with flexible, steel-reinforced rubber tracks, usually powered by hydrostatic or completely hydraulic driving mechanisms. The configuration of these tractors bears little resemblance to the classic farm tractor design.

Source: <https://en.wikipedia.org/wiki/Tractor>

Bulldozer elements

The ripper is the long claw-like device on the back of the bulldozer. Rippers can come singly (single-shank) or in groups of two or more (multi-shank rippers). Usually, a single shank is preferred for heavy ripping. The ripper shank is fitted with a replaceable tungsten steel alloy tip.



Ripping rock lets the ground surface rock be broken into small rubble easy to handle and transport, which can then be removed so grading can take place. Agricultural ripping allows workers to break up rocky or very hard earth, so that land that was once very difficult to plow can be farmed. For example, much of the very best land in the California wine country consists of old lava flows: With heavy bulldozers such as the Caterpillar D9 and the Caterpillar D11, the lava is shattered allowing practical agriculture for the wine industry. Also, hard earth can be ripped and de-compacted to allow the planting of orchards that otherwise would not have grown on the land.

The bulldozer blade is a piece of heavy metal plate, installed on the front of the tractor, with the aim of pushing things, handling rough obstacles, and shoving sand, dirt, and debris. The dozer blade on front of the tractor usually comes in 3 varieties:

1. Straight Blade ("S-Blade") which is short and has no lateral curve, no side wings, and can be used for fine grading.

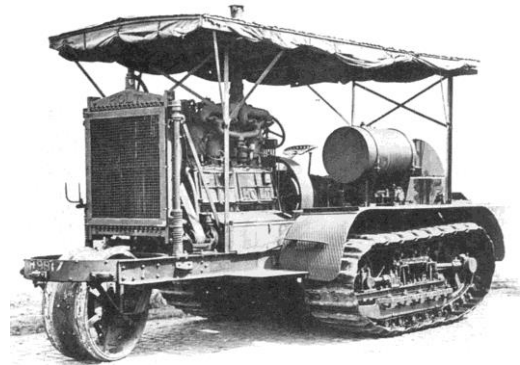
2. Universal Blade ("U-Blade") which is tall and very curved, and has large side wings to carry more material.
3. "S-U" combination blade which is shorter, has less curvature, and smaller side wings. This blade is typically used for pushing piles of large rocks, such as at a quarry.

In military use, dozer blades are fixed on combat engineering vehicles and can optionally be fitted on other vehicles, such as artillery tractors, like the Type 73 or M8 Tractor. Combat applications for dozer blades include clearing battlefield obstacles and preparing fire positions.

Source: <http://www.newworldencyclopedia.org/entry/Bulldozer>

History of bulldozers

The first bulldozers were adapted from Holt farm tractors that were used to plow fields. The versatility of tractors in soft ground for logging and road building contributed to the development of the armoured tank in World War I.



Holt tractor

In 1923, a young farmer named James Cummings and a draftsman named J. Earl McLeod made the first designs for the bulldozer. A replica is on display at the city park in Morrowville, Kansas where the two built the first bulldozer. On December 18, 1923, Cummings and McLeod filed U.S. patent #1,522,378 that was later issued on January 6, 1925 for an "Attachment for Tractors."

By the 1920s, tracked vehicles became common, particularly the Caterpillar 60. Rubber-tired vehicles came into use in the 1940s. To dig canals, raise earth dams, and do other earth-moving jobs, these tractors were equipped with a large thick metal plate in front. (The blade got its curved shape later). In some early models the driver sat on top in the open without a cabin. There are three main types of bulldozer blades: a U-blade for pushing and carrying dirt relatively long distances, a straight blade for "knocking down" and spreading piles of dirt, and a brush rake for removing brush and roots. These attachments (home-built or built by small equipment manufacturers of attachments for wheeled and crawler tractors and trucks) appeared by 1929.

Widespread acceptance of the bull-grader does not seem to appear before the mid-1930s. The addition of power down-force provided by hydraulic cylinders instead of just the weight of the blade made them the preferred excavation machine for large and small contractors alike by the 1940s, by which time the term "bulldozer" referred to the entire machine and not just the attachment.

