UNIT 6

# In the Lab

LESSON 1 **Hard Work or Luck?**

## READING

**A Read the article and choose *True* or *False*.**


The great French biologist Louis Pasteur said in a lecture at the University of Lille in 1854, "In the fields of observation, chance favors only the prepared mind." In other words, if you don't work hard and "prepare your mind," when luck comes along, you won't be able to take advantage of it. There have been numerous articles debating whether chance or hard work is more important for success. Pasteur's quote suggests that they play equal roles.

Still, some people, especially scientists, believe that when they do find success, it is because of luck. If this belief is very strong, it can cause the believer to feel that they had nothing to do with their success—it was only because of luck, and it was out of their control. This feeling can cause serious problems—depression, stress, and low self-esteem. The article "The Role of Luck in a Successful Scientific Career" featured on the Federation of European Biochemical Studies website describes a specific term for this problem. The term is "imposter syndrome" because an "imposter" is someone who pretends to be someone they're not. It is quite common among scientists; some 50% of them say they have had this syndrome to a small extent.

According to TheMuse.com in an article titled "5 Different Types of Imposter Syndrome (and 5 Ways to Battle Each One)," there are five types of ways people can suffer from imposter syndrome:

The "perfectionist" is someone who wants everything to be perfect. They set extremely high goals for themselves, which they often fail to achieve.

The "superman" or "superwoman" is an individual who works long hours to make up for the feeling that they are not as good as their colleagues.

The "natural genius" is someone who thinks they should be able to do everything with ease, since they were born with natural talent, and they get upset when that doesn't happen.

The "soloist" is someone who feels that if they ask for help, they are being weak.

The "expert" feels if they cannot do or know anything and everything, they are a failure.

In Time.com's 2018 article titled "Yes, Imposter Syndrome Is Real. Here's How to Deal With It," psychologists suggest that the solution to the problem is first to realize that there is in fact a problem and, second, to understand the type of problem the person has. Then, one needs to be open to new ways of thinking. Someone who does not have imposter syndrome isn't less intelligent than everyone else, so those who suffer from it should learn that it's OK to think like a nonimposter. Therefore, a "soloist" needs to realize that when they don't ask for help, they're slowing everyone else down. "Experts" and "natural geniuses" need to understand that the more they practice a skill, the better they will get at it.

1 Pasteur believed that both hard work and luck are important when it comes to success. True / False
2 Someone who suffers from imposter syndrome believes they are not responsible for their success. True / False
3 Around 50% of scientists say they have had a severe case of imposter syndrome. True / False
4 "Perfectionists" set high goals for themselves and always achieve them. True / False
5 All types of imposter syndrome sufferers share one thing in common—they need to do everything by themselves. True / False
6 To cure imposter syndrome, first, you need to recognize it and then you need to analyze it. True / False

## VOCABULARY

**A Choose the correct options.**

1 I wouldn't be **an absolutely** / **a highly** successful scientist without the help of my assistant.
2 This report shows we were **highly** / **absolutely** right to repeat the tests.

3 What we discovered is a **completely** / **highly** unusual type of cell growth.
4 We ran the tests three times, and we got **totally** / **highly** unexpected results each time.
5 I think that the data we've collected is **absolutely** / **completely** wrong.
6 The new science lab at the university hospital looks **highly** / **absolutely** perfect.

**B Choose the correct options.**

Scientific experiments are rarely completely **1 successful** / **perfect** the first time they're carried out. In fact, you might be totally **2 aware** / **amazed** to learn that many experiments need to be carried out hundreds of times, especially if the results are completely **3 different** / **unusual** from one test to the next. But that's the nature of scientific experimentation, because when you want to develop a completely **4 right** / **new** type of material, medication, or even process, it takes a lot of trial and error. In some cases, lives will depend on what a scientist discovers, so the results must be highly **5 accurate** / **correct**. Most of the things that scientists create aren't absolutely **6 perfect** / **unexpected** anyway, so more experimenting is needed to improve something that is good enough to use for now.

