

UNIT 9

Complete the sentences with the correct words.

evolved	flexible	involved	solid	unique
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1. Scientists believe that a gene called FOXP2 is _____ in the development of human speech.
2. Each snowflake has a _____ pattern that makes it special.
3. Over millions of years, birds have _____ a variety of beak shapes that serve different purposes.
4. An elephant's _____ trunk allows it to reach and grab objects, drink water, and touch and greet other elephants.
5. A turtle's _____ shell protects its soft body from predators.

Match the words to the definitions.

- | | |
|----------------|---|
| 6. display ● | ● a. one sheet or amount of a substance that covers something |
| 7. layer ● | ● b. something that is done to show or be seen |
| 8. process ● | ● c. an area of business and manufacturing |
| 9. theory ● | ● d. a scientific idea that explains how or why something happens |
| 10. industry ● | ● e. a series of steps for completing a complex action |

Complete the sentences with the correct phrases.

a political advantage	an obvious advantage	an unfair advantage
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11. The ability to climb walls and steep rocks gives NASA's new robots _____ over older models.

LEVEL 2 Assessment

12. Students from wealthy, well-connected families often have _____ over other students when applying for college.
13. Candidates who are skilled speakers and know how to navigate social media may have _____ over their opponents.

Complete the sentences with the correct words.

produce	promote	protect
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14. Dinosaurs may have used their feathers to _____ their babies from the cold.
15. Fireflies _____ light in order to communicate and attract potential mates.
16. Companies often _____ workers who do an excellent job.

Read the passage.

What Are Feathers For?

A Paleontologists think feathers have existed for millions of years. Fossils of a 125-million-year-old dinosaur called a theropod show that it had a thin layer of hair on its back—evidence of very primitive feathers. Discoveries such as this are helping scientists understand how and why feathers evolved.

Insulation

B Some paleontologists speculate that feathers began as a kind of insulation. Paleontologists have found theropod fossils with their front limbs spread over their nests. They think this shows that the dinosaurs were using feathers to prevent heat from escaping and to keep their young warm. In addition, many young birds are covered in light, soft feathers, which keep the birds' bodies warm. Even when they become adult birds, they keep a layer of warm feathers close to their bodies.

Attraction

C Another theory is that feathers evolved for display—that is, to be seen. Feathers on birds show a huge range of colors and patterns. In many cases, the purpose of these beautiful feathers is to attract the opposite sex. A peacock spreads its brightly colored tail feathers to attract a peahen. Generally, the more eyespots and the bigger the tail, the better the peacock's chances are of attracting a mate. Some birds use crests—feathers on their heads. Male birds of paradise use their feather display, along with dance moves designed to show off their beautiful feathers, to attract females.

LEVEL 2 Assessment

- D** In 2009, scientists found evidence that supported this display theory. They discovered very small sacs—called melanosomes—inside theropod feathers. Melanosomes give feathers their color. The theropod melanosomes look the same as those in the feathers of modern birds.

Flight

- E** We know that feathers help birds to fly. Here's how they work: A bird's feathers are not the same shape on each side. They are thin and hard on one side, and long and flexible on the other. To lift themselves into the air, birds turn their wings at a particular angle. This movement allows air to go above and below the wings. The difference in air pressure allows them to fly.
- F** Paleontologists are now carefully studying the closest theropod relatives of birds. They are looking for clues to when and how feathers were first used for flight. A 150-million-year-old dinosaur called *Anchiornis* may hold the answer. The size of a chicken, it had black-and-white arm and leg feathers. These feathers were similar to modern bird feathers, except that they were the same shape on both sides. Because of this, *Anchiornis* probably wasn't able to fly.
- G** However, paleontologists also found a particular wrist bone in *Anchiornis* fossils. This bone allowed the creature to fold its arms to its sides, keeping its arm feathers off the ground as it walked. Modern birds use a similar bone to pull their wings toward their bodies as they fly upwards. According to scientists, this common characteristic suggests that feathered dinosaurs such as *Anchiornis* evolved flight by moving their feathered arms up and down as they ran.
- H** To conclude, feathers likely evolved because they offered several advantages. Based on detailed research, scientists believe that the special design and bright colors of feathers helped dinosaurs—and later on, birds—stay warm, attract mates, and finally fly high into the sky.

