Name: _____ Date: _____

The Chilly Layer Beneath the Warm Sea

Circle group

Dive down from the top of the sea on a sunny day. The first few feet feel warm. Go a little deeper, and you may cross an invisible line where the water turns chilly. That line has a name. It is the thermocline. It is the layer where the water gets colder fast as you go deeper.

The ocean has three main parts. At the top is a surface layer. The sun warms it, and wind and waves churn it, so its temperature is fairly even. Below the thermocline is the deep water. It is cold and dark. Sunlight barely reaches it, so it stays cold all year. The thermocline sits between them like a thin blanket.

The thermocline matters because warm water is lighter than cold water. Light water resting on heavy water is steady, so the two do not mix easily. The chilly layer works a bit like a lid. Nutrients that sink toward the bottom, such as the remains of dead plankton, often stay down there. They do not rise to the sunny surface.

Where the sea is warmest, near the equator, the thermocline is usually always there. In colder places, it may appear in summer and fade in winter, when storms stir the water from top to bottom. Scientists track it because it affects where fish gather and how the ocean moves heat around the planet.

Questions

1. What is the thermocline?

_____

_____

2. Why is the surface layer's temperature fairly even?

_____

_____

3. Why does the deep water stay cold all year?

_____

_____

4. Why do the warm and cold layers not mix easily?

_____

_____

5. How is the thermocline like a lid?

_____

_____

6. Why might a thermocline fade in winter in cold places?

_____

_____

Words to know

thermocline: the layer where ocean temperature drops quickly
churn: to stir up and mix with force
plankton: tiny living things that drift in the sea
equator: the imaginary line around the middle of Earth
nutrients: substances that living things need to grow

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 Chilly Layer Beneath the Warm Sea

Triangle group

If you dive down from the surface of the sea on a sunny day, the first few feet feel warm. Go a little deeper, and you may cross an invisible line where the water suddenly turns chilly. That line has a name. It is the thermocline, the layer where the temperature drops quickly as the depth increases.

The ocean has three main parts. At the top is a surface layer. The sun warms it, and the wind and waves churn it, so its temperature is fairly even. Below the thermocline lies the deep water, which is cold and dark. The sunlight barely reaches it, so it stays cold all year long. The thermocline sits between them like a thin blanket.

The thermocline matters because warm water is lighter than cold water. A layer of light water resting on heavy water is steady, so the two do not mix easily. That means the chilly layer works a bit like a lid. Nutrients that sink toward the bottom, such as the remains of dead plankton, often stay down there instead of rising to the sunlit surface.

Where the sea is warmest, near the equator, the thermocline is usually always present. In colder regions, it may appear in summer and fade away in winter, when storms stir the water from top to bottom. Scientists track it because it affects where fish gather and how the ocean moves heat around the planet.

Questions

1. What is the thermocline?

_____

_____

2. Why is the temperature of the surface layer fairly even?

_____

_____

3. Why does the deep water stay cold all year?

_____

_____

4. Why do the warm and cold layers not mix easily?

_____

_____

5. How is the thermocline like a lid?

_____

_____

6. Why might a thermocline fade away in winter in cold regions?

_____

_____

Words to know

thermocline: the layer where ocean temperature drops quickly
churn: to stir up and mix with force
plankton: tiny living things that drift in the sea
equator: the imaginary line around the middle of Earth
nutrients: substances that living things need to grow

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 Chilly Layer Beneath the Warm Sea

Square group

If you were to dive down from the surface of the sea on a sunny day, the first few feet would feel pleasantly warm. Go a little deeper, however, and you may cross an invisible boundary where the water abruptly turns chilly. That boundary has a name. It is the thermocline, the layer in which the temperature drops rapidly as the depth increases.

The ocean has three main parts. At the top lies a surface layer, which the sun warms and the wind and waves churn, so its temperature is fairly uniform. Beneath the thermocline lies the deep water, which is cold and dark. Sunlight barely penetrates that far, so the deep water remains cold throughout the year. The thermocline lies between the two, like a thin blanket.

The thermocline is significant because warm water is lighter than cold water. A layer of light water resting on heavy water is stable, so the two do not mix easily. As a result, the chilly layer behaves somewhat like a lid. Nutrients that sink toward the bottom, such as the remains of dead plankton, frequently stay down there instead of rising to the sunlit surface.

Where the sea is warmest, near the equator, a thermocline is usually present all year. In colder regions it may appear in summer and then fade away in winter, when storms stir the water from top to bottom. Scientists keep track of it because it influences where fish gather and how the ocean moves heat around the planet.

Questions

1. What is the thermocline?

_____

_____

2. Why is the temperature of the surface layer fairly uniform?

_____

_____

3. Why does the deep water remain cold throughout the year?

_____

_____

4. Why do the warm and cold layers not mix easily?

_____

_____

5. In what way does the thermocline behave like a lid?

_____

_____

6. Why might a thermocline fade away in winter in colder regions?

_____

_____

Words to know

thermocline: the layer where ocean temperature drops quickly
churn: to stir up and mix with force
plankton: tiny living things that drift in the sea
equator: the imaginary line around the middle of Earth
nutrients: substances that living things need to grow

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 Chilly Layer Beneath the Warm Sea

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

Circle: The Chilly Layer Beneath the Warm Sea

Easier · 230 words · Flesch-Kincaid grade 4.5

1. The layer where the water gets colder fast as the depth increases.
2. Wind and waves churn it, so the water is mixed.
3. Sunlight barely reaches it.
4. Light warm water resting on heavy cold water is steady.
5. It keeps nutrients that sank from rising to the surface.
6. Storms stir the water from top to bottom.

Triangle: The Chilly Layer Beneath the Warm Sea

This passage · 238 words · Flesch-Kincaid grade 6.1

1. The layer where the water temperature drops quickly as depth increases.
2. Wind and waves churn it, so the water is mixed.
3. Sunlight barely reaches it.
4. Light warm water rests on heavy cold water, which is a steady arrangement.
5. It keeps nutrients that sank toward the bottom from rising to the surface.
6. Storms stir the water from top to bottom.

Square: The Chilly Layer Beneath the Warm Sea

Harder · 251 words · Flesch-Kincaid grade 7.5

1. The layer in which the temperature drops rapidly as the depth increases.
2. The wind and waves churn it, so the water is mixed.
3. Sunlight barely penetrates that far.
4. Light water resting on heavy water is stable.
5. It keeps nutrients that sank toward the bottom from rising to the sunlit surface.
6. Storms stir the water from top to bottom.