Over the years, bulldozers got bigger and more powerful in response to the demand for equipment suited for ever larger earthworks. Firms like Caterpillar, Komatsu, Case, Euclid, Allis Chalmers, Liebherr, LiuGong, Terex, and International Harvester manufactured large tracked-type earthmoving machines.

Bulldozers grew more sophisticated as time passed. Improvements include drivetrains analogous to (in automobiles) an automatic transmission instead of a manual transmission such as the early Euclid C-6 and TC-12 or Model C Tornadoizer, blade movement controlled by hydraulic cylinders or electric motors instead of early models' cable winch/brake, and automatic grade control. Hydraulic cylinders enabled the application of down force, more precise manipulation of the blade and automated controls.

A more recent innovation is the outfitting of bulldozers with GPS technology, such as manufactured by Topcon Positioning Systems, Inc., Trimble Inc, or Leica Geosystems for precise grade control and (potentially) "stakeless" construction. As a response to the many, - and often varying claims about these systems, The Kellogg Report published in 2010 a detailed comparison of all the manufacturers' systems, evaluating more than 200 features for dozers alone.



Caterpillar bulldozer

The best known maker of bulldozers is Caterpillar. Komatsu, Liebherr, Case and John Deere are present-day competitors. Although these machines began as modified farm tractors, they became the mainstay for big civil construction projects, and found their way into use by military construction units worldwide. The best-known model, the Caterpillar D9, was also used to clear mines and demolish enemy structures.

Source: <https://en.wikipedia.org/wiki/Bulldozer>

Shovel

A shovel is used for digging and loading earth or fragmented rock and for mineral extraction.

An electric mining shovel is a bucket-equipped machine consisting of a revolving deck with a power plant, tracks, a counterweight, and a front attachment, such as a boom. The digging phase consists of crowding the dipper into the bank, hoisting the dipper to fill it, then, retracting the full dipper from the bank. The swinging phase occurs once the dipper is clear of the bank



Hydraulic mining shovel

both vertically and horizontally. The operator controls the dipper through a planned swing path and dump height until it is suitably positioned over the haul unit. Dumping involves opening the dipper door to dump the load, while maintaining the correct dump height. Returning is when the dipper swings back to the bank, and involves lowering the dipper into the tuck position to close the dipper door.

The hydraulic mining shovel has been widely used for coal and rock loading since the 1970s.

Source: <http://www.heavyequipment.com/heavy-equipment/road-highways>

Long Reach Excavator

The term long reach excavator was probably first coined by Richard Melhuish the Chairman of Land & Water. During the 1970s Land & Water operated the UK's first hire fleet of these new and innovative long reach hydraulic excavators. In fact they still operate the largest fleet of long-reaches in the UK. Land & Water's first long reach excavator was the Hymac 580 BT All Hydraulic 360 "Waterway" machine, designed with a long arm to allow it to work on Waterways.

These early machines from Hymac changed attitudes towards hydraulic excavators. They became a serious alternative to the more traditional drag lines designs.

Around the same time Priestman (and later Ruston Bucyrus) VC (Variable Counterweight) excavators started to become more popular. However, the work VC machines could achieve was slightly constrained by design limitations and so the popularity of fully

hydraulic “long reach” machines steadily increased, especially with the arrival of more reliable machines from Japan built by manufacturers such as Hitachi and Komatsu. These Japanese designed machines used higher quality hydraulic fittings and connectors and hardly ever leaked hydraulic fluid. This was especially important when working on and around water due to the environmental impact.



Long reach excavator

Long reach excavators are often confused with high reach demolition machines – but the two products are very different. Long reach machines are not suitable for the high side twisting forces that can be exerted by demolition attachments and many demolition machines are unstable at large radius – so they are often assisted with electronic cut off devices that restrict the operating radius of the machine. Long reach machines excel at dredging operations where large quantities of material needs to be removed from underwater while the physical plant stays above water.

