UNIT 10

Giving Nature a Hand



In this unit, you will

- read about old and new ways to help people overcome disabilities.
- review identifying time and sequence words.
- increase your understanding of the target academic words for this unit.

READING SKILL Distinguishing Fact from Opinion

Self-Assessment

Think about how well you know each target word, and check (✓) the appropriate column. I have...

TARGET WORDS	never seen the word before	seen the word but am not sure what it means	seen the word and understand what it means	used the word, but am not sure if correctly	used the word confidently in *either* speaking *or* writing	used the word confidently in *both* speaking *and* writing
AWL						
advocate						
alternative						
confine						
discriminate						
error						
evaluate						
impose						
incentive						
objective						
proportion						
sum						
suspend						
tense						
voluntary						

Oxford 3000™ keywords

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Before You Read

Read these questions. Discuss your answers in a small group.

1. How many people do you know who wear glasses? What would their lives be like if they didn't own a pair of glasses?
2. What does it mean to "give someone a hand"? How can people give nature a hand to keep their bodies healthy?
3. How has science helped people have healthier bodies?

Read

This article highlights some of the ways that humans have managed to overcome the obstacles that nature put in their way.

Giving Nature a Hand

For most of human history, humans have had to live with the body that nature gave them. They lacked the knowledge to improve eyes that couldn't see clearly, or help ears that couldn't hear. Such disabilities were more than an inconvenience for early humans; they were a threat to their existence. A person with impaired vision might not be able to hunt or work with tools, for example. Over time, the **incentive** to survive led people to develop devices that would fix these impaired conditions.



EARLY WAYS TO IMPROVE VISION

During his 12th-century travels through China, Marco Polo supposedly saw people using eyeglasses. Soon, eyeglasses came into common use in Italy. The **objective** of the earliest lenses was to help people see things that were close up so they could do tasks like carving or sewing. Soon after, lenses to help people see distant objects became common. In the 18th century, the two types of lenses were combined in one pair of bifocal lenses so individuals who were both farsighted and nearsighted needed just one pair of eyeglasses.

Early glasses were held in the hand or clipped on the nose, held there by the **tension** of the stiff wire they were made from. Modern framed glasses, **suspended** from the ears by earpieces, were uncommon until the 19th century.

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IMPROVING VISION TODAY

Nowadays, other options are available. For example, about 2 percent of the people in the world opt for contact lenses, which lie on the surface of the eye. Fortunately, corneal implants and laser surgery may one day eliminate the need for corrective devices altogether.

WAYS TO IMPROVE HEARING

No evidence exists of an early device to enhance hearing, but it probably did exist. It was likely a hollow, cone-shaped animal horn with the point cut off. Held with the tip by the ear, the horn could be directed toward a voice, for example, so sound waves from the voice could be focused into the ear.

In the 20th century, battery-operated hearing aids became common. The components included a case that contained a battery and a sound-amplification device. A wire attached the device to a disc that was inserted into the ear. Today, thanks to electronics, tiny devices that fit behind the ear contain both energy cells and an amplifier. They provide not only better amplification, but also better **discrimination** between various sounds. There is now a surgical **alternative** to improve hearing without an external device. A medical **evaluation** can determine whether this **alternative**—a cochlear implant—might be right for someone with a hearing loss.



An early hearing aid

REPLACING TEETH

Tooth loss was common among our early ancestors due to accidents, infection, and disease. Being toothless affected people's ability to eat and speak clearly. It also made them physically unattractive. The earliest known false teeth, or dentures, date from the 15th century, when rich people were willing to spend a large **sum** of money for uncomfortable false teeth carved from ivory, animal teeth, or wood. When the process of making rubber was perfected in 1851, dentists immediately **advocated** its use as a base material for dentures. It was soft, so it would be comfortable. It could be molded to fit individual mouths, and it could securely hold artificial teeth. It was also cheap, making dentures affordable to everyone.

Today, dental implantation is available for people who need to replace one or several teeth. Fixed into the jawbone with a titanium screw, an implanted tooth becomes a permanent replacement rather than a removable dental device.



The exploration of an ancient Mayan burial site in Honduras uncovered the tomb of a young woman, **confined** there for 1,400 years. Her jawbone contained three tooth-shaped pieces of seashell embedded into the bone in spots where three of her natural teeth were missing. Was the dental implant a punishment **imposed** on her, or was it a **voluntary** procedure? Were the Mayans the first humans to give nature a hand with dental implants? ■

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Reading Comprehension

Mark each statement as *T* (True) or *F* (False) according to the information in Reading 1. Use your dictionary to check the meaning of new words.