## GRAMMAR

**A Complete the grammatical structures with the verb forms from the box.**

| | | |
|---|---|---|
| *would* + *have* + past participle | past perfect | future |
| simple present (x3) | simple past | *would* + infinitive |

Grammatical structures:
Zero conditional: *If* + subject + **1** _____, subject + **2** _____
First conditional: *If* + subject + **3** _____, subject + **4** _____
Second conditional: *If* + subject + **5** _____, subject + **6** _____
Third conditional: *If* + subject + **7** _____, subject + **8** _____

**B Read the first sentence and choose the correct option to complete the conditional sentence so that it means the same.**

1 Donald doesn't experiment with radiation because it's too dangerous.
If it … so dangerous, Donald … with radiation.
**a** weren't, would experiment **b** hadn't been, would have experimented
2 Scientists didn't accept the results because Miguel didn't follow the right procedures.
If Miguel … the right procedures, scientists … the results.
**a** hadn't followed, wouldn't have accepted **b** had followed, would have accepted
3 Michelle is a scientist because she likes working in a lab.
Michelle … a scientist if she … working in a lab.
**a** won't be, doesn't like **b** wouldn't be, didn't like
4 The experiment was successful because their hypothesis was correct.
Their hypothesis … correct if the experiment … successful.
**a** hadn't been, wouldn't have been **b** wouldn't have been, hadn't been

**C Unscramble and write conditional sentences. Write the *if* clause first.**

1 you / freeze / water / it / become / a solid (zero conditional)
_____.

2 you / win / first place / in the science competition / you / receive / $1,000 (first conditional)
_____.

3 Tom / not work / so hard / he / not be / a successful scientist (second conditional)
_____.

4 Frieda / study / more often / she / pass / her anatomy exam (third conditional)
_____.

## READING

**IDENTIFY REASONS**

When we identify reasons in a text, we look for the answers to why someone believes what they believe. Conjunctions such as *because*, *since*, and *as* can give us clues to these answers, because they connect beliefs and opinions to their reasons.

**A Read the article, then complete the sentences with one or two words.**

### Artificial life forms … what can we make of them?

It's been over a decade since scientists made the first artificial life form in a laboratory. The announcement appeared in the *Guardian*'s 2010 article titled "Craig Venter Creates Synthetic Life Form." The article went on to say that it was a simple organism—a type of bacteria similar to another one that causes an illness in goats. Although the artificial bacteria were much like the real ones, the entire DNA sequence of the bacteria was made in a lab with chemicals. Bacteria can play an important role in balancing life on the planet. Some bacteria are able to absorb carbon dioxide—a gas that is causing our atmosphere to heat up. Scientists believe that these manufactured forms of life, which up to this day only exist inside a laboratory, could help us address some serious problems. Naturally, some believe this type of research goes against nature. Scientists stress that with more research, artificial life forms can be the perfect tool to fix what's broken.

What do you think about artificial life forms? Are they a valuable solution or just a strange experiment? Share your thoughts with us below.

**Donna, Albuquerque, New Mexico, USA**

I believe this is something that scientists should be careful of because, if the bacteria escapes from a lab, it could get out of control and possibly harm humans. I also believe that there are systems in place that can protect us, but these are not perfect. However, I'm not terribly worried because I can't imagine that a team of scientists would be so irresponsible as to allow such a thing to destroy our planet. I think that scientists should explore the creation of artificial life, since we need something to fight things like climate change. Imagine if we created an organism that could improve air quality. I would welcome such a discovery.

1 The artificial life form that scientists created in a lab was a _____ that is similar to something we see in nature.
2 Scientists would like to create bacteria that could absorb _____, which is causing our planet to get hotter.
3 The artificial life forms that scientists created don't exist in the natural world; they are contained in a _____.
4 Scientists believe that _____ can provide them with the ability to create a life form that can help humanity.

**B Choose the correct options.**

1 Donna believes scientists should be careful because …
   **a** they don't know what they're doing.
   **b** their creation could escape from the lab.
2 Donna isn't terribly worried about artificial life forms because …
   **a** she can't imagine scientists letting things get out of hand.
   **b** there are systems in place to protect us.

## VOCABULARY

**A Choose the correct options.**

1 Some people believe stem cells are **benefit** / **beneficial**, but others see them as controversial.
2 Some vegetables can be **genetic** / **genetically** changed so they are not affected by disease.
3 You should see a **medically** / **medical** professional if you are having difficulty sleeping.
4 That star was named after the **science** / **scientist** who discovered it.
5 The drug is currently in **development** / **develop** and is therefore not safe for use.
6 It is often the **curious** / **curiosity** of a scientist that leads to a discovery.

