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СИБИРСКОГО
ФЕДЕРАЛЬНОГО
УНИВЕРСИТЕТА

**ПРОФЕССИОНАЛЬНЫЙ
АНГЛИЙСКИЙ ЯЗЫК
ДЛЯ СПЕЦИАЛИСТОВ
ГОРНОГО ДЕЛА, ГЕОЛОГИИ
И ГЕОЛОГОРАЗВЕДКИ**

Министерство науки и высшего образования Российской Федерации
Сибирский федеральный университет

ПРОФЕССИОНАЛЬНЫЙ АНГЛИЙСКИЙ ЯЗЫК ДЛЯ СПЕЦИАЛИСТОВ ГОРНОГО ДЕЛА, ГЕОЛОГИИ И ГЕОЛОГОРАЗВЕДКИ

Допущено учебно-методическим советом Сибирского федерального университета в качестве учебника для студентов, обучающихся по специальностям 21.05.02 «Прикладная геология», 21.05.04 «Горное дело», 21.05.03 «Технология геологической разведки», протокол № 1 от 24 января 2022 года

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ВВЕДЕНИЕ

Настоящий учебник является основным учебным материалом, предназначенным для аудиторной и самостоятельной работы учащихся вторых курсов (очного и заочного отделений) Института горного дела, геологии и геотехнологий и Института нефти и газа Сибирского федерального университета, направлений специалитета: 21.05.02 «Прикладная геология», 21.05.04 «Горное дело» и 21.05.03 «Технология геологической разведки», специализаций 21.05.03.01 «Геофизические методы поисков и разведки месторождений полезных ископаемых» и 21.05.03.03 «Технология и техника разведки месторождений полезных ископаемых».

По учебным целям и содержанию учебник соответствует требованиям Федерального государственного образовательного стандарта высшего образования и рабочей программе дисциплины «Иностранный язык» в части «Модуль 3. Профессиональная сфера коммуникации» (4-й семестр).

Учебник направлен на формирование у выпускников программ специалитета универсальной компетенции (УК-4), а именно способности применять современные коммуникативные технологии, в том числе и на иностранном языке, для академического и профессионального взаимодействия.

В основу учебника положены принципы обучения, направленные на развитие интегративных умений использования диалогического общения для сотрудничества в академической коммуникации: слушать и пытаться понять суть идей других, даже если они противоречат собственным воззрениям; уважать высказывания других как в плане содержания, так и в плане формы; критиковать аргументировано и конструктивно, не задевая чувств других; адаптировать речь и язык жестов к ситуациям взаимодействия.

Цель учебника – расширение и закрепление навыков и умений ознакомительного, поискового и аналитического чтения, а также обучение студентов основам перевода литературы по тематике, близкой к их будущей специальности для извлечения и обработки информации из оригинальных источников. Подобранный тестовый материал служит основой для развития иноязычной профессиональной коммуникативной компетенции, позволяет конструировать высказывания монологического и диалогического характера по актуальным вопросам общетехнической и специальной направленности.

Учебник состоит из четырех разделов (Units): Introduction to Geology, the Earth's Crust and Useful Minerals, Sources of Energy, Prospecting and Exploration. Каждый из разделов включает по 3–4 темы, содержательное наполнение которых соответствует центральной тематике раздела и вводится планом изучения темы (Learning Objectives).

Материал учебника подобран из современной зарубежной научно-технической и научно-популярной литературы, а также аутентичных видео- и аудиозапи-

сей и снабжен гиперссылками для возможности более детального знакомства студентов с интересующими их темами.

Представленные в учебнике ссылки на видео- и аудиоресурсы по темам разделов и разработанные к ним задания помогают развитию у студентов умений применять современные коммуникативные технологии для будущего взаимодействия в профессиональной сфере; способности самостоятельно находить, оценивать и использовать необходимую информацию из различных источников, представлять ее в корректной письменной и устной форме.

Каждый основной раздел темы открывается словарем терминов с транскрипцией и переводом, за которыми следует основной учебный текст. В целях формирования иноязычной компетенции система послетекстовых заданий для каждой темы включает в себя комплекс упражнений, предусматривающих овладение всеми видами коммуникативной деятельности – чтением, говорением, аудированием, письмом, переводом, освоением профессионального словаря. Авторы также включили в темы блок упражнений, направленных на тренировку и закрепление наиболее типичных для профессиональной и академической сферы грамматических и лексических конструкций, а также словообразовательных паттернов, способствующих развитию коммуникативной компетенции и активизации речевых навыков. Все темы снабжены необходимым теоретическим минимумом, опорными фразами, примерами употребления грамматических структур и лексических конструкций с использованием новой общетехнической и общенаучной лексики, а также ее переводом на русский язык.

