Name: _____ Date: _____

The Odd Water That Saves Pond Fish

Circle group

On a bitter winter day, a pond may be covered with ice. Yet the fish and frogs below can live through the whole season. They are saved by a strange habit of water. Almost every other liquid gets denser as it cools, and its solid sinks. Water does not follow this rule all the way down.

As water cools, it gets denser, like other liquids. This lasts until it reaches about four degrees Celsius. Then something odd happens. As the water nears freezing, its tiny particles lock into an open, six-sided pattern. The pattern holds the particles a little farther apart. So ice takes up more space than the same amount of liquid water. That makes ice less dense, so it floats.

What if ice sank? The ice that formed on top would drop to the bottom. The top would freeze and sink again. A shallow pond could freeze solid from the bottom up, and little could live there.

But ice floats, so it forms a lid. The lid works as insulation. It slows the loss of heat from the water below. The water just under the ice stays near freezing. The deepest water stays a little warmer, at about four degrees. In this quiet layer, fish slow down, use little energy, and wait for spring.

Questions

1. What do most liquids do as they cool?

_____

_____

2. At about what temperature is water at its densest?

_____

_____

3. What does the six-sided pattern of ice do to the particles?

_____

_____

4. Why does ice float?

_____

_____

5. What could happen to a shallow pond if ice sank?

_____

_____

6. How does the lid of ice help the animals below?

_____

_____

Words to know

denser: packed more tightly, so it has more matter in the same space
particles: the tiny pieces that make up all matter
insulation: a layer that slows the escape of heat

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Odd Water That Saves Pond Fish

Triangle group

On a bitter winter day, a pond can be covered with ice, yet fish and frogs below it may live through the whole season. They owe their survival to a strange habit of water. Almost every other liquid grows denser as it cools, and a solid sinks in its own liquid. Water does not follow this rule all the way down, and that exception changes life in cold places.

As water cools, it grows denser, as other liquids do, until it reaches about four degrees Celsius. Below that, something unusual happens. The tiny particles of water begin to lock into an open, six-sided pattern as the water approaches freezing. This pattern holds the particles slightly farther apart than they were in the liquid. The result is that ice takes up more space than the same amount of liquid water, so ice is less dense and floats.

Imagine what would happen if ice sank. Each winter, ice that formed at the surface would drop to the bottom, and the surface would freeze again and sink in turn. A shallow pond could slowly freeze solid from the bottom up, and little could live there.

Because ice floats, it forms a lid instead. The lid also acts as insulation, slowing the loss of heat from the water beneath it. Water just under the ice stays near the freezing point, while the deepest water stays a little warmer, at about four degrees. In this quiet, dim layer, fish slow down, use little energy, and wait for spring.

Questions

1. What happens to most liquids as they cool?

_____

_____

2. At about what temperature is water at its densest?

_____

_____

3. What does the open, six-sided pattern of ice do to the water particles?

_____

_____

4. Why does ice float on water?

_____

_____

5. What could happen to a shallow pond if ice sank?

_____

_____

6. How does the floating lid of ice help the animals below?

_____

_____

Words to know

denser: packed more tightly, so it has more matter in the same space
particles: the tiny pieces that make up all matter
insulation: a layer that slows the escape of heat
survival: staying alive through a hard time
exception: something that does not follow the usual rule

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Odd Water That Saves Pond Fish

Square group

On a bitterly cold winter day, a pond may be sealed beneath a sheet of ice, and yet the fish and frogs underneath can often survive the entire season. They owe their survival to a peculiar behavior of water. Nearly every other liquid becomes denser as it cools, which means that a solid formed from it sinks in the liquid. Water follows this rule only part of the way, and that exception transforms life in cold regions.

As water cools, it becomes denser, as other liquids do, until it reaches roughly four degrees Celsius. Below that point, something unexpected occurs. As the water approaches freezing, its tiny particles begin to lock into an open, six-sided pattern, and this arrangement holds them slightly farther apart than they were in the liquid. As a result, ice occupies more space than the same amount of liquid water, so it is less dense and it floats.

Consider what would happen if ice sank instead. Each winter, ice that formed at the surface would fall to the bottom, and the newly exposed surface would freeze and sink in its turn. A shallow pond might gradually freeze solid from the bottom upward, leaving almost nothing alive inside.

Because ice floats, it forms a protective lid. This lid also serves as insulation, which slows the escape of heat from the water below. The layer just beneath the ice remains close to the freezing point, while the deepest water stays a little warmer, at about four degrees. In that quiet, dim layer, fish become sluggish, spend very little energy, and wait patiently for spring.

Questions

1. What does nearly every other liquid do as it cools?

_____

_____

2. At roughly what temperature is water at its densest?

_____

_____

3. What effect does the open, six-sided pattern of ice have on the water particles?

_____

_____

4. Why does ice float on liquid water?

_____

_____

5. What might happen to a shallow pond if ice sank?

_____

_____

6. How does the floating lid of ice benefit the animals underneath?

_____

_____

Words to know

denser: packed more tightly, so it has more matter in the same space
particles: the tiny pieces that make up all matter
insulation: a layer that slows the escape of heat
survival: staying alive through a hard time
exception: something that does not follow the usual rule

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: The Odd Water That Saves Pond Fish

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: The Odd Water That Saves Pond Fish

Easier · 217 words · Flesch-Kincaid grade 4

1. They get denser.
2. About four degrees Celsius.
3. It holds them a little farther apart.
4. It takes up more space than the same amount of liquid water, so it is less dense.
5. It could freeze solid from the bottom up.
6. It insulates the water, so the water underneath stays liquid.

Triangle: The Odd Water That Saves Pond Fish

This passage · 254 words · Flesch-Kincaid grade 7.1

1. They grow denser.
2. About four degrees Celsius.
3. It holds them slightly farther apart.
4. It takes up more space than the same amount of liquid water, so it is less dense.
5. It could slowly freeze solid from the bottom up.
6. It insulates the water, so the water underneath stays liquid.

Square: The Odd Water That Saves Pond Fish

Harder · 267 words · Flesch-Kincaid grade 8.9

1. It becomes denser.
2. Roughly four degrees Celsius.
3. It holds them slightly farther apart than in the liquid.
4. It occupies more space than the same amount of liquid water, so it is less dense.
5. It might gradually freeze solid from the bottom upward.
6. It insulates the water below, so that water remains liquid.