Name: _____

SAVING THE OZONE

In "Name That Element!" (p. 20), you learned about fluorine. Read the following passage to discover how molecules containing fluorine damaged Earth's atmosphere—and how joint efforts by governments around the world helped solve the problem. Then answer the questions that follow.

RESCUING THE PLANET

Climate change is a hot topic today. But 30 years ago, scientists who studied the atmosphere were more concerned about another environmental issue: Earth's disappearing *ozone layer*. This layer of gas high in the atmosphere shields us from the sun's harmful rays.

In 1985, scientists discovered a gaping hole in the ozone over the South Pole. They determined that the hole was caused by a group of human-made chemicals called *chlorofluorocarbons* (CFCs). At the time, these molecules made of chlorine, fluorine, and carbon were widely used in spray cans and as coolants in refrigerators and air conditioners. When CFCs reach the atmosphere, chemical reactions take place that can break apart ozone molecules.

In 1987, governments around the world agreed to phase out the use of CFCs by 2000. Today, scientists say the ban has had a major positive impact. Ozone levels are still depleted in some areas, because CFCs remain in the atmosphere for a long time. But the amount of CFCs in the atmosphere is declining. Scientists predict the ozone layer will completely recover by 2065.

QUESTIONS

1. Which of the following statements BEST describes the central idea of the passage?

Ⓐ Banning CFCs has helped protect Earth's ozone layer.
Ⓑ CFCs can destroy ozone molecules.
Ⓒ The ozone hole is not as important as climate change.
Ⓓ The ozone layer provides critical protection from the sun's harmful rays.

2. Which of the following details from the article does NOT support the central idea?

Ⓐ The amount of CFCs in the atmosphere is decreasing.
Ⓑ Scientists predict the ozone layer will recover by 2065.
Ⓒ CFCs can be used as coolants.
Ⓓ CFCs in the atmosphere can break down ozone molecules.

3. What is the ozone layer?

Ⓐ the layer of the atmosphere closest to Earth's surface
Ⓑ a hole made of ozone above the South Pole
Ⓒ a layer of CFCs high in the atmosphere
Ⓓ a layer of gas high in the atmosphere that acts as a shield against the sun's harmful rays

4. According to the passage, why is the ozone layer still affected by CFCs today?

Ⓐ CFCs remain in the atmosphere for a long time.
Ⓑ The ban on CFCs was not effective.
Ⓒ Too many countries are still releasing CFCs.
Ⓓ CFC levels in the atmosphere are increasing.

5. Based on the passage, do you think the author feels that people can make a difference in environmental problems? Support your answer with evidence from the text.

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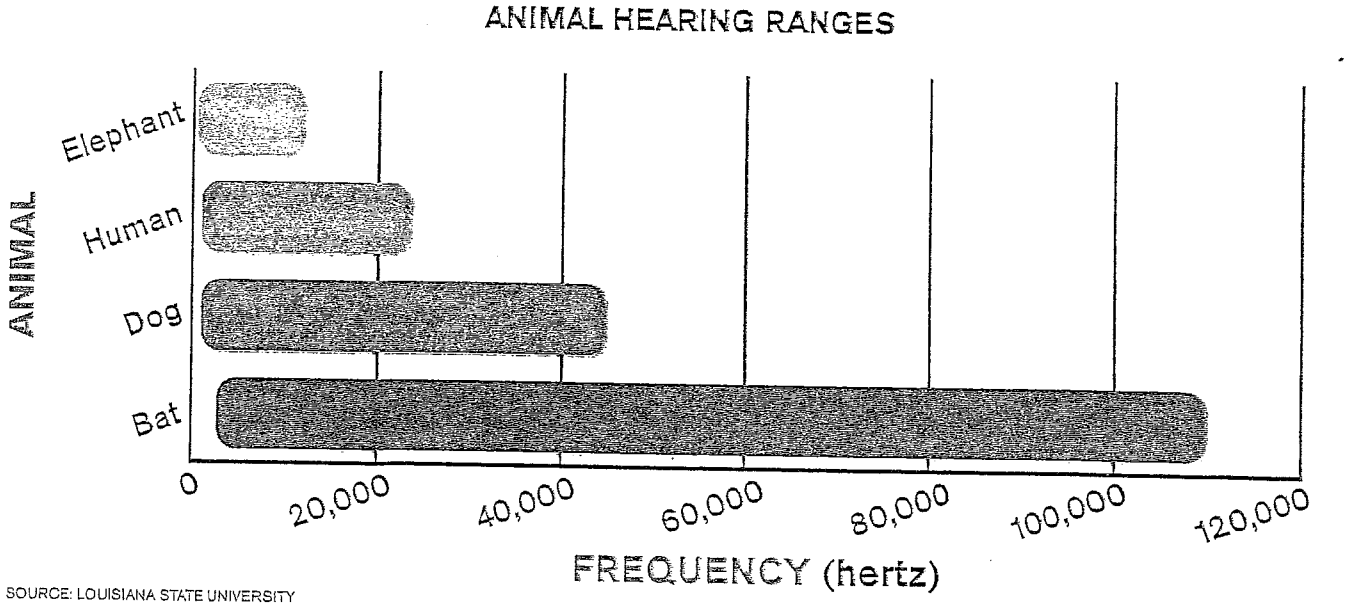
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Name: _____