Кроме того, темы разделов содержат иллюстративный материал и творческие задания коммуникативного характера: участие в беседе на профессиональную тематику, дискуссии, мини-конференции, интервью.

Учебник содержит приложения по грамматическому материалу (Grammar Bank) со схемами, таблицами, примерами и объяснениями грамматических правил, глоссарий с эквивалентным русским переводом лексических единиц для каждого юнита (Glossary), планы разговорных тем (Speaking Topics), предусмотренных для итоговой аттестации по разделу, рекомендации и практикум для самостоятельной работы по внеаудиторному чтению профессиональной направленности (Home Reading Recommendations), рекомендации и практикум по презентациям (Tips for Effective Presentations).

Учебник может быть использован преподавателями и студентами технических вузов горно-геологических и геофизических направлений подготовки.

UNIT 1

INTRODUCTION TO GEOLOGY (CAREER, SKILLS, GENERAL RESPONSIBILITIES)

UNIT 1A. MINING

Learning objectives

In this unit you will:

- ▶ acquire the vocabulary connected to mining operations and methodology;
- ▶ listen about the most popular mining jobs;
- ▶ study and practice patterns IN ORDER TO and SO THAT to explain purpose;
- ▶ learn how to talk about skills and responsibilities of a miner;
- ▶ review basic grammar tenses.

Reading

Before you read:

Exercise 1. Practice to pronounce of the following words and word combinations correctly:

| | | |
|-----------|--------------|-----------------------|
| Extract | [ɪk'strækt] | Извлекать |
| Mine | [maɪn] | Добывать |
| Designate | ['deɪzɪneɪt] | Обозначать |
| Occur | [ə'kɜːr] | Возникать, появляться |

| | | |
|---------------------|-----------------------------|-------------------------|
| Surface | ['sɜːfɪs] | Поверхность |
| Inorganic substance | [,ɪnɔː'gæɪnɪk] ['slɒbstəns] | Неорганическое вещество |

| | | |
|----------------------|-------------------------------|------------------------|
| Organic substance | [,mɔ:'gænik] ['sʌbstəns] | Органическое вещество |
| Chemical composition | ['kemikəl,] [kɒmpə'ziʃən] | Химический состав |
| Distinctive property | [di'stɪŋktɪv] ['prɒpəti] | Отличительное свойство |
| Molecular structure | [mə'lek.jə.lər] ['strʌk.tʃər] | Молекулярная структура |
| Exploration | [,eksplə'reɪʃn] | Разведка |

| | | |
|------------------------|----------------------------|------------------------|
| Deposit | [di'pɒz.ɪt] | Месторождение |
| Coal | [kəʊl] | Уголь |
| Ore | [ɔ:r] | Руда |
| Metalliferous minerals | [,metə'lifərəs] ['mɪnərəl] | Рудоносные минералы |
| Gangue | [gɑŋ] | Жильная, пустая порода |
| Aggregated rock | ['ægrɪgeɪtɪd] [rɒk] | Раздробленная порода |
| Associated rock | [ə'səʊʃieɪtɪd] [rɒk] | Сопутствующая порода |

Exercise 2. Read the text.

Mining is the process of extracting useful minerals from the surface of the Earth, including the seas and oceans. A mineral, with a few exceptions, is an inorganic substance occurring in nature that has a definite chemical composition and distinctive physical properties or molecular structure. One organic substance, coal, is often discussed as a mineral as well. Ore is a metalliferous mineral, or an aggregate of metalliferous minerals and gangue (associated rock of no economic value), that can be mined at a profit. Mineral deposit designates a natural occurrence of a useful mineral, while ore deposit denotes a mineral deposit of sufficient extent and concentration to invite exploitation.

(abridged from: <https://www.britannica.com/technology/mining/Prospecting-and-exploration>)

Exercise 3. Decide if the following statements are true or false. Correct the false ones.

1. Mining also includes extraction of minerals at a seafloor.
2. A deposit is a place where minerals are extracted.
3. Coal is inorganic substance.
4. Ore is gangue or associated rock of no economic value.
5. According to the text there are three types of menials: metalliferous minerals, an aggregate of metalliferous minerals and gangue.
6. Exploration could be only invited when a deposit is denoted as an ore deposit.

Vocabulary

Exercise 4. Match the words and their definitions.