Choose the correct answers.

17. What do scientists believe was the original purpose of feathers?
- for flying
 - for beauty
 - for warmth
18. According to the text, why would bright colored feathers be an advantage?
- They can get the attention of a mate.
 - They can make the animal easier to identify.
 - They can attract predators.
19. What inference could scientists make based on the discovery of melanosomes in theropod fossils?
- Theropods had soft feathers close to their bodies to keep them warm.
 - Theropods had colorful feathers for display, just like modern birds.
 - Theropods were ancient ancestors of birds because they had what looked like primitive feathers on their backs.

LEVEL 2 Assessment

20. What is the main idea of paragraphs E–G?
- Anchiornis* was an ancient relative of birds, the size of a chicken, with black and white feathers.
 - Modern bird feathers are thin and hard on one side, and long and flexible on the other.
 - Early feathered dinosaurs could not fly, but feather shape and the ability to fly evolved over time.
21. What was special about *Anchiornis*'s wrist bone?
- It allowed the animal to pull its arms closer to its body.
 - It made it possible for the animal to lift into the air while running.
 - It was completely different from the bones that modern birds have.

Read the passage.**Learning from the Magic of Gecko Feet**

- A** Since the time of Aristotle 2,400 years ago, people have been interested in how gecko lizards stick to walls as they move around. The famous philosopher wrote that geckos easily climbed up and down, facing in either direction. Early viewers believed that the little lizards had sticky material on their feet that helped them stay on the wall. Later, lizard-watchers wondered whether gecko feet had tiny suction cups—small, soft, cup-shaped parts that stick through air pressure when they are pressed on a surface.
- B** Until recent years, it wasn't important to investigate these ideas with experiments. Then, scientists thought that if they could learn how lizards climbed, they could copy how geckos make a strong adhesive, or glue. Scientists hoped to create something that could securely hold a heavy object on a wall, and then be removed without leaving any marks or damage on it. Geckos, unlike sticky tapes and glues, can sit on a wall and climb up and down it without leaving any marks. So, at several universities, researchers started experiments to learn more about geckos and how they climbed. They believed they would be able to use the same concepts.
- C** In the 1800s, a physics scientist named Johannes van der Waals had a theory that there was a weak force between the molecules or atoms in objects that are near each other. This force caused some molecules to attract and stick to neighboring molecules. It became known as a *van der Waals force*. When biologists closely examined geckos' feet, they found hundreds of thousands of tiny hairs called *setae* on each toe pad. Dr. Robert Full of the University of California, Berkeley, confirmed that van der Waals's theory helped to explain the geckos' climbing ability: the *setae* created thousands of tiny surfaces for van der Waals forces to operate on, helping each one stick a little bit to the wall or rock.
- D** In 2003, researchers at the University of Manchester developed gecko tape from a man-made material that copies gecko feet. By 2012, scientists at the University of Massachusetts had invented Geckskin, a thin material that can attach up to 700 pounds to a wall without leaving any mark. Since then, other institutions have worked to develop robots using the same concepts. For example, NASA has developed gecko-inspired robots for climbing surfaces in space and in extreme environments such as on Mars or the moon. Stanford University designed a robotic hand with sticky "fingers" that could grip and move various objects.

LEVEL 2 Assessment

- E** Inspired by the biology of geckos, researchers around the globe continue to explore ways in which gecko adhesion can be used for consumer, scientific, medical, and military purposes. Scientists suggest that there will probably be many future gecko products.

Choose *True* or *False*.

22. This passage is mostly about the physical characteristics of geckos.
a. True
b. False
23. Geckos stick to walls using tiny suction cups on their toe pads.
a. True
b. False
24. Early scientists did not always do experiments to confirm their theories.
a. True
b. False
25. Van der Waals was a biologist who studied gecko feet.
a. True
b. False
26. NASA developed a climbing robot modeled after geckos.
a. True
b. False

Choose all the sentences that indicate a theory.