ALL EARS

In "Mega Music Maker" (p. 12), you learned that the Earth Harp produces sound waves that would be too high for humans to hear if they came from a regular-size harp.

The varied structures of the ears of different organisms mean that each has a unique hearing range. Some animals, like bats, can hear very high-frequency sounds. Others can detect sounds that are too low for humans to hear. The graph below shows the hearing ranges of humans and three animal species. Use the graph to answer the questions that follow.



SOURCE: LOUISIANA STATE UNIVERSITY

QUESTIONS

1. Which animal can hear sounds with the lowest frequency?

2. What is the approximate upper limit of a human's hearing range?

3. Which species hears the smallest range of frequencies?

4. What is the approximate range of frequencies that a bat can hear?

5. Why might it be advantageous for a species to have a different hearing range from other animals that live around it?

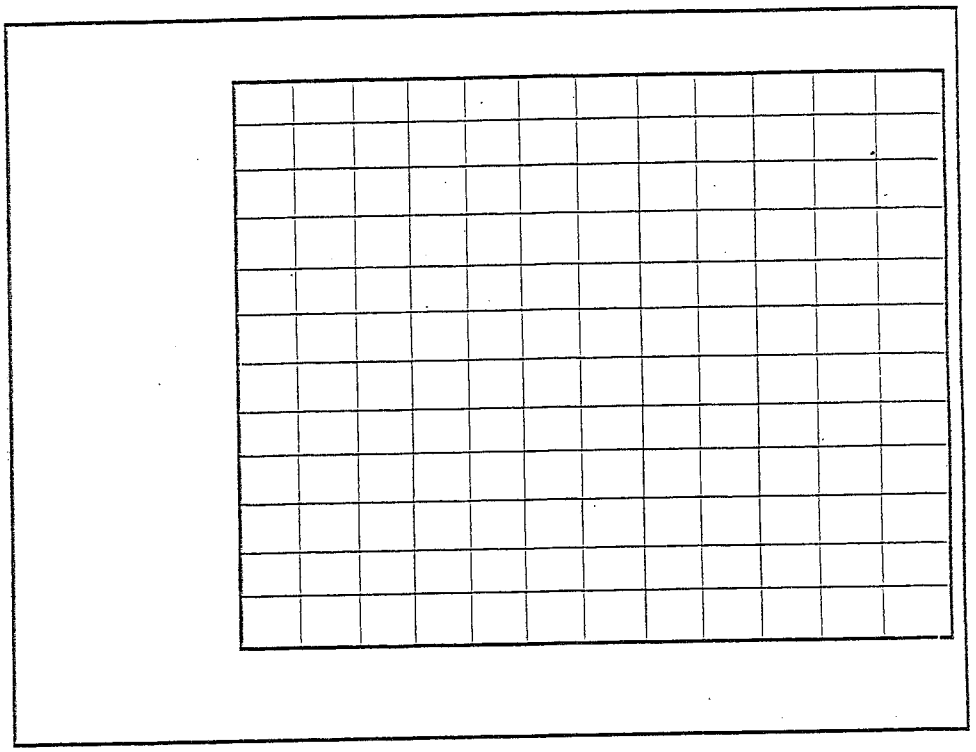
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NAME: _____ CLASS: _____ DATE: _____

CARRYING CAPACITY

DIRECTIONS: Living things occupy certain regions of the world called *ecosystems*. The plants and animals in one ecosystem live together and depend on each other for food and shelter. If certain factors change, such as weather or the introduction of predators, the ecosystem will not support the same number of organisms. In this exercise, the number of sunfish in a pond ecosystem were counted at the beginning of each year. Graph the number of sunfish on the vertical axis and the year on the horizontal axis. Label both axes and give your graph a name. Then, answer the questions below using the graph.

