Name: _____ Date: _____

A Sound Channel Deep Under the Sea

Circle group

Sound acts strangely in the deep ocean. In the right conditions, it can travel very far, bending along a path as if it were guided through a pipe. This path is called the deep sound channel. It exists because of how temperature and pressure change with depth.

Sound moves at different speeds in different parts of the sea. Warm water makes it faster. So does greater pressure. Near the surface, the water is warm, so sound is fairly fast. Deeper down, the water is colder and sound slows. Far below, the temperature stops falling, but the pressure keeps climbing. That makes sound speed up again. Somewhere in the middle is a layer where sound is slowest.

This matters because sound waves bend toward places where they move more slowly, much as light bends when it enters water. A sound that starts in or near the slow layer keeps getting bent back toward it. It does not spread out and fade. It stays trapped in a thin band, rising and falling around the slow layer as it moves along. Very little energy is lost to the surface or the sea floor, so the sound goes far.

Scientists use the channel. They send low-pitched signals across wide stretches of ocean and measure how long the signals take to arrive. This gives clues about the temperature of the water along the way. A hidden layer in the sea is a highway for sound.

Questions

1. What is the deep sound channel?

_____

_____

2. What makes sound faster near the surface?

_____

_____

3. What makes sound speed up again far below?

_____

_____

4. Why does sound in the channel not fade quickly?

_____

_____

5. Why can the travel time of signals tell scientists about water temperature?

_____

_____

6. Why is the channel called a highway for sound?

_____

_____

Words to know

channel: a narrow path that something flows or travels along
pressure: the push of the water above pressing down on what is below
layer: one level lying on top of or beneath others
energy: the power that makes things move or change
signals: messages or sounds sent from one place to another

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: _____

A Sound Channel Deep Under the Sea

Triangle group

Sound behaves strangely in the deep ocean. Under the right conditions, it can travel for enormous distances, bending along a path as though it were guided through a pipe. This path is known as the deep sound channel, and it exists because of how temperature and pressure change with depth.

Sound moves at different speeds in different parts of the sea. Warm water speeds it up, and so does greater pressure. Near the surface, the water is warm, so sound travels fairly fast. As you go deeper, the water grows colder and sound slows down. Far below, though, the temperature stops falling, while the pressure keeps climbing, and that causes sound to speed up again. Somewhere in between lies a layer where sound travels most slowly.

This matters because sound waves bend toward regions where they travel more slowly, much as light bends when it enters water. A sound that starts in or near the slow layer keeps getting bent back toward it. Instead of spreading out and fading, it stays trapped in a thin band, rising and falling around the slow layer as it moves along. Very little energy is lost to the surface or the sea floor, so the sound can carry far.

Scientists put the channel to use. By sending low-pitched signals across wide stretches of ocean and measuring how long they take to arrive, they can gather clues about the temperature of the water along the way. A hidden layer inside the sea turns out to be a highway for sound.

Questions

1. What is the deep sound channel?

_____

_____

2. What makes sound travel faster near the surface?

_____

_____

3. What makes sound speed up again far below the surface?

_____

_____

4. Why does sound inside the channel not fade quickly?

_____

_____

5. Why can travel times of signals tell scientists about water temperature?

_____

_____

6. Why is the channel compared to a highway?

_____

_____

Words to know

channel: a narrow path that something flows or travels along
pressure: the push of the water above pressing down on what is below
layer: one level lying on top of or beneath others
energy: the power that makes things move or change
signals: messages or sounds sent from one place to another

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: _____

A Sound Channel Deep Under the Sea

Square group

Sound behaves in a remarkably peculiar manner in the deep ocean. Under the right conditions, it can travel across enormous distances, curving along a path as though it were being guided through a pipe. This path is known as the deep sound channel, and it exists because of the way temperature and pressure change as depth increases.

Sound moves at different speeds in different parts of the sea. Warm water speeds it up, and so does greater pressure. Near the surface, the water is warm, so sound travels fairly quickly. As you descend, the water grows colder and sound slows down. Far below, however, the temperature stops falling while the pressure continues to climb, and that causes sound to speed up again. Somewhere in between lies a layer in which sound travels most slowly of all.

This is significant because sound waves bend toward regions where they travel more slowly, much as light bends when it passes into water. A sound that begins in or near the slow layer is continually bent back toward it. Rather than spreading out and fading away, it remains trapped in a thin band, rising and falling around the slow layer as it moves along. Very little energy is lost to the surface or the sea floor, so the sound is able to carry a great distance.

Scientists have put the channel to use. By sending low-pitched signals across wide stretches of ocean and measuring how long they take to arrive, they can gather clues about the temperature of the water along the way. A hidden layer inside the sea turns out to be a highway for sound.

Questions

1. What is the deep sound channel?

_____

_____

2. What makes sound travel faster near the surface?

_____

_____

3. What causes sound to speed up again far below the surface?

_____

_____

4. Why does sound inside the channel not fade away quickly?

_____

_____

5. Why can the travel times of signals reveal clues about water temperature?

_____

_____

6. Why is the channel compared to a highway for sound?

_____

_____

Words to know

channel: a narrow path that something flows or travels along
pressure: the push of the water above pressing down on what is below
layer: one level lying on top of or beneath others
energy: the power that makes things move or change
signals: messages or sounds sent from one place to another

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: A Sound Channel Deep Under the Sea

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

Circle: A Sound Channel Deep Under the Sea

Easier · 241 words · Flesch-Kincaid grade 4.6

1. A path in the deep ocean along which sound can travel very far.
2. The warm water.
3. The pressure keeps climbing while the temperature stops falling.
4. It is bent back toward the slow layer and stays trapped in a thin band, so little energy is lost.
5. Sound speed depends on temperature, so the timing gives clues.
6. Sound can travel along it very far.

Triangle: A Sound Channel Deep Under the Sea

This passage · 256 words · Flesch-Kincaid grade 6.8

1. A path in the deep ocean along which sound can travel enormous distances.
2. The warm water.
3. The pressure keeps climbing while the temperature stops falling.
4. It is bent back toward the slow layer and stays trapped in a thin band, so little energy is lost.
5. Sound speed depends on temperature, so the timing gives clues about it.
6. Sound can travel along it quickly and for very long distances.

Square: A Sound Channel Deep Under the Sea

Harder · 274 words · Flesch-Kincaid grade 8

1. A path in the deep ocean along which sound can travel across enormous distances.
2. The warm water.
3. The pressure continues to climb while the temperature stops falling.
4. It is bent back toward the slow layer and stays trapped in a thin band, so very little energy is lost.
5. The speed of sound depends on temperature, so the timing gives clues about it.
6. Sound can travel along it quickly and across very long distances.