27. ☐ At several universities, researchers started experiments to learn more about geckos and how they climbed.
- ☐ Scientists thought that if they could learn how lizards climbed, they could copy how geckos make a strong adhesive, or glue.
- ☐ In the 1800s, a physics scientist named Johannes van der Waals had theorized that there was a weak force between the molecules or atoms in objects that are near each other.

LEVEL 2 Assessment

28. ☐ They believed they would be able to use the same concepts.
- ☐ Early viewers believed that the little lizards had sticky material on their feet that helped them stay on the wall.
- ☐ The famous philosopher wrote that geckos easily climbed up and down, facing in either direction.

Read the sentences. Write the correct synonym for each underlined word.

bendable	car	change	copy	covering	idea
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29. A shark's scales are flexible.

30. Once scientists understood the concept of how gecko feet worked, they could use it to build new technology.

31. Some paleontologists speculate that feathers began as a kind of insulation.

32. Scientists thought that if they could learn how lizards climbed, they could mimic geckos in making a strong adhesive, or glue.

33. Sharks have gone through over 400 million years of evolution.

34. The automotive industry could use the design of the toucan's bill.

LEVEL 2 Assessment

Read the paragraphs.

- A** Mutations, or genetic changes, are passed down from one generation to the next. As more organisms inherit (receive) a mutation, it becomes more common over time. Eventually, the change becomes a normal characteristic of the species. Therefore, the mutation has led to an adaptation.
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- B** Paleontologists found the fossils of a tiny dinosaur named *Microraptor gui*, which lived around 120 million years ago. Chinese scientists who studied the fossils think it didn't fly by flapping, but rather glided between trees using its feathers like a parachute to stay in the air.
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- C** Some paleontologists speculate that feathers began as a kind of insulation. Paleontologists have found theropod fossils with their front limbs spread over their nests. They think this shows that the dinosaurs were using feathers to prevent heat from escaping and to keep their young warm.
-
- D** All organisms are uniquely adapted to the environment in which they live. Scientists are studying the design and the biological processes of these organisms to get ideas for products and technologies. This field of study is called biomimetics.
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- E** In 2003, researchers at the University of Manchester developed gecko tape from a man-made material that mimics gecko feet. By 2012, scientists at the University of Massachusetts had invented Geckskin, a thin material that can attach up to 700 pounds to a wall without leaving any trace. Since then, other institutions have worked to develop robots using the same concepts. For example, NASA has developed gecko-inspired robots for climbing surfaces in space and in extreme environments such as on Mars or the moon. Stanford University designed a robotic hand with sticky "fingers" that could grip and move various objects.

Match each paragraph with its summarizing sentence. Write A–E.

35. _____ Scientists found remains of a small dinosaur that lived long ago, and they speculate that its feathers were used for gliding between trees.
- _____ Biomimetics is the study of plant and animal biology as inspiration for the design of new technologies.
- _____ Animals or plants sometimes pass on changes in their genes, which can become normal features in the whole group over time, helping the organisms adapt.
- _____ Various products have been developed based on geckos' sticky feet, such as materials for attaching objects, and robots that climb and grip objects.
- _____ Finding fossils of dinosaurs with their feathered arms stretched over their nests suggests to experts that the ancient creatures were keeping their babies warm.

LEVEL 2 Assessment

Read the passage.

Biomimetics is the study of examples from nature and how they can help shape new technology. Some people would describe biomimetics as a new science. However, designing products that mimic nature is nothing new. Five hundred years ago, the genius Leonardo da Vinci studied the anatomy and flight patterns of birds in hopes of creating what he called "flying machines." According to Leonardo's notes, one of his earliest memories was of a hawk flying over his bed. This impressed him and later inspired him to closely observe the wing structure of birds and bats and make drawings of how they moved through the air. He believed that if he could figure out how the animals flew, then he could design a machine that worked the same way.

Leonardo's notebooks contain over 500 sketches of flying machines. Some had wings like a bat while others were more like helicopters or parachutes. Based on his study of flying animals, Leonardo came to understand several concepts that even today are essential to *aerodynamics*, the study of how air flows around solid objects. He knew about lift, drag, and airflow. Unfortunately, his work was mostly abstract and, in fact, he never produced a machine that really flew. After his death in 1519, his notes were lost and he is remembered more for his painting than his attempts to mimic the flight of animals.