1. The process or industry of extracting coal or other minerals from a mine.
2. A naturally occurring solid material from which a metal or valuable mineral can be extracted profitably.
3. (of chemical substances) being or coming from living plants and animals.
4. A combustible black or dark brown rock consisting of carbonized plant matter, found mainly in underground seams and used as fuel.
5. A layer that has formed under the ground, especially over a long period.
6. To take something out.
7. (of chemical substances) containing no carbon or only small amounts of carbon.

- a) Inorganic substance
- b) Ore
- c) Coal
- d) Organic substance
- e) Deposit
- f) To extract
- g) Mining

NB!:

combustible – горячий

consist of – состоять из

underground seams – подземные пласты

fuel – топливо

(abridged from: <https://www.lexico.com/en/definition/>)

Speaking

Exercise 5. Read a short extract taken from the website page of Siberian Federal University and answer the following questions:

1. What School do you study at?
2. What is your field of study?
3. What is your major?
4. What types of workers does your School prepare?
5. What are the companies you'll be able to work at after graduating from the university?
6. What are the usual activities for people in mining industry?

“Main fields of study and majors of our School are connected to applied geology, mining engineering and technology of geological exploration. School of Mining, Geology and Geotechnology prepares engineers and research and teaching staff for

companies working in geological exploration or mining and smelting which deal with a wide range of activities from survey and exploration to mining and processing of mineral resources”.

(abridged from: <http://www.sfu-kras.ru/en/about/igd>)

Listening

Exercise 6. Watch the video about mining career opportunities at Unskilled & Entry Level Mining Jobs and answer the about career opportunities in mining industry in Australia.

1. What are the entry level mining jobs?
2. What kinds of courses in mining are needed to start a career?
3. What is the best way to get the job if you are an unexperienced applicant?
4. What qualities do you need to develop in order to start working in mining industry and why?
5. What kinds of tests do you need to pass before getting a job?
6. What does the word “ticket” mean in mining slang? What do you need a “ticket” for?
7. What is the most popular job for women in mining industry? Why?
8. Why having a look at www.miningresumes.com is the good decision to write the best resume?

(abridged from: https://www.youtube.com/watch?v=tY9MZhaS_RY&t=195s)

Grammar

Revision “to be” forms

Глагол “to be” может переводиться глаголами «быть», «являться», «находиться», «существовать».

See Appendix A: Grammar (The verb “to be”), табл. 1.1.

Study the following examples:

1. Geological exploration **is** one of the fields of study at School of Mining, Geology and Geotechnology. *Геологоразведка – одно из направлений обучения в Школе горного дела, геологии и геотехнологии.*
2. He **will be** a geologist soon. *Он скоро станет геологом.*
3. According to the survey, mining engineering and geology **were** the most popular fields of study in 2014. *Согласно исследованию, в 2014 году наиболее популярными направлениями исследований были горное дело и геология.*

Exercise 7. Put “to be” forms into the gaps, the ask questions to the words in bold.

1. The mining courses (...) only about **4 weeks long**, but they (...) fairly expensive.
2. If **you** (...) inexperienced and unqualified you need to be fit and ready for physical labor.

3. The work (...) be **very repetitive and routine** based with long 12 hour days.
4. A lot of the **work (...) unskilled** and doesn't last very long, so it (...) great for backpackers who want to keep on travelling.
5. There (...) **lots of different types of tickets** depending on what type of work you're going to do.
6. For example, **a popular job for women on mining sites** (...) driving a dump truck because research has shown that women (...) easier on the multi-million dollar equipment.

Reading

Before you read

Exercise 8. Do the matching task and translate the following collocations.

- | | |
|-------------|---|
| 1. Complete | a) safety standards |
| 2. Shipping | b) land |
| 3. Mining | c) large groups of ore |
| 4. Access | d) the structure of an underground tunnel |
| 5. Maintain | e) underground projects |
| 6. Use | f) needed resources |
| 7. Improve | g) machinery and tools |
| 8. Collect | h) area |
| 9. Break up | i) site |

MINING (SOFT AND HARD SKILLS)

Miners spend a lot of their workday outdoors or underground. Miners can expect the following work environment characteristics:

- ▶ a lot of time spent on their feet in difficult climates;
- ▶ exposure to risk and danger;
- ▶ use of machinery and tools;
- ▶ long work hours in a remote and loud location;
- ▶ frequent travel to new mining sites.

The work environment for a miner can be physical and laborious. Because miners often have to relocate to the job site. Additionally, miners will often move from one location to another as the project needs change. The specific job tasks of a miner may change from day to day. One day, a miner may use tools to break up large groups of ore and transport it to the shipping area. Another day may be spent working on a project that improves the structure of an underground tunnel.