## GRAMMAR

**A Choose the correct options to complete the rules.**

1 We use … to mean "at the moment something happens."
**a** since **b** unless **c** once
2 We use … to mean "except if."
**a** provided that **b** unless **c** in case
3 We use … to mean "because it is true that."
**a** since **b** as long as **c** in case
4 We use … to mean "because it is possible that."
**a** as long as **b** in case **c** unless
5 We use … to mean "only if."
**a** in case **b** since **c** as long as
6 We can also use … to mean "only if."
**a** unless **b** provided that **c** once

**B Choose the correct options.**

1 We won't be able to stop the process **since** / **once** / **provided that** it begins.
2 Hank is sure to win the science award **unless** / **in case** / **since** he's achieved so much this year.
3 The government will allow the experiment **provided that** / **unless** / **in case** it doesn't break any laws.
4 The experiment is perfectly safe **provided that** / **as long as** / **unless** the equipment fails.
5 We'll keep the medical call center open on weekends **once** / **unless** / **in case** patients need advice.
6 We shouldn't run into any problems **in case** / **as long as** / **once** we follow the safety measures.

## WRITING

**A Read the questions, then choose the correct phrases to complete the ideas.**

1 Should we control the planet's population?
…, it would help with resources. …, we would be taking away people's rights.
**a** On the one hand, However **b** For one, Furthermore
2 Should we try to live on another planet?
…, the project is going to be expensive and risky, …, many of the world's cities are overcrowded.
**a** Of course, In addition **b** Obviously, But
3 Should we destroy the smallpox virus that exists in laboratories?
…, society might be safer that way. …, it might be useful for future research.
**a** For one, Still **b** On the one hand, On the other hand
4 Why should we stop experimenting on animals?
…, the practice is cruel to animals. …, the results can't usually be applied to humans.
**a** Of course, But **b** First, Furthermore

## VOCABULARY

**A Choose the correct options to complete the sentences.**

1 A **magnet** / **hammer** has a handle with a heavy metal head, and we use it to hit things.
2 The smallest part of any material is an **electric current** / **atom**.
3 We use a **wire** / **compass** to connect things so that electricity can run through it.
4 **Iron** / **Steel** is a metal we often use to make pots and pans, and it is made in a factory.
5 **An electric current** / **A magnet** passes into a light bulb and causes the bulb to light up.
6 If we are lost, we can use a **compass** / **magnet** to find the right way to go.
7 **Iron** / **Steel** is a useful metal that comes out of the ground.
8 A **wire** / **magnet** has an invisible force that attracts other metals to it.

**B Read the situations and choose the most useful item.**

1 You're going on a trip to a very large forest that you've never visited before. What item could help you find your way?
**a** a magnet **b** a hammer **c** a compass
2 You've bought some furniture, but you need to build it. What could you use to put it together?
**a** iron **b** wire **c** a hammer
3 You're working with iron in an experiment, and you drop tiny pieces of it on the floor. What could you use to pick it up?
**a** steel **b** wire **c** a magnet
4 One of the pedals on your bike has broken off. What could you use to reattach it?
**a** wire **b** iron **c** steel

## LISTENING

**IDENTIFY KEY INFORMATION**

We identify key information in a listening task by looking at the key words and phrases that come before and after any blanks. These can give us clues about the information we need to listen for.

**A 6.1 Listen to the conversation and complete the notes with one or two words.**

*Notes on Earth's magnetic field*

*How it works:*

- *Earth's center is iron—because it's very hot, it stops being* **1** _____
- *center of the Earth is* **2** _____ *iron—because of this, it turns* **3** _____ *than the Earth, creating the field*

*How it protects us:*

- *creates a shield, which* **4** _____ *harmful radiation*
- **5** _____ *solar winds from reaching Earth*
- *pushes the solar winds away so they don't* **6** _____ *the Earth's atmosphere*

## CONFIDENT COMMUNICATOR

**A Read the experiment and the conversation below. Decide if the speaker is breaking down information, using clear language, or checking for understanding. You may choose more than one answer.**

### See the iron in your cereal!

For this experiment, we used cereal with iron added. Two bowls of dry cereal were placed in a clear plastic bag and the cereal crushed into very small pieces, so it looked like sand. Then some water was added, but just enough to cover the cereal. The bag was closed, and the cereal was moved around in the water until the mixture became like soup. A small round magnet was placed on a table, with the bag laid on top of the magnet. The bag and the magnet were left alone for an hour. To see the iron, the bag and the magnet were lifted up very slowly, with the magnet kept in the same place. The bag and the magnet were both turned over and gently set back down. The magnet was supposed to be on top of the bag at that moment. The magnet was moved across the surface of the bag, and a very small amount of iron could be seen as the magnet was moved.

