МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

Белорусский национальный технический университет

Кафедра «Английский язык» №2

Электронный

учебно-методический комплекс

по учебной дисциплине

«ИНОСТРАННЫЙ ЯЗЫК (АНГЛИЙСКИЙ)»

для строительных специальностей

7-07-0732-01 «Строительство зданий и сооружений»
профилизации «Промышленное и гражданское строительство»,
«Производство строительных изделий и конструкций»
6-05-0732-01 «Техническая эксплуатация зданий и сооружений»
6-05-0732-02 «Экспертиза и управление недвижимостью»

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Диск содержит данные об учебно-методическом комплексе по дисциплине «Иностранный язык (английский)», который предназначен для студентов строительнеых специальностей, а также преподавателей кафедры «Английский язык» №2 БНТУ. Может использоваться как для проведения аудиторных практических занятий, так и для самостоятельной работы студентов

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СОДЕРЖАНИЕ

ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Данный электронный учебно-методического комплекс (ЭУМК) «Иностранный язык (английский)» для строительных специальностей предназначен для реализации образовательной программы по учебной дисциплине «Иностранный язык (английский)» для специальности 7-07-0732-01 «Строительство зданий и сооружений» (профилизации «Промышленное и гражданское строительство», «Производство строительных изделий и конструкций») специального высшего образования и для специальностей 6-05-0732-01 «Техническая эксплуатация зданий и сооружений» (профилизация «Эксплуатация объектов жилищно-коммунального хозяйства»), 6-05-0732-02 «Экспертиза и управление недвижимостью» общего высшего образования.

Целью ЭУМК является формирование иноязычной коммуникативной компетенции будущего специалиста, позволяющей использовать иностранный (английский) язык как средство профессионального и межличностного общения в области строительства. В процессе достижения главной цели решаются следующие задачи:

познавательные (знакомство с основными аспектами строительной специальности посредством иностранного (английского) языка);

развивающие (совершенствование коммуникативных умений, формирование потребности к самостоятельной познавательной деятельности, систематизация знаний и умений);

практические (овладение иноязычным общением в единстве всех его компетенций, функций и форм, что осуществляется посредством взаимосвязанного обучения всем видам речевой деятельности в рамках определенного программой предметно-тематического содержания, а также овладения технологиями языкового самообразования).

Оформление и использование ЭУМК по учебной дисциплине осуществляется в соответствии с требованиями СТП СМК БНТУ 7.1.6-03-2023.

Особенность структурирования и подачи учебного материала. Структура ЭУМК, включающая 4 основных раздела (теоретический, практический, контроля знаний и вспомогательный), позволяет эффективно реализовывать процесс обучения при проведении практических занятий, а также ориентирует обучающегося на использование иностранного языка в различных ситуациях профессиональных и деловых взаимоотношений, а также для выступления с публичной речью, перевода, реферирования и аннотирования профессионально-ориентированных и научных текстов.

Рекомендации по организации работы с ЭУМК. Данный электронно-методический комплекс предназначен как для аудиторных занятий, так и для самостоятельной работы студентов, обучающихся на строительном факультете Белорусского национального технического университета по специальностям 7-07-0732-01 «Строительство зданий и сооружений» (профилизации «Промышленное и гражданское строительство», «Производство строительных изделий и конструкций»), 6-05-0732-01 «Техническая эксплуатация зданий и сооружений» (профилизация «Эксплуатация объектов жилищно-коммунального хозяйства»), 6-05-0732-02 «Экспертиза и управление недвижимостью».

ПЕРЕЧЕНЬ МАТЕРИАЛОВ

Структура ЭУМК включает следующие разделы: теоретический, практический, контроля знаний и вспомогательный.

Теоретический раздел ЭУМК включает в себя учебно-методические материалы по функциональной грамматике английского языка, которые позволяют студентам технического вуза повторить важные грамматические явления языка и рассмотреть их на примерах из оригинальных профессионально ориентированных языковых источников. Это повышает мотивацию изучения иностранного (английского) языка для специальных целей.

Практический раздел ЭУМК включает в себя дидактический материал, представляющий собой разработки с дополнительными заданиями как для работы на практических занятиях при непосредственном контроле преподавателя, так и для самостоятельной работы студентов. Разнообразный характер упражнений позволяет варьировать лексическую и грамматическую наполняемость занятия в соответствии с практическими задачами, а также дает возможность выбора для соответствия определенному уровню владения иностранным языком. Представленные материалы легли в основу учебного пособия «Английский язык. Профессиональное общение. Гражданское строительство = English for Specific Purposes. Civil Engineering» (авторы Н.П Мартысюк, Л.М. Янушкевич), опубликованного в издательстве РИВСШ в 2023 г.

Кроме того, дополнительно используются такие учебники и учебные пособия, как: Качановская Н.Г. Строим будущее (Минск: БНТУ, 2012); Колосова Т.В. Практическая грамматика английского языка (Минск: БНТУ, 2005), Гарагуля С. И. Английский язык для студентов строительных специальностей (Ростов н/д, 2011), а также словари The Oxford-Duden Pictorial English Dictionary, Merriam-Webster Dictionary, Oxford Dictionary of English и онлайн-словарь-справочник academic.ru.

В разделе контроля знаний ЭУМК представлены образцы лексико-грамматических тестов тематического и итогового контроля, а также предметно-тематическое содержание зачёта и экзамена.

Во вспомогательный раздел включены учебная программа БНТУ по дисциплине «Иностранный язык (английский)», включающая учебно-методическую карту дисциплины, а также список рекомендуемой литературы.

ТЕОРЕТИЧЕСКИЙ РАЗДЕЛ

TWO-WAY NOUN

Two-way nouns, also called double nouns, are nouns that can be either countable or uncountable depending on their meaning in context. Typically, the uncountable version describes a general or abstract concept and the countable version describes a specification of that general concept – a *type*, a *quantity*, or a *specific application of a process* of something, *items* made of certain martials, etc.

Noun	when *uncountable*, it denotes:	when *countable*, it denotes:
metal	the general class of matter that is opaque, fusible, ductile, and typically lustrous, and conducts heat and electricity well. *Bolts are made of metal.*	a type of metal. *Bronze is an alloy composed of two metals, tin and copper. = Bronze is an alloy composed of two types of metals, tin and copper.*
pressure	a general force applied to a surface. *Walls exert pressure on the foundation.*	the amount of force that is applied over a surface divided by its area. *Natural gas is liquid only under high pressures and low temperatures.*
treatment	the general process of preserving or giving particular properties to something by using a substance. *Phosphates are often used in water treatment .*	focusing on one or more specific applications of the complete process of treatment. *At waste water facilities, sewage water undergoes three treatments. = At waste water facilities, sewage water undergoes three complete processes of treatment.*
brick	a building or paving material. *The house is made of brick.*	a handy-sized unit of building or paving material, being rectangular and made of hardened mud, clay, etc. *This wall is made of bricks.*

EXERCISE

Look at the following pairs of sentences. In one the noun in italics is used as a countable noun and in the other as an uncountable noun. Mark the sentences C for countable and U for uncountable. Translate the sentences paying attention to two-way nouns.

MODEL A: Skyscrapers are almost always made of concrete and *steel* and covered in glass. U

Небоскрёбы почти всегда сделаны из бетона и стали и покрыты стеклом.

Stainless *steels* can be used because they come in both magnetic and non-magnetic varieties. C

Нержавеющую сталь можно использовать, потому что она бывает как магнитной, так и немагнитной разновидности.

1) a) *Energy* equals mass times the speed of light squared. ___
   b) All countries should increase using alternative *energies*. ___
2) a) There are many units of *mass* in the Metric System of Measurements: gram (g), kilogram (kg) and tonne (t). ___
   b) It's possible to estimate the size of a dragon by comparison to Daenerys who looks to be about 1.6 m tall with a *mass* of around 60 kg. ___
3) a) $HC_2H_3O_2$ is a weak *acid*. ___
   b) This *acid* is good for brain development. ___
4) a) The house is made out of *straw*. ___
   b) The wind blew, picking up dust and *straws*. ___
5) a) After two *distillations* the solution is approximately 80% ABV[1]. ___
   b) *Distillation* filters, purifies, and removes some harmful chemicals. ___
6) a) I don't build with *stone*, I build with nanomaterials. ___
   b) The theatre is built of flint *stones*, and is supported by painted wooden columns. ___
7) a) *Timber* is an important raw material based on renewable resources. ___
   b) The yard was piled with cut stone and construction *timbers*. ___
8) a) Momentum is the product of mass and *velocity*. ___
   b) Thanks to Friday traffic jams, our average *velocity* was 15 km/h. ___

[1] *ABV (alcohol by volume)* 'a standard amount of alcohol contained ina given volume of an alcoholic beverage, usually defined as the number of millilitres of pure ethanol present in 100 millilitres of solution at 20˚C.'

ARTICLE

In order to understand the use of English articles one must first understand a basic property of common nouns – the property of 'reference'. It's common knowledge that nouns refer to objects or concepts *at different levels of generality:* the same noun that refers to an entire category of objects in one sentence may refer only to a particular, unique object in another.

For example, consider the word *window* in a sentence like

Every room in this building has got a window.

The writer of this sentence is probably thinking not of any particular window, but of windows in *general*: each room has got an object belonging to the general category of window.

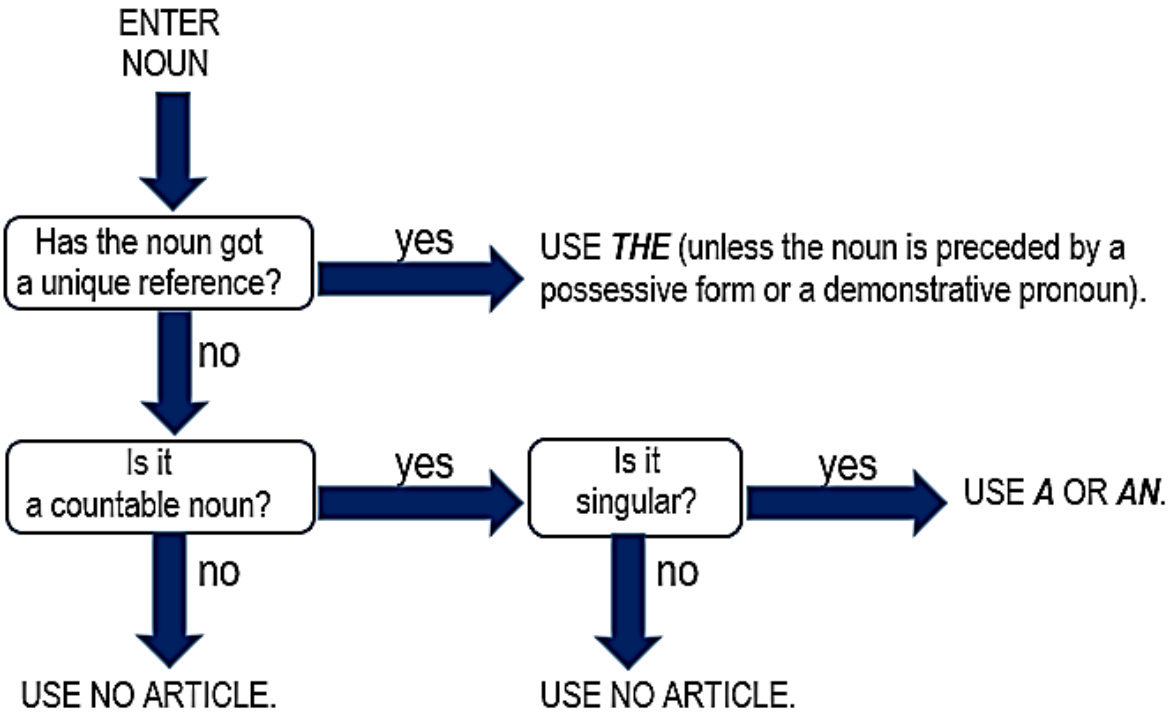
On the other hand, in a sentence like

The window in Room 423 is broken.

The writer is singling out a *particular* window, one that has got a unique identity.

The term *non-unique reference* is used to describe examples of general reference (the first window example above), and the term *unique reference* to describe examples of particular reference (the second window example above).

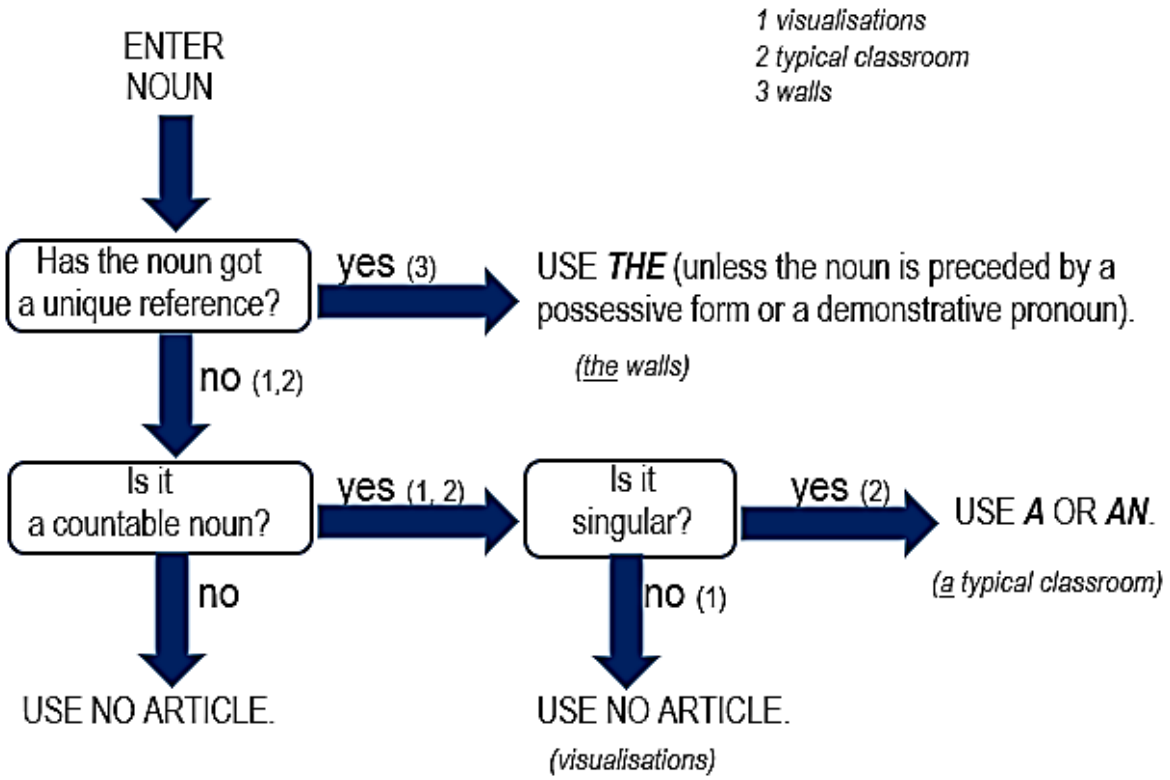
The main rules to choose a correct article are summed up in the following flow chart[1].



If you are not sure which article to choose, try using the flow chart from above. To see how this flow chart works, let's consider some of the noun phrases in the following paragraph taken from a textbook in English for academic purposes:

Visualisations surround us as we work, play and learn. Enter a *typical classroom* and you will find the walls covered with pictures, photographs, cartoons, diagrams, maps and graphs.

[1] Bases on Huckin, T. N. English for science students : A handbook for nonnative speakers // T. N. Huckin, l. Olsen – McGraw-Hill, 1983. – xvii, 549 p.



In the first sentence, consider the noun *visualisations.* If we were the authors of this paragraph and were not sure about which article to use, we could begin by asking ourselves the first question on the flow chart (in the upper left-hand cell): 'Has this noun got a unique referent?' The answer is no because the word *visualisations* is being used here to refer to visualisations in general, not any particular forms of them. Second, 'Is it a countable noun?' The noun *visualisations* is used in its plural form, so we follow the 'yes' arrow and arrive at the correct instruction: 'Use no article.'

Next, in the second sentence, the head noun of the italicized noun phrase is *classroom;* the other word is its modifier. We begin, 'Has it got a unique referent?' The answer is no, even though this noun has a modifier (*typical*); the writers want to imply that there may be *other* typical classrooms, aside from this one. We therefore go to the 'no' arrow and arrive at the next question, 'Is it a countable noun?' The answer is yes, since we know that a school has got many rooms for studies. Therefore, we follow the 'yes' arrow to the next question, 'Is it singular?' The answer is obviously yes again, which yields the final instruction: 'Use *a* or *an*.' Since the word immediately following this article – *typical* – begins with a consonant sound, the proper choice here is *a*.

Finally, let's analyze the noun *walls*. We begin by asking the first question, 'Has this noun got a unique referent?' The answer is yes because we know that these are the walls of the classroom, previously mentioned. So we answer 'yes' to this question and arrive at 'Use *the*.' Again, this result agrees with the choice made by the authors.

A word of caution in using this flow chart: be flexible and be prepared for occasional exceptions. No natural language can be completely rule-governed, and many choices may depend on cultural knowledge or on subtle word meanings that might to be unknown to you.

EXERCISES

I. Read the text. If you find a mistake in a line, cross it out and suggest an alternative. If there is no mistake, put a tick (√). The first two have been done for you.

Global timber shortage is causing problems for 0) *A global timber shortage*

the housing industry. It has caused a sharp rise in	0) √
price of new houses. In some countries, the price	1) the price of new houses
of the timber has gone up by 25 per cent.	2) the price of timber
A major reason for timber shortage is climate	3) the timber shortage
change. In addition, an increase in wildfires is	4) √
destroying forests. Many have been completely	5) √
burnt to the ground. Warmer weather has also	6) the warmer weather
increased a number of pests that damage or kill	7) the number
trees. United Kingdom has started to plant more	8) the United Kingdom
trees. But the builders joke that they don't have	9) builders
time for those trees to grow.	10) √

II. Look at the following texts and determine, using the flow chart, which article to use for each gap where appropriate. Be prepared to explain and justify your choices.

1. According to ____ legend, Archimedes (287-212 B.C.E[1].) once famously said "Give me ____ place to stand, and I shall move____ Earth with it" when he uncovered ____ physical principles behind ____ lever. While it would take____ immensely long lever to actually move ____ world, ____ statement is correct as ____ testament to ____ way it can confer ____ mechanical advantage. ____ famous quote is attributed to Archimedes by ____ later writer, Pappus of Alexandria. It's likely that Archimedes never actually ever said it. However, ____ physics of ____ levers is very accurate.

2. Although ____ study of ____ mechanics of ____ rigid bodies goes back to ____ time of Aristotle (384–322 BC) and Archimedes (287–212 BC), one has to wait until Newton (1642–1727) to find ____ satisfactory formulation of its fundamental principles. ____ These principles were later expressed in ____ modified form by d'Alembert, Lagrange, and Hamilton. ____ Their validity remained unchallenged, however, until Einstein formulated ____ his theory of ____ relativity (1905). While its limitations have now been recognized, newtonian mechanics still remains ____ basis of today's engineering sciences.

   ____ basic concepts used in ____ mechanics are ____ *space*, ____ *time*, ____ *mass*, and ____ *force*. ____ These concepts cannot be truly defined; they should be accepted on ____ basis of ____ our intuition and experience and used as ____ mental frame of ____ reference for ____ our study of ____ mechanics.

3. ____ first observation wheel was designed by George W. Ferris, ____ bridge builder from Pittsburgh, Pennsylvania. Ferris began his career in ____ railroad industry and then pursued ____ an interest in ____ bridge building. He understood ____ growing need for ____ structural steel. Ferris founded G.W.G. Ferris & Co. in Pittsburgh, ____ firm that tested and inspected ____ metals for ____ railroads and bridge builders.

   He built ____ observation wheel for ____ 1893 World's Fair, which was held in Chicago to commemorate ____ 400th anniversary of Columbus's landing in America. ____ Chicago Fair's organizers wanted something that would rival ____ Eiffel Tower. Gustave Eiffel had built ____ tower for ____ Paris World's Fair of 1889, which honored ____ 100th anniversary of ____ French Revolution.

[1] B.C.E stands for 'Before the Common Era'. It does not refer to religion and is an alternative to the abbreviation 'BC' (Before Christ).

Ferris’s ____ wheel was considered ____ engineering wonder.

4. Vitaly Lagutenko (1904, Mogilev – 1969, Moscow) was ____ Soviet architect and engineer. His studies of ____ low-cost prefabricated concrete construction, supported by Nikita Khrushchev, led to ____ complete switch of ____ Soviet building practice from ____ masonry to ____ prefab concrete. Lagutenko designed ____ the standardized 5-story apartment houses, known as ____ khrushchyovka, and ____ associated technologies of ____ fast, mass-scale construction. These low-cost blocks, built by millions of units, helped relieve ____ post-war housing shortage.
5. ____spiral and ____helical staircases can create ____ sense of ____ light within ____buildings, they can take up ____less space than ____traditional stairs, and can create ____ focal point to ____ design. They are often available as ____ pre-fabricated kits.

   ____spiral stair is ____ stair in ____ helix around ____ central column.

   ____ helical stair is ____ stair in ____ helix around ____ central void.

NUMERAL

A numeral is a figure, a letter, a word (or their combinations) representing a number. They may be divided into two major types: cardinal and ordinal numerals. Cardinal numerals indicate number, quantity or amount and are used in counting. Ordinal numerals indicate order, that is, the order of things in a series. Numerals can be written in figures or words (*2* or *two*; *25* or *twenty-five*; *17th* or *seventeenth*).

CARDINAL NUMERALS

Here are symbols and words representing cardinal numbers:

Figure	Word	Figure	Word	Figure	Word
0	zero, nought	13	thirteen	20	twenty
1	one	14	fourteen	30	thirty
2	two	15	fifteen	40	forty
3	three	16	sixteen	50	fifty
4	four	17	seventeen	60	sixty
5	five	18	eighteen	70	seventy
6	six	19	nineteen	80	eighty
7	seven			90	ninety
8	eight			100	one hundred
9	nine			101	one hundred (and) one
10	ten			1,000	one thousand
11	eleven			1,000,000	one billion
12	twelve			1,000,000,000	one billion *(AmE)* =one thousand million
				1,000,000,000,000	one billion *(BrE)* =one million million

Both in British English and in American English groups of three digits in numerals of one thousand and higher are usually separated by a comma, counting from the right:

4,286; 12,345; 378,925; 6,540,210.

Some manuals of style recommend writing four-digit numerals without a comma: *1570; 2358; 5625*.

In numbers written as words in British English, the conjunction '*and*' is used before tens, or before ones if there are no tens, starting with hundreds:

one hundred and twenty-three (123);
four hundred and seven (407);
three thousand five hundred and thirty-eight (3,538);
seventy-three thousand and five (73,005);
five million three hundred thousand and fifty (5,300,050).

Note the use of more than one conjunction '*and*' in large numbers in British English:

two million six hundred and twenty-five thousand three hundred and ten (2,625,310).

In American English, the conjunction 'and' is generally not used before tens or ones:

one hundred twenty-three (123);
four hundred seven (407);

three thousand five hundred thirty-eight (3,538);
seventy-three thousand five (73,005);
two million six hundred twenty-five thousand three hundred ten (2,625,310);
five million three hundred thousand fifty (5,300,050).

In British English, the conjunction '*and'* is also used before tens or ones in ordinal numerals above one hundred:

one hundred and tenth (110th);
three thousand and fifth (3005th).

But 'and' is not used in American ordinals:

one hundred tenth (110th); three thousand fifth (3005th).

ORDINAL NUMERALS

Ordinal numerals that can be expressed in one or two words are usually written as words.

Generally, ordinal numerals are used as adjectives and stand before nouns. An ordinal numeral is usually preceded by the definite article 'the'.

e.g.: *The first story was interesting. The second was dull.*
John Kennedy was the 35th president of the United States.

Here are ordinal numbers in figures and in words:

Figure	Word	Figure	Word
1st	first	21st	the twenty-first
2nd	second	22nd	the twenty-second
3rd	third	23rd	the twenty-third
4th	fourth	24th	the twenty-fourth
5th	fifth	25th	the twenty-fifth
6th	the sixth	26th	the twenty-sixth
7th	the seventh	27th	the twenty-seventh
8th	the eighth	28th	the twenty-eighth
9th	the ninth	29th	the twenty-ninth
10th	the tenth	30th	the thirtieth
11th	the eleventh	40th	the fortieth
12th	the twelfth	50th	the fiftieth
13th	the thirteenth	60th	the sixtieth
14th	the fourteenth	70th	the seventieth
15th	the fifteenth	80th	the eightieth
16th	the sixteenth	90th	the ninetieth
17th	the seventeenth	100th	the hundredth
18th	the eighteenth	101st	the hundred (and) first
19th	the nineteenth	345th	the three hundred (and) forty-fifth
20th	the twentieth	5,003th	the five thousand and third

Pronunciation notes

Pay attention to the differences in the spelling and pronunciation of the following cardinal and ordinal numerals.

two, twelve, twenty, twenty-two – second, twelfth, twentieth, twenty-second;
three, thirteen, thirty, thirty-three – third, thirteenth, thirtieth, thirty-third;
four, fourteen, forty, forty-four – fourth, fourteenth, fortieth, forty-fourth;

five, fifteen, fifty, fifty-five – fifth, fifteenth, fiftieth, fifty-fifth;
eight, eighteen, eighty, eighty-eight – eighth, eighteenth, eightieth, eighty-eighth;
nine, nineteen, ninety, ninety-nine – ninth, nineteenth, ninetieth, ninety-ninth.

Note the pronunciation of *5, 5th* and *9, 9th*:
five [faɪv] – *fifth* [fɪfθ]; *nine* [naɪn] – *ninth* [naɪnθ].

- Numerals *13, 14, 15, 16, 17, 18, 19* have the stress on the last syllable:
  thirteen [θəːˈtiːn] *fourteen* [fɔːˈtiːn] *fifteen* [fɪfˈtiːn]
  sixteen [sɪksˈtiːn] *seventeen* [sev(ə)nˈtiːn] *eighteen* [eɪˈtiːn]
  nineteen [naɪnˈtiːn]
- Numerals *20, 30, 40, 50, 60, 70, 80, 90* have the stress on the first syllable:
  twenty [ˈtwentɪ] *thirty* [ˈθəːtɪ] *forty* [ˈfɔːtɪ]
  fifty[ˈfɪftɪ] *sixty* [ˈsɪkstɪ] *seventy* [ˈsev(ə)ntɪ]
  eighty [ˈeɪtɪ] *ninety* [ˈnaɪntɪ]

Note the pronunciation of the ordinal numerals *20th, 30th, 40th, 50th, 60th, 70th, 80th, 90th*:

twentieth [ˈtwentɪəθ] *thirtieth* [ˈθəːtɪəθ] *fortieth* [ˈfɔːtɪəθ]
fiftieth [ˈfɪftɪəθ] *sixtieth* [ˈsɪkstɪəθ] *seventieth* [ˈsevəntɪəθ]
eightieth [ˈeɪtɪəθ] *ninetieth* [ˈnaɪntɪəθ]

FRACTIONAL NUMERALS

To show how small or large a part of something is, compared to the whole of it, you use a fraction, such as *a third (1/3)* followed by *of* and a noun referring to the whole thing.

Simple fractions

The first number in a simple fraction, written before slash (/), is called numerator and is expressed by a cardinal numeral. The second number, written after slash (/), is called denominator and is expressed by ordinal numeral.

Note: You use ordinal numeral only in oral speech and in fractions written in words, you don't have to write suffixes *-rd, -th, -ths* in written figures. Therefore, you write *1/5*, but you pronounce it and write it in words as *one-fifth*.

1/2 – *one-half / a half*	2/3 – *two-thirds*
1/3 – *one-third*	4/5 – *four-fifths*
1/4 – *one-fourth / a quarter*	3/4 – *three-fourths / three-quarters*
1/5 – *one-fifth*	5/8 – *five-eighths*
1/8 – *one-eighth*	9/10 – *nine-tenths*
1/9 – *one-ninth*	7/36 – *seven thirty-sixths*
1/10 – *one-tenth*	33/100 – *thirty-three hundredths*
1/12 – *one-twelfth*	65/1000 – *sixty-five thousandths*
1/20 – *one twentieth*	1 1/2 – *one and a half*
1/32 – *one thirty-second*	1 1/4 – *one and a quarter*
1/100 – *one-hundredth*	3 2/5 – *three and two-fifths*
1/1000 – *one-thousandth*	*6 3/7 – six and three-sevenths.*

e.g.: *He has already written three-quarters of his new novel.*
A cent is one hundredth part of a dollar.
This box weighs two-thirds of a kilogram.

Decimal fractions

The decimal point (.) (not a comma (,)!) separates the whole from the fraction in decimal fractions in English. Decimals are written in figures. When pronouncing decimals, we use the word '*point*' to represent the dot. The numbers following the dot are pronounced separately.

e.g.: *When you have the number 1.36 we say "One point three six."*

The digits to the left of the decimal point are usually read as a cardinal number, and the digits to the right of the decimal point are usually read as separate digits.

e.g.: *546.132 – five hundred (and) forty-six point one-three-two.*

INTERESTING NUMBERS

~ 0 ~

There are a number of ways you can say *0* in English.

0 is pronounced	When we use *0*	Examples
oh [əʊ]	in phone numbers	*5030370 (five oh three oh three seven oh)*
	in bus numbers, room numbers, etc.	*Bus 101 (bus one oh one)* *Room 403 (Room four oh three)*
	in years	*1908 (nineteen eight* or *nineteen oh eight)*
	referring to the 24 hour clock	*14.06 (fourteen six* or *fourteen* oh *six)*
nought [nɔːt]	as the numerical digit	*1 and 0 are the symbols used in binary system. (one and nought)*
	in decimal fractions *(BrE)*	*0.306 (nought point three nought six* or *point three nought six)*
	assessing a student's assignment *(BrE)*	*I scored 0 out of ten.* *(nought out of ten)*
zero [ˈzɪərəʊ]	as the numerical digit	*1 and 0 are the symbols used in binary system. (one and zero)*
	assessing a student's assignment *(AmE)*	*I scored 0 out of ten. (zero out of ten)*
	giving temperatures	*0˚C (zero degrees)* *-10˚C (10 degrees below zero* or *minus ten)*
nil	giving scores in team games	*Manchester United 0:5 Liverpool (Manchester United nil, Liverpool five)*
love	giving scores in tennis or squash	*40:0 (forty love)*

~ 12 ~

The number *12* is often represented as a dozen and the number *6* as a half dozen. There are some things which can be bought in dozens e.g. eggs, bread rolls, oranges.

e.g.: *12 eggs – a dozen eggs.*

6 eggs – half a dozen eggs.

Note: remember not to use the plural of dozen even if it is used with a number indicating the amount higher than 1 item.

e.g.: *A / One / Two dozen eggs please.*

~ 100 ~

A century is 100. The Roman numeral for 100 is C, for centum.

One hundred is the basis of percentages (literally '*per hundred'*). 100% is the full amount of something.

~ billion ~

In British English *billion* traditionally means a million million = 1,000,000,000,000 = 10^{12}

In American English *billion* means a thousand million = 1,000,000,000 = 10^{9}

The American *billion* has become standard in technical and financial use.

However, to avoid confusion it is better to use the terms '*thousand million*' for 10^9 and '*million million*' for 10^{12}.

Milliard is French for the number 10^9. It is not used in American English but is sometimes, but rarely, used in British English.

The word '*myriad*' used to mean 10,000. Nowadays it's used to refer to a countless number or multitude of specified things.

e.g.: *Earth hosts a myriad of animals.*

Letters as numbers

~ k ~

The letter *k* is often used to denote a thousand. So, 1k = 1,000. If you see a job advertised and it offers a salary of £12k it means £12,000.00.

~ m ~

The letter *m* is often used to denote a million. So, 1m = 1,000,000. If you see a job advertised and it offers a salary of £12m, apply for it!

~ bn ~

The letters *bn* denote a billion. So, 1bn is usually 1,000,000,000 (see above). If you see a job advertised and it offers a salary of £12bn, it's probably a misprint.

Arithmetic operations

The fundamental arithmetic operations are addition, subtraction, multiplication and division. This is how their signs are pronounced.

Arithmetic operation	Sign	Word
addition	+	plus *or* and
subtraction	–	minus
multiplication	×	times *or* multiplied by
division	÷	divided by
	=	equals *or* is

e.g.:

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

Dates in English

The table below shows the way how we say the dates in English. The left column shows how we write the dates and the right column shows how we say them.