There are a few hard and soft skills that are important to the success of a miner, including:

Problem-solving: Problem-solving skills are crucial as a miner. The ability to identify a problem and take the necessary steps to overcome it is not only important for the job, but also for staying safe when completing underground projects. Miners are

often tasked with a project to evaluate and fix a problem, whether it is finding a way to a new underground area or choosing equipment that is able to collect the needed resources.

Teamwork: Miners will often work in teams and must have strong teamwork skills. Teamwork is important for maintaining safety standards, solving problems and completing projects. Miners will learn to develop collaboration and interpersonal skills that help them succeed in the mining teamwork environment.

Communication: Developed communication skills are also important when working as a miner. Miners will communicate with team leaders and other team members to complete projects. Strong verbal and nonverbal communication skills are necessary for this role.

Technical: Modern-day miners are beginning to rely on technology to assess land and determine next steps. Miners will need advanced technical skills to use industry-specific programs.

(abridged from: <https://www.indeed.com/career-advice/careers/what-does-a-miner-do>)

Exercise 9. Classify all the skills and abilities mentioned in the text into soft and hard ones.

| Soft skills (non-technical abilities) | Hard skills (teachable and learnable abilities through books, training materials, job) |
|--|---|
| | |

Exercise 10. Put the words into the right order.

1. tools / to break up / to the shipping / may use / to transport it / large groups / area / **A miner** / of ore / and.
2. when completing / take the necessary / **The ability** / is / for staying safe / to identify a problem / underground projects / and / to overcome / steps / important.
3. **Miners** / to evaluate / are / and / often / with a project / fix the problem / tasked.
4. to collect / a way to / should be / **Miners** / and also / to find / to choose / new underground area / able / equipment / the needed resources.
5. interpersonal / teamwork / succeed / **Collaboration and** / help / in the mining / environment / miners / skills / to.
6. technical / to use / need / **Miners** / industry-specific programs / skills / advanced.
7. to another / often / change / as the project / **Miners** / one location / needs / move from.
8. are / technology / to assess / and determine / **Modern-day miners** / to rely on / land / next steps / beginning.

Listening and Use of English

Structures “in order that” and “so that” to express purpose

Союзы “in order that” и “so that” «для того чтобы» используются в предложении для того, чтобы объяснить, с какой целью совершается действие. Союз “in order that” является более формальным. Чаще всего данные союзы употребляются с модальными глаголами (can/would/will).

Study the following examples:

1. I'll go by car **so that** I can take more luggage. Я поеду на машине, **чтобы я смог** взять побольше багажа.
2. We left a message with his neighbour **so that** he would know we'd called. Мы оставили сообщение его соседу, **чтобы он знал**, что мы звонили.
3. **In order that** you can sign the form, please print it out and mail it to this address. **Чтобы вы могли** подписать форму, распечатайте ее и отправьте по этому адресу.

(abridged from: <https://dictionary.cambridge.org/ru/>)

Exercise 11. Listen to the recording and continue the sentences using “so that” and “in order to” structures.

1. A mining engineer develops a safe efficient operating plan _____
2. You need a Bachelor of Science in civil engineering _____
3. You need mechanical engineering _____
4. You need electrical engineering _____
5. Once we have a plan, we schedule the equipment _____
6. We use GPS, Global positioning system and satellites _____
7. We use biotechnologies _____
8. We use computer applications _____

(abridged from: <https://youtu.be/xva5q9L8PxI>)

Speaking

Exercise 12. In pairs, look at the following responsibilities and decide which soft and hard skills should a miner possess in order to work successfully in the mining industry.

- ▶ Mine ore, coal and rocks in an underground setting.
- ▶ Design and build supportive entryways.
- ▶ Operate explosives.
- ▶ Drive underground mining equipment.
- ▶ Transport ore, coal and rocks to designated shipping destinations above ground.
- ▶ Working in a crew on collaborative projects.

Example:

Miners **should possess** technical skills and knowledge of machinery and tools **so that they can** mine ore, coal and rocks in an underground setting.

Grammar

Active Voice Revision: Present Tenses

Изменяя форму глагола для описания действий в настоящем времени, мы можем делать акцент на:

- ▶ регулярности действия;
- ▶ обыденности действия;
- ▶ процессуальной составляющей действия;
- ▶ том, что текущее действие выражает планы говорящего;
- ▶ результатах действия в настоящем времени.

See Appendix A: Grammar (Present Tenses), табл. 1.2–1.4.