Put the key ideas in the same order as in the paragraphs. Write 1–5.

36. _____ He believed he could design a flying machine based on the way they flew.
- _____ In the 1500s, Leonardo da Vinci began observing birds and bats.
- _____ Today, da Vinci is remembered mainly for his art, not his biomimetic studies.
- _____ The science of creating technology that mimics nature is actually centuries old.
- _____ Da Vinci understood much about how flying worked, and he produced hundreds of drawings but never succeeded in building a machine.

You are going to write a summary paragraph of a reading text.

37. Summarize one of these two texts.

Learning from the Magic of Gecko Feet

- A** Since the time of Aristotle 2,400 years ago, people have been interested in how gecko lizards stick to walls as they move around. The famous philosopher wrote that geckos easily climbed up and down, facing in either direction. Early viewers believed that the little lizards had sticky material on their feet that helped them stay on the wall. Later, lizard-watchers wondered whether gecko feet had tiny suction cups—small, soft, cup-shaped parts that stick through air pressure when they are pressed on a surface.
- B** Until recent years, it wasn't important to investigate these ideas with experiments. Then, scientists thought that if they could learn how lizards climbed, they could copy how geckos make a strong adhesive, or glue. Scientists hoped to create something that could securely hold a heavy object on a wall, and then be removed without leaving any marks or damage on it. Geckos, unlike sticky tapes and glues, can sit on a wall and climb up and down it without leaving any marks. So, at several universities, researchers started experiments to learn more about geckos and how they climbed. They believed they would be able to use the same concepts.
- C** In the 1800s, a physics scientist named Johannes van der Waals had a theory that there was a weak force between the molecules or atoms in objects that are near each other. This force caused some molecules to attract and stick to neighboring molecules. It became known as a *van der Waals force*. When biologists closely examined geckos' feet, they found hundreds of thousands of tiny hairs called *setae* on each toe pad. Dr. Robert Full of the University of California, Berkeley, confirmed that van der Waals's theory helped to explain the geckos' climbing ability: the *setae* created thousands of tiny surfaces for van der Waals forces to operate on, helping each one stick a little bit to the wall or rock.

Flight

- E** A bird's feathers are not the same shape on each side. They are thin and hard on one side, and long and flexible on the other. To lift themselves into the air, birds turn their wings at a particular angle. This movement allows air to go above and below the wings. The difference in air pressure allows them to fly.
- F** Paleontologists are now studying the closest theropod relatives of birds, looking for clues to when and how feathers were first used for flight. A 150-million-year-old dinosaur called *Anchiornis* may hold the answer. The size of a chicken, it had black-and-white arm and leg feathers. These feathers were similar to modern bird feathers, except that they were the same shape on both sides. Because of this, *Anchiornis* probably wasn't able to fly.
- G** However, paleontologists also found a particular wrist bone in *Anchiornis* fossils. This bone allowed the creature to fold its arms to its sides, keeping its arm feathers off the ground as it walked. Modern birds use a similar bone to pull their wings toward their bodies as they fly upwards. According to scientists, this common characteristic suggests that feathered dinosaurs evolved flight by moving their feathered arms up and down as they ran.

LEVEL 2 Assessment

A. OUTLINE Plan an outline for your paragraph.

Include notes for a topic sentence and at least four key ideas from the original text.