The high reach excavator is a development of the excavator with an especially long boom arm, that is primarily used for demolition. Instead of excavating ditches, the high reach excavator is designed to reach the upper stories of buildings that are being demolished and pull down the structure in a controlled fashion. It has largely replaced the wrecking ball as the primary tool for demolition.

Ultra high reach demolition excavators (UHD) refers to demolition excavators with several tens of meters of reach. Reaches of up to 48 metres (157 ft) are in operation as of 2016. As of 2017 there are UHD machines that can reach 67meters.

Source: https://en.wikipedia.org/wiki/Long_reach_excavator

Road roller types

Road rollers use the weight of the vehicle to compress the surface being rolled (static) or use mechanical advantage (vibrating). Initial compaction of the substrate on a road project is done using a padfoot drum roller, which achieves higher compaction density due to the

pads having less surface area. On large freeways a four wheel compactor with padfoot drum and a blade, such as a Caterpillar 815/825 series machine, would be used due to its high weight, speed and the powerful pushing force to spread bulk material.



Padfoot drum roller

On regional roads a smaller single padfoot drum machine may be used. The next machine is usually a single smooth drum compactor that compacts the high spots down until the soil is smooth, and this is usually done in combination with a motor grader to get a level surface. Sometimes at this stage a pneumatic tyre roller would be used. These rollers feature two rows (front and back) of pneumatic tyres that overlap, and the flexibility of the tyres provides a kneading action that seals the surface and with some vertical movement of the wheels, enables the roller to operate effectively on uneven ground. Once the soil base is flat the pad drum compactor is no longer used on the road surface. The next course (road base) would be compacted using a smooth single drum, smooth tandem roller or pneumatic tyre roller in combination with a grader, and a water truck to achieve the desired flat surface with the right moisture content for optimum compaction. Once the road base is compacted, the smooth single drum compactor is no longer used on the road surface. The final wear course of asphalt concrete is laid using a paver and compacted using a tandem smooth drum roller, a three-point roller or a pneumatic tyre roller. Three point rollers on asphalt were very common once and are still used, but tandem vibrating rollers are the usual choice now, with the pneumatic tyre roller's kneading action being the last roller to seal off the surface.

Rollers are also used in landfill compaction. Such compactors typically have padfoot or “sheep’s-foot” drums, and do not achieve a smooth surface. The pads aid in compression, due to the smaller area contacting the ground.

Source: https://en.wikipedia.org/wiki/Road_roller

Hammerhead Crane

The “hammerhead”, or giant cantilever, crane is a fixed-jib crane consisting of a steel-braced tower on which revolves a large, horizontal, double cantilever; the forward part of this

cantilever or jib carries the lifting trolley, the jib is extended backwards in order to form a support for the machinery and counterbalancing weight. In addition to the motions of lifting and revolving, there is provided a so-called “racking” motion, by which the lifting trolley, with the load suspended, can be moved in and out along the jib without altering the level of the load. Such horizontal movement of the load is a marked feature of later crane design. These cranes are generally constructed in large sizes and can weigh up to 350 tons.

The design of Hammerkran evolved first in Germany around the turn of the 19th century and was adopted and developed for use in British shipyards to support the battleship construction program from 1904 to 1914. The ability of the hammerhead crane to lift heavy weights was useful for installing large pieces of battleships such as armour plate and gun barrels. Giant cantilever cranes were also installed in naval shipyards in Japan and in the United States. The British government also installed a giant cantilever crane at the Singapore Naval Base (1938) and later a copy of the crane was installed at Garden Island Naval Dockyard in Sydney (1951). These cranes provided repair support for the battle fleet operating far from Great Britain.



Hammerhead crane

In the British Empire, the engineering firm Sir William Arrol & Co Ltd was the principal manufacturer of giant cantilever cranes; the company built a total of fourteen. Among the sixty built in the world, few remain; seven in England and Scotland of about fifteen worldwide.

The Titan Clydebank is one of the 4 Scottish cranes on the Clydebank and preserved as a tourist attraction.

Source: [https://en.wikipedia.org/wiki/Crane_\(machine\)](https://en.wikipedia.org/wiki/Crane_(machine))

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