We write	We say	Notes
800	eight hundred	
827	eight twenty-six	
1066	ten sixty-six	
1607	sixteen oh seven *or* sixteen and seven	
1890	eighteen ninety	
1900	nineteen hundred	
2000	two thousand *or* twenty hundred	
2009	two thousand (and) nine twenty oh nine	
2022	twenty twenty-two	
2179	twenty-one seventy-nine	
the 1960s	the nineteen-sixties	
the 20s	the twenties	If the century is already known, it can be omitted.
the 1800s	the eighteen-hundreds *or* the nineteenth century	
3 BC	three BC *or* three Before Christ	*BC* is necessary
78 AD *or* AD 78	seventy-eight AD *or* AD seventy-eight *or* seventy-eight Anno Domini [ˌænəʊ ˈdɔmɪnaɪ]	*AD* is not necessary, except with the early centuries to avoid possible confusion
203 BCE	two oh three BCE *or* two oh three Before the Common Era	*BCE* is preferred to avoid referring to religion
135 CE	one thirty-five CE *or* one thirty-five 5 the Common Era	*CE* is preferred to avoid referring to religion
29th December, 2018	the twenty-ninth of December, 2018 *or* December the twenty-ninth 2018	*-st, -nd, -rd, -th* and the comma before the year may be omitted: *29 December 2018*
May 26th, 1679	the twenty-sixth of May 1679 *or* May the twenty-sixth 1679	*-st, -nd, -rd, -th* and the comma before the year may be omitted: *26 May 1679*
7.3.93	the seventh of March 1993 *or* March the seventh *(BrE)* July the third 1993 *(AmE)*	Date/Month/Year *(BrE)* Month/date/year *(AmE)*

Numbers after names in English

When we talk about kings we use Roman numerals. Some rich American families use the same rule. The table below shows how we write and say numbers after names in English.

We write	We say
King George IV	King George the Fourth
Queen Elisabeth I	Queen Elisabeth the First
Henry Ford II	Henry Ford the Second

Numbers after names of historical events in English

When we talk about events we also use Roman numerals. The table below shows how we write and say numbers after historical events in English.

We write	We say
World War I	the First World War
World War II	the Second World War

Telephone numbers, bank account numbers etc. in English

In English we write telephone numbers with gaps between groups of figures but not with hyphens or dots:

e.g.: *01 229 4573*

0 is pronounced as *oh*. The numbers are pronounced separately and double figures are usually given as, for example, *double two*. The other long figures such as bank account numbers or insurance numbers are pronounced in the same way.

EXERCISES

Look at the following texts and determine, using the flow chart, which article to use for each gap where appropriate. Be prepared to explain and justify your choices.

1. According to ____ legend, Archimedes (287-212 B.C.E[1].) once famously said "Give me ____ place to stand, and I shall move____ Earth with it" when he uncovered ____ physical principles behind ____ lever. While it would take____ immensely long lever to actually move ____ world, ____ statement is correct as ____ testament to ____ way it can confer ____ mechanical advantage. ____ famous quote is attributed to Archimedes by ____ later writer, Pappus of Alexandria. It's likely that Archimedes never actually ever said it. However, ____ physics of ____ levers is very accurate.
2. Although ____ study of ____ mechanics of ____ rigid bodies goes back to ____ time of Aristotle (384–322 BC) and Archimedes (287–212 BC), one has to wait until Newton (1642–1727) to find ____ satisfactory formulation of its fundamental principles. ____ These principles were later expressed in ____ modified form by d'Alembert, Lagrange, and Hamilton. ____ Their validity remained unchallenged, however, until Einstein formulated ____ his theory of ____ relativity (1905). While its limitations have now been recognized, newtonian mechanics still remains ____ basis of today's engineering sciences.

   ____ basic concepts used in ____ mechanics are ____ *space*, ____ *time*, ____ *mass*, and ____ *force*. ____ These concepts cannot be truly defined; they should be accepted on ____ basis of ____ our intuition and experience and used

[1] B.C.E stands for 'Before the Common Era'. It does not refer to religion and is an alternative to the abbreviation 'BC' (Before Christ).

as ____ mental frame of ____ reference for ____ our study of ____ mechanics.

3. ____ first observation wheel was designed by George W. Ferris, ____ bridge builder from Pittsburgh, Pennsylvania. Ferris began his career in ____ railroad industry and then pursued ____ an interest in ____ bridge building. He understood ____ growing need for ____ structural steel. Ferris founded G.W.G. Ferris & Co. in Pittsburgh, ____ firm that tested and inspected ____ metals for ____ railroads and bridge builders.

   He built ____ observation wheel for ____ 1893 World's Fair, which was held in Chicago to commemorate ____ 400th anniversary of Columbus's landing in America. ____ Chicago Fair's organizers wanted something that would rival ____ Eiffel Tower. Gustave Eiffel had built ____ tower for ____ Paris World's Fair of 1889, which honored ____ 100th anniversary of ____ French Revolution.

   Ferris's ____ wheel was considered ____ engineering wonder.

4. Vitaly Lagutenko (1904, Mogilev – 1969, Moscow) was ____ Soviet architect and engineer. His studies of ____ low-cost prefabricated concrete construction, supported by Nikita Khrushchev, led to ____ complete switch of ____ Soviet building practice from ____ masonry to ____ prefab concrete. Lagutenko designed ____ the standardized 5-story apartment houses, known as ____ khrushchyovka, and ____ associated technologies of ____ fast, mass-scale construction. These low-cost blocks, built by millions of units, helped relieve ____ post-war housing shortage.
5. ____spiral and ____helical staircases can create ____ sense of ____ light within ____buildings, they can take up ____less space than ____traditional stairs, and can create ____ focal point to ____ design. They are often available as ____ pre-fabricated kits.

   ____spiral stair is ____ stair in ____ helix around ____ central column.

   ____ helical stair is ____ stair in ____ helix around ____ central void.

ПРАКТИЧЕСКИЙ РАЗДЕЛ

Практический раздел включает методические разработки и упражнения по разделам практики устной и письменной речи и технического перевода.

BUILDING MATERIALS AND THEIR PROPERTIES

VOCABULARY NOTES FOR STUDY

artificially [ˌɑːtɪˈfɪʃ(ə)lɪ] искусственно

basalt [ˈbæsɔlt] базальт

brick кирпич, клинкер

brittleness [ˈbrɪt(ə)lnəs] хрупкость

building unit строительный элемент

carbon [ˈkɑːb(ə)n] углерод

cement [sɪˈment] цемент

clay [kleɪ] глина

common [ˈkɔmən] общий, распространенный, обычный, частый

compactness компактность

concrete [ˈkɔŋkriːt] бетон

reinforced concrete [ˌriːɪnˈfɔːst] армированный бетон, железобетон

corrosion-resistant [kəˈrəʊʒən rɪˈzɪstənt] коррозионностойкий

creep ползучесть[1]

determine [dɪˈtə ːmɪn] определять

durability [ˌdʒʊərəˈbɪlɪtɪ] долговечность

economical экономичный, экономный, экономически выгодный

elasticity [ˌiːlæˈstɪsətɪ] эластичность, упругость

extremely [ɪkˈstriːmlɪ] чрезвычайно, очень, крайне, в высшей степени

fatigue resistance [fəˈtiːg rɪˈzɪstəns] усталостная прочность[2]

fibre [ˈfaɪbə] волокно

fireproof [ˈfaɪəpruːf] огнеупорный, огнестойкий, несгораемый

fire-resistance огнестойкость

flexibility гибкость

glass [glɑːs] стекло

---

[1] Медленная непрерывная пластическая деформация материала под действием постоянной механической нагрузки. Ползучести подвержены все твердые тела в широком интервале температур. Физический механизм ползучести такой же, как и пластичности.

[2] Свойство материала не разрушаться с течением времени под действием изменяющихся рабочих нагрузок

granite [ˈgrænɪt] гранит

gypsum [ˈdʒɪpsəm] гипс

hardness твёрдость

hardwood [ˈhɑːdwʊd] твёрдая древесина

heavy тяжёлый

in comparison with по сравнению с

insulation [ɪnsjʊˈleɪʃ(ə)n] изоляция, изоляционный материал

- sound insulation звукоизоляция, звукоизоляционный материал
- heat insulation [hiːt] теплоизоляция, теплоизоляционный материал

insulator [ˈɪnsjʊleɪtə] изолятор, изоляционный материал

iron [ˈaɪən] железо

light/lightweight [ˈlaɪtweɪt] лёгкий, облегчённый

lime известь

limestone [ˈlaɪmstəʊn] известняк

malleable [ˈmælɪəb(ə)l] ковкий

marble мрамор

masonry/masonry construction каменная кладка, кирпичная кладка

material [məˈtɪərɪəl] материал

- artificial material искусственный материал
- binding material [ˈbaɪndɪŋ] вяжущее (вещество)
- building material строительный материал
- composite material [ˈkɔmpəzɪt] композитный материал
- main material основной материал
- natural material природный материал
- secondary material [ˈsek(ə)nd(ə)rɪ] вспомогательный материал

mortar [ˈmɔːtə] строительный раствор

opaque [ə(ʊ)ˈpeɪk] непрозрачный, матовый

oxygen [ˈɔksɪdʒ(ə)n] кислород

plastic [ˈplæstɪk] пластик, пластмасса

porosity [pɔːˈrɔsətɪ] пористость

product продукт, продукция, изделие

property [ˈprɔpətɪ] свойство

- chemical property [ˈkemɪk(ə)l] химическое свойство
- electrical property [ɪˈlektrɪk(ə)l] электрическое свойство
- magnetic property [mægˈnetɪk] магнитное свойство
- mechanical property [mɪˈkænɪk(ə)l] механическое свойство
- optical property [ˈɔptɪk(ə)l] оптическое свойство
- thermal property [ˈθɜːm(ə)l] теплоизоляционное свойство

rebar [ˈriːbɑː] (from English *reinforcing* + *bar*) арматура

rigid [ˈrɪdʒɪd] жёсткий

sandstone [ˈsændstəʊn] песчаник

sealant [ˈsi:lənt] герметик, уплотнитель

softwood [ˈsɔftwʊd] мягкая древесина

solid [ˈsɔlɪd] твёрдый, прочный; сплошной, литой

steel сталь

alloyed steel [ˈælɔɪd] легированная сталь[1]

stiffness [ˈstɪfnəs] жёсткость[2]

stone камень

artificial stone [ɑ:tɪˈfɪʃ(ə)l] искусственный камень

crushed stone щебень

strength [streŋθ] прочность[3]

substance [ˈsʌbst(ə)ns] вещество

the very тот самый

timber строительный пиломатериал

to be made up (of) состоять (из)

to be under development разрабатываться

to create создавать

to create through processing [θru: ˈprəʊsesɪŋ] создавать путём обработки, переработки

to decay [dɪˈkeɪ] гнить, разлагаться

to erect (of) [ɪˈrekt] возводить (из)

to harden затвердевать, твердеть

to make (from) (made (from), made (from)) делать (из)

to meet requirements удовлетворять техническим условиям или требованиям

to mix смешивать

to occur in nature [əˈkɜ:] встречаться в природе

to pour into forms [pɔ:] заливать в формы/опалубку

to process [ˈprəʊses] обрабатывать

to stretch [stretʃ] растягивать, растягиваться

toughness [tʌfnəs] ударная вязкость[4]

---

[1] Сталь, в составе которой, кроме железа, углерода и неизбежных примесей, имеются легирующие элементы, вводимые в металл для улучшения его свойств

[2] Мера податливости тела деформации при заданном типе нагрузки: чем больше жесткость, тем меньше деформация

[3] Свойство материала воспринимать, не разрушаясь, различные виды нагрузок и воздействий.

[4] Способность материала поглощать механическую энергию в процессе деформирования и разрушения под действием ударной нагрузки

transparent [trænˈspær(ə)nt] прозрачный

valuable [ˈvæljʊb(ə)l] ценный, полезный

weight [weɪt] вес

wood древесина

yield stress [ˈji:ld ˈstres] предел текучести[1]

VOCABULARY EXERCISES

I. Read the international words and guess their meaning. Mind the stress.

atom [ˈætəm]	macrostructure [ˈmækrə(ʊ)strʌktʃə]
carbon [ˈkɑ:b(ə)n]	microscope [ˈmaɪkrəskəʊp]
compactness [kəmˈpæktnəs]	microstructure [ˈmaɪkrə(ʊ)ˌstrʌktʃə]
cement [sɪˈment]	monolithic [mɔnəˈlɪθɪk]
experimentation [ɪksperɪmenˈteɪʃ(ə)n]	phosphorus [ˈfɔsf(ə)rəs]
extract, *n* [ˈekstrækt]	silicon [ˈsɪlɪk(ə)n]
function [ˈfʌŋ(k)ʃ(ə)n]	structure [ˈstrʌktʃə]
indicate [ˈɪndɪkeɪt]	zinc [zɪŋk]

II. Match the English and Russian equivalents.

1) alloyed steel	a) базальт
2) basalt	b) бетон
3) cement	c) гипс
4) clay	d) глина
5) concrete	e) гранит
6) crushed stone	f) древесина
7) granite	g) известняк
8) gypsum	h) известь
9) lime	i) легированная сталь
10) limestone	j) мрамор
11) marble	k) песчаник
12) mortar	l) строительный пиломатериал
13) sandstone	m) строительный раствор
14) timber	n) цемент
15) wood	o) щебень

III. Complete the sentences. The initial letter the word begins with is given.

1) Thank you for your most v… advice, Mr Yates.
2) When he decided to e… a building, he spent six months looking for an architect.
3) Video conferences and video calls have become very c… these days, but they still need improvement.
4) Modern day granite is treated with a polyurethane water s… for better water resistance.

[1] Механическая характеристика прочности пластичных материалов. Это наименьшее напряжение, при котором деформация происходит без заметного увеличения нагрузки.

5) Reinforced concrete contains r… and other metallic reinforcements, which are removed with magnets and recycled elsewhere.
6) The metal is p… into the form at the lowest practical temperature in order to minimize cracks and p….
7) Mars is a very cold planet, flooded with high levels of UV radiation and e… dry.
8) These days, automotive electronics are used to make a car more e…, more environmentally friendly, more safe.
9) The advantages of cement plaster noted at that time were its s…, h…, quick setting time and d….
10) It's an original m… house. It's made of brick.

IV. Choose the words from the box below to complete the sentences.

brittleness	compactness	elasticity	hardness
stiffness	strength	toughness	weight

1) _____ is another mechanical property related to hardness, it is a material's ability to resist breakage from forceful impact.
2) A problem that must be solved is cracking due to the material's extreme _____.
3) Asking for help is a _____, not a weakness.
4) High _____ and rigidity prevent breaking of the needle.
5) The _____ of diamond is such that it can cut glass.
6) The _____ of the water and the force in which it hit the shore were enormous.
7) The major advantages of camera phones are cost and _____.
8) The method is carried out, using either a _____ matrix or a flexibility matrix.

V. The chart below gives some properties of steel. Read some more facts about steel and add more characteristics of this material to the chart.

Every engineering material possesses certain properties (characteristics or qualities) which we can find by experiment. These properties may make the material suitable or unsuitable for any particular purpose.
Here are some of the properties which steels may have:

Property				Definition
Steel is	fluid.	It has	fluidity.	It flows easily when it melts.
	plastic.		plasticity.	It pulls out of shape without breaking.
	elastic.		elasticity.	It always return to its original shape.
	ductile.		ductility.	It can be stretched without breaking.
	malleable.		malleability.	It can be hammered out of shape without breaking.
	…		…	
	…		…	

As a structural material steel has some drawbacks. Yet steel has long been used, and in great quantities, in structural applications from bridges and buildings to ships, automobiles and household appliances. This is because of many advantages of steel. It is superior to other structural materials in strength, toughness, workability and other properties that are essential for such applications.

VI. Match the nouns with the correct adjectives. Memorize them.

1) brittleness	a) elastic
2) durability	b) strong
3) elasticity	c) brittle
4) flexibility	d) stiff
5) hardness	e) transparent
6) porosity	f) tough
7) stiffness	g) porous
8) strength	h) durable
9) toughness	i) hard
10) transparency	j) flexible

VII. Complete the sentences by choosing the correct words.

1) The builder added supports to make the walls *strength/strong*.
2) A diamond is *hardness/hard* but *brittleness/brittle*.
3) Concrete is *porosity/porous*, so water will slowly filter into it.
4) The combination of *strength/strong* and elasticity makes spider silk extremely *toughness/tough*, matching the *toughness/tough* of carbon fibres such as Kevlar.
5) *Elasticity/Elastic* is the property of a material which deforms when loaded but can regain its original shape when unloaded.
6) Additional screws on the corners made the box *stiffness/stiff*.
7) Phthalates are additives used in everyday plastic products to increase their *flexibility/flexible*, *durability/durable* and transparency.

VIII. Compare the properties of different materials. Complete these sentences with materials of your choice. Mind the forms of adjectives.

MODEL 1: *A metal door is heavier than* _____.
A metal door is heavier than a plastic one.

MODEL 2: *A door of metal is heavier than* _____.
A door of metal is heavier than the one of plastic.

1) A rubber seal is more elastic than _____.
2) A ceramic tile is more brittle than _____.
3) A piece of steel is harder than _____.
4) Soil is more porous than _____.
5) A column of concrete is stronger than _____.
6) A piece of cardboard is tougher than _____.
7) An asbestos tube is heavier than _____.
8) A zinced screw is less corrosion resistant than _____.
9) Basalt wool is a better heat insulator than _____.

10) Ocean water is less transparent than _____.

IX. When talking about materials we can use *–resistant* and *–proof* to describe their properties and *–tight* to describe the connections, e.g. *a heat-resistant material* is a material which cannot be damaged by heat, *a moisture-proof coating* is a coating through which moisture cannot pass, *an air-tight connection* is a connection through which air cannot pass through.

Analyze the meaning of following word-combinations (as in the examples above) and give their Belarusian/Russian equivalents. Memorize them.

Corrosion-resistant steel, a gas-tight seal, an acid-proof cement, a water-resistant coating, a light-proof film, a water-tight connection, a soundproof panel, a dent-resistant metal, weather-proof paint, a windproof jacket, sound-tight room, heatproof brick, crack-proof asphalt, crack-resistant concrete, scratch-resistant glass.

X. There is one more way to describe properties of materials. It is

MAKE/RENDER + *Noun* + *Adjective.*

Read the following information about concrete and complete the table.

In the making of concrete, the proportions of the sand, gravel, and cement are carefully measured. The strength of the concrete is partly determined by the amount of cement in the mixture. More cement would give a stronger, more durable mix, but would be more expensive. It is important not to use too much water as this will make the concrete weak. On the other hand, the concrete must be packed densely in the molds, which cannot be done if the mixture is too dry. Producing concrete of good quality is therefore a skilled business. Nowadays mechanical vibrators are used to make strong compact concrete from fairly dry mixes. If the weather is cold, concrete gains strength very slowly. Good quality concrete becomes frost-proof in a day or so. Concrete must not be allowed to dry during the first few weeks after it has been made because water is needed for the chemical change. Warm, damp weather is, therefore, the best weather for making concrete; in very cold weather, new concrete must be kept warm and in hot weather it must be kept damp.

Concrete is strong in its resistance to loads trying to crush it (compression), but much weaker in resisting forces that tend to pull it apart (tension). To overcome this weakness, steel rods known as rebar are embedded in the mixture to form reinforced concrete.

<table>
<tr><td>Warm, damp weather</td><td rowspan="5">makes/renders the concrete</td><td>harder.</td><td rowspan="5">This</td><td>hardens</td><td rowspan="5">the concrete.</td></tr>
<tr><td>Enough water</td><td>softer.</td><td>softens</td></tr>
<tr><td>Too much water
…</td><td>weaker.</td><td>weakens</td></tr>
<tr><td>Cement
…
…</td><td rowspan="2">stronger.</td><td rowspan="2">strengthens</td></tr>
<tr><td></td></tr>
</table>

XI. Using the model *MAKE/RENDER + Noun + Adjective* describe the following building materials. Some words are given to help you.

MODEL: *Water makes/renders wood weak and soft.*

Wood: water, lacquer, dampness, treatment; insects;
Brick: temperature jump, baking, roots of grass and trees;
Glass: scratches, cracks, lamination, quartz, toughening.

XII. Answer the following questions. The beginning of the answer is given to you.

MODEL: *Why is brick used to erect houses?*
Because brick is strong and durable, it is also economical.

1) Why is glass used for window panes?

   Because glass is _____.
2) Why is glass wool used to keep the heat in water boilers?

   Because glass wool has the property of good _____.
3) Why are some steel products covered with a thin layer of zinc?

   Because zinc is _____.
4) Why are some chimneys covered with mineral wool?

   Because mineral wool is _____.
5) Why do some metal sheets have a corrugated shape?

   Because the corrugated shape makes the sheet _____.
6) Why is concrete used for the columns of a building structure?

   Because _____.
7) Why are some window frames made from plastics?

   Because plastic windows _____.

XIII. Translate the words and phrases in brackets into English.

Modern *(композитные материалы)* have a number of advantages over other materials such as *(сталь)*. Perhaps most importantly, composites are *(намного легче)* in weight. They also resist corrosion, are *(гибкие)* and dent-resistant. This, in turn, means they require less *(обслуживание)* and are *(более долговечные)* than traditional materials.

The most common example of a *(композитный материал)* is reinforced *(бетон)*. In this use, structural *(стальная арматура)* provides the *(прочность)* and *(жёсткость)* to the concrete, while the hardened *(цемент)* holds the reinforcement fixed. Rebar alone would be *(слишком гибкая)* and cement alone would crack easily. However, when combined to form a composite, an extremely *(жёсткий)* material is created.

XIV. Make up a paragraph with the help of the sentences according to the model. Use the connectors. You may omit any words and make any changes, if it is necessary.

MODEL:

Given	Your paragraph
because/and/however Plastics are widely used in engineering. They are cheap. They have a resistance to atmospheric corrosion. Plastics are	*Plastics are widely used in engineering because they are cheap and atmosphere-resistant; however, they are*

not particularly strong.	*not particularly strong.*

Now continue the text:

Given	Your paragraph
and There are two types of plastics. Thermoplastics are plastics. Thermosets are plastics. *from/to* Plastics are used to make a great variety of products. Plastics are used to make textiles. Plastics are used to make engineering components. *such as* Plastics are available in many forms. Plastics are available in the form of sheets, tubes, rods. *by* These products are made. The compression moulding method is used.	

READING PRACTICE

Read the text and say what modern building materials there are.

Modern Building Materials

Materials are solid substances of which manufactured products are made. Materials that are used for structural purposes should meet certain requirements. In most cases they should be hard, durable, fire-resistant and easily fastened together.

Basic types of materials range from wood, which has been used for thousands of years, to composite materials, which are still under development. The most commonly used materials are steel, concrete, stone, wood and brick. They differ in their properties.

Timber is a name applied to wood ready to be used in construction. It is the most ancient structural material. In comparison with steel, timber is lighter, cheaper and easier to work with and its mechanical properties are good. But timber has certain disadvantages. First, it burns and is therefore unsuitable for fireproof buildings. Second, it decays. Timbers used for building purposes are divided into softwoods and hardwoods.

Stone belongs to one of the oldest building materials. Almost all survived structures of the past were erected of stone. This material features mechanical strength, compactness, porosity, sound and heat insulation, fire-resistance. The art of making any structure in stone is known as stone masonry. For masonry work granite, basalt, sandstone, limestone and marble are usually preferred. Besides, marble, granite and sandstone are widely used for decorative purposes.

A brick is best described as a “building unit”. It can be made of various materials, but most commonly it is made of clay by moulding and baking in kilns. There exists a great variety of bricks for different purposes: ordinary, hollow, lightweight, multicolour bricks etc. Bricks were known many thousands of years ago. Good bricks are the most durable man-made building materials. They are quite weather- and fire-resistant. Bricks are fairly small and light and therefore easy to work with, but when they are bonded together with mortar they make extremely strong structures. Good brick masonry needs very little maintenance, is durable and looks attractive.

Steel has come into general use with the development of industry. Steel is an alloy of iron and carbon containing less than 2% carbon and 1% manganese and small amounts of silicon, phosphorus, sulphur and oxygen. Steel is the world’s most important engineering and construction material. Its manufacture requires special equipment and skilled labour. Steel is completely recyclable, possesses great durability, and, compared to other materials, requires relatively low amounts of energy to produce. Innovative lightweight steels (such as those used in in automobiles and buildings) help to save energy and resources. Alloyed steel is corrosion-resistant. This kind of steel is widely used in construction. It is employed as rebar in reinforced concrete structures and as steel framework for skyscrapers.

Many builders and designers prefer traditional building materials and choose wood and metal instead of plastics. This used to be reasonable, since early plastics were often brittle. However, today’s technology makes plastics both durable and flexible. A good specialist sees the benefits of building with plastics. Some plastics are opaque, while others are transparent. That means that some can be used to construct walls and others can be used to make windows. Plastics vary in hardness. Rigid plastics create strong, solid structures. More elastic products make excellent insulators and sealants. Plastics are also easy to work with because they are often lightweight. However, they are often stronger than many other heavy materials.

Concrete is referred to as one of the most important building materials. It is the very building material which led to great structural innovations. The most important property of concrete is its ability to be formed into large and strong monolithic units. Concrete is made by mixing cement, sand, crushed stone and water in certain proportions. As soon as it is thoroughly mixed it is poured into forms that hold it in place until it hardens. Cement starts hardening one hour after the water has been added and this process lasts for about 28 days. Concrete should meet the following important requirements: it should be hard, strong, durable, fire-resistant and economical. The use of concrete is almost universal.

Engineers may artificially combine various materials to create a new composite material. A composite material is a combination of two materials with different physical and chemical properties. When they are combined they create a composite material which is stronger, lighter or more resistant to electricity. They can also improve strength and stiffness.

All building materials are divided into three main groups:

1) main building materials, e.g. natural and artificial stones, timber, metals and concrete;

2) binding materials, e.g. lime, gypsum and cement;

3) secondary materials which are used for the interior parts of the buildings.

We use main building materials for bearing structures. Binding materials are used for making artificial stone and for joining different planes. For the interior finish of the building we use secondary materials.

Natural materials, which include, for example, stone, sand, lime and timber, are used much as they occur in nature. Artificial building materials, such as cement, plastics, concrete, are created through processing various natural substances.

Read about properties of building materials and write out all word-combinations with the word *property*. Translate them into Russian/Belarusian and try to memorize them.

Properties of Building Materials

Manufacturers determine which material to use for a given product by evaluating properties of materials. Some properties can be linked with a material's macrostructure (structure visible to the unaided eye). Other properties are explained by a material's microstructure (structure that can be seen only through a microscope). The properties of materials are determined by their internal structure – that is, the way in which the atoms of the materials are put together.

Materials scientists study how the structure of materials relates to their properties. A large part of their work involves experimentation. Scientists group the properties of materials according to various functions that must be performed by objects made of the materials. Most properties of materials fall into six groups: mechanical, chemical, electrical, magnetic, thermal, optical.

Mechanical properties are critical in a wide variety of structures and objects – from bridges, houses, and space vehicles to chairs and even food trays. Some of the most important mechanical properties are stiffness, yield stress, toughness, strength, creep and fatigue resistance.

Chemical properties are determined by the way how a substance interacts with other substances under various chemical reactions.

Electrical properties are important in products designed either to conduct or block electricity.

Magnetic properties indicate a material's response to a magnetic field.

Thermal properties reflect a material's response to heat.

Optical properties of a material define how it interacts with light.

TEXT EXERCISES

LANGUAGE FOCUS

I. In the texts there are a lot of words of the same stem that belong to different parts of speech. Fill in the chart with them according to the model.

Initial form	Noun	Verb/Verbal form	Adjective	Adverb
work, *v*	*work framework*			

artificial, *adj*				
difference, *n*				
hard, *adv*				
insulate, *v*				
light, *adj*				
resist, v				
strengthen, *v*				
structure, *n*				

II. Four adjectives ending in *-able* or *-ible* are used in the texts to describe building materials. Write out and translate them into Belarusian/Russian. Give nouns to these adjectives.

MODEL: *reasonable – разумный*
reasonability – обоснованность

III. Look back at text "Properties of Building Materials" and write out sentences where predicates are in the Passive Voice. Change the sentences by using the predicates in the Active Voice. You may make any other changes too, if it is necessary. The first sentence is given to you as a model.

MODEL: *Some properties can be linked with a material's macrostructure. – Scientists/Specialists can link some properties with a material's macrostructure.*

COMPREHENSION CHECK

I. Complete the following sentences according to the texts of the unit.

1) All building materials are divided into … main groups
2) Natural materials are used much as …
3) Artificial building materials are created through …
4) … is a combination of two materials that have different physical and chemical properties.
5) As soon as concrete is thoroughly mixed it is …
6) Plastics vary in …
7) Concrete led to …
8) Materials are …

II. Substitute the words and word combinations in bold type with their synonyms from the texts of the unit.

1) The macro- and microstructure of a substance determine its characteristics.
2) 3D-printed bioplastics are going to become a new building material.
3) Construction materials can be generally categorized into two sources, natural and synthetic.
4) A glass surface can be made non-transparent chemically by application of acid.
5) The company used an elastic plastic for the toy.
6) Fragile glass goods must be handled with care.
7) Softwoods, e.g. a pine and fir, are workable materials.

8) Hollow bricks are more lightweight than solid ones.
9 Cement and water, important ingredients in normal concrete, are not part of sulfur concrete.
10) Concrete is full of tiny pores, so water slowly filters through it.
11) These boots are water-resistant, not impermeable to water.
12) China is a great country, only it has a man-made object which is visible from outer space – The Great Wall.

III. Match the words and word-combinations in column A with those in column B to make up all possible word-combinations.

A	B
1) are used	a) certain requirements
2) to meet	b) for fireproof buildings
3) are still	c) for structural purposes
4) they differ	d) in their properties
5) in comparison	e) into general use
6) unsuitable	f) into large monolithic units
7) were erected	g) of stone
8) are easy to work	h) strength and stiffness
9) to come	i) through processing
10) ability to be formed	j) under development
11) to improve	k) with
12) are created	l) with steel

IV. Let's see how well you understand building materials. Fill in the gaps with the names of structural materials.

1) A _____ is a handy-sized unit of building or paving materials typically rectangular and about 57x95x203 mm. It is made of moist clay and hardened by heat.
2) A _____ is a solid structural material which is composed of two or more substances with different physical characteristics. In it each substance retains its identity and contributes desirable properties to the whole.
3) _____ is a hard strong building material created by mixing cement, water and aggregates such as gravel and sand.
4) _____ is an amorphous solid, usually transparent material made by melting sand with a mixture of soda, potash and lime.
5) _____ are chemical elements or alloys that are generally shiny, somewhat malleable and hard and often conduct heat and electricity.
6) _____ are numerous synthetic solid hydrocarbon-based materials that are mostly thermoplastic or thermosetting polymers of high molecular weight.
7) _____ is an artificial metal produced from iron. It is harder and more elastic than elemental iron.
8) _____ is a hard earthen substance that can form rocks.
9) _____ is wood that has been pre-cut and is ready for use in construction.

10) _____ is a substance making up the central part of the trunk and branches of a tree. It is used as a material for construction, to manufacture various items, etc. or as fuel.

V. Mark the following statements as True (T), False (F) or No Evidence (NE) according to the information from the texts of the unit. If the statement is false or has no evidence, give your reason for this.

1) Composite materials are still being developed.
2) Brick is the oldest structural material.
3) Steel requires the lowest amounts of energy to produce.
4) Glass can be opaque or transparent.
5) Early plastics possessed both durability and flexibility.
6) Sand, crushed stone, concrete, and water are mixed in certain proportions to make cement.
7) A composite material is a combination of two materials with the same physical and chemical properties.
8) Binding materials are used for bearing structures.
9) The groups of properties of materials are chemical, electrical, magnetic, mechanical, optical, physical and thermal.
10) A material's microstructure can be seen with the unaided eye.

VI. Ask your partner about the following:

– what groups all building materials are divided into;
– what main building materials he (she) knows;
– what natural/ artificial building materials he (she) knows;
– whether heat resistance is a mechanical or thermal property;
– whether transparency belongs to optical properties;
– whether plastics are an ancient material;
– what properties timber has;
– whether bricks are produced in great variety;
– where steel can be applied to;
– whether reinforced concrete is a composite material.