YEAR	NUMBER of SUNFISH
1	5
2	10
3	20
4	40
5	55
6	52
7	48
8	45
9	50
10	53
11	49
12	51



ANSWER THESE QUESTIONS USING THE GRAPH:

1. During which year did the most rapid growth of sunfish take place ? _____
2. In which year was the population less than the year before ? _____
3. What kinds of factors could have caused the decreases ? _____
4. The number of organisms an ecosystem can support its is *carrying capacity*. Use the graph to determine the carrying capacity of this pond for sunfish. _____
5. In order for algae to grow in water ecosystems, the element phosphorus is needed. Even though sunfish do not eat algae, why would the sunfish population decrease in a year when phosphorus was limited? _____
6. During years 2 and 3, the number of minnows doubled in the pond. Using the graph, this means that minnows are
   _____(a) competitors of sunfish.
   _____(b) parasites of sunfish.
   _____(c) predators of sunfish.
   _____(d) prey of sunfish.

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Name: _____

WAVE WARNING

In "Mega Music Maker" (p. 12), you learned about the sound waves produced by an unusual harp. Many things other than musical instruments—including earthquakes—create these vibrating energy waves. Read the passage below to learn how sound waves could one day help warn people of huge water waves called tsunamis that can be triggered by earthquakes. Then answer the questions that follow.

SOUND OF A TSUNAMI

When an earthquake suddenly shakes the seafloor, the moving rock can set off tsunamis that travel far across the ocean and cause severe damage along coastlines. New research suggests that the sound waves that earthquakes produce could help alert people that these massive waves are approaching.

Tsunami warning systems already exist in many places. Floating devices can sense the vibrations from undersea earthquakes and measure changes in water pressure to detect large approaching waves. But these systems may give people only a few minutes' notice, and they can't always accurately predict the tsunami's size.

Now scientists are trying to come up with better methods by studying an earthquake that struck off the coast of Japan in 2011, which generated a massive tsunami. Their research suggests that earthquakes that cause tsunamis release sound waves with a larger *amplitude*, or height of the sound waves' peaks, than earthquakes that don't create tsunamis. The higher the amplitude of the sound waves, they found, the taller the tsunami will be.

Sound waves travel through the water 10 times faster than a tsunami does. If scientists can create a system to detect and analyze the underwater sound waves in real time, they may be able to give better warnings before a tsunami hits.

QUESTIONS

1. Which of the following is a limitation of current tsunami warning systems?

Ⓐ They work only for large earthquakes.
Ⓑ Only a few places have the warning systems.
Ⓒ They don't measure the strength of the earthquake.
Ⓓ People may have only a few minutes' warning.

2. What is a wave's amplitude?

Ⓐ the speed at which it travels
Ⓑ the height of its peaks
Ⓒ the direction in which it travels
Ⓓ the distance between two peaks

3. Which of the following BEST describes the central idea of the passage?

Ⓐ Large earthquakes cause deadly tsunamis.
Ⓑ Earthquakes release sound waves.
Ⓒ Sound waves could be monitored to improve tsunami warnings.
Ⓓ Current tsunami warning systems are not good enough.

4. Which of the following is NOT a reason that sound waves could help improve tsunami warnings?

Ⓐ Only tsunami-causing earthquakes release sound waves.
Ⓑ The height of the sound waves is related to the size of the tsunami.
Ⓒ Sound waves travel faster through the water than tsunamis do.
Ⓓ Earthquakes that produce tsunamis release sound waves with high amplitudes.

5. Why do you think it is important for people onshore to know the size of an approaching tsunami?

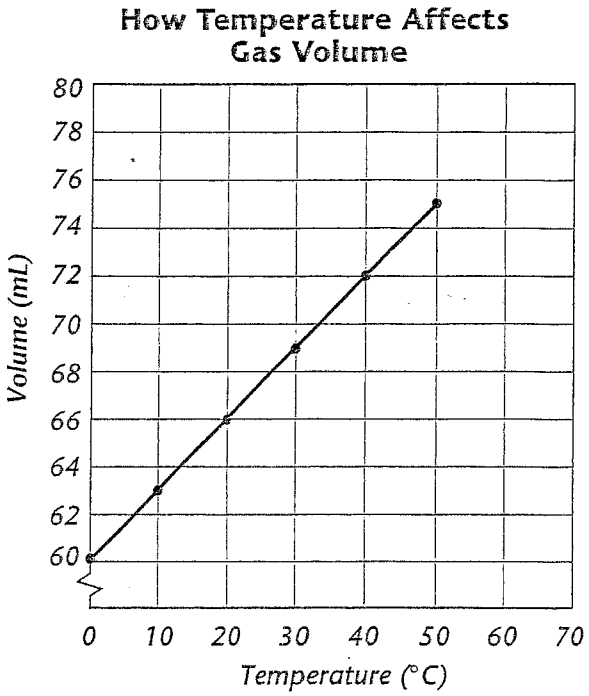
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Name _____ Date _____ Class _____