___ 1. Survival is a strong incentive to fix impairments.

___ 2. The objective of the earliest eyeglasses was to help people do close-up tasks.

___ 3. Early eyeglasses were secured to the ears by tension or suspended from the nose.

___ 4. A large proportion of people are choosing to have corneal implants to eliminate the need for corrective devices.

___ 5. A penalty was imposed on people for using animal horns as hearing aids.

___ 6. A medical evaluation may determine that a person's hearing would improve with a cochlear implant.

___ 7. Better sound discrimination is possible in modern hearing aids.

___ 8. Dentists advocate the use of corneal implants as an alternative to dentures.

READING SKILL Distinguishing Fact from Opinion

LEARN

As you read, it is important to recognize the difference between a *fact* and an *opinion*.

FACT	information that can be proven to be right or wrong
OPINION	a statement that you cannot prove to be either right or wrong

Opinions often contain value words such as *best, worst, beautiful, awful, funniest,* or *most interesting*. Compare these two statements:

It is raining.
The weather is awful.

You can prove the first statement by looking out of the window. The second statement is someone's opinion of the weather, so you cannot prove it is right or wrong.

APPLY

A. With a partner, decide whether each statement is a fact or an opinion. Write *Fact* or *Opinion* on the line.

_____ 1. Humans cannot live without oxygen to breathe.

_____ 2. Good vision is more important than good hearing.

_____ 3. Humans have five toes on each foot.

_____ 4. People with big ears can hear better.

_____ 5. Long eyelashes are pretty.

_____ 6. Type O is the most common blood type.

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B. Write one fact and one opinion about devices to improve hearing. Write one fact and one opinion about devices to improve vision. Read your sentences aloud in a small group and let the others decide which are facts and which are opinions. Discuss any statements that you disagree about.

C. Look again at Reading 1. Scan the article to find one sentence that states an opinion. (Hint: It's about dentures.)

REVIEW A SKILL **Identifying Time and Sequence Words** (See p. 84)

Scan Reading 1. What words are used to identify the present time in the development of each type of device?

_____

_____

Vocabulary Activities STEP I: Word Level

The adjective *objective* is related to facts and opinions. A text or observation is considered objective if it only deals with information that is based on facts, not emotions. The opposite is *subjective*, meaning based on personal opinions.

OBJECTIVE It is raining.

SUBJECTIVE The weather is awful.

Objectivity is the noun form and *objectively* is the adverb form.

*Readers sometimes question the **objectivity** of a news article.*

*Newspapers try to report the news **objectively**, without personal opinion.*

The noun *objective* has a different meaning. It is a formal alternative for *goal* or *aim*.

*The inventor's **objective** was to create contact lenses for animals.*

CORPUS

A. With a partner, match the medical device on the left with its *objective*. Take turns making sentences describing the connections.

*The **objective** of dentures is to substitute for missing teeth.*

c 1. dentures	a. to improve declining eyesight
___ 2. hearing aids	b. to attain improved hearing
___ 3. eyeglasses	c. to substitute for missing teeth
___ 4. cochlear implants	
___ 5. contact lenses	
___ 6. dental implants	

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B. **Imagine that these sentences appeared in a newspaper article. With a partner, cross out the subjective words so that the statements become an objective report of the news.**

1. At a public meeting yesterday, our ~~popular~~ mayor advocated suspending the ~~ridiculous~~ city tax on sunglasses.
2. The audience applauded wildly after his convincing speech.
3. The administration made a terrible decision that affected many people when it foolishly imposed this tax.
4. Last year the tax generated only the tiny sum of $63.00.
5. After many long and boring comments from angry citizens, the meeting finally ended at 8:00.

C. **Read this paragraph about ways of straightening teeth. Use the target vocabulary in the box to complete the sentences. Use the words in parentheses to help you.**

advocate	incentive	proportion
impose	confined	tense
alternative	objective	voluntarily

Nowadays, many adults _____ (1. force) the discomfort of dental braces on themselves _____ (2. willingly). It will be the second time around for a large _____ (3. part) of adults who are considering braces. One day they notice that teeth which were perfectly aligned in childhood have shifted and may even overlap. Dentists _____ (4. recommend) braces for them. Their _____ (5. goal) is to prevent future health problems. However, the patients' _____ (6. motive) is usually to improve their appearance. Standard braces are made of steel, but a popular _____ (7. choice) for adults are clear plastic bands. The first few days with new braces are the worst. The pain in their mouth makes patients feel _____ (8. stressed). Often the pain is not _____ (9. limited) to the mouth. Patients may temporarily experience headaches and earaches, too. However, when the braces are ultimately removed, most adults say that the discomfort was worth it.