VII. Answer the following questions about the text.

1) What does the term *material* mean?
2) There are four main groups of structural materials, aren't they? What are these groups?
3) How are main building materials used? Binding materials? Secondary materials?
4) Which is created through processing various natural substances: artificial or natural materials?
5) Have people widely used steel since time immemorial?
6) What are the main drawbacks of timber?
7) Are the properties of materials linked with their macrostructure or microstructure?
8) Plastic is a durable material, isn't it?
9) What do materials scientists study?
10) Do materials scientists classify materials' properties into three large groups?

11) Can you define major mechanical properties of materials?
12) Why is it important to study properties of materials?

VIII. Expand the following statements. Add as much as possible information from the texts.

1) There are three groups of structural materials.
2) The properties of substances are determined by their structure.
3) It is critically important to study properties of building materials.
4) Each construction material has its own advantages and disadvantages.

IX. Ask your partner questions about:

1) classifications of building materials; 2) classifications of materials' properties; 3) most commonly used building materials; 4) traditional and modern construction materials; 5) advantages and drawbacks of structural materials.

SPEAKING PRACTICE

What do you think?

1. Scaffolding can be constructed using different materials such as metal pipes or bamboo. With your partner, make up a list of the properties these two materials have and discuss the advantages and disadvantages of each.
2. Discuss with your groupmates or in pairs which construction materials are more sustainable, i.e. better for nature, economy and society: innovative or traditional ones.
3. The unit doesn't say a word about innovative building materials. Do you know any? Search the Internet and find out more about innovations in this field.

- Make a computer presentation. Share what you discover with your groupmates in the next class. Give each other feedback on your presentations.
- Make a poster presentation. Show your work to your groupmates in the next class. Give each other feedback on your posters.

Discussion on the future. Work in pairs.

STUDENT A's QUESTIONS (Do not show these to Student B.)

1) What comes to mind when you think about your future?
2) Where do you see yourself in ten, twenty and fifty years from now?
3) What futuristic things from science fiction movies do you want to happen in real life?
4) Barack Obama said "The best is yet to come". Do you agree?
5) What will the world's biggest problem be in the future?
6) What does the past teach us about the future?

STUDENT B's QUESTIONS (Do not show these to Student A.)

1) How would you like to influence the future?

2) Does the expression “the good old days” mean that the future will probably be worse?
3) What are your plans for the immediate, near and far future?
4) What technology will we be using in the future?
5) What are some major changes the world will see in the future?
6) Would you like to live 100 years in the future or the past? Why?

SPEAK ON THE TOPIC:

- the classification of building materials;
- the classification of their properties;
- modern building materials;
- an innovative structural material.

ELEMENTS OF A BUILDING

VOCABULARY NOTES FOR STUDY

basement [beɪsmənt] цоколь, цокольный этаж

column [ˈkɔləm] колонна

dome купол

door дверь

exterior door [ɪkˈstɪərɪə ˈdɔː] входная дверь; внешняя дверь

interior door [ɪnˈtɪərɪə ˈdɔː] межкомнатная дверь; внутренняя дверь

flat 1) плоский; 2) квартира

floor 1) перекрытие; 2) пол; 3) этаж

finishing layer отделочный слой покрытия

flooring покрытие пола, настил

framed structure каркасная конструкция

foundation [faʊnˈdeɪʃən] фундамент, основание

deep foundation фундамент глубокого заложения

shallow foundation фундамент неглубокого заложения

pier foundation [ˈpɪə faʊnˈdeɪʃən] столбчатый фундамент[1]

pile foundation свайный фундамент[2]

raft foundation [ˈrɑːft faʊnˈdeɪʃən] плитный фундамент[3]

spread foundation [ˈspred faʊnˈdeɪʃən] фундамент на естественном основании[4]

ground/soil земля, грунт, почва

load [ləʊd] нагрузка

dead load [ˈded ˈləʊd] постоянная нагрузка

live load [ˈlɪv ˈləʊd] временная нагрузка

earthquake load [ˈɜːθkweɪk ˈləʊd] сейсмическая нагрузка

snow load снеговая нагрузка

wind load [ˈwɪnd ˈləʊd] ветровая нагрузка

load-bearing [ˈləʊd ˈbeərɪŋ] воспринимающий нагрузку, несущий

member элемент (конструкции)

nonload-bearing [ˈnɔnləʊd ˈbeərɪŋ] не несущий нагрузку, ненесущий

performance производительность, эффективность

functional performance эксплуатационные качества

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[1] Отдельные, не связанные между собой опоры под стены или колонны здания, имеющие сравнительно небольшую глубину заложения.

[2] Фундамент, опертый на сваи.

[3] Сплошная фундаментная плита, как правило из монолитного железобетона, сразу под все сооружение или под секцию сооружения.

[4] Естественное основание – это грунты природного сложения, не подвергавшиеся никакому вмешательству со стороны человека и образовавшиеся естественным путем. К фундаментам на естественном основании относят ленточный, плитный и столбчатый.

structural performance конструктивные характеристики (сооружения)

plot of land участок земли, земельный участок

post [pəʊst] столб, стойка

privacy [ˈprɪvəsɪ] уединение, уединённость, приватность

roof [ruːf] крыша

domed roof купольная крыша

flat roof плоская крыша

pitched roof [ˈpɪtʃt ˈruːf] скатная крыша

roof covering кровельное покрытие

roof decking настил крыши

roofing material кровельный материал

security [sɪˈkjʊərɪtɪ] безопасность

shell оболочка; свод

shingle гонт[1]; кровельная плитка

slab плита

slate шифер

space пространство

staircase/ stair [ˈsteəkeɪs] лестница

step ступень, ступенька

sub-floor [ˈsʌbflɔː] основание пола

substructure [ˈsʌbstrʌktʃə] подземная часть (сооружения)

superstructure [ˈsuːpəstrʌktʃə] надстройка, часть здания выше фундамента, наземная часть (сооружения)

supporting [səˈpɔːtɪŋ] несущий, опорный

terrazzo [teˈrætsəʊ] тераццо[2]

tile 1) плитка; 2) черепица

to carry one’s own weight нести свой собственный вес

to enclose [ɪnˈkləʊz] огораживать

to give protection (against) давать защиту (от)

to keep off (kept off, kept off) избегать, не допускать *(to prevent from stepping on an object; i.e. you keep off a surface (the grass, the bridge, the sidewalk, etc.))*

to keep out (kept out, kept out) не допускать, не впускать, не позволять *(to prevent from going into an area/location/building; i.e. you keep out of a space (a room, a building, a park, etc.))*

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[1] Узкие и тонкие еловые, сосновые или осиновые дощечки с пазами, соединяемые одна с другой и используемые как кровельный материал.

[2] Тераццо производится из залитой клинкерным цементом мраморной крошки. Иногда в смесь добавляют осколки других камней или стекла, которые образуют рассыпчатые узоры, – получается очень прочный материал. Тераццо – долговечный износостойкий пол.

to lay (laid, laid) a foundation закладывать фундамент

to maintain a comfortable indoor climate поддерживать комфортный микроклимат помещения

to meet (met, met) a need удовлетворять потребность

to perform well under loads [pəˈfɔːm] являться эффективным при сейсмических нагрузках

to protect (from) защищать (от)

to provide обеспечивать, предоставлять, предусматривать, давать

to support [səˈpɔːt]/ bear (bore, borne) [beə; bɔː; bɔːn] /carry the load нести нагрузку

to transfer the load (from) (to) [trænsˈfɜː] передавать нагрузку (с) (на)

truss стропильная ферма

uppermost [ˈʌpəməʊst] самый верхний

wall стена, стенка

partition wall перегородка, разделительная стена

VOCABULARY EXERCISES

I. Read the international words and guess their meaning. Mind the stress.

act [ækt]	functional [ˈfʌŋ(k)ʃ(ə)n(ə)l]
aesthetics [iːsˈθetɪks]	fund [fʌnd]
basic [ˈbeɪsɪk]	furniture [ˈfɜːnɪtʃə]
basically [ˈbeɪsɪklɪ]	location [lə(ʊ)ˈkeɪʃ(ə)n]
category [ˈkætəg(ə)rɪ]	material [məˈtɪərɪəl]
classification [ˌklæsɪfɪˈkeɪʃ(ə)n]	occupant [ˈɔkjʊp(ə)nt]
classify [ˈklæsɪfæɪ]	problem [ˈprɔbləm]
component [kəmˈpəʊnənt]	region [ˈriːdʒ(ə)n]
critical [ˈkrɪtɪk(ə)l]	specification [ˌspesɪfɪˈkeɪʃ(ə)n]
element [ˈelɪm(ə)nt]	storm [stɔːm]
factor [ˈfæktə]	traditionally [trəˈdɪʃənəlɪ]
function [ˈfʌŋ(k)ʃ(ə)n]	vertical [ˈvɜːtɪk(ə)l]

II. Match the English and Russian equivalents.

1) floor	a) Вход в пещеры запрещён!
2) Keep out of the caves!	b) кровельная плитка
3) load-bearing	c) кровельный материал
4) nonload-bearing	d) наземная часть сооружения
5) Please keep off the grass!	e) ненесущий
6) roofing material	f) нести нагрузку
7) shingle	g) несущий
8) slab	h) опорный
9) slate	i) передавать нагрузку
10) substructure	j) перекрытие
11) superstructure	k) плита

12) support/bear/carry the load	l) плитка
13) supporting	m) По газону не ходить!
14) tile	n) подземная часть сооружения
15) to transfer the load	o) шифер

III. Complete the sentences. The initial letter the word begins with is given.

11) If the sign says ‘K… o…’, it is warning you not to go somewhere.
12) Some manufacturers have created vinyl t… that very closely resemble wood, stone, t…, and concrete.
13) As soon as the t… are installed, the joint between them will b… most of the roof’s weight.
14) The house rests on a brick p… f….
15) There are three ways to place piles for a d… f….
16) P… f…, a kind of deep foundation, is actually a slender column or long cylinder made of materials such as concrete or steel.
17) Even if something falls on it – the surface of this laminate f… is resistant to a lot of stress.
18) The key to a really good s… is keeping the moisture off the floor.
19) For additional strength, metal rods were included in the dome’s s….
20) Putting a sticker over your web cam is probably the best thing you can do for your p….

IV. Choose the words from the box below to complete the sentences.

flat roof	domed roof	slate roof	shell
shingle roof	dome	pitched roof	tile roof

9) A _____ is a roof which is almost level in contrast to the many types of sloped roofs.
10) A _____ is designed mainly to keep out rain and heat, and is traditionally made from locally available materials such as clay or terracotta.
11) A conventional _____ consists of thin slates, hung over wooden laths.
12) A huge geodesic _____ re-creates the climate of a rainforest.
13) Ancient Romans invented the _____ made if concrete.
14) For 25 years, the roofless _____ dominated the skyline; its west wall collapsed in 2004.
15) In Korea, a traditional house is covered with a _____ made of oak bark.
16) Metal is one of the few materials that can be used for both a flat roof and a _____.

V. Read the text and complete the chart below.

Buildings are designed so they are capable of performing the design requirements. The most important of these requirements include the following:

A Weather resistance –	keep out wind, dust and precipitation
B Privacy–	provide visual screening
C Surfaces –	provide surfaces for activities

D Security – keep out intruders
E Fire resistance – prevent fire from spreading
F Structure – resist loads
G Ventilation – provide fresh air
H Thermal insulation – modify the passage of heat
I Sound insulation – control sound transmission
J Moisture – control the passage of moisture
K Light – provide natural light

Element	Main functions
basement	*C, H, J*
column	
door	
external wall	
floor	
foundation	
internal wall (partition)	
roof	
staircase	
window	

VI. Use the information from the chart above to make statements like in the model:

MODEL: *The functions of the basement include providing surfaces for activities and modifying the passage of heat and moisture.*

VII. Answer the questions:

MODEL: *The partition enables the building to provide visual screening.*
The roof and the external walls are designed to resist loads.
The external wall acts as a thermal insulator.

1) What enables the occupants of a building to
   – keep warm?
   – keep dry?
   – have privacy?
   – be safe from intruders?
   – be safe from fire?
2) What element is designed to
   – support snow loads?
   – resist passage of moisture?
   – let in natural light?
   – control the noise level between rooms?
   – control the movement of people up and down the building?
   – control the movement of people into and out of the building?
3) What elements act as
   – a thermal insulator?
   – a space divider?

– a sound insulator?

– a filter to separate the internal volume from the external environment?

VIII. Fill each gap with the help of the connectors from the box below. Some connectors may be used interchangeably.

also	whereas	in relation to	which (2)	that
in order to	besides	i.e.	than	and

Basement vs Cellar

In the UK “The Approved Documents” provide guidance on ways to meet the building regulations. They contain general guidance on the performance expected of materials and building work (1) _____ comply with the building regulations. They (2) _____ give practical examples and solutions on how to achieve compliance for some of the more common building situations.

The Building Regulations Approved Document F “Ventilation” suggests that, (3) _____ dwellings, a *basement* “...is a dwelling or a usable part of a dwelling ((4) _____ a habitable room), (5) _____ is situated partly or entirely below ground level.”

(6) _____ a *cellar* “... is part of a dwelling (7) _____ is situated partly of entirely below ground level, is distinct from a basement in that it is used only for storage, heating plant or purposes other than habitation.”

(8) _____, Approved Document B “Fire Safety” defines a *basement storey* as “a storey with a floor (9) _____ at some point is more (10) _____ 1,200 mm below the highest level of ground adjacent to the outside walls.”

IX. Translate the words and phrases in brackets into English.

Are you aware of the different types of foundations?

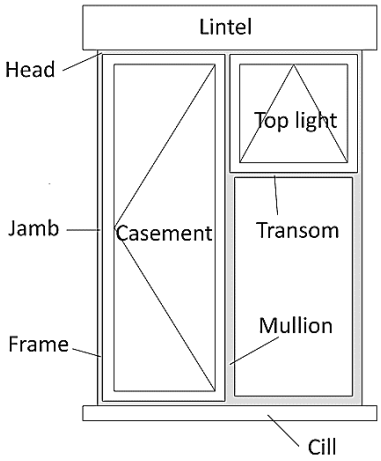
Broadly speaking, all (*фундаменты*) are divided into two categories: 1) (*фундаменты неглубокого заложения*) and 2) (*фундаменты глубокого заложения*). The words («*неглубокий*») and («*глубокий*») refer to the depth of (*грунта*) in which (*закладывается фундамент*). (*Фундаменты неглубокого заложения*) can be made in depths of as little as 1 m, while (*фундаменты глубокого заложения*) can be made at depths of 20–65m. (*Фундаменты неглубокого заложения*) are used for small, light buildings, while deep ones are usually for large, heavy buildings.

(*Фундаменты неглубокого заложения*) usually comprise (*плитные фундаменты*) and (*фундаменты на естественном основании*). Their depth is (*меньше*) than or equal to its width.

(*Фундаменты глубокого заложения*) include, for example, (*свайные фундаменты*) and (*столбчатые фундаменты*). They are constructed very deep below the (*поверхностью земли*), and their depth is (*больше*) than its width.

These foundations can be used (*передавать нагрузки*) to a (*более глубокий*), (*более прочный*) and more stable (*грунт*) at depth if near the (*поверхность*) it is unsuitable.

X. Engineering deals with a lot of measurement. What important dimensions in construction work do you know? Read the description of products by an American window manufacturer. What dimensions of windows are given? Complete the chart below.



SASH WINDOWS

These are standard windows for a home. Their typical dimensions are a width of 60cm and a height of 90 cm. The bottom sash opens. The top sash is fixed.

STORM WINDOWS

These are a greater weight and provide extra strength to resist wind and other weather. They have a 3 cm thickness. We start at a minimum window length of 80 cm.

CASEMENT WINDOWS

These windows also have a sash. It swings inward or outward. They should be installed on a cill with a minimum length of 8 cm.

FRENCH DOORS

We cut custom glass to fit French doors. They require a minimum jamb width of 8 cm. The depth at the bottom of the door should be 1 cm.

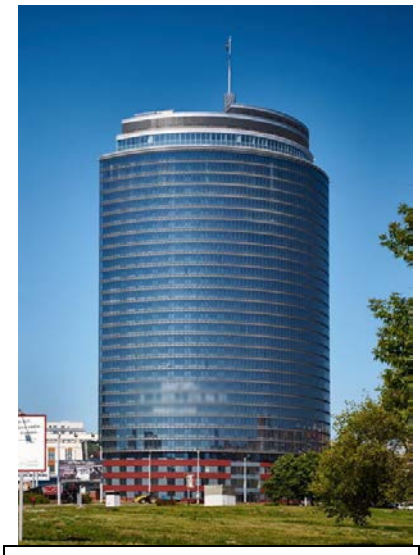
	DIMENSIONS				
Noun	depth	length	thickness	_____	width
Adjective	_____	_____	_____	heavy	_____

XI. Complete the sentences by choosing the correct words.

1) The pile foundation of Lakhta Center in St. Petersburg is 82 m *deep/depth.*
2) Within Minsk the Svisloch River has a maximum *deep/depth* of 5.5 m.
3) The National Library of Belarus is 73.7 m *high/height.*
4) Burj Khalifa is 828 m in *high/height.*
5) The total *long/length* of the Great Chinese Wall is more than 21,000 km.
6) The Channel Tunnel connects the UK and France and is about 51 km *long/length.*
7) The walls of old houses can be even more than 1,500 mm in *thick/thickness.*
8) The *thick/thickness* of this floor board is 30 mm.
9) Nezavisimosti Avenue is a minimum 48 m *wide/width.*
10) This foundation trench is 2 m in *wide/width.*
11) The concrete slab has a *weight/heavy* of 3,000 kg.
12) The *weight/heavy* of this steel truss roof 30,000 kg.

XII. Here are Top 3 of the tallest buildings in Minsk, Belarus according to skyscraperpage.com. Can you find these buildings in the photos?

1. The Parus
2. Royal Plaza
3. Futuris



Work in pairs. Ask you partner questions about these buildings and complete the specification charts.

STUDENT A's Specification charts (Do not show these to Student B.)

	The Parus	Royal Plaza	Futuris
Address	Kal'variyskaya, 16		Nezavisimosti, 173
Function	Mixed use: residential+office+retail	office	
Completion date		2013	2019
Architectural style	modern	modern	
Structural type	high-rise		high-rise
Height	133 m	130 m	
Floors		33	25
Floor height	3–3.6 m		3 m
Floor area	230 m^2 (penthouse)	700 m^2	
Materials	reinforced concrete glass	reinforced concrete glass	
Number of lifts		8	13

STUDENT B's Specification charts (Do not show these to Student A.)

	The Parus	Royal Plaza	Futuris
Address		Pobediteley, 7A	Nezavisimosti, 173
Function	Mixed use: residential+office+retail		office
Completion date	2014	2013	
Architectural style	modern		modern
Structural type		high-rise	high-rise
Height	133 m		100 m
Floors	32	33	
Floor height	3–3.6 m	3 m	
Floor area		700 m^2	1,000 m^2
Materials	reinforced concrete glass		reinforced concrete glass
Number of lifts	6	8	

READING PRACTICE

Read the text and say what structural elements are the most essential parts of a building.

Elements of a Building

The first houses were built to protect their owners from weather and, therefore, were very simple – a roof to keep off the rain or snow, and walls to keep out the wind. Buildings erected now can be divided into two broad classifications: they are either for housing or for industrial purpose.

A building has two main parts, the substructure (the part below ground) and the superstructure (the part above ground). The substructure is usually called the foundation. It includes the basement walls, even though these may extend above the ground.

Both the substructure and the superstructure help support the load (weight) of the building. The dead load of a building is the total weight of all its parts. The live load is the weight of the furniture, equipment, stored material, and occupants of a building. In some regions, the wind load of a building is important if the structure is to withstand storms. The snow load and earthquake loads may also be significant factors.

All buildings have similar parts such as foundation, walls, floors, columns, roof, partition walls, staircases, doors and windows. These building components are classified in two categories: structural elements and non-structural elements. Structural elements are the primary load-bearing components of a building. They are foundation, wall, column, floor, roof and staircase. Non-structural elements are, for

example, partition walls, doors and windows.

The basic functional requirements for these building components are discussed below.

Foundation. The foundation is the most critical structural element of any structure and many failures happen more often due to weak foundations than due to any other cause. That is why a designer must make sure that the superstructure, foundation and soil act together. The main function of a foundation is to transfer the load of the entire building to the underlying ground. The foundations of any structure should be laid much below the ground surface.

The ground and the type of a structure define which the foundation would be better: shallow or deep. In case of load-bearing walls, the foundation can be spread. For framed structures, pier, pile, and raft foundations may be chosen.

Wall. Walls are provided to enclose or divide the floor space in a desired way. In addition, walls provide security, privacy, and give protection against weather. A load-bearing wall supports dead load as well as live loads and transfer them down to the substructure. A nonload-bearing wall, on the other hand, carries its own weight and is not designed to carry the loads of the structure. Such walls are normally called partition walls.

Column. A column may be defined as vertical load-bearing member the width of which neither less than its thickness nor more than four times its thickness. A post is a vertical load-bearing structural element similar to a column though it is smaller than it.

Floor. Floors are flat supporting structural elements of a building. They divide it into different levels to create more useful area on a given plot of land. A floor basically consists of two parts: the sub-floor and the flooring.

A sub-floor is the structural component of the floor which supports all the loads (dead and live), and flooring is the covering layer of desired specification (cement concrete, terrazzo, tiles, etc.) provided over the sub-floor as a finishing layer for aesthetics.

Roof. Roof is the uppermost component of a building and its main function is to cover the space below and protect it from rain, snow, sun, wind, etc. A roof basically consists of two components: a roof decking and a roof covering.

The choice of the type of roof should never be made without taking into account the location of the building, weather conditions, the budget and functional and aesthetics requirements. The structural components of a roof decking in case of a pitched roof is generally a truss, in case of a domed roof it is a shell or dome and in case of a flat roof it is a flat slab. A roof covering is designed to provide shelter from the weather. Roofing materials can be tiles, slates, shingles, etc.

Staircase. A staircase may be defined as a structure comprising of a number of steps connecting one floor to another. It should be constructed in such a manner that it is safe and comfortable to use. The selection of the material to be used depends upon the aesthetical importance, the budget, durability and fire resisting qualities desired.

Door. Most buildings have several different kinds of doors, each designed to meet a particular need. All doors are classified as either exterior or interior models. Exterior doors allow access, provide security and maintain a comfortable indoor

climate. They are made to be particularly strong, weather-resistant and energy efficient. Lighter-weight interior doors are used between rooms and in similar applications.

Window. Windows are transparent elements of a structure. They are traditionally glass, although plastics are being used, especially in schools where breakage creates a maintenance problem. Most parts of a window come from a lumber mill, already cut in the proper sizes.

Each of these structural elements is an essential part of a building and requires thorough consideration in design and construction for their functional and structural performance.

Read the text and what loads a fixed structure may carry.

Loads

The structural system of every house is required to support and transmit various loads. These loads can be classified as static or dynamic.

Static loads are applied slowly to a structure and do not change quickly. Examples of static loads include live loads, dead loads and soil and hydraulic loads. Live loads are any moving or movable loads resulting from people, collected water and/or snow or movable equipment. Dead loads are associated with the building weight and any elements permanently attached to it. Soil and hydraulic loads are ground pressure loads exerted on a wall and hydraulic loads from groundwater.

Dynamic loads are applied suddenly to a structure, often with rapid changes in magnitude and point of application, e.g. wind loads, earthquake loads. Wind loads are forces exerted by the energy of moving air. Earthquake loads cause lateral movement at the base of a building that can lead to failure or collapse in extreme cases. Flexible buildings such as timber-frame structures perform well under earthquake loads.

TEXT EXERCISES

LANGUAGE FOCUS

I. There are 15 irregular verbs (finite and non-finite forms) in text “Elements of a Building”. Find them and fill in the chart according to the model.

Infinitive	Past Tense	Past Participle	Present Participle/Gerund
1) keep off	*kept off*	*kept off*	*keeping off*
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			

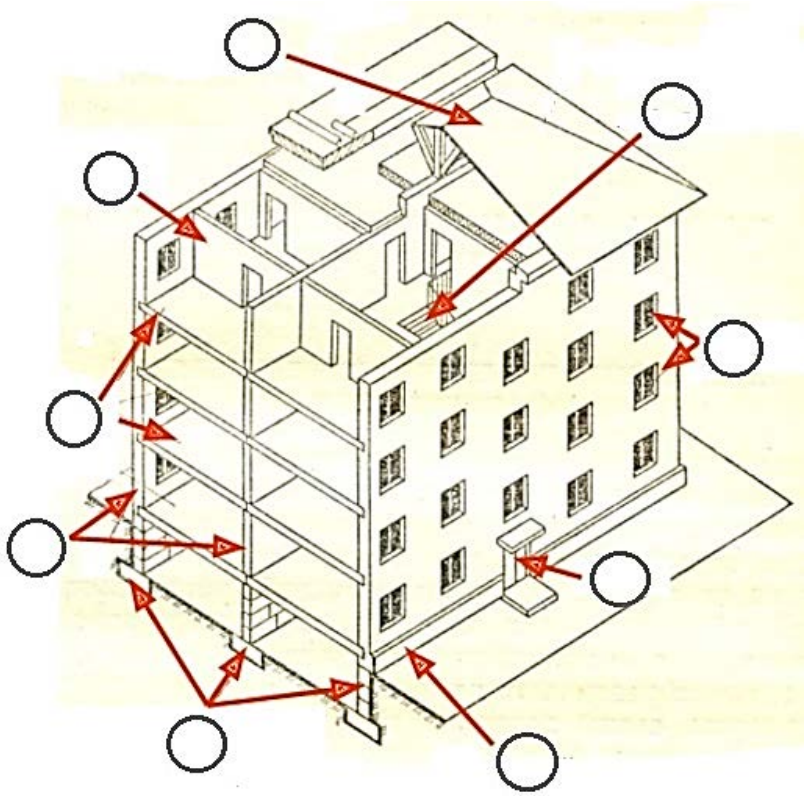
12)			
13)			
14)			
15)			

II. The following words are in text “Loads”. In the text find other words of the same stem that belong to a different part of speech. Fill in the chart with them according to the model. There is <u>one extra word</u> in the chart! Circle it.

Initial form	Noun	Verb/Verbal form	Adjective	Adverb
structure, *n*	*structures*		*structural*	
apply, *v*				
change, *n*				
ground, *n*				
movable, *adj*				
system, *n*				
water, *n*				

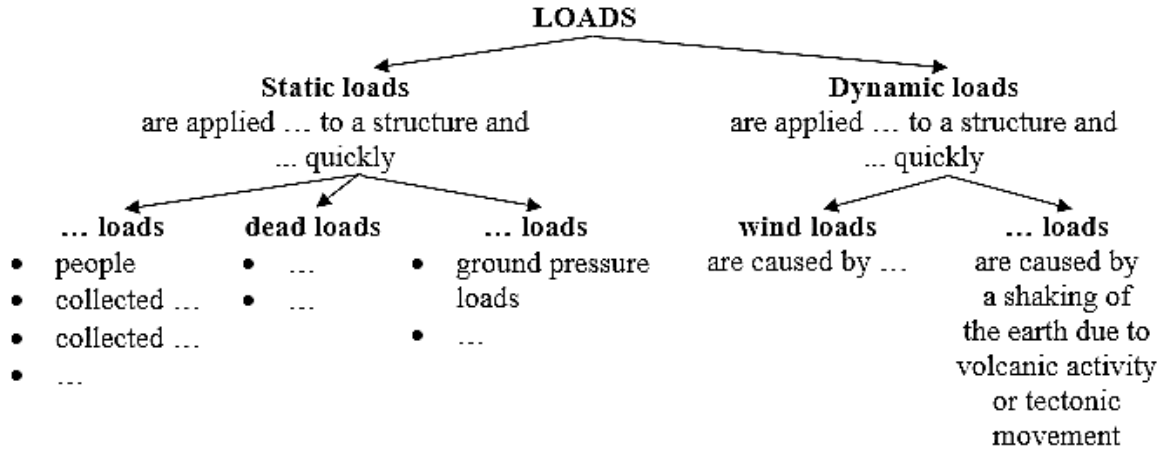
COMPREHENSION CHECK

I. Look back at text “Elements of a Building” and label the drawing. What element of a building is not shown?



1) _____
2) _____
3) _____
4) _____
5) _____
6) _____
7) _____
8) _____
9) _____

II. Look back at text “Loads” and write down the necessary words instead of dots.



III. Complete the following sentences according to the texts of the unit.

1) Nowadays buildings may be built for two purposes: for … or for …
2) … and … are two main parts of a building.
3) All buildings have such similar parts as …
4) Foundations can be …, …, … or …
5) … carries its own weight and is not designed to carry the loads of the structure.
6) … and … are vertical load-bearing members.
7) A floor basically consists of …
8) The main function of a … is to cover the space below and protect it from weather.
9) … connects one floor to another.
10) … can be either exterior or interior.
11) Traditionally, windows are made of …
12) ... structures are earthquake-resistant.

IV. Substitute the words and word combinations printed in bold with their synonyms from the texts of the unit.

1) Do not go into that yard. The man who lives there owns a mean dog.
2) Do not step onto the sidewalk; it’s freshly asphalted.
3) This exam is extremely important because it will determine your university career.
4) The part of the house below ground level is flooded with groundwater.
5) The magnitude of dynamic loads changes rapidly.
6) Wind loads are forces that are applied by the moving air.
7) I don’t know if we have the financial resources for such an expensive design.
8) The huge foundation carried all the loads of the old castle.
9) All the explicit sets of requirements to be satisfied by our roofing materials can be found in this catalogue.
10) The choice of the roof shape depends on many factors.
11) Early houses were just shelters to provide protection from rain, snow, wind and wild animals.
12) A teacher’s main task is to teach students how to learn.
13) Besides, a good teacher helps students find their talents and motivates to develop them.

V. Match the words and word-combinations in column A with those in column B to make up all possible word-combinations.

A	B
1) aesthetical	a) against weather
2) be made without	b) a particular need
3) framed	c) element
4) significant	d) factors
5) is laid	e) from weather
6) partition	f) importance
7) requires	g) load-bearing member
8) structural	h) much below the ground surface
9) support	i) storms
10) to give protection	j) structures
11) to meet	k) taking into account
12) to protect	l) the weight of the building
13) to transfer the load	m) thorough consideration
14) vertical	n) to the underlying ground
15) withstands	o) walls

VI. Let’s see how well you understand structural elements of a building. Fill in the gaps with the names of building elements.

17) A _____ is a flight of stairs with supporting framework[1], casing[2], and balusters[3].

18) A _____ is a piece of timber or metal fixed firmly in an upright position as a stay or support.

19) A _____ is a portal of entry into a building, a room, or vehicle, consisting of a rigid plane movable on a hinge. It is frequently made of wood or metal. A _____ may have a handle to help open and close, a latch to hold the door closed, and a lock that ensures the _____ cannot be opened without the key.

20) A _____ is a solid upright structure designed usually to support a larger structure above it, such as a roof or a horizontal beam, but sometimes for decoration.

21) A _____ is a structure formed of beams, girders or slabs, with proper covering, which divides a building horizontally into storeys/stories.

22) A _____ is a vertical structure that divides a room.

23) A _____ is an opening in the wall of a building for admission of light and air that is usually closed by casements (оконные створки) or sashes (оконный переплет) containing transparent material (such as glass) and capable of being opened and shut.

---

[1] *framework* – каркас
[2] *casing* – обшивка
[3] *baluster* – балясина

24) A _____ is each of the substantial structures acting either as the exterior or interior divisions within a structure.
25) A _____ is the cover of a building.
26) A _____ is the lowest and supporting part or member of a wall, including the base course and footing courses; in a frame house it is the whole substructure of masonry.

VII. Mark the following statements as True (T), False (F) or No Evidence (NE) according to the information from the texts of the unit. If the statement is false or has no evidence, give your reason for this.

1) The superstructure of a building is its part below ground.
2) Load-bearing components of a building are foundation, wall, column, floor, roof and staircase.
3) The structural system of any house must support and transmit various loads.
4) A load-bearing wall is not supposed to carry the loads of the structure.
5) A truss is the structural component of a roof decking in case of a flat roof.
6) Slates, shingles, etc. can be chosen as a finishing layer of a floor.
7) Floors can be made of slabs, beams or girders.
8) All foundations are either shallow or deep.
9) The primary function of a basement is to transfer the load of the whole building to the ground beneath the structure.
10) Partition walls, doors and windows are examples non-structural components.
11) Ancient Egyptians invented the column.

VIII. In text “Elements of a Building” there are a number of phrases that help describe a classification. Write them out. They will help you to describe structural loads shown in the diagram in ex. II (section ‘Comprehension Check’).