Skills Test A: Basic Process Skills *(continued)*

Questions 17–18: Read the paragraph below and examine the graph. Then answer each question on the line at the left.

A scientist heated an expandable rubber container. As the container was heated, the gas inside expanded. The scientist measured the container's size at every temperature increase of 10 degrees and then graphed the data as shown at the right.



_____ 1. Determine the size of the container when the temperature is 25°C.

_____ 2. Predict what the container size would be if the temperature were 60°C.

Questions Use the following student notes to match the correct information from Column 2 with each item in Column 1. Write the letter of the correct answer on the line at the left.

I investigated yeast, tiny organisms that give off carbon dioxide gas as they grow. In two bottles, I put 2 mL of yeast, 5 mL of sugar, and water. In Bottle A, I used 250 mL of cold water (20°C). In Bottle B, I used 250 mL of warm water (40°C). I attached a balloon to each bottle. After five minutes, I observed bubbles forming on the surface inside both bottles, and the balloons on both bottles expanded. The balloon on Bottle B became about twice as large as the balloon on Bottle A.

Column 1 Sections of a Lab Report	Column 2 Information to Use in a Lab Report
_____ 3. Problem or Question	a. If you increase the water temperature, then the yeast will give off more gas.
_____ 4. Hypothesis	b. After five minutes, Balloons A and B expanded. Balloon B expanded more than Balloon A.
_____ 5. Materials	c. Yeast give off more gas at higher temperatures.
_____ 6. Procedure	d. What factors help yeast to grow?
_____ 7. Observations	e. Balloon B became bigger than Balloon A, so that means that the yeast in Balloon B gave off more gas.
_____ 8. Analysis	f. Combine the yeast, sugar and water in a bottle. Put a balloon on the bottle.
_____ 9. Conclusion	g. Yeast, sugar, warm and cool water, containers, timer

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Name _____

INQUIRY SKILL FOCUS

Skills Test A: Basic Process Skills

Questions 1–4: Read each statement. If the statement is an observation, write "O" on the line at the left. If the statement is an inference, write "I" on the line at the left.

_____ 1. I hear a dog barking.

_____ 2. In two weeks, there will be snow on the ground.

_____ 3. The temperature today is 4°C.

_____ 4. I smell smoke coming from the pile of wood.

I wondered if the amount of sunlight that plants receive affects how quickly the plants grow. I took bean seeds and planted them in soil. Each pot had 5 seeds.

Every day I watered the bean seedlings. Each pot of seedlings was given 10 mL of water each day. I kept all the pots of seedlings at 20°C.

One pot of seedlings got 2 hours of sunlight each day. Another pot of seedlings got 6 hours of sunlight each day. Another pot of seedlings got 10 hours of sunlight each day.

Every day I measured and recorded the height of the seedlings.