Tension refers to how tightly something is stretched. It can describe the forces acting on objects or the emotional forces acting on people.

*The dentist increases the **tension** in my braces a little more each week.*

*Don's been so **tense** since he lost his job. He's been having **tension** headaches.*

*The atmosphere was **tense** as the doctor removed the bandages from the patient's eyes.*

In grammar, *tense* refers to the time of a verb.

*The past **tense** form of "keep" is "kept."*

CORPUS

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D. **With a partner, think of things that might make these people feel tense. What is the cause of the tension?**

1. someone getting on an airplane
2. the hostess of a large party
3. someone who cannot hear
4. someone going to a job interview
5. a teacher on her first day of school
6. a new parent

E. **An *incentive* is something that encourages a person to do something. With a partner, match the incentive with the action that will make it possible. Take turns making sentences with the matches.**

c 1. having a nice smile — a. getting dentures

*Having a nice smile is an **incentive** for getting braces.*

___ 2. being able to see clearly — b. exercising every day
___ 3. being able to hear conversations — c. getting braces
___ 4. being able to chew food — d. giving up smoking
___ 5. having big muscles — e. wearing a hearing aid
___ 6. improving your health — f. wearing glasses

Vocabulary Activities STEP II: Sentence Level

The word *sum* has several uses, all related to the idea of a total amount of something. In math, for example, the *sum* is the result you get when you add numbers together.

*The **sum** of 6 + 2 + 3 is 11.*

It is also the total value of a group of things.

*A team is only as good as the **sum** of its players.*

It can refer to an amount of money.

*Most insurance pays you a large **sum** when disaster strikes.*

The phrase *sum up* means to state the main points of a text or conversation.

*The doctor **summed up** the situation in three words: "You need glasses."*

A *summation* is a formal review of the main points of something, written or spoken.

*The jury listened carefully to the lawyer's three-hour **summation**.*

CORPUS

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F. **Look again at Reading 1. Check (✓) the statement that accurately sums up each of these paragraphs.**

PARAGRAPH 2

___ 1. Some people cannot see things at a distance.

___ 2. Certain lenses are for farsighted people.

___ 3. The history of eyeglasses began many centuries ago.

PARAGRAPH 3

___ 1. Modern ways to correct vision are different from earlier ways.

___ 2. About 2 percent of people in the world wear contact lenses.

___ 3. After the 19th century, glasses had earpieces to hold them on.

Now, write statements that sum up these paragraphs. Use *in summation* or *to sum up* in each statement.

1. PARAGRAPH 4: *To sum up, effective hearing devices didn't become available until the 20th century.*
2. PARAGRAPH 5: _____
3. PARAGRAPH 6: _____

To *impose* something on a person is to use authority to require them to obey. *Imposition* is the noun form.

*The city will **impose** a fine on residents who park in the streets overnight.*

Unfavorable circumstances can *impose* problems on people.

*Poverty **imposes** many hardships on people.*

If someone *imposes on* you, they interrupt your routine and expect a favor from you.

*I don't want to **impose** on you, but may I use your computer?*

Someone who is *imposing* is impressive in appearance or behavior and seems powerful.

*Standing before the crowd in full uniform, the general was an **imposing** figure.*

CORPUS

G. **With a partner, think of limits that might be *imposed on* people in each category. Then choose one category and write in your notebook a short paragraph that describes three limits.**

Poverty	Blindness	Autism
Poverty imposes many limits on people. One is . . .		

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The word *discriminate* has several different meanings related to the idea of differentiation—or noticing differences between things.

The law should not ***discriminate*** *between famous and ordinary people.*

Mrs. Clifford is very ***discriminating.*** *She only serves the best quality foods.*

To *discriminate* one thing from another means to be able to see, hear, smell, touch, or feel the difference.

I can't ***discriminate*** *one perfume from another. They all smell the same to me.*

He has trouble with color ***discrimination*** *and can't tell lime green from olive green.*

To *discriminate* against a person or a group of people is to treat them unfairly.