Study the examples:

1. Underground mining geologists **usually oversee** the underground mine geology departments and team. *Горные инженеры-геологи обычно контролируют отделы и команду геологии при выполнении подземных горных разработок.*
2. Out product manager **is visiting customers** to present the latest products and hosting factory visits **on Monday**. *В понедельник наш менеджер по продукции посещает клиентов, чтобы представить новейшие продукты и организовать посещение завода.*
3. The miners **have not excavated** the site **yet**. *Шахтеры еще не разрабатывали этот участок.*

Exercise 13. Correct the conversation between two miners using Present Simple or Present Progressive forms of the verb.

A: Hi, James! Nice to see you again!

B: Tom! What a surprise! Where **(1) (you / fly)** to?

A: I am on my way to Mirny mine which is located in Siberia, Russia.

B: Really? So far from home, isn't it? **(2) (I / go)** to Bingham Canyon mine.

A: Oh, **(3) (you / work)** in the United States?

B: Yes. I work as a crane operator and I'm responsible for machinery and tools.

A: OK. Do you have a set schedule or you are on call?

B: **(4) (we / have)** a set schedule but we reschedule twice a month. What about you?

A: I've just got this job as a project manager, so **(5) (I / have)** a meeting at the main headquarter in Mirny. **(6) (you / know)** Salt Lake City? Your mine is located there if I am not mistaken.

B: Not very well. My brother lives there. **(7) (I / not / go)** there very often. What your first project will be?

A: Don't know all the details. At the moment, **(8) (I / work)** on a project that improves the structure of an underground tunnel in Mirny. I know that Bingham Canyon is one of the largest mine in the world. **(9) (you/ operate)** a crane in such a loud location? How can you work such long hours on a site? My job is mostly at the office.

B: **(10) (things / go / well)** if you follow some safety precautions and as I said we have some shifts.

A: I see. **(11) (my plane / board)** and I've got to go. Bye.

Grammar

Active Voice Revision: Past Tenses

Изменяя форму глагола для описания действий в прошедшем времени, мы можем делать акцент на:

- ▶ законченности действия в прошлом;
- ▶ процессуальной составляющей действия в прошлом;
- ▶ том, что действию в прошлом предшествовало другое действие.

See Appendix A: Grammar (Past Tenses), табл. 1.5, 1.6.

Study the examples:

1. **Last year** I participated in Product Quality Reviews and Issue Resolution meetings. I **didn't give** presentations at the local industry conferences. *В прошлом году я участвовал в обзорах качества продукции и встречах по решению проблем. Я не выступал на местных отраслевых конференциях.*
2. **Were** you carrying coal to a dewatering plant **when** our boss phoned? *Несли ли вы уголь на установку обезвоживания, когда звонил наш босс?*
3. **Before** we extracted the precious minerals, we **had conducted** a geological survey. *Перед тем, как добыть драгоценные полезные ископаемые, мы провели геологическое изучение.*

Exercise 14. Meet Simone Hensher: Mining Engineer, Safety Ambassador, Diversity Champion. Match the main events in her life with the correct background situations.

1. In September 2010 – Simone's children went to elementary school (full time) and she had applied for a scholarship with Glencore Canada's Sudbury and received it.
2. In 2015 – Simone transferred to Nickel Rim South Mine and worked as an underground front line supervisor from 2016 to 2017.
3. In October 2018 – Simone became part of Glencore Canada's Sudbury Integrated Nickel Operations (INO).
4. In March 2018 – The Workplace Safety North provided Simone with supervision in the field of safety.
5. In June 2018 – Simone took home the award for top technician in The Workplace Safety North (WSN) 69th Annual Ontario Mine Rescue Competition.
 - a) She was studying books and having extensive hands-on training at a workplace.
 - b) She was participating in the competition amongst technicians and got a tremendous result for a first-timer.
 - c) She was studying geological engineering at the university.

d) She was developing and training employees to standards for safe and efficient equipment operation.

e) She was working as an underground front line supervisor in INO.

Exercise 15. Ask Simone Hensher about her (responsibilities, career, activities in mining, experiences). Use Past Simple, Past Progressive or Past forms of to be.

Interviewer: _____

Simone: There would be nothing worse than standing back and watching something happen and not having the capacity to do something. So having the ability to be able to do what you need to do to save a life is pretty empowering.

Interviewer: _____

Simone: My training for the competition involved both book studying and extensive hands-on training.

Interviewer: _____

Simone: Overall, I think that the experience was a very positive one in my life.

Interviewer: _____

Simone: Yes, I really enjoyed my mine rescuer status. I believe that it is a tremendous, and it is another step closer to safer mines and safer work.

Interviewer: _____

Simone: My employer gave me unique path into the industry, which gave me a different perspective and set of skills.