a. room temperature

b. hours of sunlight

c. amount of water

d. type of seeds

e. rate of growth

Controlled Variables

1. _____

2. _____

3. _____

Manipulated Variables

4. _____

Responding Variables

5. _____

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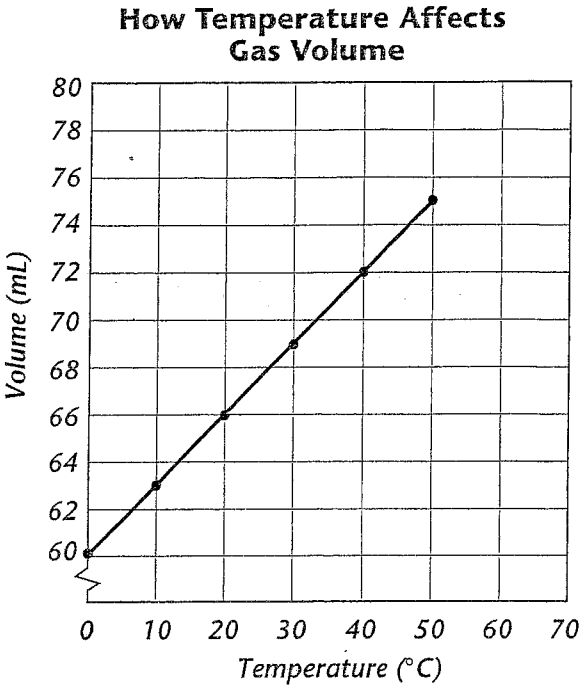
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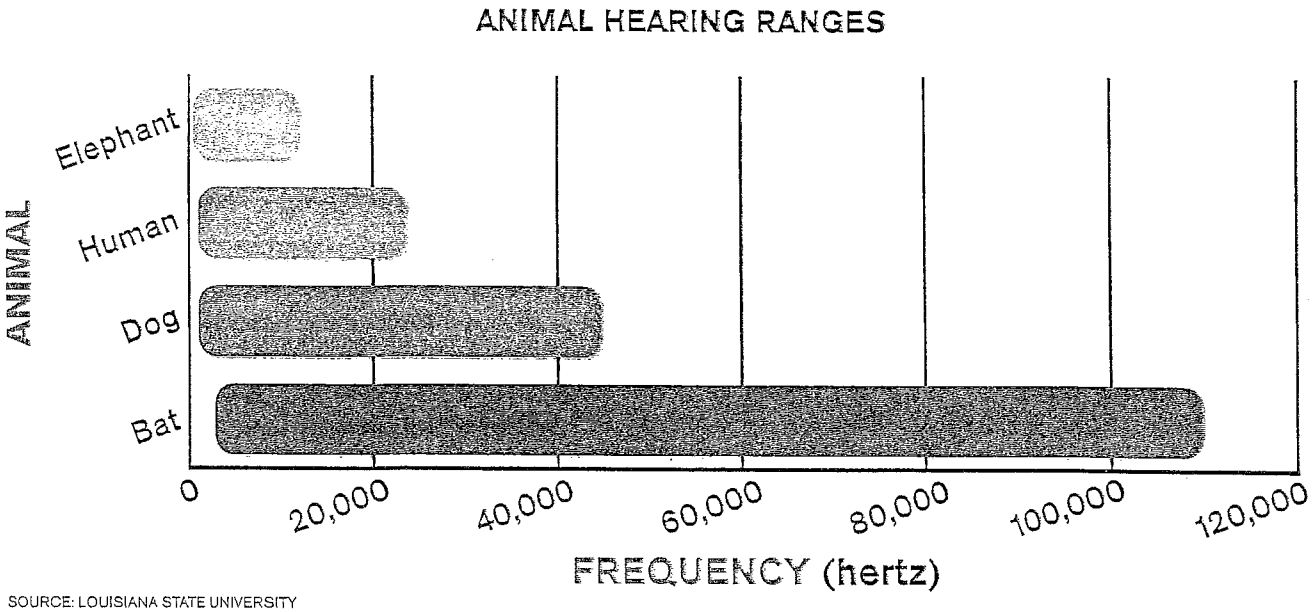
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In 1985, scientists discovered a gaping hole in the ozone over the South Pole. They determined that the hole was caused by a group of human-made chemicals called *chlorofluorocarbons* (CFCs). At the time, these molecules made of chlorine, fluorine, and carbon were widely used in spray cans and as coolants in refrigerators and air conditioners. When CFCs reach the atmosphere, chemical reactions take place that can break apart ozone molecules.

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QUESTIONS

1. Which of the following statements BEST describes the central idea of the passage?

Ⓐ Banning CFCs has helped protect Earth's ozone layer.
Ⓑ CFCs can destroy ozone molecules.
Ⓒ The ozone hole is not as important as climate change.
Ⓓ The ozone layer provides critical protection from the sun's harmful rays.

2. Which of the following details from the article does NOT support the central idea?

Ⓐ The amount of CFCs in the atmosphere is decreasing.
Ⓑ Scientists predict the ozone layer will recover by 2065.
Ⓒ CFCs can be used as coolants.
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3. What is the ozone layer?

Ⓐ the layer of the atmosphere closest to Earth's surface
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4. According to the passage, why is the ozone layer still affected by CFCs today?