IX. Answer the following questions about the texts.

a. What components of a building are there?
b. A building has two main parts, doesn’t it? What are they?
c. What foundations are shallow? Deep?
d. What are structural elements? Non-structural elements?
e. What is the main function of a foundation?
f. Why is it important to define the type of ground below the future building?
g. What types of walls are there? What are their functions?
h. Are columns and posts load-bearing members of a structure?
i. The floor consists of three parts: the ground floor, the sub-floor and the flooring, doesn’t it? What functions do the floor parts have?
j. Where is the roof?
k. What should be considered when choosing the type of a roof?
l. Does the choice of a staircase design depend on aesthetics only?
m. Are interior doors made particularly strong, weather-resistant?
n. What materials are used for windows?
o. What types of loads may a building carry?

X. Expand the following statements. Add as much as possible information from the texts.

1) Ancient houses were simple.
2) All buildings have similar components.
3) All structural elements are an essential part of a building.
4) Thorough consideration in design and construction is required for the best functional and structural performance of a building.

XI. Ask your partner questions about:

1) early human dwellings; 2) loads; 3) building components of a building (structural and non-structural elements); 4) famous high-rise buildings in Minsk (other cities).

SPEAKING PRACTICE

What do you think?

4. Is it possible to build a cheap, strong, comfortable and at the same time beautiful building? Do you know any examples?
5. Which are more sophisticated: builders of the past or civil engineers of today?
6. The unit gives some facts about three latest high-rise projects in Minsk: the Parus, Royal Plaza and Futuris, but doesn't say a word about other countries. Do you know any foreign tall buildings worth mentioning? Search the Internet and find out more detail.

- Make a computer presentation. Share what you discover with your groupmates in the next class. Give each other feedback on your presentations.
- Make a poster presentation. Show your work to your classmates in the next class. Give each other feedback on your posters.

Discussion on the earthquakes. Work in pairs.

STUDENT A's QUESTIONS (Do not show these to Student B.)

1) Have you ever experienced an earthquake?
2) Do you think that an earthquake is the world's scariest natural disaster?
3) What should you do the when an earthquake hits?
4) Why do people live in areas that have lots earthquakes?
5) Would you move to a city like Tokyo or San Francisco, where a huge earthquake could strike at any time?
6) What would you put in your emergency earthquake bag?
7) Why do earthquakes happen?

STUDENT B's QUESTIONS (Do not show these to Student A.)

1) What do you know about earthquakes?
2) What would happen to your town if a big earthquake struck?
3) What would you do if an earthquake struck right now?
4) Do you know where the emergency shelters are in your town (for earthquakes

or other natural disasters)?
5) Scientists say animals know hours before that an earthquake will strike. How do you think this is possible?
6) Do you think scientists will one day be able to make totally earthquake-proof buildings and cities?
7) Have you ever sent money to earthquake victims (or victims of any other natural disaster)?

SPEAK ON THE TOPIC:

- structural elements of a building;
- an outstanding building project

CONSTRUCTION METHODS

VOCABULARY NOTES FOR STUDY

aggregate [ˈægrɪgət] заполнитель

assembly [əˈsemblɪ] сборка, монтаж

batch plant [ˈbætʃ ˈplɑːnt] бетонно-растворный узел

bolting [bəʊltɪŋ] крепление болтами, болтовое крепление

cableway [ˈkeɪb(ə)lweɪ] кабельный кран, кабель-кран

chuting [ˈʃuːtɪŋ] подача (материала) по желобам

clearing [ˈklɪərɪŋ] очистка; расчистка

compaction уплотнение

curing [ˈkjʊərɪŋ] выдержка (бетона) (до получения необходимых свойств)

derrick деррик-кран, деррик[1]

travelling derrick передвижной деррик-кран

design strength [dɪˈzaɪn ˈstreŋθ] расчётная прочность

dewatering [diːˈwɔːtərɪŋ] откачка (воды)

earth fill земляная насыпь

earthworks [ˈəːθwəːks]/groundworks/ground works[ˈgraʊn(d)wəːks]/ земляные работы

equipment [ɪˈkwɪpm(ə)nt] оборудование

hoisting equipment [ˈhɔɪstɪŋ] грузоподъёмное оборудование

transportation equipment транспортные средства

erection [ɪˈrekʃ(ə)n] монтаж, возведение, сооружение, установка, сборка

steel erection монтаж металлоконструкций

excavation [ekskəˈveɪʃ(ə)n] 1) земляные работы, выемка грунта; 2) выемка, котлован

excavation area [ˈeərɪə] зона земляных работ

fabricating shop сварочный цех

form/formwork опалубка; элемент опалубки

forming формовка, формование (бетона), укладка (бетона) в формы

foundation treatment укрепление основания

grade уровень грунта (на стройплощадке)

grouting [ˈgraʊtɪŋ] цементация (грунта)

growth растительный покров

hoarding [ˈhɔːdɪŋ] (временный) забор вокруг стройплощадки

installation [ɪnstəˈleɪʃ(ə)n] 1) оборудование; аппаратура; 2) размещение, расположение; 3) установка (оборудования); монтаж; 4) ввод в эксплуатацию;

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[1] Подъёмный кран со стрелой и опорной поворотной мачтой.

внедрение

electrical installation электрооборудование здания; внутренняя электропроводка

mechanical installation монтажная работа

landscaping [ˈlæn(d)skeɪpɪŋ] озеленение

mix truck автобетономешалка

pavement дорожное покрытие

paver дорожный укладчик

paving [ˈpeɪvɪŋ] мощение

asphalt paving [ˈæsfælt ˈpeɪvɪŋ] асфальтирование

placement 1) укладка (*бетона, арматуры*); 2) установка; монтаж

concrete placement укладка бетонной смеси, бетонные работы

preassembled [ˌpriːəˈsemb(ə)ld] предварительно собранный

prefabricated [ˌpriːˈfæbrɪkeɪtɪd]/off-site изготовленный заводским способом; сборный

project [ˈprɔdʒekt] 1) проект; 2) строительный объект

off site [ˈɔfsaɪt] вне площадки, объекта; за территорией площадки, объекта

on site [ˈɔnsaɪt] на площадке, объекте; на территории площадки, объекта (activities taking place or located on the site)

rammer трамбовка[1]

removal [rɪˈmuːv(ə)l] удаление

riveting [ˈrɪvɪtɪŋ] 1) клёпка, заклёпывание; 2) заклёпочное соединение; заклёпочный шов

roller каток

settlement [ˈset(ə)lm(ə)nt] осадка, оседание *(напр. фундамента, грунта)*

site место; участок; (рабочая) площадка

subsurface investigation [ˈsʌbsəːfɪs ɪnˌvestɪˈgeɪʃ(ə)n] глубинное исследование грунта

to assemble [əˈsemb(ə)l] собирать, монтировать

to compact [kəmˈpækt] уплотнять

to dismantle [dɪsˈmænt(ə)l] демонтировать, разбирать, снимать

to fragment [frægˈment] разбивать, разламывать; раздроблять

to handle 1) обращаться; 2) перемещать; грузить, выгружать

to loosen [ˈluːs(ə)n] делать рыхлым, разрыхлять

to operate [ˈɔpəreɪt] 1) работать, действовать; 2) управлять, эксплуатировать

to prevent [prɪˈvent] предотвращать, препятствовать, предупреждать, не допускать, предохранять

---

[1] Машина или устройство ручного действия для уплотнения грунтов трамбованием.

to pump качать, накачивать; откачивать; перекачивать; выкачивать (*насосом*)

to solidify [səˈlɪdɪfaɪ] затвердевать, застывать, твердеть

to strip the topsoil [ˈtɔpsɔɪl] снять растительный слой

trench канава; котлован

truss ферма[1]

unit секция

welding сварка

wellpoint [ˈwelpɔɪnt] иглофильтр[2]

VOCABULARY EXERCISES

I. Read the international words and guess their meaning. Mind the stress.

amalgam [əˈmælgəm]
asphalt [ˈæsfælt]
balance [ˈbæl(ə)ns]
barge [bɑːdʒ]
bituminous [bɪˈtjuːmɪnəs]
bulldozer [ˈbʊldəʊzə]
classify [ˈklæsɪfaɪ]
column [ˈkɔləm]
construction [kənˈstrʌkʃ(ə)n]
crane [kreɪn]
defect, n [ˈdiːfekt]
electro-osmosis[3] [ɪˌlektrəʊɔzˈməʊsɪs]
excavator [ˈekskəveɪtə]
granite [ˈgrænɪt]
ingredient [ɪnˈgriːdɪənt]
injection [ɪnˈdʒekʃ(ə)n]
limit, *v* [ˈlɪmɪt]
method [ˈmeθəd]
mixture [ˈmɪkstʃə]
natural [ˈnætʃ(ə)r(ə)l]
operation [ɔpəˈreɪʃ(ə)n]
procedure [prəˈsiːdʒə]
scraper [ˈskreɪpə]
section [ˈsekʃ(ə)n]
structure [ˈstrʌktʃə]
stabilizing [ˈsteɪbəlaɪzɪŋ]
technique [tekˈniːk]
tunnel [ˈtʌn(ə)l]
utilize [ˈjuːtɪlaɪz]

II. Match the English and Russian equivalents.

1) asphalt paving	a) укрепление основания
2) batch plant	b) строительный объект
3) concrete placement	c) сварочный цех
4) design strength	d) расчётная прочность
5) excavation area	e) рабочая площадка
6) fabricating shop	f) зона земляных работ

[1] Несущая конструкция для перекрытия пролётов, состоящая из прямолинейных стержней, соединённых жёстко друг с другом в виде решётки. Фермы бывают деревянные, металлические и железобетонные.

[2] Колонна труб, оканчивающаяся фильтровым звеном с режущим наконечником, погружаемая в горные породы и используемая для откачки воды с целью понижения уровня подземных вод.

[3] Электроосмос – это движение жидкости через капилляры или пористые материалы под действием внешнего электрического поля. Электроосмос используют для удаления избыточной влаги из почв при прокладке транспортных магистралей и гидротехническом строительстве, для сушки торфа, а также для очистки воды, технических жидкостей и др.

7) foundation treatment	g) грузоподъёмное оборудование
8) hoisting equipment	h) глубинное исследование грунта
9) project	i) бетонные работы
10) site	j) бетонно-растворный узел
11) subsurface investigation	k) асфальтирование

III. Complete the sentences. The initial letter the word begins with is given.

21) $17,900 were saved due to the decision to upgrade rural roads without p… them as originally planned.
22) A t… is defined as a narrow excavation (in relation to its length) made below the surface of the ground.
23) A w… is a small diameter well used for dewatering.
24) An e… as any man-made cut, cavity, trench, or depression in the Earth's surface formed by earth removal.
25) Cement mixed with sand and gravel produces concrete, or with fine a… produces mortar for masonry.
26) One of the ways to control ground water during civil engineering works is g….
27) One road went straight up the steep hill, the other one turned to the right, with a very small g….
28) Recently they've asked us to expand the tennis courts and build a park on the s….
29) Soil c… is a crucial part of the construction process.
30) The cars are a… on an a… line.
31) The s… i… revealed that the new planet may possibly have a subsurface ocean of liquid water at depths less than 300 kilometres.
32) The use of c… in construction is limited to dams, to some dredging operations, and in special cases to bridges.
33) When will they d… the old bridge?
34) H… must be erected to secure the excavation area.

IV. Use the words from the box below in the proper forms to complete the sentences.

assemble	compact	dismantle	fragment	handle
loosen	operate	prevent	pump	solidify

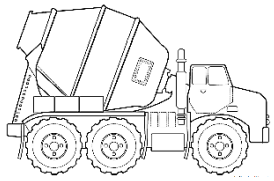
27) It is often necessary to _____ the rock by use of explosives.
28) He used a spade to _____ the soil.
29) Bananas grow in a wide variety of soils, as long as the soil is at least 60 cm deep, has good drainage and is not _____.
30) Please _____ the fruit carefully or it will bruise.
31) Depending on the conditions, a single fluid can _____ into many different possible forms.
32) 20 percent of the oxygen coming from your lungs, 20 percent of the blood _____ from your heart, is servicing your brain.
33) Never worked in a factory before, never _____ machinery?
34) OK, I have to take steps to _____ that.

35) The reactors are built in factories and _____ in shipyards, where productivity is much higher and quality standards easier to control than on construction sites.

36) I was trained to _____ bombs, not to build them!

V. What building machines and equipment are shown in the pictures below? Label pictures with the machines and equipment in the box.

bulldozer	cableway	crane	derrick	excavator
mix truck	paver	rammer	roller	scraper



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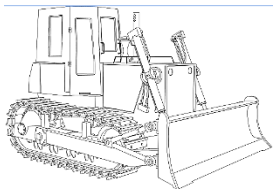

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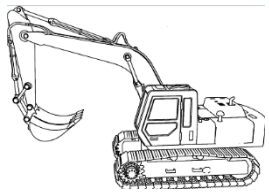

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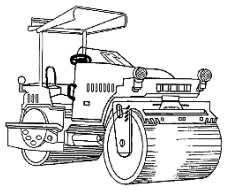

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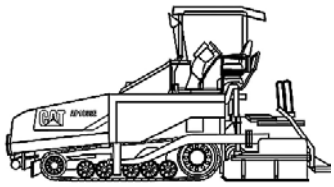

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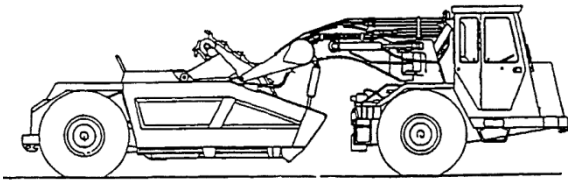

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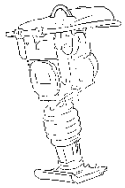

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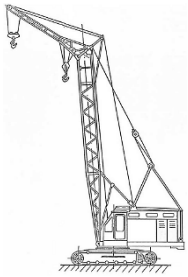

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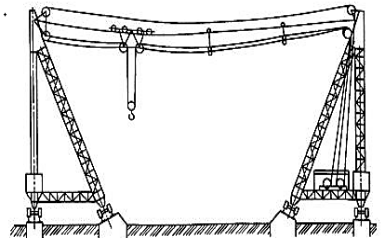

9

10

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____
7) _____
8) _____
9) _____
10) _____

VI. Match the verbs of building operations with their definitions.

1) to bolt	a) To join two materials (especially metals) together by applying heat, pressure and filler, either separately or in any combination
2) to chute	b) To attach or fasten parts by using headed pins or bolts of metal that attach two or more parts together by fitting through a hole and deforming the head(s) at either end.
3) to cure concrete	c) To connect or assemble pieces by using a metal rod or pin that has a head at one end and a screw

	thread at the other and is secured by a nut
4) to investigate the subsurface	d) To maintain necessary moisture in concrete in order to aid chemical reaction between cement and water that results in the formation of chemicals contributing to setting and hardening of the concrete
5) to landscape	e) To take samples and examine the below surface materials including soil, rock, groundwater and any artificial materials.
6) to prefabricate	f) To remove the surface organic soil
7) to rivet	g) To convey by a chute
8) to strip the topsoil	h) To take engineering measures to improve the bearing capacity of the foundation supporting the structure, improve its deformation performance or impermeability.
9) to treat the foundation	i) To create or maintain a landscape
10) to weld	j) To manufacture the parts of something, especially a building, at a factory so that construction consists mainly of assembling and uniting standardized parts

VII. Translate the words and phrases in brackets into English.

A *(строительная площадка)* is an *(зона)* or piece of land on which *(строительные работы)* are being carried out.

The term ‘building site’ is often used interchangeably with ‘construction site’, although this tends to indicate that buildings (and sometimes, more specifically, housing) are being constructed, whereas the term ‘construction site’ can refer to all types of works, such as road construction, sewer construction, *(озеленение)*, and so on.

Typically, land will become a construction site when it is handed over to a contractor to begin the construction works.

In the first phase of the works, construction may include activities such as: securing the site, *(расчистка участка)*, setting up site facilities, demolition, *(земляные работы)*, and so on. It is often considered that a site has become a construction site when *(забор вокруг стройплощадки)* is erected to secure its perimeter.

Once ground works begin, construction sites may appear to progress relatively quickly as structural frames grow and cladding is fixed. They may then appear to slow again as internal *(монтажные работы)* and *(электрооборудование здания)* and then finishing work are carried out.

VIII. Complete the statements with *most* or *the most*. Do you agree with the statements?

1) _____ people in the construction industry have never been on a construction site.

2) In the UK _____ old buildings are listed[1].
3) The client is _____ important person in any project.
4) _____ building inspectors work for local authorities.
5) _____ engineers are not familiar with project management tools.
6) _____ unskilled labourers work on a temporary basis.
7) One of _____ difficult tasks in project management is avoiding cost overruns.

IX. To show what sort of connection there is between one sentence and another special sentence connectors are used. Sequence of events is indicated by the sentence that show sequence of time or put points in order. Match the English sentence connectors with their Russian equivalents.

SHOWING SEQUENCE OF TIME

1) after	a) в то время, как
2) as	b) до
3) as soon as	c) за этим следует
4) at the same time as	d) как только
5) before	e) когда
6) from the beginning of ... to the end of…	f) когда
7) immediately after	g) не раньше; до тех пор, пока
8) simultaneously with	h) одновременно с
9) this is followed by	i) одновременно с
10) this precedes	j) от начала… до конца…
11) until	k) после
12) when	l) сразу после
13) while	m) это идёт до

PUTTING POINTS IN ORDER

1) finally	a) в конце
2) first	b) впоследствии; в дальнейшем; потом; позже
3) initially	c) затем; тогда; потом
4) later	d) позже
5) subsequently	e) сначала; в первую очередь
6) then	f) с самого начала; вначале; первоначально

X. Complete the text with the sentence connectors in the box.

first	as soon as	then	before
immediately after	finally	second	

We do this every day. It’s routine. The procedure is simple. There are only seven stages and the result is always the same. (1) _____, you smile at the guard and say ‘Good morning’. (2) _____, the guard smiles back at you and (3) _____ says ‘Good morning’. (4) _____ allowing you to pass, the guard asks you for your ID. (5) _____ you show him your ID, the guard smiles and says ‘Thank you’. (6) _____ you also smile and say ‘Thank you’. (7) _____ you enter the project site.

[1] *listed* = term used in the UK to show that an old building is protected by government order.

XI. Work in pairs to explain other processes you know about. Then explain the process to another pair.

XII. The timeline bar chart, Gantt diagram or Gantt chart is often used to manage project tasks. It was invented by the American engineer Henry L. Gantt in 1910. The basic technique is quite simple, consisting of a graphic representation based around two axes: the vertical axis features tasks and the horizontal axis shows time. It is the most commonly used method of scheduling works in the construction industry and can be easily understood, even by those less familiar with scheduling tools. The figure below shows a simplified Gantt diagram, indicating the tasks and their weekly distribution.

Use it to make sentences about sequence of operations of the project. Mind sentence connectors.

Activity ID	Activity Name	TIMESCALE (WEEKS)																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
WBS 1	GROUND WORKS																				
1	Excavation																				
2	Backfill and Compaction																				
WBS 2	STRUCTURAL WORKS																				
3	Concrete works																				
4	Steel works																				
WBS 3	FINISHING WORKS																				
5	Brick Laying																				
6	Wall Plastering																				
7	Painting																				
8	Floor Covering																				
WBS 4	ELECTRICAL WORKS																				
9	Conduit Works																				
10	Cable																				

	Pulling																			
WBS 5	MECHANICAL WORKS																			
11	Plumbing Works																			
12	Fittings																			

READING PRACTICE

Read the jumbled parts of the text and arrange them into a logical order to make a complete text.

1 – *C*	2 –	3 –	4 –	5 –	6 –	7 –

Construction methods

a. Asphalt paving is an amalgam of crushed aggregate and a bituminous binder. It may be placed on the roadbed in separate operations or mixed and spread at one time on the roadbed by a paver. Then the pavement is compacted by rollers.

b. Concrete construction consists of several operations: forming, concrete production, placement, and curing. Forming is required to contain and support the fluid concrete within its desired limits until it solidifies and can support itself. The form is made of timber or steel sections or a combination of both.

Concrete may be obtained from batch plants which deliver it in mix trucks if the job is close to such a plant, or may be produced at the job site. Aggregates are sometimes produced at or near the job site.

Concrete is placed by chuting directly from the mix truck, where possible, or from buckets handled by means of cranes, derricks or cableways, or it can be pumped into place by special concrete pumps.

Curing of the surfaces is required to maintain the proper balance of water and cement that is needed to develop full design strength.

Concrete paving for airports and highways is a fully mechanized operation. Concrete is placed into the road forms from a mix truck or a moveable paver. Specialized machines then spread and vibrate the concrete, smooth its surface, cut contraction joints, and apply a curing compound.

c. Construction methods are the procedures and techniques utilized during construction. Construction operations are generally classified according to specialized fields. These include preparation of the project site, groundworks, foundation treatment, steel erection, concrete placement, asphalt paving, and electrical and mechanical installations. Procedures for each of these fields are generally the same, even when they are applied to different projects, such as buildings, dams, or airports. However, the relative importance of each operation is not the same in all cases, e.g. tunnel construction involves different procedures.

d. Foundation treatment. When subsurface investigation reveals structural defects in the foundation area of a future structure, the foundation must be strengthened. Water

passages, cavities, and other defects are filled and strengthened by grouting. Grouting consists of injection of fluid mixtures under pressure. The fluids solidify in these voids. Most grouting is done with cement and water mixtures, though asphalt and clay may also be the ingredients.

e. Preparation of the site starts with erecting hoarding along its perimeter and consists of the removal and clearing of all surface structures and growth from the site of the proposed structure. A bulldozer is used for small structures and trees. Larger structures must be dismantled.

f. Groundworks includes excavation and placement of earth fill. Excavation follows preparation of the site and is performed when the existing grade must be changed. Excavation generally starts with the stripping of the topsoil, which is later reused for landscaping around the new structure. Excavation may be done by excavators and scrapers.

Efficient excavation on land requires a dry excavation area, because many soils are unstable when wet and cannot support building equipment. Dewatering becomes a major operation when the excavation lies below the natural water level. When this occurs, dewatering and stabilizing of the soil may be accomplished by trenches, and in some cases by wellpoints and electro-osmosis.

Some materials, such as granites or hard clays, require blasting to loosen or fragment the material.

After placement of the earth fill, it is almost always compacted to prevent settlement. Compaction is generally done with rollers. Rammers are used for compaction close to structures where there is no room for rollers to operate.

g. Steel erection. The construction of a steel structure consists of the assembly at the site of prefabricated steel sections. The steel sections may consist of beams, columns, or small trusses which are joined together by riveting, bolting, or welding. It is more economical to assemble sections of the structure at a fabricating shop rather than on site, but the size of preassembled units is limited by the capacity of transportation and hoisting equipment. The crane is the most common type of hoisting equipment, but when a structure is too high or large to be erected by a crane, it is necessary to place one or more derricks on the structure to handle the steel. For river bridges the steel may be handled by cranes on barges, or, if the bridge is too high, by travelling derricks which ride on the bridge being erected.

TEXT EXERCISES

LANGUAGE FOCUS

I. In the text there are a lot of words ending in *–ing* that belong to different parts of speech. Fill in the chart with them according to the model. Can you guess why most construction operations terms are verbal nouns?

Finite Verb	Gerund/Verbal Noun	Participle I	Preposition
			according to

II. Two adjectives beginning in *pre-* are used in the text. Write out and translate them into Belarusian/Russian. Can you guess the meaning of the prefix *pre-*[1]? Give your examples of words beginning with *pre-*, be ready to explain their meaning.

III. Skim the text and write out sentences with attributive clauses. Change the clauses into attributive participial phrases. You may make any other changes too, if it is necessary.

MODEL: *Prefabrication in the construction industry refers to manufacturing that takes place off site under factory conditions. –*
Prefabrication in the construction industry refers to manufacturing, taking place off site under factory conditions.

Off-site construction

The phrase ‘off-site construction’ refers to the manufacturing of elements or components of a construction project at another location. Typically, this can include planning, design, fabrication and assembly in off-site factories. The completed item is then transported to site and assembled in place.

Off-site locations may be permanent manufacturing facilities or temporary facilities (also known as field factories) that operate for the duration of a project and then ‘fly’ to a new location to service another project.

Off-site construction is often referred to as ‘prefabrication’, ‘off-site manufacture’ or ‘modern methods of construction’, and it may involve modular construction. It is most commonly concerned with permanent structures rather than temporary or moveable structures.

Off-site construction has increasingly been promoted as a solution to many of the problems that face the UK construction industry. This is because of the significant time-efficiencies that can be achieved through using off-site techniques, as well as better safety, reduced waste, higher quality, reduced-down time and so on.

Off-site construction particularly suits to high-volume, repetitive components, or products that require factory conditions to achieve the desired level of quality. It is widely considered that housing should be an obvious target for off-site construction.

IV. Skim the text and write out sentences with attributive participial phrases. Change the phrases into attributive clauses. You may make any other changes too, if it is necessary.

MODEL: *In situ (or in-situ) is a Latin phrase, commonly used in the construction industry to mean ‘on site’, ‘in place’ or ‘in position’. –*
In situ (or in-situ) is a Latin phrase that/which is commonly used in the construction industry to mean ‘on site’, ‘in place’ or ‘in position’.

On-site construction

[1] This prefix is usually prefixed to words without using a hyphen (-) (e.g. *prefix*). A hyphen is used in the following cases: 1) where excluding a hyphen could to lead to a mispronunciation of the word (compare: *pre-yaw course* and *preyaw course*; 2) always in British English before the letter *e* (e.g. *pre-existing*); 3) often in British English before other vowels (e.g. *pre-operative, preoccupy*); 4) always before a character other than a letter (e.g. *pre-1960*).

The term ‘on site’ (or on-site) typically refers to work, carried out on the construction site itself. This is opposed to ‘off-site’, generally associated with prefabrication or pre-assembly techniques.

Generally, on-site construction techniques tend to be more labour- and time-intensive, and they may have lower quality due to the difficulties of working in an uncontrolled environment, weather and other changeable conditions, space and access restrictions and so on. However, they can be more flexible in response to changes that may arise on site.

COMPREHENSION CHECK

I. Complete the following sentences according to the texts of the unit.

1) Construction operations are generally classified according …
2) … ride on the bridge being erected.
3) Blasting is used sometimes to loosen or fragment …
4) … may be accomplished by trenches, wellpoints and electro-osmosis.
5) The foundation must be strengthened if structural defects in the foundation area are revealed during …
6) … is assembling prefabricated steel sections at the site.
7) … are examples of hoisting equipment used to handle steel sections.
8) Prefabricated steel sections are preassembled at …
9) Mix trucks deliver fluid concrete from a … when it is near the construction site.
10) Cranes, derricks and cableways use ... to handle concrete.

II. Substitute the words and word combinations in bold type with their synonyms from the texts of the unit.

1) Drainage may be necessary on sites where there are trenches and excavations in which water can accumulate.
2) The asphalt paving machine was invented in the USA in 1936.
3) Assembling of steel sections is one of the top 10 most hazardous occupations according to BLS[1] fatality data year after year.
4) The project helped introduce new construction methods in Haiti, such as the installation of off-site fabricated panels.
5) X-ray fluorescence is a procedure that allows to determine the alloy composition of metal parts.
6) Ready mixed concrete trucks are used to transport mixed concrete to sites.
7) The quality and amount of concrete being used and adopted methods of mixing and placing will determine the type of mixing plant required.
8) Diggers are machines commonly used on construction sites to excavate and load most types of soil.
9) Different materials may be used for grouting depending upon factors such as the soil or rock type and the area to be strengthened.

[1] the Bureau of Labor Statistics (BLS) is an American government agency that collects and analyzes a range of economic and employment data. It produces national and regional figures on employment, labor force participation, productivity, and wages. (*https://www.investopedia.com/terms/b/bls.asp*)

10) Injection of fluid materials into soil or rock to change their physical characteristics is relatively costly.

11) Before construction works can begin, site clearance and preparatory groundworks are generally necessary. This might include removal of any vegetation including roots and levelling the site to a roughly even gradient.

12) Embankment is done to raise the elevation of a site for the purpose of future development.

III. Here are 10 pairs of antonyms used in the unit. Find them. Do you know the contexts in which they are used? Give examples.

Assemble, compact, different, dismantle, dry, earth fill, high, large, loosen, low, off-site, on-site, permanent, placement, quickly, removal, slowly, small, subsurface, surface, temporary, the same, trench, wet

IV. Match the words and word-combinations in column A with those in column B to make up all possible word-combinations.

A	B
1) classified according	a) along the perimeter
2) preparation	b) by electro-osmosis
3) procedures	c) by rollers
4) hoarding	d) for these fields
5) clearing of growth	e) from the mix truck
6) compaction is done	f) from the site
7) accomplished	g) into the forms
8) fluid mixtures	h) of the project site
9) ride	i) on the bridge
10) contain the fluid concrete	j) to specialized fields
11) chute	k) under pressure
12) is placed	l) within the desired limits
13) is compacted	m) with rollers

V. Work in pairs. Discuss building equipment you are familiar with.

MODEL 1: *Student A: What does a wellpoint do?*
Student B: It dewaters the site.
MODEL 2: *Student A: What is a wellpoint used for?*
Student B: It is used for dewatering.
MODEL 3: *Student A: What is a wellpoint used to do?*
Student B: It is used to dewater the site.

VI. Mark the following statements as True (T), False (F) or No Evidence (NE) according to the information from the texts of the unit. If the statement is false or has no evidence, give your reason for this.

1) Construction methods are the procedures and techniques used in construction.
2) Excavation may be done not only by excavators and scrapers, but also by draglines and clamshells.
3) Rollers and rammers are used for compacting

4) The placement of the earth fill almost always follows compaction to prevent settlement
5) Concrete and water mixtures, asphalt and clay are common ingredients of grouting
6) Concrete construction consists of forming, concrete production, placement, and curing
7) Mix trucks, cranes, cableways and pumps are used for concrete construction
8) Concrete paving is crushed aggregate mixed with a bituminous binder
9) Mix trucks use a chute to place the concrete either in the required location or into a pump.
10) The size of preassembled units is limited by the hoisting equipment and capacity of transportation.
11) Tunnel construction involves preparation of the project site, groundworks, foundation treatment, steel erection, concrete placement, asphalt paving, and electrical and mechanical installations.
12) Grade "A" Earth fill shall consist of sand, earth and yellow clay and may be mixed.

VII. Answer the following questions about the texts.

a. What operation is needed to develop full design strength of a concrete structure?
b. What machines are used for paving?
c. How may beams, columns and small trusses be joined together into steel sections?
d. What limits the size of preassembled steel units?
e. What is the purpose of concrete forming?
f. What do batch plants produce?
g. What equipment is used for placing concrete?
h. The relative importance of each operation is not the same in all cases, is it?
i. What procedures does preparation of the side include?
j. What is the difference in on-site and off-site construction?

VIII. Expand the following statements. Add as much as possible information from the texts.

1) Procedures for each of construction operations are generally the same for different projects.
2) Site preparation include hoarding, clearing, demolition and dismantling.
3) Dewatering is an important construction operation.
4) Each construction project is unique though standard construction procedures are used.

IX. Ask your partner questions about:

1) building machines and equipment; 2) construction operations; 3) off-site construction; 4) traditional and modern construction methods; 5) advantages and drawbacks of on-site and off-site construction.

X. Look back at text “Construction methods” and put the activities in a high-rise residential construction project in the correct order. Describe the flowchart. Sentence connectors putting points in order may help you.

preparation of the site		asphalt paving	concrete construction
groundworks	design	landscaping	foundation treatment

XI. Produce a flowchart for each of the construction operations from text “Construction methods”. Then write a short passage explaining the process. Use special words to show time sequence.

SPEAKING PRACTICE

What do you think?

7. Work in pairs. Tick the statements you agree with. Explain your reasons.

A project has a beginning and an end.
A project need people.
A project is led by a project manager (PM).
A project is always a team.
A project is always for a client.

8. What are the key factors in any construction project?

9. Text “Construction methods” says that the relative importance of each construction operation depends on what you are going to build. With your groupmates discuss how the importance of construction procedures differ in such projects as a wooden house, a skyscraper, a bridge and a dam.

10. Discuss with your groupmates or in pairs how to make construction methods more sustainable, i.e. better for nature, economy and society.

11. The unit doesn’t say a word about innovative construction methods. Do you know any? Search the Internet and find out more about innovations in this field.

