Name: _____

WHAT'S THE POINT?

In "Masters of Color" (p. 20), you read about how some animals manipulate light to create amazing colors. Below are three statements that represent the central ideas for three of the four sections of the article. For each statement, determine which section is represented and record at least two facts from it that support the central idea.

CENTRAL IDEA: Learning how animals use structural coloring could help scientists improve technology that relies on light.

SECTION TITLE: _____

_____

SUPPORTING DETAIL 1: _____

_____

SUPPORTING DETAIL 2: _____

_____

CENTRAL IDEA: Very bright colors can be created by colorless structures.

SECTION TITLE: _____

_____

SUPPORTING DETAIL 1: _____

_____

SUPPORTING DETAIL 2: _____

_____

CENTRAL IDEA: Unusual colors and color changes help animals survive in different ways.

SECTION TITLE: _____

_____

SUPPORTING DETAIL 1: _____

_____

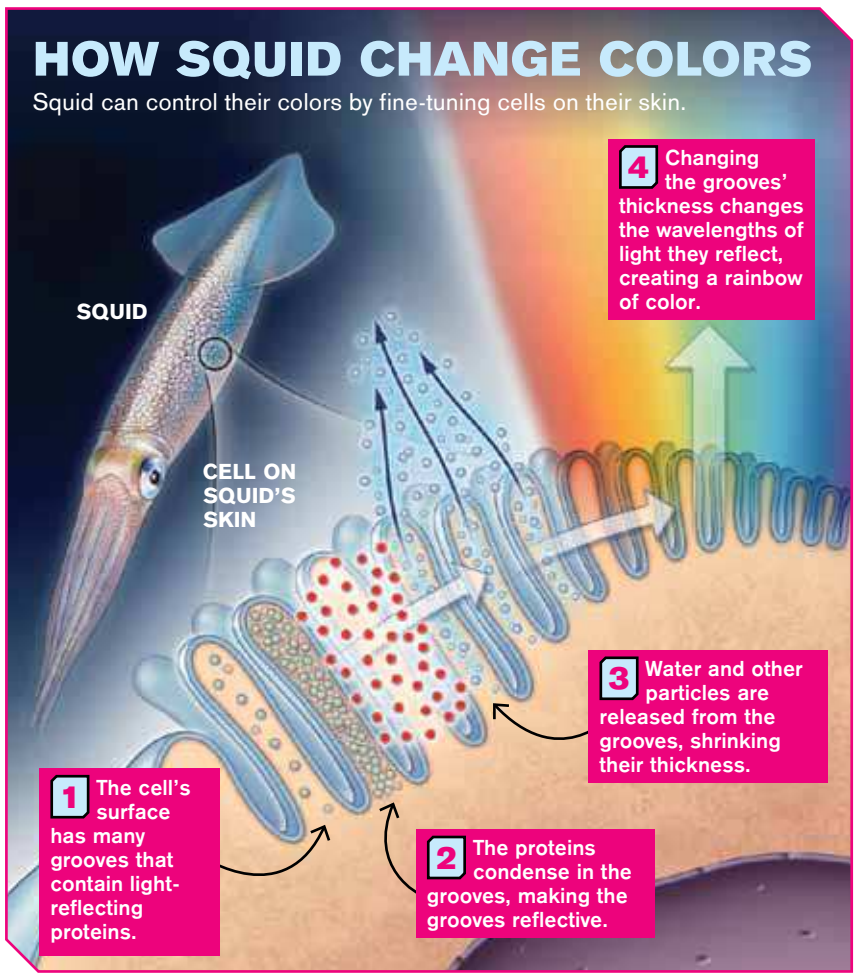
SUPPORTING DETAIL 2: _____

_____

Name: _____

SHOWING ITS COLORS

In "Masters of Color" (p. 20), you learned how structures in some animals' skin create amazing colors. The diagram "How Squid Change Colors" shows the cell structures that help squid shift hues. Study the diagram and then use complete sentences to answer the questions that follow.



QUESTIONS

1. Use your own words to describe how the squid's skin cells look.

2. What causes the cells to reflect light?

3. What do the small bubbles in the diagram represent?

4. Which characteristic of the cells controls the wavelength of light that is reflected?

5. How does the shape of the grooves in the squid's cells change?

6. The changes to the grooves in a squid's cells can be reversed. How do you think these structures can thicken?

Name: _____

PREHISTORIC COLORS

In "Masters of Color" (p. 20), you learned how many animals produce brilliant colors. Read the following passage to learn how the colors of ancient beetles were preserved for millions of years. Then answer the questions that follow.

COLOR PRESERVATION

When many fossilized beetles are unearthed, their ancient remains still shine with brilliant colors. Recent research has shown how these colors compared with the actual shades the insects displayed when they lived millions of years ago.