In past decades, employers often ***discriminated against*** *women.*

Racial ***discrimination*** *is still common in many places.*

It is often difficult to tell which meaning of *discriminate* or *discrimination* is being used. Here are some helpful hints.

When *discriminate* or *discrimination* means "to recognize differences,"

- it is nearly always used with *between* or with *from*.
- two or more similar things are mentioned.

When *discriminate* or *discrimination* means "to treat people unfairly,"

- it is nearly always used with *against*.
- a particular person or a group of people is mentioned.
- a particular type of discrimination is named: for example, *age discrimination*.

CORPUS

H. **Rewrite these sentences in your notebook to include a form of *discriminate*. Read your sentences in a small group. Did you convey the correct meaning in each of your sentences?**

1. Society is unfair to people who are fat.
2. People who are colorblind usually cannot tell red from green.
3. It is against the law for employers to treat someone unfairly because of his race.
4. Immigrants often face unfair treatment in their new countries.
5. Movie actors wear contact lenses because studios won't hire actors who wear glasses.
6. Lemons and limes taste the same to me.

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Before You Read

Read these questions. Discuss your answers in a small group.

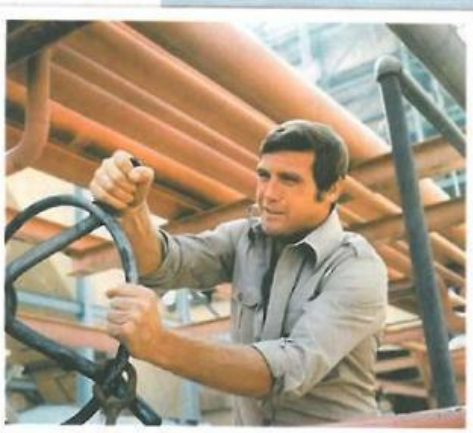
1. Eyeglasses, hearing aids, and false teeth are common devices that assist people who have physical limitations. What other devices do you know of that help people's bodies function?
2. Have you ever seen people with artificial arms or legs? What could they do?
3. How do you think artificial limbs will change in the future?

Read

The title of this article refers to a 1970s science fiction television series, *The Six Million Dollar Man*.

BIONIC PEOPLE

Some 40 years ago, a bionic man was the hero in a science fiction television series called *The Six Million Dollar Man*. In the series, an astronaut has a terrible accident. His damaged arms and legs are replaced with high-tech artificial ones costing six million dollars. The new arms and legs made him "bionic"—part human and part machine. More recently, a real bionic man has been created, and for a **sum** nearly as great as the original one. Jesse Sullivan can't run 60 miles per hour, but he does have a bionic arm to replace one he lost in an accident. This new arm is not science fiction. It is the world's first thought-controlled artificial arm.



The Six Million Dollar Man

JESSE'S STORY

In 2001, Jesse Sullivan was 54 years old and working as a lineman for an electrical power company. Somehow, he made an **error** and contacted with a live wire on the ground that gave him a 7,200-volt shock of electricity. His arms were destroyed.

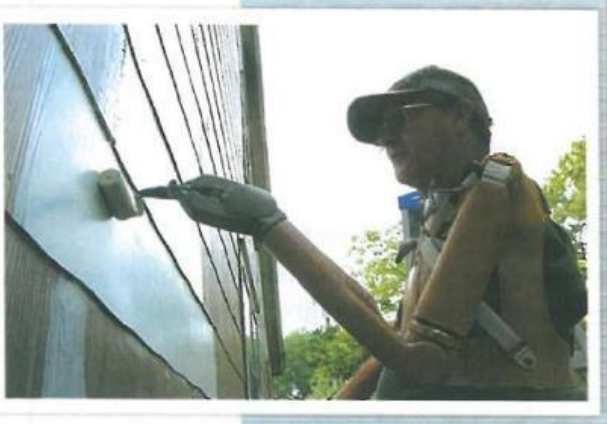
After recovering from the accident, Jesse got a set of artificial arms. He controlled them by moving his back muscles and pressing tabs with his neck. He learned quickly and did well, so his doctors at the Rehabilitation Institute of Chicago **advocated** using him as a research subject. He would continue to use a conventional artificial

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right arm, but his new left arm would be a 12-pound Neuro-Controlled Bionic Arm. Instead of using his body to move it, he would use his brain.