- Make a computer presentation. Share what you discover with your groupmates in the next class. Give each other feedback on your presentations.
- Make a poster presentation. Show your work to your classmates in the next class. Give each other feedback on your posters.

Discussion on technology. Work in pairs.

STUDENT A’s QUESTIONS (Do not show these to Student B.)

1) What comes to mind when you hear the word ‘technology’?
2) Is technology a good or a bad thing? Why?
3) Do you like using technology to learn?
4) What do you think very old people think of modern technology?

5) How has technology changed society?
6) Mark Kennedy said, “All of the biggest technological inventions created by man – the airplane, the automobile, the computer – say little about his intelligence, but speak volumes about his laziness.” Do you agree?

STUDENT B’s QUESTIONS (Do not show these to Student A.)

1) What do you think of today’s technology?
2) Do you think we’ve become obsessed with technology?
3) What things would you never let technology replace?
4) Has technology made our lives better than our grandparents’ lives?
5) Frank Lloyd Wright said, “If it [technology] keeps up, man will waste away all his limbs but the push-button finger.” What does this mean? Do you like this quote?
6) Alan M. Eddison said, “Modern technology owes ecology an apology." What does this mean? Do you agree?

(based on *https://esldiscussions.com/t/technology.html*)

SPEAK ON THE TOPIC:

- common construction methods;
- an innovative construction method or technology.

SUSTAINABILITY IN CONSTRUCTION

VOCABULARY NOTES FOR STUDY

aside from помимо, кроме, наряду с *(not including)*

benefit [ˈbenɪfɪt] выгода, польза, прибыль

beyond за, вне, после, выше, сверх, за пределами, вне, после *(farther along in space or time or degree)*

biodiversity [ˌbaɪə(ʊ)daɪˈvəːsɪtɪ] биоразнообразие, биологическое разнообразие

bn = billion [ˈbɪljən] миллиард

challenge [tʃælɪn(d)ʒ] сложная задача; проблема

CO_2 = carbon dioxide [ˈkɑːb(ə)n daɪˈɔksaɪd] углекислый газ

concern over/about [kənˈsəːn] обеспокоенность чем-л.; беспокойство, интерес к чему-л./кому-л.; забота о чём-л./ком-л.

consumption [kənˈsʌm(p)ʃ(ə)n] потребление, расход, расходование
energy consumption энергопотребление, потребление энергии

corporate social responsibility корпоративная социальная ответственность[1]

cost стоимость

costs затраты, расходы, издержки
fuel costs затраты на топливо
operating costs эксплуатационные расходы

emission [ɪˈmɪʃ(ə)n] выброс *(газообразных отходов)*; выхлоп *(автомобиля и т. п.)*; выпуск *(дыма)*

energy waste потери энергии

environmentally-friendly экологически безопасный; экологически чистый

€ = Euro [ˈjʊərəʊ] евро *(единая европейская валюта)*

finiteness [ˈfaɪnaɪtnəs] ограниченность; конечность

green building 1) «зелёное» здание; 2) «зелёное» строительство

hazardous [ˈhæzədəs] опасный

heat loss [ˈhiːt ˈlɔs] тепловые потери

impact on [ˈɪmpækt] воздействие на

ongoing [ˈɔngəʊɪŋ] 1) постоянный, непрерывный; 2) текущий (происходящий в настоящее время)

over the lifespan [ˈlaɪfspæn] в течение срока эксплуатации

primary goal [ˈpraɪm(ə)rɪ ˈgəʊl] основная задача, первоначальная цель

recyclable [riːˈsaɪkləbl] 1) пригодный для переработки; 2) повторно используемый

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[1] Нормативная концепция деловой этики, согласно которой действия корпорации должны соответствовать целям и ценностям общества.

renewable [rɪˈnjuːəbəl] возобновляемый *(о природных ресурсах и т. п.)*

solar panel [ˈsəʊlə ˈpæn(ə)l] солнечная батарея, батарея солнечных элементов; солнечная панель; панель с солнечными элементами

supply [səˈplaɪ] 1) снабжение; поставка; 2) запас

water supply водоснабжение

food supply снабжение продовольствием

sustainable [səˈsteɪnəb(ə)l] (экологически) устойчивый *(не наносящий ущерба окружающей среде)*

sustainable construction устойчивое строительство, рациональное строительство

sustainable development устойчивое развитие

sustainable technology (экологически) устойчивая технология

sustainability [səˌsteɪnəˈbɪlətɪ] устойчивость[1]

economic sustainability экономическая устойчивость

environmental sustainability экологическая устойчивость, устойчивость окружающей среды

social sustainability социальная устойчивость

the three pillars of sustainability [ˈpɪləz] три столпа устойчивости

tangible [ˈtæn(d)ʒɪb(ə)l] ощутимый; осязаемый; реальный, ясный

The truth of the matter is правда в том, что; правда заключается в том, что

to affect [əˈfekt] влиять, затрагивать

to arrange human activity [əˈreɪn(d)ʒ] организовать человеческую деятельность

to charge fees [tʃɑːdʒ fiːz] взимать плату

to cost (cost, cost) стоить

to deliver in savings приносить (определённую сумму денег) экономии

to deplete resources [dɪˈpliːt rɪˈzɔːsɪz] исчерпывать запасы; исчерпать ресурсы

to incorporate [ɪnˈkɔːpəreɪt] включать (в состав чего-л.)

to increase [ɪnˈkriːs] 1) увеличивать, повышать, усиливать; 2) увеличиваться, повышаться; возрастать, расти; усиливаться

to maintain the ideals поддерживать идеалы

to meet the needs удовлетворять потребности

to preserve [prɪˈzəːv] 1) сохранять, оберегать; 2) хранить, поддерживать

to reduce [rɪˈdjuːs] уменьшить, уменьшать, снижать, сокращать, понижать,

to result in [rɪˈzʌlt] приводить к

to save 1) спасать, уберегать; 2) беречь, экономить; save on экономить на чём-л./ком-л.; 3) копить, откладывать (деньги); 4) оберегать, охранять (напр.

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[1] Характеризует общественную и человеческую деятельность, благодаря которой общество и каждый из его членов удовлетворяет свои потребности, не нанося вреда природному потенциалу, т. е. сохраняя равные возможности для существования и развития последующих поколений; понятие применяется в социально-экономической сфере и экологии

памятник истории)

to supply [səˈplaɪ] 1) снабжать; 2) поставлять, доставлять, давать

waste отходы, потери

waste disposal [ˈweɪst dɪˈspəʊz(ə)l] размещение отходов, захоронение отходов

waste management company компания, занимающаяся организацией удаления отходов

habitat [ˈhæbɪtæt] среда обитания

VOCABULARY EXERCISES

I. Read the international words and guess their meaning. Mind the stress.

activities [ækˈtɪvətɪz]	generation [dʒenəˈreɪʃ(ə)n]
area [ˈeərɪə]	global [ˈgləʊb(ə)l]
climate [ˈklaɪmət]	ideal *n, adj* [aɪˈdɪəl]
commission [kəˈmɪʃ(ə)n]	industry [ˈɪndəstrɪ]
company [ˈkʌmp(ə)nɪ]	organisation [ɔːg(ə)naɪˈzeɪʃ(ə)n]
compromise *v, n* [ˈkɔmprəmaɪz]	positive [ˈpɔzɪtɪv]
concern [kənˈsəːn]	potential [pə(ʊ)ˈtenʃ(ə)l]
demonstrate [ˈdemənstreɪt]	potentially[pə(ʊ)ˈtenʃ(ə)lɪ]
ecosystem [ˈiːkəʊsɪstəm]	process [ˈprəʊses]
element [ˈelɪm(ə)nt]	reputation [repjʊˈteɪʃ(ə)n]
energy [ˈenədʒɪ]	resource [rɪˈsɔːs]
firm [fəːm]	tonne [tʌn]

II. Read the proper name.

the Brundtland Commission[1] [ðə ˈbruːntlænd kəˈmɪʃ(ə)n]
Greta Thunberg[2] [ˈgretə ˈtʊnberɪ]

III. Match the English and Russian equivalents.

1) emission	a) водоснабжение
2) energy consumption	b) выброс (газообразных отходов)
3) energy waste	c) затраты на топливо
4) food supply	d) потери энергии
5) fuel costs	e) потребление энергии
6) heat loss	f) размещение отходов, захоронение отходов
7) operating costs	g) снабжение продовольствием
8) sustainability	h) тепловые потери
9) waste disposal	i) устойчивость
10) water supply	j) эксплуатационные расходы

[1] Комиссия Брундтланд (международная комиссия по окружающей среде и развитию)
[2] Грета Тунберг (шведская школьница, экологический активист)

IV. Complete the sentences. The initial letter the word begins with is given.

1) The output power of a one square meter s… p… is about one watt, so it is difficult to use them on a large scale at present.
2) Einstein, in his special theory of relativity, postulated the constancy and f… of the speed of light for all observers.
3) The deep wells of the castle assured them a good s… of fresh water, but all other things were in scarce s….
4) Movement and transportation of h… materials must be separated from other goods and specific instructions need to be followed.
5) It is quite clear that depletion of r… represents an o… threat to the civilization.
6) Over their l… batteries degrade gradually that results in reduced capacity due to the chemical and mechanical changes to the electrodes.
7) Some engineered plastics, which are used in mobile phone cases, should have positive economic value as a r… material.
8) Wood can also be a substitute for non-r… construction materials such as plastics, steel or concrete.
9) The smartphone is having a huge i… in even the poorest countries.
10) Decades after the first conquest of the world's highest peak, tons of rubbish left behind by climbers has started to raise c….
11) Domestic animals can easily live next to people, whereas wild animals' h… is mainly in forests, jungles and oceans.
12) We run experiments, build prototypes, make objects and bring aspects of the future to life, making it concrete and t…, so you can really feel the impact of these future possibilities here and now.

V. Use the words from the box below in the proper forms to complete the sentences.

affect	charge	deplete	increase	meet
preserve	reduce	result	save	supply

1) We've been experimenting with electromagnetic pulses and how they _____ machinery.
2) Research shows that when kids have a nutritious well-balanced breakfast, their chances of graduating _____ by 20 percent.
3) Now, we know that we can _____ these heat losses.
4) They canned the fruits _____ them.
5) The practice of bycatching dolphin that occurs in some fisheries _____ in deaths of several million dolphins since 1960.
6) In spite of all drawbacks gadgets have, their benefits are much more considerable, as they _____ people's time and let them enjoy life.
7) The Russians _____ Leningrad by ice for three years.
8) Resources in danger of becoming _____ include oil, phosphorus, grain, fish, and water.
9) No fee _____ for public information.
10) The Golden Palace Hotel is designed _____ the needs of its guests by offering the travellers luxurious conditions.

VI. Match the ‘green’ terms with their definitions.

1) corporate social responsibility	a) Design and construction of structures that are ecologically correct by using resources effectively, using internal recycling, renewable energy sources, recyclable and biodegradable construction materials, and fitting into the local environment. Its aims are to reduce to a minimum environmental impact, and to take human factors into consideration.
2) economic sustainability	b) The idea that a company should be interested in and willing to help society and the environment as well as be concerned about the products and profits it makes.
3) environmental sustainability	e) The removal and disposal of household and factory rubbish.
4) green building	c) Causing little harm to the environment.
5) recyclable	f) Involving the use of natural products and energy in a way that does not harm the environment.
6) renewable	g) Practice of creating a healthy environment that’s based on ecological principles. It focuses on six principles: “conserve, reuse, recycle/renew, protect nature, create non-toxic and high quality.”
7) social sustainability	h) Innovation that considers natural resources and fosters economic and social development. Its goal is to drastically reduce environmental and ecological risks and to create a sustainable product.
8) sustainable construction	j) Process for creating sustainable successful places that promote wellbeing, by understanding what people need from the places they live and work.
9) sustainable development	l) Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
10) sustainable	i) Practices that support long-term economic growth without negatively impacting social, environmental, and cultural aspects of the community.
11) sustainable technology	k) Responsibly interacting with the planet to maintain natural resources and avoid jeopardizing the ability for future generations to meet their needs.
12) environmentally-friendly	d) Able to be collected, sorted and processed in order to be reused.
13) waste management	m) Having an ongoing or continuous source of supply.

VII. Translate the words and phrases in brackets into English.

The concept of a *(«зелёное» здание)* was developed in the 1970s in response to

the energy crisis and people's *(растущая обеспокоенность) growing concerns* about the environment. The need to *(экономить)* energy and solve environmental problems *(привели к)* a wave of *(«зелёное» строительство)* innovation that has continued to this day.

Green buildings are not easily defined. They are often known as '*(устойчивые здания)*' or 'eco-homes', but there isn't one opinion on what can be classed as a 'green'. However, it is generally agreed that green buildings are structures that are sited, designed, built, renovated and operated to energy efficient guidelines[1], and that they will have a *(положительное)* environmental, economic and social *(влияние)* over their *(срок службы)*.

Four main areas need to be considered in green building: materials, energy, water and health.

Although still being under development, green building is a rapidly growing field. UK regulations[2] now demand that green specifications[3] are met in all new building *(проектирование)* and *(разработка)*, as part of their *(стратегия устойчивого развития)*, and this means that green buildings are emerging throughout the country.

VIII. In English there are several sentence connectors that show cause and effect. Group the sentence connectors from the list below according to their meaning. Give their Russian equivalents.

as	since
as a result	so
because	therefore
consequently	this resulted in
hence	thus

showing CAUSE	showing EFFECT

IX. Complete the text with the sentence connectors in the box. In some cases, several variants are possible.

as	as a result	because	so (2)	therefore

During building construction, several things went wrong, (1) _____ there are several changes to be made to the Gantt chart of the project. Here is a description of what happened. Excavation was delayed for two weeks (2) _____ the excavator broke down. (3) _____ the machine drivers could not start work until week 3. (4) _____ the steel erectors had to wait until the machine drivers had completed their work, they were also delayed by two weeks. Consequently, the cladding fixers

[1] *guidelines* – нормативные руководства
[2] *regulations* –постановления
[3] *specifications* – технические характеристики

could not start until week 17. Bricks were in short supply during weeks 15 to 20 and (5) _____ the bricklayers worked three weeks longer than expected. (6) _____ the plumbers and the roofing constructors started three weeks later. But by putting on extra men the building was completed on schedule.

READING PRACTICE

Read the text and tell the ways to reduce environment impact in construction.

Sustainable construction

The definition of sustainability is not nearly as simple as it might seem, likewise with the definition of sustainable development. This is best illustrated by the fact that there are over 200 different definitions to answer what sustainable development is.

Sustainability is a broad term describing a desire to carry out activities without depleting resources or having harmful impacts. It is defined by the Brundtland Commission as ‘meeting the needs of the present without compromising the ability of future generations to meet their own needs.’

Some broader descriptions define it as a means of arranging human activity so that society, its members and its economies are able to meet their needs and express their greatest potential in the present, while preserving biodiversity and natural ecosystems, planning and acting for the ability to maintain these ideals for future generations. Social, economic, and environmental sustainability comprise the three pillars of sustainability.

The construction industry, by its very nature, is a big user of natural resources. From energy usage to emissions, the construction industry has a huge impact on the environment. Aside from the potential for building over wild habitats, the construction industry energy use is high. In fact, the construction industry accounts for an incredible 36% of worldwide energy usage, and 40% of CO_2 emissions. The fabrication and transportation of materials can have a great impact on carbon emissions. Mining for raw materials can result in the pollution of local water. The manufacture of concrete has resulted in over 2.8bn tonnes of CO_2. Construction can also result in hazardous waste, and the improper disposal of such waste can result in pollution that affects not just the environment, but also the health of people living in that area.

But with growing concerns over climate change and the finiteness of the resources, there is increasing pressure on construction firms to reduce their environmental impact.

Sustainable construction means using renewable and recyclable materials when building new structures, as well as reducing energy consumption and waste. The primary goal of sustainable construction is to reduce the industry’s impact on the environment.

Sustainable construction methods include:

- using renewable and recyclable resources;
- reducing energy consumption and waste;
- creating a healthy, environmentally-friendly environment;

- protecting the natural environment.

Sustainable construction doesn't end when the building is complete; the building itself should have a reduced impact on the environment over its lifespan. This means that the building design should incorporate elements that have an ongoing positive influence on the building's environmental impact. These can include proper insulation to prevent heat loss, solar panels to reduce energy consumption, and building materials with a long lifespan.

Adopting sustainable construction methods is not an overnight process; there are challenges to face, the greatest of which is cost. There will always be pressure on construction organisations to reduce costs where possible, but there are still concerns that sustainable construction methods will cost an organisation more.

While there are challenges involved in adopting sustainable construction methods, there are also great benefits too. Naturally, adopting sustainable construction methods will reduce your organisation's impact on the environment. But there are more tangible benefits too which will help you demonstrate the value of sustainable construction beyond environmental concerns.

The truth of the matter is that green buildings come with lower operating costs. In fact, research suggests that the use of the latest sustainable technologies in construction processes could potentially deliver a remarkable €410bn a year in savings on global energy spending.

There are also direct savings available for your organisation; by reducing waste, for instance, you will reduce the fees charged by your waste management company. By adopting more efficient vehicles, you will save on fuel costs.

And there is another huge benefit on your company: sustainable construction can help your organisation's reputation by demonstrating your sense of corporate social responsibility.

TEXT EXERCISES

LANGUAGE FOCUS

I. Look back at text "Sustainable construction" and copy out 3 phrases with Participle I and 3 phrases with participle II.

	Participle I	Participle II
1)		
2)		
3)		

II. Four words beginning in *eco-* have been used in the unit. Write out and translate them into Belarusian/Russian. Can you guess what the prefix *eco-* means?

Look in a dictionary or search the Internet to find the meanings for some more words with this prefix. Share your findings with your partners.

Give your examples of words beginning with *eco-*, be ready to explain their meaning.

eco *adj*	eco-action	ecolabelling
eco-city	ecobabble	ecomanagement
eco-tourism	ecocar	ecopornography
eco-warrior	ecofreak	ecoterrorism

III. Choose five sustainability related words that are new to you and write a sentence that uses each in the correct context. Then create one paragraph or a short story that uses at least 3 of them.

IV. There are several ways that speakers and writers can focus on their attitude towards what they are saying or writing. Certain adjectives and adverbials indicate your opinion on the issue being discussed.

Look back at text "Sustainable construction". Is the author emotional or neutral when talking about negative impact on nature and people? Which adjectives and adverbs from the list below does the author use to show this?

almost	of course
at least	practically
great	remarkable
huge	tangible
incredible	the truth of the matter
naturally	true
obvious	typically

V. Look back at text "Sustainable construction". Find four sentences with adverbial gerunds. Change the gerunds into finite verbs or participles. You may make any other changes too, if it is necessary.

MODEL 1: *In choosing to reduce transportation costs it is necessary to think about logistics regulations. –*
When you <u>choose</u> to reduce transportation costs it is necessary to think about logistics regulations.

MODEL 2: *In choosing to reduce transportation costs it is necessary to think about logistics regulations. –*
<u>Choosing</u> to reduce transportation costs it is necessary to think about logistics regulations.

COMPREHENSION CHECK

I. Complete the following sentences according to the texts of the unit.

1) To adopt sustainable construction methods means to use …, to reduce …, to create … and to protect …
2) By adopting sustainable construction methods, a company can demonstrate its …
3) The term '…' describes a desire to arrange human activity without depleting resources or having harmful impacts.
4) 2.8bn tonnes of CO_2 are the result of …
5) … of construction waste can result in pollution, affecting not just the environment, but also the health of people living in that area.

6) The greatest challenge a company has to face when adopting sustainable construction methods is …
7) … helps save on the fees charged by waste management companies.
8) More efficient vehicles reduce …
9) Green buildings are often known as …
10) Although …, green building is a rapidly growing field.

II. Substitute the words and word combinations in bold type with their synonyms from the texts of the unit.

1) Part of our mission profile is to show to our ability to maintain ourselves out of our own resources.
2) Eco-activists' aim is to raise awareness of climate change.
3) You said that you're very much influenced by your relatives from Scotland.
4) It turns out that giant clams have a giant effect on coral reefs.
5) To satisfy the needs of the growing population more land had to be cultivated.
6) All three of these areas: laws, individuals and industry come together to help solve the problem that new technologies cause.
7) Most eco-homes also use as many low-power DC devices as possible.
8) The International Coral Reef Initiative was established in 1994 to conserve, restore and promote the sustainable use of coral reefs and related ecosystems.
9) Half the world away, Facebook's most ambitious connectivity project is being developed in the small industrial town of Bridgewater, three hours west of London.
10) It's common knowledge that smoking and drinking can shorten our lives dramatically.

III. Here are 10 pairs of antonyms used in the unit. Find them. Do you know the contexts in which they are used? Give examples.

Consumption, death, domestic, future, high, improper, increase, life, local, loss, low, non-renewable, present, proper, reduce, renewable, savings, supply, wild, worldwide

IV. Match the words and word-combinations in column A with those in column B to make up all possible word-combinations.

A	B
1) a big user	a) as it might seem
2) a great impact	b) for 40% of the emissions
3) a positive influence	c) for building
4) as simple	d) for raw materials
5) available	e) for your organisation
6) involved	f) in adopting methods
7) growing concerns	g) of natural resources
8) increasing pressure	h) on carbon emissions
9) likewise	i) on construction firms
10) mining	j) on energy spending
11) savings	k) on fuel costs
12) the potential	l) on the environment

13) to account	m) over climate change
14) to save	n) with

V. Adopting sustainable construction methods involves certain benefits: environmental, economic and social. In pairs classify the benefits from the list below into these three groups. Be ready to explain your choice.

- conserve and restore natural resources;
- create, expand, and shape markets for green product and services;
- enhance and protect biodiversity and ecosystems;
- enhance occupant's comfort and health;
- heighten aesthetic qualities;
- improve air and water quality;
- improve occupant's productivity;
- improve overall quality of life;
- minimize pressure on local infrastructure;
- optimize life-span economic performance;
- reduce operating costs;
- reduce waste streams

Environmental benefits	Economic benefits	Social benefits

VI. Read the text about principles of sustainability in skyscraper construction, operation and maintenance. Discuss:

– what challenges skyscrapers involve;
– what environmental, economic and social benefits of sustainable construction are mentioned in the text;
– what other benefits a sustainable skyscraper can have in the future.

The skyscraper is a product of the industrialized age, made possible by cheap energy and raw materials. The amount of steel, concrete and glass needed to construct a skyscraper is vast, and these materials represent a great deal of embodied energy.

Tall skyscrapers are very heavy, which means that they must be built on a sturdier foundation than would be required for shorter, lighter buildings. Building materials must also be lifted to the top of a skyscraper during construction, requiring more energy than would be necessary at lower heights.

Furthermore, a skyscraper consumes a lot of electricity because potable and non-potable water must be pumped to the highest occupied floors, skyscrapers are usually designed to be mechanically ventilated, elevators are generally used instead of stairs, and natural lighting cannot be utilized in rooms far from the windows and the windowless spaces such as elevators, bathrooms and stairwells.

Despite these costs, the size of skyscrapers allows for high-density work and living spaces, reducing the amount of land given over to human development. Mass

transit and commercial transport are economically and environmentally more efficient when serving high-density development than suburban or rural development.

Also, the total energy expended towards waste disposal and climate control is relatively lower for a given number of people occupying a skyscraper than that same number of people occupying modern housing.

VII. A fully-sustainable eco-city is a city which does not need to buy in power, water, materials, etc. from other places because it is able to meet its needs in a sustainable way itself. How can it work? In pairs discuss ways this could be achieved using theses headings. Use conditionals to talk about possible future actions.

Buildings	Food supply	Water supply
Energy	Public transport	Waste

MODEL: *Buildings*

I think that materials for the buildings would be found locally. That way there would be little transport needed. And buildings would be well insulated to reduce the amount of energy needed to heat or cool them. If buildings had big windows, you could use sunlight instead of electric lights.

VIII. Mark the following statements as True (T), False (F) or No Evidence (NE) according to the information from the texts of the unit. If the statement is false or has no evidence, give your reason for this.

1) There are more than 200 different definitions of sustainable development.
2) According to the Brundtland Commission, sustainable development is ‘meeting the needs of the present without compromising the ability of future generations to meet their own needs.’
3) The three pillars of sustainability are economic, environmental, and social sustainability.
4) Sustainable construction is not only erecting a structure, but also the reduced environmental impact of the structure over its lifespan.
5) Companies cannot save money on sustainable construction technologies but may improve their reputation.
6) Green buildings are cheap in operating.
7) Proper insulation, solar panels, durable building materials are used in sustainable construction.
8) The construction industry is the largest energy consumer.
9) The construction industry can affect not only wild habitats, but also people’s health.
10) The world’s CO_2 emissions are caused by the construction industry.

IX. Answer the following questions about the texts.

a. How does the construction industry affect the environment?
b. What makes construction firms reduce their environmental impact?
c. What does sustainable construction mean?
d. What is the primary goal of sustainable construction?

e. What should the design of a structure incorporate to reduce the environmental impact?
f. What challenges does a company face if it chooses sustainable construction methods?
g. Are there any benefits from adopting sustainability in construction? What are they?

X. Expand the following statements. Add as much as possible information from the texts.

1) The construction industry is a big user of natural resources.
2) The construction industry has a huge impact on the environment.
3) Adopting sustainable construction methods is quite challenging.
4) Sustainable construction has certain benefits.

XI. Ask your partner questions about:

1) the three pillars of sustainability; 2) sustainable construction methods; 3) benefits from using sustainable construction methods; 4) green building; 5) eco-cities.

SPEAKING PRACTICE

What do you think?

12. Are sustainable eco-cities a utopia or a possible future?

13. Greta Thunberg is a teenage eco-activist from Sweden who advocates against hazardous emissions, resulting in climate change. Read the transcript of her speech on climate. Is it persuading? What other arguments and/or examples would you add?

Read Russian president Vladimir Putin's reaction to Greta Thunberg's speech "How Dare You?". Is it persuading? Do you agree with Putin?

- In groups work out tangible steps that can be taken by individuals/local governments/countries to meet the challenges of environmental impact. Be realistic.

14. The unit doesn't say a word about passive and active house designs and intelligent house technology. What do you know about these latest sustainable construction technologies? Search the Internet and find out more detail about innovations in this field.

- Make a computer presentation. Share what you discover with your groupmates in the next class. Give each other feedback on your presentations.
- Make a poster presentation. Show your work to your classmates in the next class. Give each other feedback on your posters.

Discussion on sustainable development. Work in pairs.

STUDENT A's QUESTIONS (Do not show these to Student B.)

1) What is sustainable development?
2) In which countries is sustainable development most important?
3) How is sustainable development linked to standard of living?
4) What is your country's policy on sustainable development?
5) Is sustainable development more important for the developed or developing world?
6) How often do you hear or read about sustainable development in the news?
7) Do you know of any sustainable development projects that have worked?
8) What is your opinion on ecofreaks?

STUDENT B's QUESTIONS (Do not show these to Student A.)

1) Do you think sustainable development is an interesting and important topic?
2) Is sustainable development possible in today's world in which people are becoming richer and consuming more of the Earth's natural resources?
3) How important is sustainable development in relation to issues like climate change, poverty, terrorism, etc?
4) What problems does a lack of sustainable development lead to?
5) What roles do countries like the USA, China, Russia and India have in sustainable development?

6) What questions about sustainable development would you like answered?
7) Do you think people will be talking about sustainable development 50 years from now?
8) Do you think ecoterrorism is good?

(based on *https://esldiscussions.com/s/sustainable_development.html*)

SPEAK ON THE TOPIC:

- Sustainability in construction;
- an innovative sustainable construction method or technology;
- sustainability: a utopia or possible future?

SUPPLEMENTARY READING

Text 1

Before you read

1) Do you think punishment is a good way to teach people a lesson?
2) Have you ever met teachers who practised punishing their students? What did they punish them for? Did it help?
3) Are there any alternative ways to solve students' behavior problems?

Read the text and answer the questions.

REWARDS, YES! PUNISHMENTS, NO!

A major factor in creating classroom discipline problems is the overuse of punishments as an answer to misbehavior. While most teachers would agree with this statement, recent research indicates that punishments outweigh rewards by at least 10 to 1 in a typical classroom. The types of punishments identified include such old favorites as The Trip to the Office and "Write a million times", "I will not… ." But punishments also include the most unconscious (but frequent) responses made for minor infractions: 'evil eye' stare of disapproval and the countless pleas to "Face front," "Stop talking," "Sit down!" and so on.

Punishments (both major and minor) have at least four consequences that frequently lead to increased classroom disruption:

(1) Punishment brings attention to those who misbehave. We all know the adage, "The squeaky wheel gets greased." Good behavior frequently leaves a student nameless and unnoticed, but bad behavior can bring the undivided attention of the teacher before an audience of classmates!

(2) Punishment has negative side effects such as aggression, depression, anxiety, or embarrassment. At least, when a child is punished he feels worse about himself, about you and your class, or about school in general. He may even try to reduce the negative side effects by taking it out on another child or on school equipment.

(3) Punishment only temporarily suppresses bad behavior. The teacher who rules with an iron ruler can have students who never misbehave in her presence, but who misbehave the moment she leaves the room or turns her back.

(4) Punishment disrupts the continuity of your lessons and reduces the time spent on productive learning.

These facts, and because punishments are usually not premediated (and frequently do not address the real problems of misbehavior such as boredom, frustration, or physical discomfort), usually work to increase classroom discipline problems rather than to reduce them.

In view of these factors, the preferred approach is to use rewards. Rewards bring attention to *good* behaviors: "Thank you for being prepared." Rewards provide an appropriate model for other students, and make students feel positive about themselves, about you, and about your class. Also, reinforcing positive behaviors reduces the inclination toward misbehavior and enhances the flow of your lesson. You stay on task, get more student participation, and accentuate the correct responses.

1) What is the main reason for discipline problems in a classroom?
2) What are the most typical examples of punishment to stop students' misbehavior?
3) How often do teachers use them?
4) Is punishment effective in decreasing classroom disruption? Why?
5) What are the most common consequences of practising punishments at a classroom?
6) What can a teacher do instead of punishing for misbehavior in order to reduce classroom discipline problems?

Think about it

1) Which is easier for a teacher: to punish misbehavior or to reward good behavior?
2) Are there any cases when rewards won't work?

Text 2

Before you read

1) Are there any cases when punishment is the only way out?
2) Have you ever experienced the 'whole class punishment'? Was it an appropriate punishment? Did it work?
3) What is the worse way to punish a student?

Read the text and answer the questions.

LET THE PUNISHMENT FIT THE CRIME

When rewards are inappropriate, many teachers create discipline problems by using short-sighted or ineffective punishments. The classic example is the 'whole class punishment.' "Okay, I said if anyone talked there would be no recess, so we stay in today!" this approach frustrates students (especially the ones who were behaving properly) and causes more misbehavior.

Research indicates that punishments are most effective when they are the natural consequences of the behavior. For example, if a child breaks a window, it makes sense to punish him with clean-up responsibilities and by making him pay for damage. Having him write 1,000 times, "I will not break the window," or having him do extra math problems (!) does little to help him see the relationship between actions and consequences.

In reality, this is one of the hardest suggestions to follow. In many cases, the "natural consequences" are obscure ("Okay Steve, you hurt Carlton's feelings by calling him fat. For your punishment, you will make him feel better"). So, finding an appropriate punishment is often difficult. We suggest that after racking your brain, you consult with the offenders. They may be able to come up with a consequence that at least appears to them to be a fit punishment. In any case, nothing is lost for trying.

1) What are the most common examples of inappropriate punishments?
2) When is punishment the most effective? Give examples.
3) Is it easy to give an appropriate punishment?

Think about it

1) Is it effective to let offenders choose their punishment?
2) Can you give your examples of a fit punishment?

Text 3

Before you read

1) What specialists are involved in technological development?
2) Are their roles equally important in this process?

Read the text and answer the questions.

THE ESSENTIAL TRIANGLE

Technological and industrial progress depends on the scientist, the engineer and the technologist – an essential triangle. Each makes major contribution to progress. The engineer depends upon the scientist for new knowledge and upon the technologist foe specialized assistance in translating engineering plans into operating reality.

Pure scientists can make their contribution to progress through the investigation of the unknown.

The interests of research engineers are in the area of applied science and research. Scientists work in a world of generalizations and abstractions. Technologists on the other hand, work in the real world of specific things and concrete objects. Their problems are practical and require practical solutions. Technologists are more interested in how to do things. They must understand engineering tables and formulas and apply them in their work. Scientists, research engineers and technologists – all play an important role in the modern world.