Like many insects, instead of containing colored pigments, the beetles have *exoskeletons* that owe their bright hues to structural color. Microscopic surfaces in the insects' outer shells interact with light waves to create brilliant colors. When ancient beetles died and were buried under layers of sediment, their remains were exposed to high pressures and temperatures. Scientists didn't know how these conditions changed the color-creating structures.

To find out, researchers used high-powered microscopes to analyze the structures in 15-million-and 47-million-years old beetle fossils. They found that color-creating structures remained. But the effects of fossilization slightly altered the way light travels through the shells. The result: Fossilized beetles appear slightly redder than the insects would have when they were alive. By correcting for this color shift, scientists can now determine the original hues of the ancient insects.

QUESTIONS

1. Which of the following BEST represents the central idea of this passage?

Ⓐ Beetle fossils are still colorful even after being buried for millions of years.
Ⓑ Fossilized insects display slightly different colors than their original hues.
Ⓒ Beetle shells create colors in unusual ways.
Ⓓ Fossilization changes the structure of beetles' shells.

2. How do the beetles described in the passage get their brilliant colors?

Ⓐ They have colored pigments in their shells.
Ⓑ The buried fossils absorb colored minerals from surrounding rocks.
Ⓒ The color comes from chemicals in the food the beetles ate when alive.
Ⓓ Light waves interact with special structures in their exoskeletons.

3. According to the passage, why did scientists think the colors of fossilized beetles would be different from their colors which they were alive?

Ⓐ The fossilization process exposes the insects' remains to high pressures and temperatures.
Ⓑ They thought the beetles' colors would fade.
Ⓒ Today's beetles don't display the same bright colors as the fossils.
Ⓓ Other fossils the scientists studied have different colors from their living forms.

4. The color of a fossilized beetle is ____ than the insect's original hue.

Ⓐ bluer
Ⓑ darker
Ⓒ redder
Ⓓ brighter

5. Which of the following statements is NOT true?

Ⓐ Fossilization destroys the color-creating structures in beetles' shells.
Ⓑ Fossilized beetles can be brightly colored.
Ⓒ Scientists analyzed the exoskeletons of fossilized beetles, some of which were more than 20 million years old.
Ⓓ The results of this research will help scientists determine the original colors of fossilized insects.

Name: _____

OUT OF SIGHT

In "Masters of Color" (p. 20), you learned how some animals reflect light waves in ways that help them get attention or hide from predators. Other animals have adaptations that let them see light in unusual ways. Read the following passage to learn about the extraordinary vision of some animals. Then answer the questions that follow.

ANIMAL VISION

All organisms see by detecting light waves. In humans and many other animals, light passes through the eye's clear covering, called the *cornea*, and then through the disc-shaped *lens*. These structures bend the light waves to focus them on the *retina* at the back of the eye. The lens can adjust automatically to produce a sharp image of an object that's nearby or far away.

Millions of photoreceptor cells inside the retina detect light and send signals to the brain, where the image is processed. *Vertebrates*, or animals with a backbone, like humans, have rod-shaped photoreceptors, which work well in dim light, and cones, which detect colors. *Invertebrate* animals, which have no backbone, often sport photoreceptors shaped like microscopic bottle brushes.

These different structures allow some animals to see the world in ways that humans can only imagine. *Ultraviolet* light has a wavelength that is too short to be detected by the human eye. But some creatures, such as bees, have photoreceptors that are sensitive to these compact waves. Spotting ultraviolet light patterns on flowers helps bees home in on nectar.

QUESTIONS

1. The clear covering on the eye is called the ___.

Ⓐ cornea
Ⓑ lens
Ⓒ retina
Ⓓ lid

2. What photoreceptor shape is common in animals without a backbone?

Ⓐ rod
Ⓑ cone
Ⓒ bottle brush
Ⓓ both rods and cones

3. ____ light has a very ____ wavelength.

Ⓐ Visible; short
Ⓑ Ultraviolet; short
Ⓒ Ultraviolet; long
Ⓓ Invisible; tall

4. Which of the following statements is NOT true?

Ⓐ Humans have photoreceptors that work well in dim light.
Ⓑ Light-sensitive photoreceptors are located in your retinas.
Ⓒ Photoreceptor cells send signals to the brain.
Ⓓ Humans' photoreceptors can detect ultraviolet light.

5. Which of the following BEST describes the central idea of this passage?

Ⓐ Some animals have eye structures to see light that is invisible to humans.
Ⓑ The eye is a complicated structure.
Ⓒ Humans have better eyesight than animals.
Ⓓ Humans can't see all types of light.

6. An animal's eyes are adapted to the lifestyle of the organism. How might a nocturnal raccoon see differently than an eagle?