Jesse underwent surgery to prepare for this. The **objective** was to isolate the healthy nerves that once controlled movement in Jesse's left arm. These nerves were reattached to muscles in Jesse's chest. Eventually the re-routed nerves would grow into the chest muscles. Finally, electrodes were attached to Jesse's chest and connected to his artificial arm. Now, when Jesse **tenses** these chest muscles, it creates a tiny electrical signal. The signal activates a computer in the left arm that does what Jesse's brain tells it to do. The movement is as **voluntary** and as immediate as it would be in a real arm.



Jesse Sullivan

The brain not only gives signals to the missing arm, it receives them as well. When a doctor touches Jesse's chest in various spots, it feels to Jesse as if the doctor is touching his thumb, for instance, even though his hand and arm are missing. Eventually he will be able to feel what the bionic hand is touching and to **discriminate** between sensations of heat and cold.

This bionic arm is **suspended** from a plastic framework that fits around Jesse's upper body. It has six motors and consists of parts from around the world. The hand was made in China, the wrist in Germany, and the shoulder in Scotland. The six motors move the bionic arm's shoulder, elbow, and hand as a unit. Jesse uses his arm to help him put on socks, shave, eat, and do other personal and household chores just by thinking about them.

CLAUDIA'S STORY

In 2004, Claudia Mitchell became the second person to use a thought-controlled artificial arm. That year the 24-year-old woman lost her left arm in a motorcycle accident. While she was recovering from her accident, she worried about her future. She was very brave. She did not want the accident to **impose** restrictions on her or **confine** her to her house. She saw no **alternatives** until she read a magazine article about Jesse Sullivan and his bionic arm. The article gave her the **incentive** to try to get her own bionic arm. She said to herself, "I've got to have one of those."

Her doctors **evaluated** her and agreed to make her into a bionic woman. After surgery, Claudia was fitted with a 10-pound

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artificial arm that she controls with her brain. She mastered the use of her new arm and entered college.

Today a **disproportionate** amount of research into brain-controlled artificial arms is focused on implanting sensors in the brain to link the brain to the arm. Dr. Todd Kuiken, who heads the neural engineering program at the Chicago Institute, rejects this approach. He says of the technique used with Jesse and Claudia, "The exciting thing about this technique is we are not implanting anything into (the) body."



Claudia Mitchell

Reading Comprehension

Mark each statement as *T* (True) or *F* (False) according to the information in Reading 2. Use your dictionary to check the meaning of new words.

___ 1. Jesse's doctors made an error and charged him a sum of six million dollars.

___ 2. The objective of Jesse's surgery was to isolate the healthy nerves that once controlled the left arm and reattach them to chest muscles.

___ 3. When Jesse tenses his chest muscles, he activates a computer.

___ 4. Someday Jesse's hand will be able to discriminate between heat and cold.

___ 5. Claudia worried that her accident might impose restrictions on her life or confine her to her house.

___ 6. She saw an alternative when she read about Jesse in a magazine article.

___ 7. The article gave Claudia the incentive to meet Jesse Sullivan.

___ 8. A disproportionate amount of research is focused on bionic arms.

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READING SKILL Distinguishing Fact from Opinion

APPLY

A. Read these statements. Decide whether each one is a fact or an opinion. Write *Fact* or *Opinion* on the line. Compare answers with a partner.

_____ 1. *The Six Million Dollar Man* was a science-fiction TV show.

_____ 2. *Bionic* is a confusing term for people with artificial limbs.

_____ 3. It must be strange to have someone touch your chest and feel it in your hand.

_____ 4. Claudia is very lucky that she has a bionic arm.

_____ 5. Claudia's bionic arm is very heavy.

B. Look again at Reading 2. Scan the article to find one sentence that states an opinion. (Hint: It's about Claudia.)

C. In your notebook, write two facts and two opinions about the people in Reading 2. Read your sentences aloud in a small group and let the others decide which are facts and which are opinions. Discuss any statements that you disagree about.

Vocabulary Activities STEP I: Word Level

A. With a partner, list some alternatives for these situations.

1. Your uncle was in a car accident and both of his legs were injured. Suggest some alternate ways for him to travel to his job.
2. Your grandmother's eyesight is very poor. She likes stories about famous people, but she can't see well enough to read. What alternatives can you suggest so she can still enjoy these stories?