The principal work of engineers is design. They have to design various structures: products, machines, houses, roads, bridges, etc. Like research engineers, engineers ask “why?”. Like technologists, engineers are also concerned with “how?”.

Engineers must combine many characteristics of the scientist, research engineer and technologist. They must have a basic knowledge of the sciences, and understanding of the abstract techniques of research engineers and they should know much of the technology employed by technologists.

Perhaps the most important function of engineers is to integrate the work of the essential triangle. Their interest must be in combining the abstract-theoretical world and the technical-practical world.

1) What does *essential triangle* mean?
2) What specialists are to solve practical problems?
3) Whose professional interests lie in the sphere of pure science?
4) Who work in a world of applied science and research?
5) What is engineers’ main task?
6) How do engineers intergrade the work of all specialists that take part in technological progress?

Think about it

1) Why is it a triangle that is chosen to describe the interaction of specialists in technological and industrial progress? Do you agree with this choice?
2) What other professions would you include in the list of those who are engaged in technological development?

Text 4

Before you read

1) What do environmental engineers deal with?
2) Is it a highly demanded job? Why?

Read the text and answer the questions.

ENVIRONMENTAL ENGINEER

While studying Civil engineering at university, I became increasingly interested in water, in particular water supply. So, I went back to university and did a post-graduate qualification in Environmental studies. Today I work in the Environment Department of a large engineering company, I'm responsible for environmental assessments, strategic assessments, contamination assessments, and waste management.

Nowadays, I'm mainly office-based. In a typical day I review proposals for new works, for example building an airport in the Far East, designing a solid waste management plant, or carrying out an environmental assessment proposal for a resort development in the Caribbean. I have to look at the environmental impacts, the scale and design of a project, and the pricing. Civil Engineers, Geologists, Ecologists, Environmental Scientists, and Landscape Architects are some of the specialists involved. The effects a project will have on habitats and the ecology of the area are really important, and we also have to think about sustainability. This includes looking at the effects a project will have on the people who live locally, both during the construction and after the project is completed. I regularly review on-going projects with the Project Managers.

I like my job because I'm very interested in the subject. It gives me a great sense of satisfaction to feel I can make a difference. When we're designing engineering facilities, there's a real sense of excitement when the plans turn into reality, especially with something innovative. It's great to work with people who all share a desire to see sustainable development.

1) Does the job of an environmental engineer require a university degree?
2) Does it involve travel?
3) Is there a lot of written communication?
4) What aspects of the environment does the narrator work with?
5) Who does he work for?
6) What does he especially enjoy about his job? Why?

Think about it

1) Would you like to major in Environmental engineering? Why?
2) What skills should one develop to be a highly qualified environmental engineer?

Text 5

Before you read

1) What career opportunities are there in engineering and technology?
2) When does a career path usually start?
3) What should you do to be a highly demanded specialist on a job market?

Read the text and answer the questions.

CAREER DEVELOPMENT

Technology is the key to so many enterprises that there are innumerable career paths available. We live in a global society competing on innovation, clever thinking, and creativity. There is a challenging career in technology for brightest people.

There are many good examples of people who started their career at a fairly low level but were identified as potential talents and were given support and training. This allowed them to rise up through their companies. With technology playing such an important part at any company, staff with backgrounds in technology are increasingly being promoted to senior positions.

Companies seeking to recruit new graduates frequently take part in the ‘Milk round’. This means they visit universities and colleges, invite students to attend presentations, and conduct interviews with those who are interested in employment. There is competition to recruit the most able students. The ‘virtual milk round’ is where this system of recruitment is carried out over the Internet.

Your curriculum vitae (CV) is one of the most important documents presented to a potential employer. It lists academic achievements and work experience along with relevant personal information. It must be clear and well written to hold the employer’s attention and provide the essential information. Employers often ask applicants to supply a covering letter along with their CV. This allows the applicant to go into more detail as to why they are suitable for the job and they have the opportunity to address the employer on a more personal level.

Short-listed candidates for a post will be interviewed. Interviews are about selling yourself and presentation skills are most important. Practising these skills and preparing before attending an interview can improve one’s chance of getting the job. Second interviews often ask candidates to carry out more practical tasks so that the interviewers can really assess how a candidate performs under pressure.

In a highly competitive job market it is important to gain the necessary qualifications and take opportunities to acquire additional work experience such as participating in exchange programmes organized by colleges, universities, and employers. Two examples of UK technical qualifications are NVQs (National Vocational Qualifications) and BTECs (The Business and Technology Education Council). NVQs are vocational awards achieved through assessment and training. They are practical qualifications based on being able to do the job. There are five levels from Le1vel 1, which focuses on basic work activities, to Level 5 for senior management. BTECs are vocational qualifications to prepare students both for employment and for progression to higher education.

1) Is it easy to climb up a career ladder in technology nowadays?
2) What do *milk round* and *virtual milk round* mean?
3) What is a CV?
4) Why is it preferable for applicants to supply a covering letter too?
5) What skills are needed to be successfully interviewed for a job?
6) Why are job candidates asked to do some practical tasks at interviews?
7) What is important to do in order to become more competitive on a job market?
8) What opportunities are there in the UK for this?

Think about it

1) Is it easy for a person with backgrounds in technology to be promoted to senior positions in Belarus?
2) What opportunities are there in Belarus for those who would like to gain higher qualifications and acquire additional work experience?

Text 6

Before you read

1) Have you ever come across stereotypes?
2) Do people need stereotypes? Why?
2) Are there any stereotypes of civil engineering?
3) Can you describe a stereotyped civil engineer? Do the civil engineers you met fit this image?

Read the text and say whether the statements are true or false. Correct the false ones.

7 MYTHS ABOUT A CAREER IN CIVIL ENGINEERING

Civil engineering is an exciting and rewarding career, but for some reason, there are still some misconceptions about the job and the people who do it.

In their own words, civil engineers from a wide range of backgrounds bust some of the most common myths about the wonderful profession that is civil engineering, and the brilliant opportunities it provides anyone looking for something to do.

Myth 1: it's a man's world

It may have started out that way back when ICE[1] was founded, but this is no longer the case.

"What a load[2] of rubbish!" says Emma Watkins, Skanska engineer and one of ICE President Andrew Wyllie's Future Leaders.

"I've had so much support and lots of help ever since I started and have been given nothing but respect for working in the industry."

That's not to say that there's not still some way to go before the number of women in civil engineering matches that of men. The good news is that the figure is rising. ICE's own records show that 14% of the total membership is female, and the percentage of female engineers on ICE training agreements has grown to 21.3%.

Kishore Ramdeen, from Highways England, recognises the historic imbalance but says that organisations are becoming increasingly aware that diverse teams produce better results.

"You can now work in the civil engineering industry and be part of teams that have a 50:50 split male to female."

Andy Mitchell, CEO of Tideway, said that 57% of the people his company employs are female, and agrees that while progress is being made, more needs are to be done.

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[1] *The Institution of Civil Engineers* (ICE) is a charity and international membership organisation established to 'foster and promote the art and science of civil engineering'. It was founded in 1818 and was granted a royal charter in 1828. It now represents approximately 80,000 members worldwide.

[2] *a load* 'a lot'; *loads* 'lots'

"We must continue to highlight what an exciting, wide-ranging and flexible industry this is to work in and to champion our female engineers to inspire the next generation," he says.

Myth 2: you have to be good at maths

There's no need to fear if maths is not your strong point. Hiba Khan, Mott Macdonald engineer, says that she's "barely doing much maths", and she's five years into her career.

"I mostly find myself managing projects and people, talking to clients and pitching ideas," she says.

Ruth Watson, an award-winning civil engineering apprentice, says there's much more to engineering than maths.

"Rather than hardcore maths, it's more problem-solving. How are we going to make this structure work? What components can we use to make this more sustainable? How will this impact the environment?" she says.

Myth 3: you have to be good at physics

Bianca Wheeler, Construction Engineer at Jacobs, was told as a student that she'd have to be good at physics, only to find that this was untrue.

"Yes, principles that stem from physicists' work and theories are present in engineering, especially when working in design, but this is more about structural mechanics rather than quantum physics and such that you learn in A level physics," she says.

Myth 4: engineers are boring, and so is civil engineering

No one likes to think of themselves as boring, and many civil engineers are quick to prove the opposite is true. Many we have spoken to have loads of hobbies and interests outside civil engineering, from music and dancing to sports, photography and travelling.

"A lot of us are quite social," says Ashkan Amiri, from Kier.

Meanwhile, Blessing Danha says that the work is "incredibly interesting and you work as a team".

The team aspect of civil engineering is significant, as a common misconception is that engineers are loners who don't interact with other people much.

"Completely the opposite," says Monika Szczyrba, Skanksa engineer and another of ICE President Andrew Wyllie's Future Leaders. "It's all about the team effort."

Myth 5: engineers aren't diverse

"Put your stereotypes away," says Ayo Sokale, from the Environment Agency, who says that the industry welcomes anyone and everyone who's ready to take on the challenges that civil engineers try to solve.

Major Rob Ridley, from the Royal Engineers, agrees.

"The profession needs people with diverse skills; creative thinkers who can develop concepts to solve problems, highly analytical people who can dig into the detail, people in offices, on site, all over the world," he says.

"There's a space in engineering for most inquisitive people."

Tara Fraser says that your skills are much more important than your gender.

"My experience has been that sites and contractors are far more interested in your professional delivery of projects and couldn't care less about gender or

sexuality," she says.

Myth 6: it's all hard hats, concrete and hi-vis vests[1]

"Yes, there are parts of civil engineering that will involve you wearing the stereotypical safety gear, but who says you can't have fun if you do," says Sakthy Selvakumaran.

"There are so many other sides for those who aren't as keen on working in the mud," she adds, and, as Kishore Ramdeen says, you can go an entire civil engineering career without ever wearing a hard hat.

Civil engineering doesn't just mean construction either, Bryn Noble, WSP engineer, argues.

"Civil engineers improve the quality of life for society, we do this through a variety of ways, construction is just one of them. This is why my project as one of President's Future Leaders is focused on understanding how civil engineers can help mitigate loneliness," he says.

Myth 7: engineers love Lego

"Not all civil engineers are obsessed with Lego," says Jack Rose.

And believe it or not, a number of civil engineers we spoke to have never built anything with Lego in their lives! So, if the iconic building blocks haven't played much of a role in your childhood, don't worry. It doesn't mean you can't be a civil engineer.

1) There is still some wrong understanding of what civil engineering and civil engineers really are.
2) Civil engineers are mostly males.
3) If your maths skills are poor, you will fail as a civil engineer.
4) Physics must be a civil engineer's strongest point.
5) It would be hard for outgoing people to work as civil engineers.
6) Employers are mostly interested in an engineer's professional skills.
7) All civil engineers have to wear the safety gear.
8) A civil engineer must be crazy about Lego.

Think about it

1) Has the text managed to persuade you that civil engineering is the career for you? If not, why?

Text 7

Before you read

1) What skills should a qualified civil engineer have?
2) Have you got any of them yet?
3) What skills are you going to develop?

Read the text and answer the questions.

FIVE TRANSFERABLE SKILLS IMPORTANT TO CIVIL ENGINEERING

As part of National Careers Week, civil engineer Janet Benefo explored what

[1] A *hi-vis vest* (high-visibility vest) is a type of clothing that is easily seen at night and in poor weather conditions.

skills will help you go far in the industry.

Finding inspiration

I was inspired to become a civil engineer at an early age by my father who is also a civil engineer (now retired). He would sometimes bring engineering drawings home and explain to me how the different parts of the buildings were defined with line thicknesses and shading. This was in the days when drawings were done by hand using tracing paper and ink pens.

I had the opportunity to visit some of my father's projects, and it was a great feeling to see the translation of his drawings into finished buildings. It was that which made me decide that I wanted to play a part in developing and improving our infrastructure.

Always something different

What I love about the role of a civil engineer is that it can be quite varied, so you never get bored. I've worked in a variety of civil engineering roles including:

- designing road layouts to prevent flooding.
- inspecting old bridges to ensure they were well-maintained.
- supervising the construction of a bridge over a railway line.
- project managing the construction of multistorey buildings overseas.

The main principles of civil engineering have been the same for hundreds of years, but the way in which we carry out our work is always evolving.

An example is the use of drones to inspect dangerous structures or provide aerial views of landscapes. Another example is the use of virtual reality to 'walk' in and around structures before they are built to enhance the design and identify any potential issues.

From my 20 years of experience, the following are what I think are some important skills that civil engineers need to have.

What skills do civil engineers use?

1. Communication skills

I realised early in my career that aside from the science and mathematical knowledge (technical skills) there are many other skills that I needed to carry out my job effectively, especially communication.

It's very important that civil engineers can express themselves clearly and in a way that's receptive to their audience. My ability to communicate with people at all levels helped me to be successful in getting a job and doing the job well. I would always consider who I was going to meet and how I would deliver my contribution in a way that they could appreciate and understand.

I've designed schemes and then carried out public consultations, displaying my drawings and explaining the details of the scheme and how it would affect the people living and working in the local area.

I learned from these events how to explain some quite complicated technical things to non-engineers and get them 'on board' to see the positive changes the project would bring for their community.

2. Analytical and reasoning skills

Civil engineers use analytical skills to identify a problem and brainstorm the possible solutions. We use reasoning skills to weigh up the pros and cons to decide

the best way forward and we communicate these findings back to colleagues, clients and others involved.

3. Organisational skills

Organisational skills are also very important. When I'm given a brief for a project, the first thing I do, after identifying what is required, is to list the various items/activities and organise those items into a sequence with time frames to create a programme of delivery.

This skill helped me to become an effective manager, as I was able to identify the extent of the work on a project and the resources needed. And learning how to carefully monitor the work, I'm able to make sure projects don't overrun or go over budget.

4. Being a team player

The ability to be a team player is an essential skill in civil engineering because we collaborate with many other professionals on our projects.

For example, working on a bridge project I talked with geotechnical engineers about the ground conditions to give me an idea of what type of foundation would be suitable, as well as consulting with the gas, electricity, water and telecommunications companies to make sure we didn't damage their services during construction.

5. You love finding out about other cultures

I was fortunate to work on civil engineering projects overseas in Ghana, which I loved.

Although the technical aspects were the same in Ghana as they are in the UK, some of the terminology was different and this became clear to me very early on, and so I made a point to clarify items with my Ghanaian counterparts to ensure we were on the same page. Also, the health, safety and welfare culture in Ghana varied from project to project, and I found the attitude to be very relaxed and easy-going.

However, despite the cultural differences, engineers have a common technical language, and with professional qualification from ICE[1], you're equipped to work anywhere you want in the globe – from Tasmania to Timbuktu.

1) Does civil engineering involve various activities?
2) What technical skills are essential in the job of a civil engineer?
3) Why are good communicative skills needed for effective civil engineers?
4) What skills are needed in problem-solving?
5) Why should a civil engineer be an effective manager?
6) Why is it crucial for a civil engineer to be a team player?
7) What skills can help civil engineers overcome cultural differences when working on multinational projects?

Think about it

Why do civil engineers need develop their professional skills throughout their career?

Text 8

Before you read

1) What subjects are you particularly good at?

[1] *ICE* 'Institution of Civil Engineers'

2) Did these subjects help you make your career choice? How?

Read the text and answer the questions.

THE BEST SUBJECTS TO STUDY

Civil engineers come from all walks of life, all sorts of backgrounds. The work is incredibly varied and so are the people that choose engineering as their job. But you'll find that most are best at these subjects:

Maths

Maths is a must-have subject to be a civil engineer as a lot of the work involves measuring, calculating, designing, working out lengths, weights, quantities, loads, etc.

Sciences. Particularly Physics

You need to be able to understand and measure forces and movement and calculate the strength of structures you are designing.

Geography or Geology

If you don't want your building or structure to sink into the mud you need to know about the types of ground and design the right foundations.

Digital & Computing

Digital skills are playing an increasingly important role right across engineering as more and more tasks are being digitised.

Art, Design&Technology

Innovative new ideas that can be expressed visually are needed in every type of engineering.

Languages, group work and sport

Civil engineers usually work in teams and often involved in projects around the world. So languages, teamwork and communication skills all count.

1) What subject must a civil engineer master? Why?
2) Is it important to know physics well if you design structures?
3) How can Geology and Geography help build a strong structure?
4) Can a civil engineer with poor digital skills perform engineering tasks well?
5) Why are Art, Design&Technology necessary subjects to be good at?
6) How do languages, group work and sport help engineers do their job?

Think about it

1) Would you change the list of subjects? How?
2) Are you good at all the subjects mentioned in the text? If not, will this prevent you from becoming a professional?

Text 9

Before you read

1) Have you ever met the term *deformation* in civil engineering?
2) How can members of a structure be deformed?

Read the text and answer the questions.

DEFORMATION

Whenever a force acts upon a body, there is an accompanying changes in shape

or size of the body. This is called deformation. In designing structures, it is often necessary that we know what the deformation in certain members will be. A floor joist, for instance, may deflect to such an extent that the floor will vibrate or the plastered ceiling below will crack. For the usual cases we can readily determine what deformation will be.

Compression. When the force acting upon a body has a tendency to shorten it, the force is called compressive, and the stresses within the body are compressive stresses. A typical example of compression is a column having a load on its upper end.

Tension. When a force acts upon a body in such a manner that the body tends to lengthen or pull apart, the force is called tensile, the stresses within it are tensile stresses. For example, the cables of The Golden Gate Bridge are in tension.

Shear. A shearing stress occurs when we have two forces acting on a body in opposite directions but not at the same time. Forces acting as a pair of scissors, tending to cut a body, is an illustration.

Bending. The fibres in the upper part of the beam are in compression, and those in the lower part are in tension. These stresses are not equally distributed over the cross section.

Hooke's law. In the 17th century Robert Hooke, a mathematician and physicist, developed the theory that "deformations are directly proportional to stresses". In other words, if a force produces a certain deformation, twice the force will produce twice the amount of deformation.

Elastic limit. The elastic limit may be defined as the unit stress beyond which the deformations increase in a faster ratio than the applied loads. If the unit stress is greater than the elastic limit and the load is removed, we will find that the bar has permanently increased its length. This permanent deformation is called permanent set.

1) What is deformation?
2) In designing a structure, must an engineer know what deformation its members will undergo?
2) How does a compressive force act on an object?
3) What are the stresses within such an object called?
4) What is a tensile force?
5) When does a shearing stress take place?
6) What is the essence of Hooke's law?
7) What is the elastic limit?

Think about it

Can you define the stresses that a floor beam undergoes? A bridge support?

Text 10

Before you read

1) What types of construction do you know?
2) What building materials are used for each of them?

Read the text and correct the statements if necessary.

BUILDING MATERIALS IN DIFFERENT TYPES OF CONSTRUCTION

Building materials are used in two basic ways. In the first way they are used to support the loads on a building and in the second way they are used to divide the space in a building. Building components are made from building materials and the form of a component is related to the way in which it is used. We can see how this works by considering three different types of construction:

1. In mass construction, blocks of materials such as brick, stone, or concrete are put together to form solid walls. These materials are heavy; however, they can support the structural loads because they have the property of high compressive strength. Walls made up of blocks both support the building and divide the space in it.
2. In planar construction, sheet materials are used to form walls which act as both space-dividers and structural support. Timber, concrete and some plastics can be made into large rigid sheets and fixed together to form a building. These buildings are lighter and faster to construct than buildings made up of blocks.
3. In frame construction, rod materials can be used for structural support but not for dividing spaces. Timber, steel and concrete can be formed into rods and used as columns. Rod materials with high tensile and compressive strength can be fixed together to form framed structures. The spaces between the rods can be filled with light sheet materials which act as space dividers but do not support structural loads.

1) Rod materials are used not only for dividing space but also for supporting a building.
2) Block materials, sheet materials and rod materials can be concrete.
3) Steel is chosen for frame construction due to its high tensile strength and low compressive strength.
4) The sheet materials, that are used as space dividers in a frame construction, can be very lightweight because they do not carry structural loads.
5) Mass construction buildings are light while planar construction buildings are heavy.

Think about it

1) Which of the construction types is the oldest? the newest? Why do think so?
2) How do new building materials revolutionize construction?

Text 11

Before you read

1) What does the design of a structure depend on?
2) How much does the choice of building materials determines architecture?

Read the text and correct the statements if necessary.

THE ROLE OF BUILDING MATERIALS IN ARCHITECTURAL DESIGN

William Morris mentioned in his essay in 1892 that, “The subject of material is clearly the foundation of architecture”. When a material is used in new and

unexpected ways, or where its characteristics are presented in an unconventional condition, the level of the design is raised. The history of modern architecture can nearly be represented through the lens of the history of building materials. The relation between architecture and materials had been clearly simple until the industrial revolution. Materials were employed either for their utility and availability or for their appearance and ornamental qualities.

Early materials were available rock, animal skins and minor wood elements. At prehistoric times design made use of these elements in a fashion suitable to the nomadic lifestyle. A civilization evolved more mining of stone, production of brick and use of cement paste and plaster. Architectural design made the best use of these available materials by creating new methods (arches and vaults), and due to this the design prospects expanded. Before the 19th century the use of materials in the design was subject to issues of function and form. Knowledge of materials was gained through experience and observation. Master builders were those who had gained that knowledge and skills necessary for working with available materials, often by trial and error.

In the early of the 1800s, the wide spread of steel led to the emergence of long span and high-rise building forms. Materials were converted from being subordinate to architectural needs into a means to satisfy functional performance and to open up new formal effects. Manufacturing of glass led to the appearance of the international style, whose transparent architecture could be located in any climate and in any context. Using curtain wall systems allowed the disconnection of the façade material from the building's structure and made the façade a purely formal element. Glass, steel, and concrete were developed and with them new building form were introduced.

Engineering materials, such as aluminium and titanium can now be efficient and easily used as building skins[1] due to advancements in computer aided design and computer aided manufacturing (CAD/CAM) technologies, allowing a new range of building façade and forms. As a result, materials can be chosen and applied as compositional and visual surfaces, and designers consider them as an integral part of the design process. In the future, smart materials offer wide options in architectural design and can be an important strategy for material and energy saving technologies. Thus, it can be a significant contribution towards sustainable development.

1) Using materials in unusual ways develops design.
2) Until the industrial revolution materials were chosen for architectural needs only if they were useful, easily obtainable or attractive.
3) In the 19th century architectural design was determined by form and function.
4) At the beginning of the 19th century the expansion of steel resulted in high-rise construction.
5) Since the1800s materials have become subordinate to architectural needs.
6) Achievements in concrete, glass and steel production led to new forms of buildings.
7) Outer coverings of buildings are made of engineering materials.
8) In spite of CAD/CAM technologies, materials are used as compositional and visual

[1] The *skin* covers the outside of a building but carries no structural loads.

surfaces.
9) Smart materials are offering wide opportunities for architecture.

Think about it

1) What material can be called smart? Do you know any smart materials, already being used?
2) How can smart materials be involved in sustainable development?

Text 12

Before you read

1) What loads must a civil engineer take into account when designing a structure?
2) What loads are highly predictable? Highly unpredictable?

Read the text and answer the questions.

LOADS

The gravitational force on a structure can be divided into dead loads and live loads. Dead loads can be calculated accurately because they rarely change with time and are usually fixed in one place. Live loads are always variable and movable, so no exact figures can be calculated for these forces.

Structures must also resist other types of forces, such as wind or earthquakes, which are extremely variable. It is impossible to predict accurately the magnitude of all the forces that act on a structure during its life; we can only predict from past experience the probable magnitude and frequency of the loads.

Engineers never design a structure so that the applied loads exactly equal the strength of the structure. This condition is too dangerous because we can never know the exact value of either the applied loads or the strength of the structure. Therefore, a number called a ‘factor of safety’ is used. The safety factor is defined as the ratio of the probable strength of the structure and the probable loads on the structure. This factor may range from 1.1 (where there is little uncertainty) to perhaps 5 or 10 (where there is great uncertainty).

1) What loads are easy to determine?
2) Why are live loads hard to estimate accurately?
3) How can wind and earthquake loads be determined?
4) How can an engineer predict the possible loads that will occur on a structure?
5) Why do engineers never design a structure so that the applied loads exactly equal the strength of the structure?
6) When there is great uncertainty about the loads on a structure and its strength, does an engineer choose a high or low safety factor?

Think about it

1) When does a structure’s failure occur?
2) Will it be possible to calculate all extremely variable loads acting on a structure?

Text 13

Before you read

1) Do building styles differ around the world?

2) What factors can influence this diversity?

Read the text and answer the questions.

SO VARIOUS HOUSES

The primitive houses of many native tribes are often little more than shelters of mud, skin, or wood, hardly deserving the name of ‘house’. It’s only in settled civilizations that permanently constructed houses have been developed. Their forms differ widely according to the life people live, the climate, the materials available for building, and the skill with which these are used.

The shape of the house is strongly influenced by the climate. Where it is warm as in the Mediterranean and Arab countries, the plan of the house is open, with the rooms often arranged round a courtyard and which admits air but not too much sun. In the north, houses are more compact so that they can be more easily kept warm in winter; where there is much rain, they have steep roofs to throw it off. But where there is much snow and frost, as in Switzerland, they generally have flatter roofs where the snow will lie, making a warm blanket over the house.

The shape of windows is also dependent on the climate. They are large in the north to admit sunlight, though not so large as to make the rooms too cold; in the south, windows are small so as to keep the house as cold as possible inside, and are often shaded from the direct glare of the sun by balconies or verandahs which provide a cool sitting place in the open air. Shutters outside the window also provide protection from the sun. Windows are placed facing away from the sun in hot countries and, where possible, towards the sun in cold countries to let in as much light and warmth as possible. Chimneys are a prominent feature of the exterior of the northern house.

The materials of which houses are built play a large part in giving character to the scenery of different countries. In England, before modern transport made it possible to carry cheap bricks all over the country, and before standardized building materials were made in factories, every region had its characteristic building material. Because old houses are built of local materials they fit into the landscape, and their colour and texture harmonize with it. Efforts are still made, therefore, to build as far as possible in local materials, especially in country districts.

Other countries, especially those less highly industrialized than Britain likewise retain many traditional materials and building methods. In Mediterranean countries the prevailing building materials are white-washed brick and plaster, with roofs of half-round Roman tiles. In many parts of central Europe, the prevailing material is timber, though nowadays in towns timber is used less because of the danger of fire. In Holland and Denmark red or yellow brick is used, with roofs of red pantiles or plain tiles.

In Oriental countries houses are most commonly built of local sun-dried brick or timber. Japan is probably the country where the houses have retained their characteristic structure and appearance with fewest changes. The traditional house has a timber frame and the walls and partitions are light screens of paper, bamboo, or similar material. Such a light construction is suited to a climate and is less dangerous in earthquakes than heavy materials would be.

In the Middle Ages, when people spent most of their time outdoors, rooms were

few and barely furnished. But as indoor activities increased, there was more emphasis on indoor comfort, and rooms were set apart for different purposes. Nowadays, in the West, the desire for privacy has led to small houses or flats with small rooms, so that each family can have a separate living place and each person a separate room. But not all people want privacy; in the Arab lands of the eastern Mediterranean and in Mexico, China and elsewhere parents, children, grandchildren and other relatives all prefer to live together in the same house, forming one large household. In warm countries people live much more out of doors than in the north, and consequently, the houses are simpler and more barely furnished.

In the USA houses have changed as social customs changed. At first, American houses followed the patterns brought from Europe by early immigrants, but, since timber was the most easily obtainable material, boarded walls and shingle roofs largely replaced bricks, and tiles. Lately, different regions have evolved their own methods of house building to suit local conditions; for instance, a low, rambling house with widely spreading eaves, extending into lodgings and terraces, is typical of the Pacific coast. In addition, the plan of the house has begun to change as the American way of life has diverged more and more from the European one. Houses are less formal and rooms merge one into other, providing more space for general family life and fewer rooms for special purposes.

1) What do primitive houses look like?
2) What factors influence the form of a house?
3) What materials do people use to build houses in different regions?
4) What features are typical of a traditional house in a snowy northern region?
5) Where are small windows, shutters and wide roof eaves popular? Why?
6) What is a characteristic feature of an old English building?
7) Why do Japanese prefer light materials for their houses?
8) How did the desire for privacy change the interior space of a house?

Think about it

1) How did the climate, cultural traditions and available building materials influence the architecture of your country?
2) Do you believe that architecture is becoming more and more intercultural and local building traditions are disappearing?

Text 14

Before you read

1) How much have homes changed in your country for the last 100 years?
2) What are these changes?
3) In what way will homes of the future be different from homes of today?

Read the text and answer the questions.

FUTURE HOMES

The work of house builders is to construct attractive homes within budget. Planning permission must be obtained first and the homes must meet building regulations. Their work is becoming more difficult because of a shortage of suitable building land in many countries. In addition, they have to build houses which take

into account global warming, drought and flood risks, and future fuel crises.

It is assumed that future homes will adapt to these circumstances and will make use of new technologies. Householders will expect their homes to produce much of the energy their family needs, so wind turbines, solar panels, and geothermal energy systems will be included. Homes will be modified to collect and store rainwater and to recycle water. New systems of cooling will be developed to cope with rising temperatures.

Earth homes maintain a stable temperature all year round so heating and air-conditioning costs are much lower. They can be built into hillsides or built on level ground with a living roof garden to make them less noticeable. Those built into hillsides or partially underground must be built with proper drainage and be waterproof, not just from rain water but also ground water. The building must be strong enough to support the soil on the roof and resist the pressure of the soil on the rear and side walls within the hillside.

In the Netherlands, where building land is very expensive, floating homes have been built on barges which rise and fall due to tidal action or river level changes. The technology developed there could be applied more widely as sea levels rise around the world.

Land shortages and ageing populations will intensify the demand for modular homes that can be adjusted to meet the changing needs of a family. Interior walls can be moved or taken away. Furniture will be more adaptable, and smart technology will make life more comfortable and safer. For example, refrigerators will read bar codes on food and suggest menus as well as warn when food is no longer safe to eat.

1) What is house builders' task?
2) What documentation is needed to start building?
3) Why is it getting harder to build?
4) How are future homes supposed to adapt to global changes?
5) What advantages do earth homes have?
6) Why does the idea of floating homes seem viable?
7) How can furniture meet the changing needs of a family?

Think about it

American president Barack Obama said, "The best is yet to come". Do you agree?

Text 15

Before you read

1) What building machinery and equipment do you know?
2) What machines can be used for underwater building works?
3) Have you ever heard about caissons?
4) Do you know how the caisson work?

Read the text and answer the questions.

CAISSON

A caisson is a large box-like structure used by engineers who have to make foundations or do building work under water. The name comes from the French word

caisse, meaning ‘box’. If a glass is turned upside down and pushed to the bottom of a bowl of water only a little water gets into it. This is because the only way the water can rise inside the glass is by compressing the air which is already there. When the air is so compressed that its pressure downward equals the water’s pressure upward, the water must stop rising. This fact is useful to engineers needing to build below water level.

Three types of caisson are used – box caissons, open caissons, and pneumatic caissons.

Floating or box caissons are open at the top and closed at the bottom. They are usually built on land, floated into position and sunk onto a prepared foundation. The sides of the caisson, when it is sunk, stick up above the water. Box caissons are used in building piers, breakwaters, jetties and sea walls. This type of caisson was developed in 1738 during the building of Westminster Bridge over the River Thames in London.

Open caissons are open at the bottom as well as at the top. The bottom of the caisson has a cutting edge and soil can be dredged up, through shafts, from the top. As the caisson sinks, extra sections are added to keep the top of the caisson above the level of the water. When the caisson reaches a sufficient depth to give a watertight seal with the ground, the water is pumped out. People can then go down and work inside the caisson. Open caissons are usually used for shallow water work. They were used in China over 3,000 years ago.

Pneumatic caissons are similar to open caissons except that they have an airtight partition about 2 meters above the cutting edge. The caisson is towed out into the water to its required position, and flooded so that it sinks. Extra weight, usually in the form of concrete, is added to prevent the caisson from refloating when compressed air is pumped in through pipes. The pressure of the compressed air inside the caisson forces the water out of the bottom. When it is empty, workers can go down to work in the working chamber at the bottom of the caisson.

One or more tubes, or locks, lead down to the bottom of the caisson. Each lock is an air-tight shaft with doors at the top and bottom. The air lock was patented in 1830 by Thomas Cochrane, a British admiral. The locks are built so that it is impossible to open both doors at once, for if this were done the compressed air would rush out of the working chamber and the water would pour in.