Interviewer: _____

Simone: I wanted to encourage more women to go into mining, because we're still very underrepresented in the industry and I thought that it would be great.

(abridged from: the text for the tasks https://www.glencore.ca/en/Media-and-insights/Insights/meet-simone-hensher-mining-engineer-safety-ambassador-diversity-champion?fbclid=IwAR3zbNCi42_SS6BP3zgZeHBuiNEXxoWQ8d0NQcNUYAA5lsmv3MhAeDCut2c)

Grammar

Active Voice Revision: Future tenses and “to be going to”

Изменяя форму глагола для описания действий в будущем времени, мы можем делать акцент на:

- ▶ прогнозах на будущее;
- ▶ спонтанных решениях;
- ▶ выражении надежды, обещания или опасения;
- ▶ отдаленных планах и намерениях.

See Appendix A: Grammar (Future Tenses and “to be going to”), табл. 1.7, 1.8.

Study the examples:

1. Will you **be able to perform** long-range planning duties as well as short-range engineering after your graduation? *Сможете ли вы выполнять обязанности*

по долгосрочному планированию, а также краткосрочному проектированию после окончания учебы?

2. She **is going to** become an underground mining engineer. *Она собирается стать горным инженером по подземным работам.*
3. I **promise I'll come** to the meeting with engineering and geology teams. *Я обещаю, я приду на встречу с инженерно-геологическими командами.*

Exercise 16. Match the questions to answers. Pay attention to different future forms. More than one answer is possible.

1. How are you getting there?
2. What's happening?
3. Where are you going?
4. What will you do there?
5. What are you doing?
6. What your workplace will be like?

- a) He is loading ore into trucks and cars.
- b) I am going to Bingham Canyon mine.
- c) They are loading ore into trucks and cars.
- d) We are going by a crew bus.
- e) I am transporting the broken coal from the face in wheelbarrows.
- f) I think, I will build new shafts and develop new drives, rises, crib rooms and air vents.
- g) Probably, it will be one of rural and remote locations.

Speaking

Plans

Exercise 17. What will you be doing in 10 years' time?

I will be working in _____

I will be probably working for _____

I will have _____

I won't be _____

Exercise 18. Work in pairs. Look at these hazardous situations and explain what you will do.

1. Mines are noisy places, with the constant of drilling and heavy machinery, and the potential for hearing damage is quite serious.

What will you do, if you hear loud noise?

2. Mines are very hot and humid. A common health risk that miners face is thermal – or heat – stress.

What will you do if you feel hot?

3. There are a lot of harmful chemicals in mines. Risks include chemical burns, respiratory problems.

*What **will** you do if you go down the mine without any protection?*

4. In mines located in Australia ultraviolet rays can put you at risk of skin cancer and can cause damage to your eyes.

*What **will** you do if you are at surface **mines (outdoors)**?*

5. Mines are very deep. A miner could experience some problems affecting their bones, muscles, blood vessels and nerves during due to a trip, fall or heavy lift.

*What **will** you do if you feel bad while going down the mine.*

Some ideas to use:

- ▶ Apply safe handling and proper disposal.
- ▶ Put on personal hearing protection.
- ▶ Put on protective eye wear.
- ▶ Use using an oxygen self-rescuer.
- ▶ Apply sunscreen.
- ▶ Put on some respiratory protective equipment and clothing with cooling systems or breathable fabrics.
- ▶ Call mines rescue team.

(abridged from: <https://www.miningreview.com/health-and-safety/mining-health-safety-7-common-risks-to-protect-yourself-against/>)

UNIT 1B. APPLIED GEOLOGY

Learning objectives

In this unit you will:

- ▶ acquire the vocabulary connected to applied geology and its methodology;
- ▶ learn how to talk about skills and responsibilities of an applied geologist;
- ▶ study and practice patterns IN ORDER TO and SO THAT to explain purpose;
- ▶ review basic grammar tenses.