**Jonathan:** Let's try out that experiment you saw online. It looks like it has a few steps to make it work right.
**Miranda:** **1** Yes, I've looked over the instructions and got together all the things we need: a box of cereal with iron added, a small round magnet, a plastic bag, a couple of small bowls, and a glass of water.
**Jonathan:** OK, what's the first thing we need to do?
**Miranda:** Well, we need to use two bowls of cereal. I have these bowls, so we'll be using the right amount.
**Jonathan:** Great, that's easy. I'll pour the cereal into the bowls here. OK, now what do we do?
**Miranda:** **2** Well, we take the cereal, which is dry, and we pour it into the bag. Then we crush the cereal until it looks like sand.
**Jonathan:** Yeah, that's very weird. I don't get that!
**Miranda:** **3** I think they mean to break the cereal up until the pieces are as small as you can make them. There we go—it looks like sand now. **4** Do you see that?
**Jonathan:** Ah, yes, that's perfect! What's the next step?
**Miranda:** **5** We add some water to it, but only a small amount. Then we put the magnet somewhere on the table, like this, and we lay the bag down on top of it.
**Jonathan:** Hmm, that's strange. Why would we do that?
**Miranda:** Magnets attract iron. So my guess is that the water has made the iron in the cereal break free. Now the magnet can attract it. **6** Do you understand what I mean?
**Jonathan:** Yes, yes, I get it now. That's cool!
**Miranda:** It says to leave it for an hour. Let's wait and come back when it's done.

| | | | | |
|---|---|---|---|---|
| **1** | **a** breaking down information | **b** using clear language | **c** checking for understanding |
| **2** | **a** breaking down information | **b** using clear language | **c** checking for understanding |
| **3** | **a** breaking down information | **b** using clear language | **c** checking for understanding |
| **4** | **a** breaking down information | **b** using clear language | **c** checking for understanding |
| **5** | **a** breaking down information | **b** using clear language | **c** checking for understanding |
| **6** | **a** breaking down information | **b** using clear language | **c** checking for understanding |

**B Read the rest of the dialogue and complete it with the sentences that best simplify information.**

**Miranda:** So, it's been an hour. Let's see what happened. **1** _____
**Jonathan:** Yes, I guess we need to be careful to keep the magnet in the same place.
**Miranda:** OK, done. **2** _____
**Jonathan:** Yes, very gently so we don't mess anything up.
**Miranda:** OK, the magnet is on top. **3** _____ Oh, look! Do you see the iron?
**Jonathan:** Yeah, I can see it. Cool! It's strange that we eat that, but it must be healthy because people keep eating it!

**1** **a** The instructions say both the bag and the magnet need to be turned over.
**b** I'm going to turn the bag and the magnet over at the same time.
**2** **a** Now, I'll set the bag down gently, and I'll keep the magnet in place.
**b** Now, the bag and the magnet need to be set back down on the table.
**3** **a** So, the magnet is moved across the surface slowly …
**b** So, I'll move the magnet slowly …

## LIFE SKILLS

**A** **Read the blog and the comments and decide how the people feel about openness in science. Write *very open*, *somewhat open*, or *not very open*.**

### Is there such a thing as being too open-minded?

I've been reading biographies of great scientists lately, and while I'm impressed by their discoveries, sometimes their openness to new ideas led them to make mistakes. In a 2013 article on the Scientific American website titled "The Danger for Scientists of Keeping an Open Mind," I read about Alfred Russel Wallace, who codiscovered natural selection with Charles Darwin in the 1800s. It was a revolutionary idea, and one that is still very important today. Because Wallace was so open-minded, he accepted all ideas. The article goes on to say that while open-mindedness is a good thing for scientists, they should also be skeptical sometimes. What do you think? Let me know in the comments section below.