B. Think of some words and phrases you can use in your paragraph. Write them in the box.

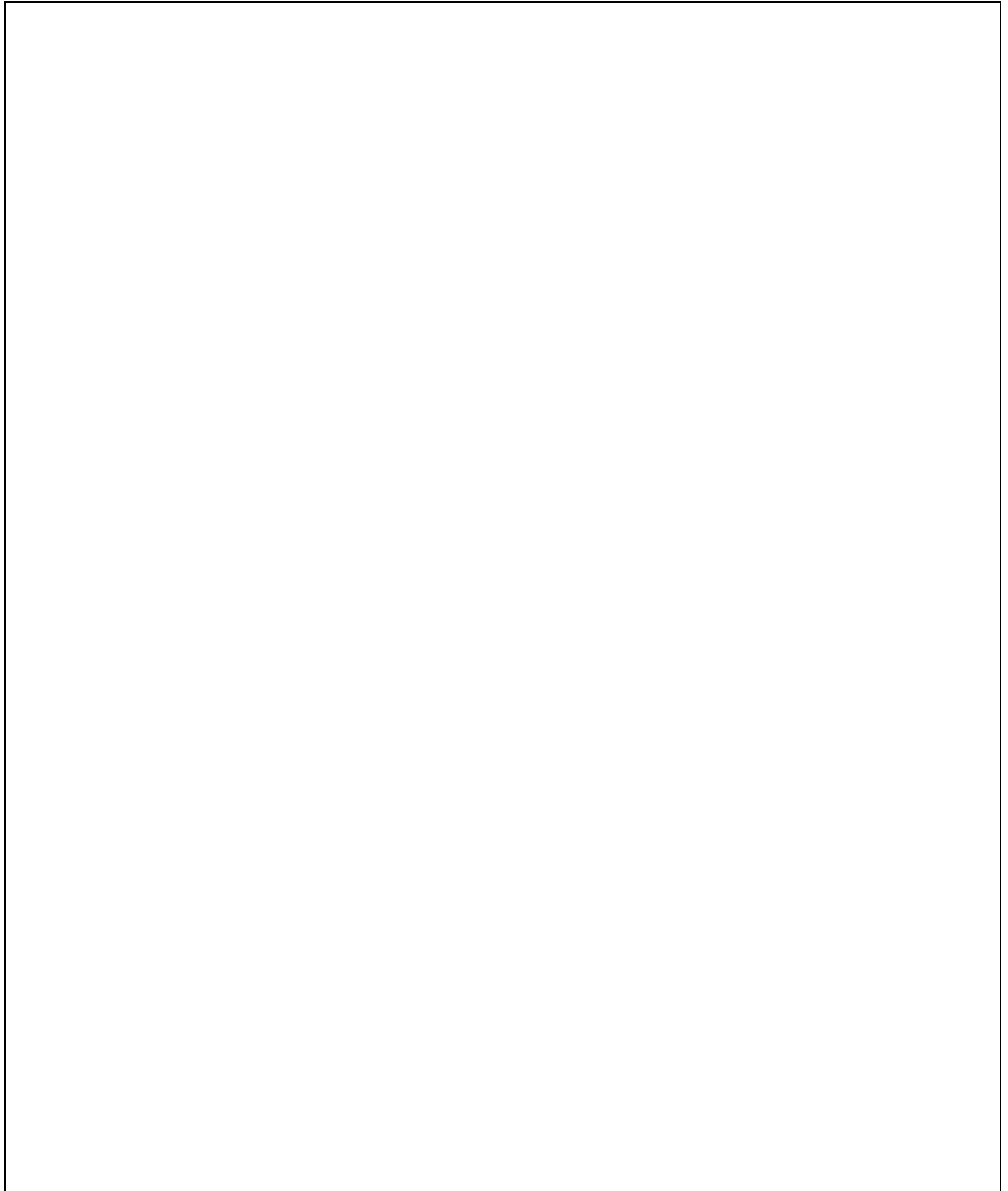
The words and phrases below can be useful when writing your summary.

- *adaptation*
- *advantage*
- *characteristic*
- *evidence*
- *theorize*

C. Write your paragraph based on your outline. Use the model to help you. Remember to use the vocabulary you wrote down. Be sure to put the key ideas in the same order as in the original text. Paraphrase, or restate the information in your own words using synonyms.**Model:*****Summary of the text “Adaptation and Survival” from the Student’s Book pages 166–167***

An adaptation is a change in a plant or an animal that helps it survive in its environment. These changes are often the result of genetic mutations. As more and more organisms inherit a mutation, it eventually becomes a common feature of the species. In other words, the mutation becomes an adaptation. There are two kinds of adaptations: physical and behavioral. A desert plant that can store water in its stem is an example of a physical adaptation. Whale migration is an example of a behavioral adaptation. Occasionally an adaptation occurs for a particular reason, but then it later takes on a different function. Feathers are an example of this type of adaptation.

LEVEL 2 Assessment



(12 points)