Reading

Before you read:

Exercise 1. Practice to pronounce of the following words and word combinations correctly:

| | | |
|------------------|--------------------------|---|
| Interior surface | [ɪnˈtɪrɪər] [ˈsɜːrfɪs] | Внутренняя поверхность |
| Exterior surface | [ɪkˈstɪrɪər] [ˈsɜːrfɪs] | Наружная поверхность, внешняя поверхность |
| Geological time | [ˌdʒiːəˈlɑːdʒɪkl] [tʌɪm] | Геологический возраст |

| | | |
|----------------------------|-----------------------------------|---|
| Anticipate changes | [æn'tɪsɪpeɪt] [tʃeɪndʒ] | Предвидеть изменения |
| Deductive reasoning | [dɪ'dʌktɪv] ['ri:zənɪŋ] | Дедуктивное рассуждение |
| Geological rates | [,dʒi:ə'la:dʒɪkl] [reɪts] | Геологические показатели темпа изменений |
| Environmental implications | [ɪn,vairən'mentl] [ɪmplə'keɪfənz] | Последствия для окружающей среды; экологические последствия |
| Mitigate the hazards | ['mɪtɪgeɪt] ['hæzərd] | Уменьшить опасность |
| Earthquakes | ['z:θ,kweks] | Землетрясения |
| Slope failures | [sləʊp] ['feɪljə] | Откосное разрушение; сползание откоса; оползание откоса |
| Volcanic eruptions | [vɒl'kænɪk] [ɪ'rʌpʃn] | Извержения вулканов |

(abridged from: <https://courses.lumenlearning.com/wmopen-geology/chapter/outcome-what-is-geology/>)

Exercise 2. Read the text.

In its broadest sense, geology is the study of Earth – its interior and its exterior surface, the rocks and other materials that are around us, the processes that have resulted in the formation of those materials, the water that flows over the surface and lies underground, the changes that have taken place over the vastness of geological time, and the changes that we can anticipate will take place in the near future. Geology is a science: we use deductive reasoning and scientific methods to understand geological problems.

Geology is arguably the most integrated of all of the sciences because it involves the understanding and application of all of the other sciences: physics, chemistry, biology, mathematics, astronomy, and others. But unlike most of the other sciences, geology has an extra dimension, that of time – billions of years of it. Geologists study the evidence that they see around them, but in most cases, they are observing the results of processes that happened thousands, millions, and even billions of years in the past. Those were processes that took place at incredibly slow rates – millimeters per year to centimeters per year – but because of the amount of time available, they produced massive results.

Geology is also about understanding the evolution of life on Earth; about discovering resources such as metals and energy; about recognizing and minimizing the environmental implications of our use of those resources; and about learning how to mitigate the hazards related to earthquakes, volcanic eruptions, and slope failures.

(abridged from: <https://courses.lumenlearning.com/wmopen-geology/chapter/outcome-what-is-geology/>)

Exercise 3. Decide if the following statements are true or false. Correct the false ones.

1. Geology uses inductive reasoning and to understand geological problems.

2. Geology doesn't involve the understanding and application of different branches of science.
3. Geology studies the processes that take place at incredibly high rates.
4. Slope equations can't be mitigated with the help of geological studies.
5. Geologists study only the evidence that they see around them.
6. Geology doesn't involve understanding the evolution of life on Earth.

Vocabulary

Exercise 4. Match the words and their definitions.

1. Long period of time occupied by the earth's geologic history.
2. A measurable extent of a particular kind, such as length, breadth, depth, or height.
3. Velocities at which geologic processes occur range from imperceptibly slow to exceptionally fast.
4. Make (something bad) less severe, serious, or painful.
5. Matter, found mainly in underground seams and used as fuel.
6. The downward and outward movement of rock or unconsolidated material as a unit or as a series of units.
7. A danger or risk.
8. Expect or predict.

NB!:

predict – предсказывать

velocity – скорость

downward / upward – по направлению вниз / вверх

extent – степень

- a) Anticipate
- b) Hazards
- c) Mitigate
- d) Geological time
- e) Slope failures
- f) Extra dimension
- g) Geological rates

(abridged from: https://courses.lumenlearning.com/wmopen_geology/chapter/outcome-what-is-geology/; https://www.mindat.org/glossary/slope_failure; <https://www.merriam-webster.com/>)

Speaking

Exercise 5. Read a short extract taken from the website page of Siberian Federal University and answer the following questions:

1. What School do you study at?
2. What is your field of study?

3. What is your major?
4. What types of workers does your School prepare?
5. What are the companies you'll be able to work at after graduating from the university?
6. What are the usual activities for people in mining industry?

“Main fields of study and majors of our School are connected to applied geology, mining engineering and technology of geological exploration. School of Mining, Geology and Geotechnology prepares engineers and research and teaching staff for companies working in geological exploration or mining and smelting which deal with a wide range of activities from survey and exploration to mining and processing of mineral resources”.

“Institute of Petroleum and Natural Gas Engineering created as part of SFU, effectively implements the modules of the competencies of graduates and modernization of educational standards in areas of training of bachelors, specialists and masters demanded in oil companies, as well as develops and supports the implementation of modular elective courses and electives student learning, providing personnel resources of scientific research and innovative development of the enterprises of fuel-energy complex.