The atmospheric pressure at sea-level is about 1,013 millibars (about one kilogram per square centimeter), but the pressure of compressed air in a pneumatic caisson may be more than three times this. The workers must get used to the pressure gradually each time they go down into the caisson. An air lock, or compression chamber, is built into the shaft through which they pass. This is a small room in which they must remain while the pressure inside is gradually raised until it is the same as in the working chamber. When returning to the surface, workers must spend a long time in the compression chamber. If their bodies are not reaccustomed slowly to normal pressure, they may get caisson disease, or decompression sickness, also known as ‘the bends’. They can also suffer from a disease called bone necrosis. This may weaken their bones so much that they become permanently crippled.

From the working chamber the mud and silt is cleared away and hoisted to the surface through a separate lock called the excavation, or muck, lock. As work goes

on, the cutting edges of the caisson cut down into the river bed. When the correct level is reached the foundation for the bridge or wall can be built. Sometimes the caisson itself is filled with concrete and used as a foundation. Pneumatic caissons are used in laying the foundations of bridges, piers, dams, or in the sinking of large wells. People working in a caisson must stand terrific heat because the high pressure raises the temperature of the air. Blower pipes circulate the air for better ventilation. The workers are limited to the amount of time they can work in compressed air, and the higher the pressure, the shorter the time. Because of these dangers and the inefficient use of manpower involved, caissons, particularly those at high pressures, are used less now than in the past.

1) What does a caisson look like?
2) What physical principle is used in caissons?
3) How many types of caissons are there? What are they?
4) Which type is the oldest?
5) Which type was used to build Westminster Bridge?
6) What parts does a pneumatic caisson consist of?
7) Why is it dangerous to work in a pneumatic caisson?

Think about it

1) What caissons are the best for deep water work?
2) What caissons are the safest?
3) How would you improve caisson technology?

Text 16

Before you read

1) If no one assists you, is it easy to build a house from the beginning to the end?
2) What professional people can be employed for this?

Read the text and say whether the statements are true or false. Correct the false ones.

PROCESS OF CONSTRUCTING A BUILDING

When an architect receives a commission for a building, she meets the client and discusses his requirements. After visiting the site, the architect draws up preliminary plans and, together with a rough estimate of the cost, submits them to the client for his approval. If the client suggests changes, the architect incorporates them into the final design which shows the exact dimension of every part of the building. At this stage, several building contractors are invited to bid for the job of constructing the building. When they submit their tenders or prices, the architect assists her client in selecting the best one and helps him to draw up a contract between the client and the contractor.

Work now starts on the building. As construction proceeds, the architect makes periodic inspections to make sure that the building is being constructed according to her plans and that the materials specified in the contract are being used. During the building period, the client pays the bills from the contractor. Subsequently, the contractor completes the building and the client occupies it. For six months after the completion there is a period known as the ‘defect liability period’. During this period, the contractor must correct any defects that appear in the fabric of the building.

Finally, when all the defects have been corrected, the client takes full possession of the building.

1) The architect gives the client an approximate estimate before visiting the site.
2) The client and the architect choose the best building contractor after the final design is ready.
3) A contract is signed by the architect and the contractor.
4) The architect supervises the construction works to make sure that everything is being done according to the documentation.
5) The defect liability period lasts half a year.
6) It is the contractor who must remove defects during the defect liability period.

Think about it

1) Which is in charge of cost control: the client, the architect or the contractor?
2) What does the phrase *the client takes full possession of the building* mean?
3) Who is responsible for maintaining the building after the defect liability period is over? Why?

Text 17

Before you read

1) Why do people wish to build tall structures?
2) Can you give examples of tall structures of the past and the present?
2) Do you know any skyscrapers? What cities are they in?

Read the text and put the stages in the construction of a skyscraper in the correct order.

SKYSCRAPER CONSTRUCTION

Skyscrapers start with a very large excavation which will contain the foundations, several floors, and possibly even a metro station. The type of foundations depends on the nature of the ground. Usually they are made by drilling narrow, deep holes and filling them with reinforced concrete to form piles. Another method is to drive steel piles, as much as twenty metres in length, into the ground. A thick raft of concrete is laid on top of the piles.

Vertical steel columns are bolted to the foundations. Each column rests on a platform of steel to spread the load. Steel girders are fixed horizontally from column to column by steel erectors to form a strong framework. Metal decking is laid across the girders and filled with lightweight liquid concrete which is pumped up from the ground. When it sets, it forms the floors.

Ducts are installed below the floors to carry all services: electricity, water, drains. All exposed metalwork is fireproofed. If a fire happens, it is important that the structure can withstand high temperatures without buckling.

The same process is repeated as the building rises. In some construction methods, entire floors are built at ground level and hoisted into position by cranes.

The outside of the building is covered in cladding. This consists of prefabricated panels of materials such as stainless steel, aluminium, and glass.

a) ___ Ducts are installed beneath each floor to carry cables and pipes.

b) ___ Girders are bolted to the columns to form the floors of the skyscraper.
c) ___ Liquid concrete is poured onto the formers.
d) ___ Metal decking, called floor formers, is laid between the beams to form a shallow pan.
e) ___ Outer walls, called cladding, are lifted into position by cranes.
f) ___ The foundations are laid.
g) ___ The process is repeated floor by floor until the skyscraper is completed.
h) ___ The vertical steel columns that form the base of the skyscraper's main frame are fixed to the foundations.

Think about it

1) Would you like to live in a skyscraper or would you prefer to work in an office there? Why?
2) Do skyscrapers have any chance to appear in Belarus? Why?

Text 18

Before you read

1) What advantages do skyscrapers have?
2) Do skyscrapers have any disadvantages?

Read the text and correct the statements if necessary.

HIGH LIVING: SKYSCRAPERS

High buildings, often called skyscrapers, allow us to make maximum use of the limited and often expensive building land in cities. They can also demonstrate the confidence and importance of a company, city or country, and lead to never-ending competition to build the highest tower.

When we look at a skyscraper, we see the shining metal or glass exterior. But this is only the outer covering. All the load-bearing structure is inside the building. A high building is like a human or animal body: it consists of a structural skeleton inside and an outer skin or covering. The structural skeleton of the skyscraper is made of steel and consists of vertical columns, horizontal girders, and (sometimes) diagonal braces to give extra strength. These are made of steel beams, which are bolted or riveted together. To make the girders more rigid and prevent them from buckling (or bending), they are often made with a cross-section in the shape of the leter I (I-shaped girders or I-girders).

When the columns and girders for one storey or level are in position, the concrete floor is made. This is done by laying metal decking (flat metal sheets like the deck of a boat) across the girders and filling them with liquid concrete. The decking moulds the concrete to the correct shape. Ducts are placed under the floors to carry the cables and pipes of the electrical and plumbing services. Most high buildings are constructed using the process of prefabrication, in which complete sections or floors are fabricated beforehand at ground level, then hoisted by cranes and fitted into position.

When the steel structure is completed, the outside of the building is covered with its outer skin, called the cladding or curtain wall. This consists of panels made of a variety of materials, such as glass, aluminium, or stainless steel.

Skyscrapers impose a massively concentrated load on their foundations. Where there are poor ground conditions, huge effort is put into creating suitable foundations through the use of piles and concrete rafts. Piles are long columns made from steel or reinforced concrete. Steel piles are driven vertically into the ground by a pile-driver until they reach bedrock (a layer of rock deep in the ground) or a stable layer of heavy clay which is considered suitable to bear the weight of the building. Reinforced concrete piles are made by drilling to the correct depth, inserting a network of steel rods, then filling the hole with concrete. A concrete raft is a flat base or platform of steel-reinforced concrete, which is formed above the piles and attached to them. This spreads the weight of the building over a wide area and through the piles to the bedrock. Another way of spreading weight is by using thick bases called piers which are expanded outwards like small pyramids.

In earthquake zones, special foundations are constructed which permit the tower to rock backwards and forwards, and absorb the force of the shock without serious damage. In windy conditions, a skyscraper will sway by as much as fifteen centimetres.

1) Skyscrapers make it possible to use land most effectively.
2) The skin is made of glass or metal panels.
3) The skeleton is a load-bearing structure of a skyscraper.
4) Steel girders, beams and braces form the cladding.
5) Floors are made of concrete.
6) Ducts for electrical and plumbing services are below the ceilings.
7) Steel and concrete are used to make skyscraper foundations.
8) In earthquake areas skyscrapers are made more flexible to withstand the earth shakes.

Think about it

1) What technological achievements made skyscrapers possible?
2) What risks can super-tall skyscrapers be at?

Text 19

Before you read

Have you ever heard about Greta Thunberg[1]? What is she famous for?

Read the text and correct the statements if necessary.

‘HOW DARE YOU’:
TRANSCRIPT OF GRETA THUNBERG’S UN CLIMATE SPEECH
Teenage activist denounces ‘empty word’ and lack of concrete solutions

Nikkei staff writers
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Swedish teenage activist Greta Thunberg caused a stir at the United Nations on Monday with her blistering criticism of world leaders’ inaction on climate change. The following is an edited transcript of her remarks.

[1] Greta Thunberg ['gretə 'tʊnberɪ]

My message is that we'll be watching you. This is all wrong. I shouldn't be up here. I should be back in school on the other side of the ocean. Yet you all come to us young people for hope. How dare you!

You have stolen my dreams and my childhood with your empty words. And yet I'm one of the lucky ones. People are suffering. People are dying. Entire ecosystems are collapsing. We are in the beginning of mass extinction, and all you can talk about is money and fairy tales of eternal economic growth. How dare you!

For more than 30 years, the science has been crystal clear. How dare you continue to look away and come here saying that you're doing enough, when the politics and solutions needed are still nowhere in sight.

You say you hear us and that you understand the urgency. But no matter how sad and angry I am, I do not want to believe that. Because if you really understood the situation and still kept on failing to act, then you would be evil. And that I refuse to believe.

The popular idea of cutting our emissions in half in 10 years only gives us a 50% chance of staying below 1.5 degrees Celsius, and the risk of setting off irreversible chain reactions beyond human control.

Fifty percent may be acceptable to you. But those numbers do not include tipping points, most feedback loops, additional warming hidden by toxic air pollution or the aspects of equity and climate justice. They also rely on my generation sucking hundreds of billions of tons of your CO_2 out of the air with technologies that barely exist.

So a 50% risk is simply not acceptable to us – we who have to live with the consequences.

To have a 67% chance of staying below a 1.5 degrees' global temperature rise – the best odds given by the Intergovernmental Panel on Climate Change – the world had 420 gigatons of CO_2 left to emit back on January 1, 2018. Today that figure is already down to less than 350 gigatons.

How dare you pretend that this can be solved with just "business as usual" and some technical solutions? With today's emissions levels, that remaining CO_2 budget[1] will be entirely gone within less than eight and a half years.

There will not be any solutions or plans presented in line with these figures here today, because these numbers are too uncomfortable. And you are still not mature enough to tell it like it is.

You are failing us. But the young people are starting to understand your betrayal. The eyes of all future generations are upon you. And if you choose to fail us, I say: We will never forgive you.

We will not let you get away with this. Right here, right now is where we draw the line. The world is waking up. And change is coming, whether you like it or not.

Thank you.

1) Mass extension has begun.
2) Scientists have done much to help the world solve the urgent environmental problems.

[1] *CO_2 budget* (or carbon budget) reflects the total amount of carbon emissions that can be emitted for temperatures to stay below a certain limit.

3) Cutting CO_2 emissions by 50% in 10 years won't solve the problem of global warming.
4) CO_2 budget is not large enough to prevent global temperature from growing.
5) People are coming to understand that for the sake of all future generations certain measures must be taken.

Think about it

1) Does Greta Thunberg's speech sound persuading?
2) What other arguments and/or examples would you add?

Text 20

Before you read

1) Did you know that *cradle* can mean 'the earth, i.e. material deposits within the ground'?
2) Have you ever heard about cradle-to-cradle cycle? Can you guess what processes it includes?

Read the text and answer the questions.

CRADLE TO CRADLE

Cradle-to-Cradle (C2C) is about seeing garbage as an eternal resource and doing the right thing from the beginning. It is about making community and product development function in the same way as a healthy ecological system where all resources are used effectively, and in a cyclical way (as opposed to the current linear system that can be better described as a Cradle-to-Grave system).

To make the C2C system to be sustainable, all materials in products need to be kept clean and should not be mixed. Alternatively, a separation system in place is needed; it can be applied after the item is discarded. C2C methodology is based on the concept that "waste = food", meaning that what is considered waste can become food in a new product cycle.

This methodology was developed by professor Michael Braungart and William McDonough in 2001 and it has been used as inspiration in products, buildings and production systems.

C2C cyclical systems

In practical terms, C2C requires products to ensure that all materials can be classified into one of two cyclical systems:

- Biological cycle – Materials that naturally biodegrade and can be returned to the ecological system. Examples of such materials are natural fibres and bio plastics.
- Technology cycle – Metals, oil-based plastics and chemicals are examples of valuable materials that can be recycled or reused producing the same or better quality in closed systems, provided they are not mixed.

1) What is the essence of Cradle-to-Cradle methodology?
2) Who are the authors of it?
3) How do a Cradle-to-Cradle and Cradle-to-Grave systems differ?
4) What systems does C2C consist of?
5) What materials does each of these systems include?

Think about it

1) Why were the images of a cradle and a grave chosen to describe recycling methods?
2) How would you call these methods?

Text 21

Before you read

1) What is your attitude to consumerism, i.e. an obsession with buying material goods or items without necessity?
2) How can consumerism be stopped?

Read the text and say what the title of the text means.

LEAN MEAN GREEN

The ‘Lean Mean Green’ philosophy aims to produce developments that lower the demand for resources, provide efficient structures and deploy innovative technology.

It is based on the hierarchy:

Lean. Reducing the demand for materials, energy, water and other resources. For example, creating guidelines for building designers to ensure demand is low from the outset, by utilizing passive measures such as natural heating, lighting, ventilation and external shading.

Mean. Ensuring that materials and systems are used responsibly and efficiently. For example, reducing distribution losses for energy (or water) between generation and usage. This might involve supplying heat, cooling, power and water from an on-site source.

Green. Supplying any remaining requirements from renewable sources to minimize carbon emissions. For example, solar power or rainwater harvesting.

Developers can tend to jump straight to the ‘green’ aspect, that is, renewable energy generation, but the other two – using less and making sure as much as possible gets to the point of usage – are equally important.

The philosophy can be applied to environmental assessments and strategies at all scales, including: the design of buildings and infrastructure, new city developments and climate change adaptation projects, as well as implementing strategies to reduce carbon and take advantage of carbon finance and trading. Being ‘lean, mean and green’ in its broadest sense requires integration of central and local government policy, legislation, building regulations, client policy and design strategy.

While the Lean Mean Green approach is popular in the ‘Global North’[1] it can be less useful in the ‘Global South’[2] where the ‘lean’ aspect may already happen

[1] The *Global North* encompasses the rich and powerful regions such as North America, Europe, and Australia.

[2] The term *Global South* refers broadly to the regions of Latin America, Asia, Africa, and Oceania. Along with such terms as *Third World* and *Periphery* it denotes regions outside Europe and North America, mostly (though not all) low-income and often politically or culturally marginalized.

through necessity, and in fact increased resource consumption may be required to improve quality of life.

After you have read the text, say whether the following statements are true or false

1) The Lean Mean Green philosophy is based on the hierarchy of 4 aspects.
2) The ‘mean’ aspect of the approach is responsible and efficient consumption.
3) Natural heating, lighting, ventilation and external shading are examples of the ‘green’ aspect.
4) The ‘lean’ aspect includes using renewable sources.
5) The ‘green’ aspect is the most important of the three.
6) The Lean Mean Green approach is more suitable for the Global South.

Think about it

1) Are the adjectives *lean*, *mean* and *green* accurate enough to describe the essence of the three aspects?
2) How would you call them?
3) Is the Lean Mean Green approach an effective means to achieve sustainability?
4) Is your energy demands sustainable? Are you going to adopt the Lean Mean Green approach?

РАЗДЕЛ КОНТРОЛЯ ЗНАНИЙ

ОБРАЗЦЫ ТЕМАТИЧЕСКИХ ТЕСТОВ

BUILDING MATERIALS
VARIANT I

I. Complete the missing forms:

	Adjective	**Noun**
1.		strength
2.	Elastic	
3.		brittleness
4.	Transparent	
5.		porosity

II. Insert the right words:

a) mechanical b) yield stress c) electrical d) creep e) magnetic

1. … properties indicate a material's response to a magnetic field.
2. … is a measure of material's resistance to gradual deformation under a constant force.
3. … properties refer to material's ability to conduct electric current.
4. … measures how much force per unit area must be exerted on a material for that material to permanently deform.
5. … properties are physical properties that a material exhibits upon the application of forces.

III. Match the synonyms:

1) characteristics 2) artificial 3) flexible 4) man-made 5) recyclable 6) reused 7) elastic 8) non-transparent 9) opaque 10) properties

IV. Give the terms to the definitions:

1. A rectangular block of hard material used for building walls and houses.
2. A very hard building material made by mixing together cement, sand, small sones, and water.
3. A strong metal that is a mixture of iron and carbon, used for making things that need a strong structure, especially vehicles and buildings.
4. A hard substance that forms the branches and trunks of trees and can be used as a building material, for making things, or as a fuel.
5. A hard, transparent material, used to make windows, and other objects.

BUILDING MATERIALS
VARIANT II

I. Complete the missing forms:

	Adjective	**Noun**
1.		stiffness
2.	Tough	
3.		durability
4.	Hard	
5.		flexibility

II. Insert the right words:

a) chemical b) stiffness c) strength d) thermal e) fatigue resistance

1. … properties are those properties of a material which is related to its conductivity of heat.
2. … measures the greatest force a material can withstand without breaking.
3. … properties include catalytic properties and resistance to corrosion.
4. … measures the resistance of a material to repeated applications and withdrawals of force.
5. … measures how much a material bends when first subjected to a mechanical force.

III. Match the synonyms:

1) building 2) brittle 3) workable 4) durable 5) construction 6) easy to work with 7) impermeable 8) long-lasting 9) waterproof 10) fragile

IV. Give the terms to the definitions:

1. A material made up of more than one substance that is used for building things.
2. The hard, solid substance found in the ground that is often used for building.
3. A mixture of sand, water, and cement or lime that is used to fix bricks or stones to each other when building walls.
4. A grey powder that is mixed with water and sand to make mortar or with water, sand, and small stones to make concrete.
5. A very hard, grey, pink, or black rock, used for building.

ELEMENTS OF A BUILDING
VARIANT I

I. Complete the missing forms:

	Noun	**Adjective**
1.	depth	
2.		long
3.		thick
4.	width	
5.		high

II. Match the antonyms:

1) flat 2) substructure 3) dynamic 4) slowly 5) movable
6) static 7) quickly 8) slope 9) superstructure 10) fixed

III. Insert the prepositions where necessary:

1) The first houses were built for the purpose … protecting their owners from the weather.
2) The buildings can be divided … stone (or brick), wood and concrete type.
3) Foundations carry … the dead … live loads.
4) … addition, walls are built to enclose areas and carry the weight of floors and roofs.
5) The construction of the floors in a building depends … the basic structural frame that is used.

IV. Match the terms with their definitions:

a) staircase b) door c) floor d) window f) roof

1) The covering that forms the top of a building, vehicle, or other object.
2) A level of a building.
3) A set of stairs inside a building, usually with a bar fixed on the wall or onto vertical poles at the side for you to hold on to.
4) A flat object that is used to close the entrance of something such as a room or building, or the entrance itself.
5) A space usually filled with glass in the wall of a building or in a vehicle, to allow light and air in and to allow people inside the building to see ou

ELEMENTS OF A BUILDING
VARIANT II

I. Complete the missing forms:

	Verb	**Noun**
1.		depth
2.	lengthen	
3.		strength
4.		width
5.	weigh	

II. Match the antonyms:

1) vertical 2) heavy 3) surface 4) deep 5) external
6) internal 7) horizontal 8) shallow 9) subsurface 10) light

III. Insert the prepositions where necessary:

1) These building components are classified … two categories: structural elements and non-structural elements.
2) … the substructure … the superstructure help to support the load of the building.
3) A roof basically consists … two components: a roof decking and a roof covering.
4) All doors are classified as … exterior … interior models.
5) Floors divide the building … stories.

IV. Match the terms with their definitions:

a) post b) column c) partition d) foundation f) wall

1) The structure below the surface of the ground that supports a building.
2) A vertical stick or pole stuck into the ground, usually to support something or show a position.
3) A vertical structure, often made of stone or brick, that divides or surrounds something.
4) A tall, vertical stone post, used as a support for a roof or in classical buildings for decoration, or standing alone as a monument.
5) A vertical structure like a thin wall that separates one part of a room or building from another

ОБРАЗЦЫ ТЕСТОВ ДЛЯ ИТОГОВОГО КОНТРОЛЯ

Final Lexical-Grammar Test (1 term)

Variant 1

PART 1

1. Skim the text “Formwork”.

Formwork is the term given to either temporary or permanent moulds into which concrete or similar materials are poured. In the context of concrete construction, the falsework supports the shuttering moulds.

Formwork comes in three main types. Traditional timber formwork is built on site out of timber and plywood or moisture-resistant particle board. It is easy to produce but time consuming for larger structures, and the plywood facing has a relatively short lifespan. It is still used extensively where the labour costs are lower than the costs for procuring reusable formwork. It is also the most flexible type of formwork, so even where other systems are in use, complicated sections may use it.

Engineered formwork systems are built out of prefabricated modules with a metal frame (usually steel) and covered on the application (concrete) side with material having the wanted surface structure (steel, timber, etc.). The two major advantages of formwork systems, compared to traditional timber formwork, are speed of construction (modular systems clip or screw together quickly) and lower life-cycle costs (barring major force, the frame is almost indestructible, while the covering may have to be replaced after a few - or a few dozen - uses, depending on the applications).

Special formwork is required to bring the concrete into a desired form. It must be firm, tight and smooth. Any formwork must be firm so as to stand the pressure of fresh concrete and, if necessary, the weight of workers and equipment, retaining its shape under this stress. The formwork to be used for any part must be tight so as to prevent the concrete from leaking out. Moreover, formwork must be smooth so that the concrete structure is given a smooth and plane surface, and to allow the forms to be conveniently removed when the concrete has hardened. Formwork should be easy to handle so that no time is wasted in order to assemble and disassemble it. When handled carefully, formwork may be used several times. Generally, shuttering boards and timber shuttering panels are used as materials for the forms. The formwork is to be supported because shuttering boards and panels alone cannot stand the pressure exerted by the concrete and because their length covers only part of the overall length of the formwork. The shuttering boards and panels are supported by means of square timber, wood planks, round timber, wire, and special metal structures.

The whole formwork is known to show high stability. The individual parts must be connected in such a way that they can be easily unfastened. Nails, bolts and cramp irons are used as joining elements. The formwork stability is improved by wedging so as to obtain certain tension in the formwork. Plain foundations, columns, walls, ceilings, beams and lintels are the building units which most commonly require formwork. The most important operations to erect the formwork are measuring and cutting the timber to required size as well as joining different formwork parts.

Formwork = shuttering= form – опалубка
Falsework – строительные леса, поддерживающие леса опалубки
Bar – препятствовать, исключать
Leak – протекать, вытекать
Cramp iron – штырь, крюк, железная скоба
Wedge – приваривать
Lintel – перемычка (окна или двери)

2. Decide whether the following statements are true or false according to the text.
1. Formwork must stand the pressure of fresh concrete but not the weight of workers.
2. Shuttering boards and panels alone can stand the concrete pressure.
3. Plain foundations commonly do not require formwork.
4. The falsework support the shuttering moulds.
5. There are 3 major advantages of formwork systems in comparison with traditional timber formwork.

3. Choose the contextual meaning.

1) overall	a) комбинезон	b) общий	c) предельный
2) tight	a) плотный	b) непроницаемый	c) тесный
3) stress	a) ударение	b) давление	c) напряжение
4) plane	a) самолёт	b) плоскость	c) ровный
5) handle	a) трогать руками	b) управлять	c) обращаться

4. Which sentence means exactly the same?
1) Any formwork must be firm so as to stand the pressure of fresh concrete and, if necessary, the weight of workers and equipment.
a) Каждая опалубка должна быть прочной, чтобы выдержать давление залитого бетона и, если необходимо, вес оборудования и рабочих.
b) Любая опалубка должна быть прочной, чтобы выдержать давление залитого бетона и, если необходимо, вес оборудования и рабочих.
c) Каждая опалубка должна быть прочной, чтобы выдержать давление свежего бетона и, если необходимо, вес оборудования и рабочих.

2) When handled carefully, formwork may be used several times.
a) Если с опалубкой обращаться аккуратно, её можно использовать долгое время.
b) Если с опалубкой обращаться аккуратно, её можно использовать несколько раз.
c) Когда опалубку аккуратно трогают, её можно использовать несколько раз.

3) The whole formwork is known to show high stability.
a) Вся опалубка, вероятно, отличается хорошей устойчивостью.
b) Известно, что вся опалубка отличается хорошей устойчивостью.
c) Вся опалубка вряд ли отличается хорошей устойчивостью.

PART 2

5. Grammar Recognition (miscellaneous): choose the correct variant.

Some of the earliest examples of concrete slabs 1) ….. by Roman engineers. As concrete 2) ….. tension or torsional stress, these early structures consisted of arches, vaults and domes. The most notable concrete structure from this period is the Pantheon in Rome. 3) ….. these structure, temporary scaffolding and formwork was built in the future shape of the structure. These 4) ….. techniques were not isolated to 5 ….. concrete, but were and are widely used in masonry.

1). a).are built b).built c).were built
2). a).cannot resist b).cannot to resist c).can resist
3). a).molding b).to mold c).to be molded
4). a).building b).built c).being built
5). a).pours b).pouring c).will pour

PART 3

6.Match the terms with their definitions.

1. retain a) a piece of wood or stone over a door or window, that forms part of the frame
2. site b)to put or squeeze something tightly into a narrow space, so that it cannot move easily
3. timber c). to continue to hold or contain something
4. wedge d). a place where a building was, is or will be situated
5. lintel e) wood that is prepared for use in building
6. smooth f) completely flat and even, without any lumps, holes or rough areas

7. Fill in the blanks using the words from the list below.

a)mosque,b) marble, c)strength, d)masterpieces,e) hotel,f) structure,g) concrete).

Located at the city of Agra, the Taj Mahal is one of the most beautiful 1) ….. of architecture in the world. The Mughal dynasty reached its highest 2) ….. and fame during the reign of their early Emperors. The architectural complex is comprised of 5 main elements: a main gateway, 3) … , a rest house and the Taj Mahal mausoleum. Most impressive are the black white chessboard 4) … floor, the four tall minarets at the corners of the 5) …, and the majestic dome … in the middle.

PART 4

8. Read the text. Choose the best summary.

Like concrete, brick and concrete masonry units are strong in compression and weak in tension. These materials have traditionally been used in walls, both bearing and nonbearing. Usually, wall thicknesses required by code specifications to prevent lateral (боковой) instability are such that the actual compressive stresses are low. Crushing is seldom an important design constraint.

Masonry walls are more permanent than wood walls and provide effective barriers to both fire and noise. They are less expensive and often more attractive than formed concrete walls. Brick generally has more variation of pattern and texture than does concrete block, but is also more expensive.

It is becoming increasingly common to use reinforced concrete block for retaining walls and structural pilasters. In this construction, individual reinforcing bars are grouted (цементировать) in some of the vertically aligned cells of the concrete units and serve as tensile reinforcement. This greatly increases the lateral load capacity of the block. Reinforcing can also be placed in special channel-shaped blocks to serve as lintels and tie beams. Brick can be reinforced by using two withes (перегородка) to create a cavity (полость) for grout and reinforcing bars. The brick not only serves as formwork but also carries compressive forces under load.

a). The advantages of masonry walls over formed concrete walls are presented.
b) The functions and properties of brick and concrete masonry units are considered.
c). The increasing popularity of brick and concrete masonry units is paid special attention to.

9. Put the jumbled sentences in the right order.
a). Periodically, he submits (предоставить) his bills (счет) to the client.
b). The contactor submits his tender.
c). Subsequently, the completes the building.
d) During the defects liability (ответственность) period the contractor corrects any defects in the building.
e). If his tender is approved, he sings a contract with the client and starts work on the building.

Keys

Variant1

2)	3)	4)	5)	6)	7)	8)	9)
1.F 2.F 3.F 4.T 5.F	1.b 2.b 3.b 4.c 5.c	1.b 2.b 3.b	1.c 2.a 3.b 4.a 5.b	1.c 2.d 3.e 4.b 5.a 6.f	1.d 2.c 3.a 4.b 5.f	b	1.b 2.e 3.a 4.c 5.d

Final Lexical-Grammar Test (2 term)

Variant 1

1. Skim the text.

Burj Dubai History Has Now Risen

Dubai announced Burj Dubai to the world with the claim, ‘History Rising’. Six years on and history has most certainly ‘risen’.

The tower is the focal point of the 500-acre master planned community Downtown Burj Dubai, which is widely described as the most prestigious square kilometer on earth. It is the development’s crowing glory in every sense, a building that has pushed the boundaries of design and engineering further than many thought possible.

Standing at more than 800 m, Burj Dubai captivates audiences with its height. But its construction underground is equally worthy of fascination. More than 45,000 m^3 of concrete, weighing more than 110,000 tonnes, make up the tower’s steel-reinforced foundations with 192 piles running to a depth of over 50 m.

Excavation work for the tower began soon after the announcement of its launch, with more than 60 contractors and consultants joining forces on a project of unprecedented scale and ambition.

Work on Burj Dubai’s superstructure began in March 2005, with the foundation work alone taking 12 months. The distinctive triple-buttressed outline of the Burj Dubai was inspired by the desert lily Hymenocallis.

Extensive seismic and wind tunnel testing was carried out to perfect the design of the tower. The triple-buttressed shape of Burj Dubai allows it to manage the effect of wind vortices generated around the tower, as well as changes in atmospheric pressure between its base and spire.

The main construction material of Burj Dubai is reinforced concrete, specially designed to withstand the staggering pressures inherent in the world’s tallest building. In total, Burj Dubai employs a record-breaking 330,000 $m^3$of concrete; 39,000 metric tonnes of reinforced steel; 103,000 sq m of double glazed glass; and 15,500 sq m of embossed stainless steel.

Once the lengthy construction work of its foundation was complete, the vertical ascent of Burj Dubai was surprisingly fast. The first 100 levels of the tower were completed only 1,093 days after excavation started. A level was added every three days before the uppermost levels of the tower were reached.

In November 2007, the concrete for the highest reinforced core walls of Burj Dubai was pumped from ground level to a height of 601 m, breaking the previous record for concrete pumping held by Taipei 101.

Work on the glass and aluminium exterior cladding of Burj Dubai started in May 2007 and was completed in September 2009. At the outset, around 20-30 cladding panels were installed each day. The daily rate of installation reached 175 panels as the project neared completion.

A staggering total of 24,348 panels cover a curtain wall area of 132,190 sq m. But the Burj Dubai’s shimmering exterior is designed to minimize heat transmission into the building itself, therefore saving energy. Condensation from the panels is also collected and used for landscape irrigation.

Burj Dubai's spire may resemble a needle at ground level, but in reality it is a colossal structure made up of 4,000 tonnes of structural steel. Nor is it exclusively ornamental, housing as it does communications equipment for the tower.

A total of 57 elevators and eight escalators serve people living, working and enjoying their leisure time inside the tower. Burj Dubai has four swimming pools, a cigar lounge, residents' lounge, the fine dining restaurant, and a variety of health and fitness facilities.

Visitors to the 'At The Top, Burj Dubai' 124th floor observation deck which offers 360-degree views of the city and is open to the public can read the 'I am Burj Dubai' legend evoking the tower's soul: "I am the power that lifts the world's head proudly skywards, surpassing limits and expectations. Rising gracefully from the desert and honouring the city with a new glory, I am an extraordinary union of engineering and art, with every detail carefully considered and beautifully crafted..." "I am the heart of the city and its people, the marker that defines Emaar's ambition and Dubai's shining dream. More than just a moment in time, I define moments for future generations…" From the ''From the earth to the sky'', one can view Level 124 and the summit of Burj Dubai at a near vertical angle.

II. Decide whether the following statements are true or false according to the text.

1) Downtown Burj Dubai is considered to be the most prestigious square kilometer on earth.
2) The triple-buttress outline of the Burj Dubai resembles the flower.
3) To improve the design of the tower seismic and wind tunnel testing was fulfilled.
4) Heat transmission into the building itself is minimized due to the Burj Dubai's shimmering exterior.
5) The Burj Dubai's spire is decorated and it houses communication equipment for the tower.