Ⓐ CFCs remain in the atmosphere for a long time.
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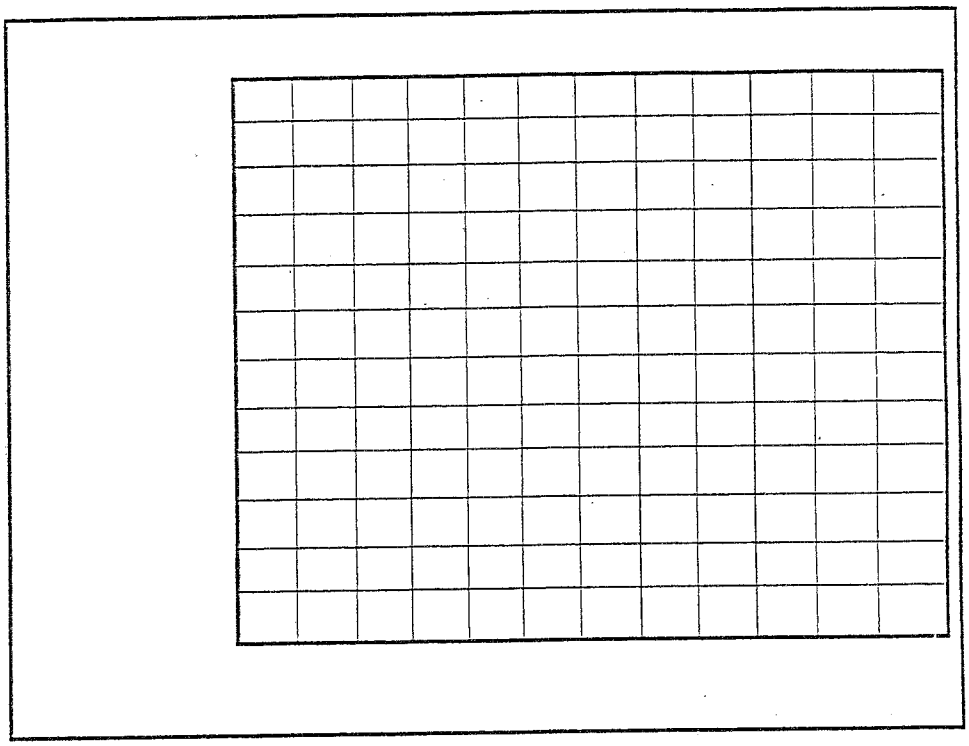
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NAME: _____ CLASS: _____ DATE: _____

CARRYING CAPACITY

DIRECTIONS: Living things occupy certain regions of the world called *ecosystems*. The plants and animals in one ecosystem live together and depend on each other for food and shelter. If certain factors change, such as weather or the introduction of predators, the ecosystem will not support the same number of organisms. In this exercise, the number of sunfish in a pond ecosystem were counted at the beginning of each year. Graph the number of sunfish on the vertical axis and the year on the horizontal axis. Label both axes and give your graph a name. Then, answer the questions below using the graph.

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ANSWER THESE QUESTIONS USING THE GRAPH:

1. During which year did the most rapid growth of sunfish take place ? _____
2. In which year was the population less than the year before ? _____
3. What kinds of factors could have caused the decreases ? _____
4. The number of organisms an ecosystem can support its is *carrying capacity*. Use the graph to determine the carrying capacity of this pond for sunfish. _____
5. In order for algae to grow in water ecosystems, the element phosphorus is needed. Even though sunfish do not eat algae, why would the sunfish population decrease in a year when phosphorus was limited?
6. During years 2 and 3, the number of minnows doubled in the pond. Using the graph, this means that minnows are
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   _____(c) predators of sunfish.
   _____(d) prey of sunfish.

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Name: _____

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2. What is a wave's amplitude?

Ⓐ the speed at which it travels
Ⓑ the height of its peaks
Ⓒ the direction in which it travels
Ⓓ the distance between two peaks

3. Which of the following BEST describes the central idea of the passage?

Ⓐ Large earthquakes cause deadly tsunamis.
Ⓑ Earthquakes release sound waves.
Ⓒ Sound waves could be monitored to improve tsunami warnings.
Ⓓ Current tsunami warning systems are not good enough.

4. Which of the following is NOT a reason that sound waves could help improve tsunami warnings?

Ⓐ Only tsunami-causing earthquakes release sound waves.
Ⓑ The height of the sound waves is related to the size of the tsunami.
Ⓒ Sound waves travel faster through the water than tsunamis do.
Ⓓ Earthquakes that produce tsunamis release sound waves with high amplitudes.

5. Why do you think it is important for people onshore to know the size of an approaching tsunami?

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