COMMENT

Ann, Westfield, VA **1** _____

I'm fascinated by scientists, too, and I think if you want to become a truly imaginative scientist, you have to allow your mind to travel wherever it wants. Personally, if a scientist investigates strange phenomena, I don't think that's a problem. What matters is the advancements they make in science, since that benefits everyone in the world.

reply share

Steven, Dayton, OH **2** _____

I think there are too many scientists in the world today whose openness to new ideas has led them in the wrong direction. You have scientists who want to do strange things to the human mind or make robots function exactly like humans. These are just two examples of how scientists sometimes think too "openly."

reply share

Jessica, Berkeley, CA **3** _____

Science is all about openness, in my opinion. You have to think about things differently in order to solve problems. While you're thinking in this way, you discover new things. However, I think a good scientist is able to judge their ideas effectively.

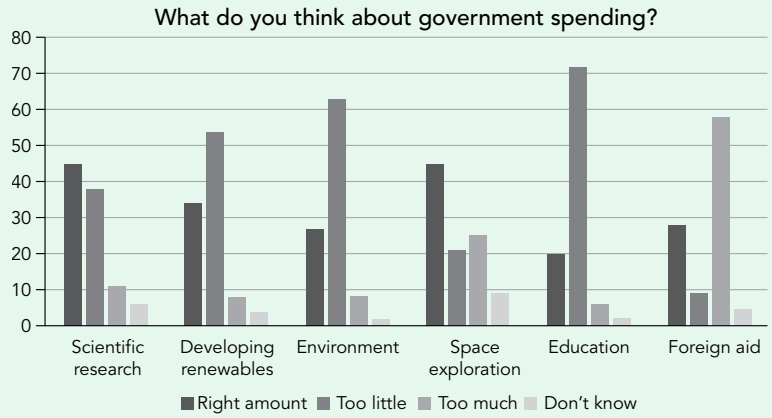
reply share

## THINKING SKILL

**A** **Read the short article and look at the graph, then choose *True* or *False*.**

### What do people think about government spending?

I was curious to learn about the public's attitude toward government spending in various areas. At first I looked at scientific and medical research, but I expanded my research to include other fields. Take a look at this graph to see my findings.




**Source:** National Science Board. 2018. Science and Engineering Indicators 2018. Alexandria, VA: National Science Foundation (NSB-2018-1).

1 People are mostly satisfied with how the government spends money in most of these areas. True / False
2 People are least satisfied with how the government spends money on education. True / False
3 More than twice as many people think the government spends too little on the environment as those who are satisfied and those who think too much is spent. True / False
4 More people think the government spends too much on foreign aid than on any other category. True / False
5 The percentage of people who think too much is spent on these policies is mostly less than those who think it's the right amount or it's too little. True / False
6 More people think the government spends too much on space exploration than on any other category. True / False
7 It seems that when it comes to the environment and education, people know how they feel more than they do about any of the other categories. True / False

## Progress Check

### Lesson 1

I can understand the meaning of openness. ☐
To review, go to LIFE SKILLS **A** & **B**, p. 70.

I can understand adverb + adjective collocations. ☐
To review, go to VOCABULARY **B**, p. 71.

I can understand conditional sentences. ☐
To review, go to GRAMMAR **A** & **B**, pp. 71–72.

I can pronounce conditional sentences with proper intonation. ☐
To review, go to PRONUNCIATION **A** & **B**, p. 72.

I can talk about what leads to academic success. ☐
To review, go to SPEAKING **B** & **C**, p. 72.

### Lesson 2

I can understand different points of view and identify reasons in science. ☐
To review, go to READING **B** & **C**, pp. 73–74.

I can understand how to form science-related words. ☐
To review, go to VOCABULARY **A**, p. 74.

I can understand how to use conditional conjunctions and phrases. ☐
To review, go to GRAMMAR **B**, p. 74.

I can write a for/against essay. ☐
To review, go to WRITING **A**, p. 75.

I can talk about possible courses of action. ☐
To review, go to SPEAKING **A**, p. 75.

### Lesson 3

I can understand words related to magnetism. ☐
To review, go to VOCABULARY **A**, p. 76.

I can listen for and identify key information. ☐
To review, go to LISTENING **B**, p. 76.

I can interpret information from graphs. ☐
To review, go to THINKING SKILL **A**, p. 77.

I can simplify information. ☐
To review, go to CONFIDENT COMMUNICATOR **A** & **B**, p. 78.