III. Choose the contextual meaning.

1)	scale –	a) шкала	b) масштаб	c) измерять масштаб
2)	record -	a) записывать	b) запись	c) рекорд
3)	outset -	a) вначале	b) многообразие	c) начинание
4)	cover –	a) покрытие	b) покрывать	c) защитный слой бетона
5)	generation -	a) производство	b) поколение	c) генерация, образование

IV. Which sentence means exactly the same?

1) More than 45,000 m^3 of concrete, weighing more than 110,000 tonnes, make up the tower's steel-reinforced foundations with 192 piles running to a depth of over 50 m.

a) Более 45000 $м^3$ бетона весом, превышающим 110000 тон, используется для армированного сталью фундамента с 192 сваями, уходящими на глубину свыше 50 м.

b) Более 45000 $м^3$ бетона весом, превышающим 110000 тон, использовалось для армированного сталью фундамента с 192 сваями, уходящими на глубину свыше 50 м.

c) Более 45000 м^3 бетона, который образует армированный фундамент со 192 сваями, весит свыше 110000 тон и уходит больше чем на 50 метровую глубину.

2) The triple-buttressed shape of Burj Dubai allows it to manage the effect of wind vortices generated around the tower, as well as changes in atmospheric pressure between its base and spire.

a) Тройная контрфорсная форма Бурж Дубай позволит противодействовать вихревым потокам, которые образуются вокруг башни, и изменениям атмосферного давления между основанием и шпилем.

b) Тройная контрфорсная форма Бурж Дубай позволяет зданию противостоять вихревым потокам, образующимся вокруг башни, а также изменениям в атмосферном давлении между основанием и шпилем.

c) Благодаря тройной контрфорсной форме Бурж Дубай может противостоять вихревым потокам, образующимся вокруг башни, также хорошо как и изменениям в атмосферном давлении между основанием и шпилем.

3) The daily rate of installation reached 175 panels as the project neared completion.

a) Только когда строительство проекта близилось к завершению, ежедневный коэффициент установки панелей достиг 175.

b) По мере завершения строительства объекта, ежедневно устанавливалось 175 панелей.

c) Когда проект приблизиться к завершению, ежедневно будут устанавливаться 175 панелей.

Part 2

V. Grammar: choose the correct variant.

A surprising fact about Petronas towers is 60% of material 1)_____ to construct them has been local. The whole concept of the towers 2)_____ on the classic architectural value. The interiors of the towers have been done up in the traditional Malaysian style. There are traditional motifs everywhere as 3)_____ as glass paintings which depict the culture.

The strange thing about the skyway is that it 4)_____ also be used as an evacuation mode 5)_____ case of an emergency. This skyway has been kept intact by a three round bearings which are 51 meters in length.

1)	A. used	B. to be used	C. using
2)	A. based	B. is based	C. to be based
3)	A. well	B. better	C. the best
4)	A. has to	B. should	C. can
5)	A. in	B. at	C. on

VI. Give the missing forms of the words below.

Verb	Noun
1) to expand	

2) to excavate	
3) to resist	
4) to deepen	
5) to install	
6) to restrict	

VII. Guess the terms to the following definitions.

1) walk-up *a) to remove the building from the site*
2) arcade *b) to make a break in a process*
3) block *c) a town house without elevators*
4) demolish *d) making explosion*
5) interrupt *e) a part between two streets of any town*
6) blasting *f) the room with arches as a ceiling*

VIII. Fill in the blanks using the words from the list below.

a) composed *c) demolishes* *e) cement* *g) concreters*
b) mix *d) varies* *f) stone*

Concrete floors are usually the work of the 1)_____, but the 2)_____ finish is often left to the plasterers. Concrete for floors 3)_____ according to position. For solid floors laid on the ground the mix may be 4)_____ of Portland cement 1 part, sand 1 part, aggregate 4 parts; for upper floors on pre-cast beams, terra-cotta tubes, or metal lathing a 1:2:4 5)_____ is common.

Part 3

IX. Read the following text and choose the best abstract.

Correct diagnosis is the first essential. Moisture can travel some distance through the interior of a wall before it appears inside. If the damp-proof course near the ground is sound, the dampness may penetrate in one of the following ways: directly through the wall; through gaps between window and door frames and wall jambs and heads, or under sills; downwards from exposed parapets and copings; downwards from leaky roofs. In the case of direct penetration, this may be due to the wall being exposed to rain-bearing gales. Even the best-quality solid brickwork in strong mortar may admit damp in this way. In old buildings the penetration may be due to decay of the walling, or possibly of the mortar joints only. In the latter case re-pointing with fairly strong mortar should cure the trouble. But it is a mistake to use a strong cement mortar. Such a mortar shrinks and opens fine cracks and fissures. A cement-lime mortar is best. If the walling is defective, cut out any old bricks or stones and replace with new.

a) The treatment of damp walls is considered.
b) Different ways of moisture penetration into a building are described.

c) Making moisture diagnosis as the essential thing during construction is dealt with.
d) The use of mortar to prevent moisture penetration is spoken about.

X. Put the jumbled sentences in the right order.

a) The columns are placed along the building line and are known as exterior or wall columns; they also occur at required intervals within the body of the building, in which case they are called interior columns.
b) Skeleton frame construction has been made possible by the development of structural steel and later of reinforced concrete.
c) The walls are consequently mere enclosures bearing no weight and are of the same thickness on all stories.
d) A framework is thereby formed, the walls being carried upon the wall girders at each storey level.
e) According to this method the loaded floor and roof beams rest upon girders running between the columns.

Keys

II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
1. F	1. b	1. c	1. a	1. expansion	1. c	1. g	C	b
2. T	2. c	2. b	2. b	2. excavation	2. f	2. e		e
3. T	3. a	3. b	3. a	3. resistance	3. e	3. d		a
4. T	4. b		4. c	4. depth	4. a	4. a		d
5. F	5. b		5. a	5. installation	5. b	5. b		c
				6. restriction	6. d			

ПРЕДМЕТНО-ТЕМАТИЧЕСКОЕ СОДЕРЖАНИЕ ЗАЧЁТА И ЭКЗАМЕНА

Темы к зачёту

1. Engineering.

2. Choosing civil engineering as a profession.

3. Studies: university is different to school

4. Jobs in Construction.

5. Building Materials: Classification and Properties.

6. Concrete: Composition, Kinds and Properties.

СПИСОК
вопросов для зачета

1. Engineering.
1. What is the origin of the word engineering?
2. What is the ancient definition of engineering?
3. What branches of engineering do you know?
4. What branches appeared first? Which branches appeared in the 20th century?
5. What is the modern definition of engineering?
6. What is the aim of civil engineering?
7. What does civil engineering deal with?
8. What engineer's duties can you think of? Which of them are the most important from your point of view?

2. Choosing civil engineering as a profession.
1. What is your intended major?
2. What disciplines shape your major?
3. What degree will you graduate with?
4. Why did you choose to apply to BNTU?
5. Why are you sure that you will receive enough knowledge and skills at BNTU?
6. Why do you aspire that academic activities give you rich experience by the time you graduate?
7. What types of lessons do students have to attend at BNTU?
8. What were your favorite subjects at school? What are they at BNTU?
9. Which is easier: studying at University or going to school?
10. What career ambitions do you have?
11. What are the most important skills for a civil engineer to succeed?

3. Studies: university is different to school
1. Who is responsible for a student's studies?
2. Are the teaching staff of your university always there to help you or do they keep distant?
3. Are attendance and participation up to your teaching and academic staff?

4. Will you get a four-year or five-year Bachelor of Engineering degree in civil engineering?
5. What degree will you graduate with?
6. What is your major?
7. What disciplines shape your major?
8. What are your minors?
9. What types of lessons do students have to attend at university?
10. What do a student's career options depend on?
11. How can each course of studies be assessed?
12. Which is easier: studying at University or going to school?

4. Jobs in Construction.

1. What segments is the construction industry divided into?
2. What are the general contractor's responsibilities
3. What is the difference between a general contractor and a specialty trade contractor?
4. What areas of the construction industry are construction trades workers employed in?
5. Who assist construction trades workers?
6. What are construction manager's duties?
7. Who is responsible for completing a project on schedule?

5. Building Materials: Classification and Properties.

1. What does the term material mean?
2. How many groups of structural materials are there? What are these groups?
3. How are main building materials used? Binding materials? Secondary materials?
4. Which is created through processing various natural substances: artificial or natural materials?
5. What are the main properties of timber/stone/metal? (positive/negative)
6. Are the properties of materials linked with their macrostructure or microstructure?
7. What do materials scientists study?
8. How many groups do materials scientists classify materials' properties?
9. Can you define major mechanical properties of materials?
10. Why is it important to study properties of materials?

6. Concrete: Composition, Kinds and Properties.

1. What are the basic components of concrete?
2. What are the main properties of concrete?
3. What kinds of concrete do you know?
4. Where is concrete used in construction?
4. How long does curing last? What is it?
5. What requirements for making concrete do you know?

Темы к экзамену

СПИСОК

тем экзаменационных для
по учебной дисциплине
«Иностранный язык (английский)»
1 курс (2 семестр)

для специальностей строительного факультета

7-07-0732-01 «Строительство зданий и сооружений»
профилизаций «Промышленное и гражданское строительство»,
«Производство строительных изделий и конструкций»,
6-05-0732-01 «Техническая эксплуатация зданий и сооружений»,
6-05-0732-02 «Экспертиза и управление недвижимостью»

1. Engineering
2. Choosing civil engineering as a profession
3. Building Materials: Classification and Properties
4. Concrete: Composition, Kinds and Properties
5. Jobs in Construction
6. Elements of a Building
7. Construction Methods
8. Sustainability in Construction

СПИСОК

экзаменационных вопросов
по учебной дисциплине
«Иностранный язык (английский)»
для специальности строительного факультета

7-07-0732-01 «Строительство зданий и сооружений»
профилизаций «Промышленное и гражданское строительство»,
«Производство строительных изделий и конструкций»,
6-05-0732-01 «Техническая эксплуатация зданий и сооружений»,
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1. What does the term material mean?
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9. Can you define major mechanical properties of materials?
10. Why is it important to study properties of materials?

Тема 4. Concrete: Composition, Kinds and Properties.

1. What are the basic components of concrete?
2. What are the main properties of concrete?
3. What kinds of concrete do you know?
4. Where is concrete used in construction?
4. How long does curing last? What is it?
5. What requirements for making concrete do you know?

Тема 5. Jobs in Construction.

1. What segments is the construction industry divided into?
2. What are the general contractor's responsibilities
3. What is the difference between a general contractor and a specialty trade contractor?

4. What areas of the construction industry are construction trades workers employed in?
5. Who assist construction trades workers?
6. What are construction manager's duties?
7. Who is responsible for completing a project on schedule?

Тема 6. Elements of a building

1) What components of a building are there?
2) A building has two main parts, doesn't it? What are they?
3) What foundations are shallow/deep?
4) What are structural/ non-structural elements?
5) What is the main function of a foundation?
6) Why is it important to define the type of ground below the future building?
7) What types of walls are there? What are their functions?
8) What are load-bearing members of a structure?
9) What parts does the floor consist of? What functions do they have?
10) What is the roof? What should be considered when choosing the type of a roof?
11) What does the choice of a staircase design depend on?
12) What materials are used for windows?
13) What types of loads may a building carry?

Тема 7. Construction methods

1) How are construction operations generally classified?
2) What are construction methods?
3) What do construction operations include? Do they differ when applied to different projects?
4) What procedures does preparation of the side include?
5) What operation is needed to develop full design strength of a concrete structure?
6) How may beams, columns and small trusses be joined together into steel sections?
7) What limits the size of preassembled steel units?
8) What is the purpose of concrete forming?
9) What do batch plants produce?
10) What equipment is used for placing concrete?
11) What machines are used for paving?
12) What is the difference between on-site and off-site construction?

Тема 8. Sustainability in construction

1) How does the construction industry affect the environment?
2) What makes construction firms reduce their environmental impact?
3) What does sustainable construction mean?
4) What is the primary goal of sustainable construction?
5) What should the design of a structure incorporate to reduce the environmental impact?
6) What challenges does a company face if it chooses sustainable construction methods?
7) Are there any benefits from adopting sustainability in construction? What are they?
8) Are sustainable eco-cities a utopia or a possible future?

9) What environmentally- friendly building materials do you know?
10) Are these materials applied in our country? How?
11) Will environmentally- friendly building materials replace traditional building materials? Why? Why not?

ВСПОМОГАТЕЛЬНЫЙ РАЗДЕЛ

УЧЕБНАЯ ПРОГРАММА БНТУ ПО УЧЕБНОЙ ДИСЦИПЛИНЕ «ИНОСТРАННЫЙ ЯЗЫК (АНГЛИЙСКИЙ)»

В ЭУМК представлены выдержки из учебной программы по учебной дисциплине «Иностранный язык (английский)» для специальностей 7-07-0732-01 «Строительство зданий и сооружений» (профилизации «Промышленное и гражданское строительство», «Производство строительных изделий и конструкций»), 6-05-0732-01 «Техническая эксплуатация зданий и сооружений» (профилизация «Эксплуатация объектов жилищно-коммунального хозяйства»), 6-05-0732-02 «Экспертиза и управление недвижимостью.

Белорусский национальный технический университет

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ИНОСТРАННЫЙ ЯЗЫК
(английский)

Учебная программа учреждения высшего образования
по учебной дисциплине для специальностей
7-07-0732-01 «Строительство зданий и сооружений»
профилизаций «Промышленное и гражданское строительство»,
«Производство строительных изделий и конструкций»,
6-05-0732-01 «Техническая эксплуатация зданий и сооружений»,
6-05-0732-02 «Экспертиза и управление недвижимостью»

Минск 2023 г.

Учебная программа составлена на основе образовательных стандартов ОСВО 7-07-0732-01-2023, ОСВО 6-05-0732-01-2023, ОСВО 6-05-0732-02-2023 и учебных планов специальностей 7-07-0732-01 «Строительство зданий и сооружений» (рег.№ СФ69д-1/уч утв. 31.03.2023, рег.№ СФ69з-1/уч утв. 03.04.2023, рег.№ СФ69зн-1/уч утв. 03.04.2023, рег.№ СФ67д-2/уч утв. 31.03.2023, рег.№ СФ67з-2/уч утв. 03.04.2023); 6-05-0732-01 «Техническая эксплуатация зданий и сооружений» (рег.№ СФ69д-1/уч утв. 31.03.2023), 6-05-0732-02 «Экспертиза и управление недвижимостью» (рег.№ СФ71д-1/уч утв. 31.03.2023, рег.№ СФ71з-1/уч утв. 03.04.2023).

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(протокол №____ от _____ 2023 г.)

И. о. заведующего кафедрой _____ О.Ю. Муха

Методической комиссией строительного факультета Белорусского национального технического университета

(протокол №____ от _____ 2023 г.)

Председатель методической _____ С.Н. Ковшар

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Научной библиотекой БНТУ _____
Т.И. Бирюкова

Научно-методическим советом Белорусского национального технического университета (протокол №____ секции №1 от _____ 2023 г.)

ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Учебная программа по учебной дисциплине «Иностранный язык (английский)» разработана для специальностей 7-07-0732-01 «Строительство зданий и сооружений» (профилизации *«Промышленное и гражданское строительство», «Производство строительных изделий и конструкций»*), 6-05-0732-01 «Техническая эксплуатация зданий и сооружений», 6-05-0732-02 «Экспертиза и управление недвижимостью».

Целью изучения дисциплины является формирование иноязычной коммуникативной компетенции будущего специалиста, позволяющей использовать иностранный язык как средство профессионального и межличностного общения.

В процессе достижения главной цели решаются следующие задачи:

- *познавательные*, позволяющие сформировать представление об образе мира как целостной многоуровневой системе (этнической, языковой, социокультурной и т.п.); об уровне материальной и духовной культуры; системе ценностей (религиозно-философских, эстетических и нравственных); особенностях профессиональной деятельности в изучаемых странах;
- *развивающие*, позволяющие совершенствовать речемыслительные и коммуникативные способности, память, внимание, воображение, формирование потребности к самостоятельной познавательной деятельности и т.д.;
- *воспитательные*, связанные с формированием общечеловеческих, общенациональных и личностных ценностей, таких как: гуманистическое мировоззрение, уважение к другим культурам, патриотизм, нравственность, культура общения;
- *практические*, предполагающие овладение иноязычным общением в единстве всех его компетенций (языковой, речевой, социокультурной, компенсаторной, учебно-познавательной), функций (этикетной, познавательной, регулятивной, ценностно-ориентационной) и форм (устной и письменной), что осуществляется посредством взаимосвязанного обучения всем видам речевой деятельности в рамках определенного программой предметно-тематического содержания, а также овладения технологиями языкового самообразования.

Учебная дисциплина базируется на знаниях курса средней общеобразовательной школы и связана с «Обзорными лекциями по специальности». Знания и умения, полученные студентами при изучении данной дисциплины, позволяют осуществлять коммуникацию на английском языке в различных ситуациях профессиональных и деловых взаимоотношений, а также выполнять реферирование, аннотирование и перевод профессионально значимых англоязычных текстов и научных работ.

В результате изучения учебной дисциплины «Иностранный язык (английский)» студент должен:

знать:

- систему иностранного языка в его фонетическом, лексическом и грамматическом аспектах;

- социокультурные нормы бытового и делового общения в современном поликультурном мире;
- историю и культуру страны изучаемого языка;
- основные формы культурной коммуникации;

уметь:

- вести общение профессионального и социокультурного характера на иностранном языке, сочетая диалогические и монологические формы речи;
- читать литературу на иностранном языке по профилю обучения (изучающее, ознакомительное, просмотровое и поисковое чтение);
- использовать иностранный язык в качестве инструмента профессиональной деятельности: перевод, реферирование и аннотирование профессионально ориентированных и научных текстов, выступление с публичной речью, составление деловой документации;
- использовать стилистические нормы иностранного языка в соответствии с ситуацией профессиональных или деловых взаимоотношений;

иметь навык:

- владения системой иностранного языка в его фонетическом, лексическом и грамматическом аспектах;
- владения правилами речевого этикета;
- владения рациональным и эффективным языковым поведением в ситуациях межкультурной коммуникации.

Освоение данной учебной дисциплины обеспечивает формирование следующей компетенции:

УК-3. Осуществлять коммуникации на иностранном языке в академической, научной и профессиональной среде для реализации научно-исследовательской и инновационной деятельности.

Согласно учебным планам специальности *7-07-0732-01* «Строительство зданий и сооружений» профилизации *«Промышленное и гражданское строительство»,* на изучение учебной дисциплины отведено:

- для очной (дневной) формы получения высшего образования всего 200 часов, из них аудиторных – 100 часов;
- для заочной формы получения высшего образования всего 200 часов, из них аудиторных – 26 часов.
- для заочной формы получения высшего образования, интегрированного со средним специальным образованием, всего 200 часов, из них аудиторных – 24 часа.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено в таблицах 1, 2, 3.

Таблица 1.

Очная (дневная) форма получения высшего образования						
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации	Форма промежуточной аттестации
1	1			50	тест	зачёт
1	2			50	тест	экзамен

Таблица 2.

Заочная форма получения высшего образования						
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации	Форма промежуточной аттестации
1	2	2		12	тест	зачёт
1	3			12	тест	экзамен

Таблица 3.

Заочная форма получения высшего образования						
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации	Форма промежуточной аттестации
1	1	2		10	тест	зачёт
1	2			12	тест	экзамен

Согласно учебным планам специальности 7-07-0732-01 «Строительство зданий и сооружений» профилизации *«Производство строительных изделий и конструкций»* на изучение учебной дисциплины отведено:

- для очной (дневной) формы получения высшего образования всего 200 часов, из них аудиторных – 100 часов;

- для заочной формы получения высшего образования всего 200 часов, из них аудиторных – 20 часов.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено в таблице 4 и таблице 5.

Таблица 4.

Очная (дневная) форма получения высшего образования						
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации	Форма промежуточной аттестации
1	1			50	тест	зачёт
1	2			50	тест	экзамен

Таблица 5.

Заочная форма получения высшего образования						
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации	Форма промежуточной аттестации
1	1			10	тест	зачёт
1	2			10	тест	экзамен

Согласно учебному плану специальности 6-05-0732-01 «Техническая эксплуатация зданий и сооружений» для очной (дневной) формы получения высшего образования на изучение учебной дисциплины отведено всего 200 часов, из них аудиторных – 100 часов.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено в таблице 6.

Таблица 6.

Очная (дневная) форма получения высшего образования						
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации	Форма промежуточной аттестации
1	1			50	тест	зачёт
1	2			50	тест	экзамен

Согласно учебным планам специальности 6-05-0732-02 «Экспертиза и управление недвижимостью» на изучение учебной дисциплины отведено:

- для очной (дневной) формы получения высшего образования всего 220 часов, из них аудиторных – 100 часов;
- для заочной формы получения высшего образования всего 220 часов, из них аудиторных – 16 часов.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено в таблице 7 и таблице 8.

Таблица 7.

Очная (дневная) форма получения высшего образования						
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации	Форма промежуточной аттестации
1	1			50	тест	зачёт
1	2			50	тест	экзамен

Таблица 8.

Заочная форма получения высшего образования						
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации	Форма промежуточной аттестации
1	1	4		6	тест	диф.зачёт
1	2			6	тест	диф.зачёт

СОДЕРЖАНИЕ УЧЕБНОГО МАТЕРИАЛА

Раздел I. ЯЗЫКОВОЙ МОДУЛЬ

Тема 1.1. Фонетика

Звуковой строй иноязычной речи в сопоставлении с фонетической системой родного языка: особенности произнесения отдельных звуков (гласных, согласных), звукосочетаний, слов и фраз; расхождение между произношением и написанием; фонетическая транскрипция. Интонационное оформление фраз различного коммуникативного типа: повествования, вопроса, просьбы, приказа, восклицания. Фразовое и логическое ударение в сложном предложении.

Тема 1.2. Словообразование

Словообразовательные модели (существительное, прилагательное, наречие, глагол).

Тема 1.3. Имя существительное

Категории числа, падежа, определённости.

Тема 1.4. Имя прилагательное

Категория степеней сравнения. Сравнительные конструкции.

Тема 1.5. Местоимение

Типы местоимений (личные, притяжательные, указательные, вопросительные, неопределённые, возвратные).

Тема 1.6. Числительное

Типы числительных (простые, производные, сложные; количественные порядковые; дробные).

Тема 1.7. Наречие

Типы наречий. Категория степеней сравнения.

Тема 1.8. Глагол

Видо-временная система (действительный, страдательный залог). Модальные глаголы и их эквиваленты. Согласование времён.

Тема 1.9. Неличные формы глагола

Инфинитив. Причастие. Герундий. Конструкции с неличными формами глагола.

Тема 1.10. Служебные слова

Предлоги. Союзы. Союзные слова.

Тема 1.11. Простое предложение

Типы простых предложений; порядок слов. Члены предложения: способы выражения, правила согласования подлежащего и сказуемого. Специфические конструкции и обороты.

Тема 1.12. Сложное предложение

Типы сложного предложения (сложносочинённое и сложноподчинённое). Бессоюзное подчинение. Типы придаточных предложений. Условные предложения.

Тема 1.13. Прямая и косвенная речь

Правила перевода в косвенную речь предложений разных типов.

Тема 1.14. Профессиональная лексика

Наиболее употребительные слова и словосочетания по предметно-тематическому содержанию курса. Сочетаемость слов; свободные и устойчивые словосочетания. Общенаучная лексика и терминология.

Тема 1.15. Разговорные клише

Знакомство. Установление, поддержание контакта. Выражение просьбы. Выражение согласия, несогласия с мнением автора (собеседника). Начало, продолжение, завершение беседы. Выражение собственного мнения. Запрос о мнении собеседника. Уверенность, неуверенность.

Раздел II. МОДУЛЬ СОЦИАЛЬНОГО ОБЩЕНИЯ

Тема 2.1. Социально-бытовое общение

Личностные характеристики (биографические сведения, работа, хобби и т.д.).

Тема 2.2. Роль иностранного языка в профессиональном общении

Роль иностранного языка в профессиональной деятельности инженера. Роль международного сотрудничества в профессиональной деятельности.

Тема 2.3. Современные технологии и окружающая среда

Экологическая культура. Технический прогресс и глобальные проблемы человечества. Пути решения проблем защиты окружающей среды с точки зрения инженера. Экологические проблемы Беларуси, Великобритании и США в сопоставлении.

Раздел III. МОДУЛЬ ПРОФЕССИОНАЛЬНОГО ОБЩЕНИЯ

Тема 3.1. Учебно-профессиональное общение

Вклад белорусов в мировую науку и технику. Организация инженерного образования в Республике Беларусь и странах изучаемого языка: США и Великобритании. Обучение в университете. БНТУ.

Тема 3.2. Профессиональное общение

Предмет и содержание специальности. Общее представление о структуре и характере профессиональной деятельности. Избранная специальность как отрасль инженерии.

Тема. 3.3. Обмен научно-технической информацией

Обмен научно-технической информацией (на выставке, конференции). Электронная презентация. Постерная презентация.

Тема 3.4. Аннотирование статьи по специальности

Составные части аннотации на иностранном языке. Клишированные фразы для написания аннотации.

Тема 3.5. Реферирование статьи по специальности

Основные части реферата на иностранном языке. Клишированные фразы для написания реферата.

Тема 3.6. Производственное общение

Типичные ситуации производственного общения. Социокультурные нормы делового общения. Профессиональная этика.

УЧЕБНО-МЕТОДИЧЕСКАЯ КАРТА УЧЕБНОЙ ДИСЦИПЛИНЫ

очная (дневная) форма получения высшего образования

Номер раздела, темы	Название раздела, темы, занятия	Количество аудиторных часов			Количество часов СР	Форма контроля знаний
		Лекции	Практические занятия	Лабораторные занятия		
1	2	3	4	5	6	7
	1 семестр					
1.	Языковой модуль					тест
1.1.	Практическое занятие №1. Фонетика		2			опрос
1.2	Практическое занятие №2. Словообразование		2			опрос
1.3	Практическое занятие №3. Имя существительное		2			опрос
1.4	Практическое занятие №4. Имя прилагательное		2			опрос
1.5	Практическое занятие №5. Местоимение		2			опрос
1.6	Практическое занятие №6. Числительные		2			опрос
1.7	Практическое занятие №7. Наречие		2			опрос
1.8	Практическое занятие №8. Глагол		6			опрос
1.9	Практическое занятие №9. Неличные формы глагола		8			опрос
1.10	Практическое занятие №10. Служебные слова		2			опрос
1.11	Практическое занятие №11. Простое предложение		2			опрос
1.1	Практическое занятие №12. Сложное предложение		4			опрос

2						
1.13	Практическое занятие №13. Прямая и косвенная речь		2			опрос
1.14	Практическое занятие №14. Профессиональная лексика		10			опрос
1.15	Практическое занятие №15. Разговорные клише		2			опрос
	Итого за семестр		50			зачёт
	2 семестр					
2.	Модуль социального общения					тест
2.1	Практическое занятие №1. Социально-бытовое общение		2			опрос
2.2	Практическое занятие №2. Роль иностранного языка в профессиональном общении		2			опрос
2.3	Практическое занятие №3. Современные технологии и окружающая среда		6			опрос
3.	Модуль профессионального общения					опрос
3.1	Практическое занятие №4. Учебно-профессиональное общение		6			опрос
3.2	Практическое занятие №5. Профессиональное общение		10			опрос
3.3	Практическое занятие №6. Обмен научно-технической информацией		6			опрос
3.4	Практическое занятие №7. Аннотирование статьи по специальности		6			опрос
3.5	Практическое занятие №8. Реферирование статьи по специальности		6			опрос
3.6	Практическое занятие №9. Производственное общение		6			опрос
	Итого за семестр		50			экзамен
	Всего аудиторных часов		100			

ИНФОРМАЦИОННО-МЕТОДИЧЕСКАЯ ЧАСТЬ

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Средства диагностики результатов учебной деятельности

Оценка уровня знаний студента производится по десятибалльной шкале в соответствии с критериями, утвержденными Министерством образования Республики Беларусь.

Для оценки достижений студента рекомендуется использовать следующий диагностический инструментарий:

– устный и письменный опрос во время практических занятий;

– тест;

– защита заданий, выполненных в рамках управляемой самостоятельной работы;

– зачёт;

– экзамен.

Требования к обучающемуся при прохождении текущей аттестации

Проверка знаний и умений осуществляется в форме текущего, промежуточного и итогового контроля. *Текущий контроль* предусмотрен программой и осуществляется на аудиторных занятиях с целью проверки уровня владения пройденной частью языкового и речевого материала и степени сформированности коммуникативных навыков и умений. Текущий контроль осуществляется в форме комплексных заданий, лексико-грамматических тестов, коллоквиумов, собеседований.

Промежуточный контроль проводится в конце прохождения каждой темы в виде лексико-грамматических тестов и самостоятельной работы по текстам по специальности.

Итоговый контроль носит комплексный характер и проводится в двух формах: зачёта и экзамена.

Оценка учебных достижений студентов на экзаменах по дисциплине «Иностранный язык (английский)» производится по десятибалльной шкале. Для оценки учебных достижений студентов используются критерии, утвержденные Министерством образования Республики Беларусь.

ЗАЧЁТ по дисциплине «Иностранный язык (английский)» основывается на результатах текущего и промежуточного контроля и направлен, с одной стороны, на проверку умения работы с текстом, а с другой стороны, – на проверку коммуникативных навыков и умений, приобретенных студентами на соответствующем этапе обучения.

Требования к зачёту:

Письменная часть

1. Лексико-грамматический тест.

2. Чтение и письменный перевод оригинального общенаучного или общетехнического текста с иностранного языка на родной со словарем. Объём – 1000 печатных знаков. Время выполнения – 45 мин.

Устная часть

1. Подготовленное высказывание по заданной ситуации (10-12 предложений) и неподготовленная беседа с преподавателем в рамках данной ситуации (6-7 реплик).

2. Реферирование оригинального или частично адаптированного культурологического или научно-популярного текста на иностранном языке; беседа на иностранном языке по содержанию текста. Объём текста – 700 печатных знаков. Время выполнения – 10 мин.

ЭКЗАМЕН включает следующие задания:

Письменная часть

1. Лексико-грамматический тест.

2. Чтение и письменный перевод оригинального профессионально ориентированного текста с иностранного языка на родной со словарем. Объем – 1300-1500 печатных знаков. Время – 45 мин.

Устная часть

1. Подготовленное высказывание по заданной ситуации и неподготовленная беседа с преподавателем в рамках данной ситуации (по предметно-тематическому содержанию дисциплины).

2. Реферирование аутентичного или частично адаптированного общественно-политического, культурологического, научно-популярного текста; беседа на иностранном языке по содержанию текста. Объём текста – 900 печатных знаков. Время – 5-7 мин.

Перечень контрольных вопросов и заданий для самостоятельной работы студентов

Выполнение тестовых заданий по темам:

1. Словообразовательные модели
2. Имя существительное
3. Имя прилагательное
4. Типы местоимений
5. Типы числительных
6. Типы наречий
7. Глагол: действительный, залог
8. Глагол: страдательный залог
9. Модальные глаголы и их эквиваленты
10. Согласование времён
11. Инфинитив
12. Причастие
13. Герундий
14. Конструкции с неличными формами глагола
15. Служебные слова
16. Типы простых предложений; порядок слов
17. Члены предложения: способы выражения, правила согласования подлежащего и сказуемого
18. Типы придаточных предложений
19. Условные предложения

20.Прямая и косвенная речь

Подготовка сообщений по темам:

1. Моя учёба в БНТУ
2. Что такое гражданское строительство?
3. Профессия инженера-строителя

Подготовка постерной презентации по темам:

1. Выдающиеся инженеры мира
2. Выдающиеся инженеры Беларуси
3. Известные выпускники БНТУ

Подготовка электронной презентации по темам:

1. Инновации в строительстве
2. Инновационные строительные материалы
3. Инновационные строительные технологии
4. История строительства зданий и сооружений
5. Строительные технологии
6. Уникальные здания мира и Беларуси
7. Уникальные сооружения мира и Беларуси
8. Экологические и энергоэффективные методы строительства

Методические рекомендации по организации и выполнению самостоятельной работы студентов

При изучении дисциплины рекомендуется использовать следующие формы самостоятельной работы:

– подготовка сообщений, тематических докладов, презентаций по заданным темам;

– проработка тем (вопросов), вынесенных на самостоятельное изучение.