B. *Confine* can mean to keep someone or something in a particular place. It can also refer to controlling or setting the limits of something. With a partner, match the type of business in the first column to what it confined (center column) and the type of limit (last column). In your notebook, take turns making sentences.

*This restaurant **confined** its menu to Mexican food.*

Type of Business	What It Confined	Type of Limit
1. ~~a restaurant~~	its broadcasting	girls under 18
2. a library	its children's books	~~Mexican food~~
3. a private school	its repairs	900 words
4. a clothing store	~~its menu~~	items under $20
5. an auto repair shop	its articles	Japanese cars
6. a radio station	its student body	a cozy corner
7. a magazine	merchandise	ten hours a day

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Voluntary describes an action that is done willingly, without being required to do it.

The adverb form is *voluntarily.*

*Involvement in the study is strictly **voluntary.** You don't have to do it to graduate.*

*The participants **voluntarily** donated their time to help the researchers.*

The noun and the verb have the same form: *volunteer.*

***Volunteers** at the local hospital play games with the sick children.*

*Amy always v**olunteers** to help out when they are shorthanded.*



C. **With a partner, decide which of these actions are voluntary and which are required.**

1. giving your seat on a bus to an old person
2. straightening crooked teeth with braces
3. wearing glasses to improve your vision
4. getting a passport to travel overseas
5. using a bed net to prevent malaria
6. getting a license to drive a car
7. paying for groceries at a market
8. visiting a sick patient in a hospital

An *advocate* is a person who speaks or writes publicly in favor of a particular position or cause. *Advocacy* is the noun form of this action. The verb is also *advocate.*

*My uncle is an **advocate** for disabled people. He **advocates** for them.*

*His **advocacy** resulted in new laws to help the disabled.*



D. **Imagine that the city wants to build a new hospital. They asked doctors at the current hospital to volunteer ideas for the new hospital. Each doctor is an advocate for his or her own specialty. With a partner, match the doctor with what he or she might advocate. Take turns making sentences with the information. Check your dictionary for the meaning of new words.**

*The surgeon is an **advocate** of doubling the number of operating rooms.*

*The surgeon **advocates** doubling the number of operating rooms.*

___ 1. pediatrician	a. doubling the number of operating rooms
___ 2. pharmacist	b. installing reclining chairs for new mothers
___ 3. obstetrician	c. building a modern kitchen for the cafeteria
___ 4. nutritionist	d. building a playroom for the sick children
a 5. surgeon	e. purchasing new X-ray machines
___ 6. radiologist	f. adding computers to keep track of medicines

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Vocabulary Activities STEP II: Sentence Level

To *suspend* something means to hang something, either permanently or temporarily.

*Jesse's new arm was **suspended** from his shoulder by a plastic frame.*

To *suspend* an activity is to stop it temporarily.

*The lab will **suspend** research on the vaccine until a new director is hired.*

To *suspend* a person is to dismiss them from a job, school, project, etc. temporarily, usually as a punishment. *Suspension* is the noun form.

*Hannah was **suspended** from school for a week for bad behavior.*

*During her **suspension** she wasn't allowed to watch TV or go online.*

CORPUS

E. **Rewrite these sentences using a form of *suspend*. Compare your sentences with a partner.**

1. The biology lab technician was dismissed for a week for being careless.
2. He hung hot lamps too close to the dishes of bacteria we were studying.
3. We had to stop our experiment until we could grow new bacteria.
4. The technician was not paid during the time he was not working.
5. When he returns, we'll show him the proper way to hang the lamps.

Word Form Chart

Noun	Verb	Adjective	Adverb
proportion	_____	(dis)proportional (dis)proportionate	(dis)proportionally (dis)proportionately

A *proportion* is concerned with the relationship among the parts that make up a whole. Like a ratio, it can compare one part to another part in terms of number. It can also compare parts in terms of importance, size, degree, or other factors.

*The largest **proportion** of undergraduates is made up of women.*

The two adjective forms are interchangeable, as are the two adverb forms.

*An enormous TV took up a **disproportionally** large area of the room.*

*Each roommate had a **proportionate** amount of space in the closet.*

When two parts are *in proportion*, this means they are of the correct sizes relative to each other. For instance, in an accurate drawing of a person, the ears will be larger than the eyes—but they are supposed to be. *Out of proportion* is the opposite.

*The artist has drawn the eyes and ears in **proportion.***

*But look how big the mouth is. It's **out of proportion** with the rest of the head.*

CORPUS

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