An effective system of engineering personnel training for the oil industry is based on the balance of interests of education, science and business, which can successfully solve current and future problems of the educational process, as well as quickly change its content, methods and organizational forms in accordance with production needs and situation on the labour market.

Graduates of the Institute of Petroleum and Natural Gas Engineering possess skills of management, engineering and operational and research activity”.

(abridged from: <http://www.sfu-kras.ru/en/about/igd>; <http://inig.sfu-kras.ru/en/about-spg/>)

Listening

Before you listen

- | | |
|---------------------------|--------------------|
| 1. Petroleum | a) a new model |
| 2. Collect | b) core samples |
| 3. Build up | c) new data |
| 4. Core samples' | d) geologist |
| 5. Identify | e) images |
| 6. Get and apply | f) rock properties |
| 7. Send geophysical tools | g) down the hole |
| 8. Drill for | h) facility |
| 9. Take | i) oil and gas |

Exercise 6. Watch the video about the career as petroleum geologist and answer the following questions:

1. What will you do as a petroleum geologist?
2. What are geologists sometimes called “treasure hunters”?
3. What types of data do geologists interpret analyzing geological log measurements?
4. What is the porosity of rocks?
5. Does the job involves working in the office or in the field?
6. Do geologists work individually or collaborate with other specialists?
7. What types of procedure with samples do geologists usually perform?
8. What are the educational requirements for the job?
9. What does it mean to think in “three dimensional ways”?

(abridged from: https://www.youtube.com/watch?v=RRZr_d2d3YQ&ab_channel=alisWebsite)

Grammar

Revision “to be” forms

Глагол “to be” может переводиться глаголами «быть», «являться», «находиться», «существовать».

See Appendix A: Grammar (The verb “to be”), табл. 1.1.

Study the following examples:

1. Geological exploration **is** one of the fields of study at School of Mining, Geology and Geotechnology. *Геологоразведка – одно из направлений обучения в Школе горного дела, геологии и геотехнологии.*
2. He **will be** a geologist soon. *Он скоро станет геологом.*
3. According to the survey, mining engineering and geology **were** the most popular fields of study in 2014. *Согласно исследованию, в 2014 году наиболее популярными направлениями исследований были горное дело и геология.*

Exercise 7. Put “to be” forms into the gaps, the ask questions to the words in bold.

1. If you (...) down-to-earth kind of **person** with skills at certain sciences and technologies, consider becoming a petroleum geologist;
2. Petroleum geologists explore oil and gas that (...) **beneath the surface**;
3. With the help of logs, we can identify rock properties including the type of rock it (...), the type of liquid that (...) there, or how tight the rock (...);
4. A lot of the work that I do (...) actually **in the computer**;
5. I took a **class** in geology and it (...) really all about rocks;
6. The work (...) be **very repetitive and routine** based with long 12 hour days.

(abridged from: https://www.youtube.com/watch?v=RRZr_d2d3YQ&ab_channel=alisWebsite)

Reading

Before you read

Exercise 8. Do the matching task and translate the following collocations.

- | | |
|-------------------------|--------------------------------|
| 1. Challengeable | a) features |
| 2. Geographical | b) environments and conditions |
| 3. Ore | c) information systems |
| 4. Undertake | d) the fieldwork |
| 5. Geological | e) software |
| 6. Field | f) internationally |
| 7. Drawing and modeling | g) deposits |
| 8. Operate | h) large amounts of work |
| 9. Complete | i) equipment |

GEOLOGY (SOFT AND HARD SKILLS)

- a) Languages
- b) Effective written communication
- c) Technical and IT skills
- d) Field skills
- e) Effective oral communication

1. _____

You must be able to convey your ideas and your reasoning effectively but concisely to reach robust conclusions. This means your work must be interesting, logical and easy to read.

2. _____

Being able to present or lecture to an audience is one of the most important skills you can acquire during a degree. There will be assignments in which you present to your lecturers and peers.

It is imperative to learn to engage with your audience so they are interested in what you are talking about.

3. _____

All professions nowadays require basic IT skills, such as word processing, database analysis and data management. These are rarely a problem for those who have completed an undergraduate degree. However, gaining other IT skills in geographical information systems, drawing and modelling software is becoming increasingly important.

All professional geologists will use specialist software, regardless of the sector they work in, and having a basic understanding of the functionality of some of these is highly desirable to employers.

Many specialist software (modelling) packages permit 3-D and 4-D visualisation of geological features and processes. Understanding how these relate to the real world and their limitations is very important.