Name: _____ Date: _____

Why a Thermos Keeps Soup Hot

Circle group

You pour hot soup into a bottle in the morning. At lunch the soup is still warm. How?

The secret is in the walls. A thermos is a bottle inside a bottle. Between the walls, almost all the air is gone. Heat cannot cross empty space well. So the warmth of the soup stays in.

The inside walls are often shiny. A shiny wall bounces heat back, like a mirror bounces light. A tight stopper at the top keeps warm air from getting out.

A thermos works for cold drinks, too. The walls keep the heat out. A cold drink stays cold.

A scientist named James Dewar made the first one more than a hundred years ago. He wanted to keep cold things from warming up.

Questions

1. What is a thermos made of?

_____

_____

2. What is gone from the space between the walls?

_____

_____

3. What does a shiny wall do with heat?

_____

_____

4. What does the tight stopper do?

_____

_____

5. Why does a thermos keep cold drinks cold?

_____

_____

6. Why might a thermos work badly if its outer wall cracked?

_____

Words to know

thermos: a bottle with double walls that keeps drinks hot or cold

stopper: a plug or cap that closes the top of a bottle

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: _____

Why a Thermos Keeps Soup Hot

Triangle group

You pour hot soup into a bottle in the morning. At lunchtime, the soup is still warm. How does the bottle do that?

The secret is in the walls. A thermos is really a bottle inside another bottle. Between the two walls is a space where almost all of the air has been taken out. Heat has a hard time crossing empty space. Without air to carry it, the warmth of the soup cannot easily slip through to the outside.

The inside walls are often shiny, too. A shiny surface bounces heat back, the way a mirror bounces light. That keeps even more warmth inside the bottle. Finally, a tight stopper at the top keeps warm air from escaping through the opening.

A thermos works for cold drinks as well. The same walls that hold heat in will also keep heat out. A cold drink stays cold because the warmth of the day cannot easily reach it. A scientist named James Dewar built the first bottle of this kind more than a hundred years ago. He wanted to keep very cold materials from warming up while he studied them.

Questions

1. What is a thermos made of, according to the passage?

_____

_____

2. What has been taken out of the space between the walls?

_____

_____

3. What does a shiny inside wall do with heat?

_____

_____

4. What does the tight stopper do?

_____

_____

5. Why does a thermos keep cold drinks cold?

_____

_____

6. Why might a thermos stop working well if its outer wall cracked?

_____

_____

Words to know

thermos: a bottle with double walls that keeps drinks hot or cold
stopper: a plug or cap that closes the top of a bottle
surface: the outside or top layer of something
escaping: getting out and getting away
materials: the things that something is made from or used with

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: _____

Why a Thermos Keeps Soup Hot

Square group

Imagine pouring steaming soup into a bottle early in the morning and discovering at lunchtime that it is still warm. How does the bottle manage to do that?

The secret lies in its walls. A thermos is really a bottle sitting inside another bottle. Between the two walls is a space from which almost all of the air has been removed. Heat has a very hard time crossing empty space, because without air to carry it, the warmth of the soup cannot easily slip through to the outside.

The inner walls are frequently shiny as well. A shiny surface reflects heat in the same way that a mirror reflects light, which keeps even more warmth inside the bottle. Finally, a tight stopper at the top prevents warm air from escaping through the opening.

A thermos works equally well for cold drinks, since the same walls that hold heat in will also keep heat out. A cold drink stays cold because the warmth of the day cannot easily reach it. A scientist named James Dewar built the first bottle of this kind more than a hundred years ago, because he wanted to prevent very cold materials from warming up while he studied them.

Questions

1. What is a thermos made of, according to the passage?

_____

_____

2. What has been removed from the space between the two walls?

_____

_____

3. What does a shiny inner wall do with heat?

_____

_____

4. What does the tight stopper accomplish?

_____

_____

5. Why does a thermos keep cold drinks cold?

_____

_____

6. Why might a thermos perform poorly if its outer wall cracked?

_____

_____

Words to know

thermos: a bottle with double walls that keeps drinks hot or cold
stopper: a plug or cap that closes the top of a bottle
surface: the outside or top layer of something
escaping: getting out and getting away
materials: the things that something is made from or used with

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: Why a Thermos Keeps Soup Hot

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

Circle: Why a Thermos Keeps Soup Hot

Easier · 126 words · Flesch-Kincaid grade 1.7

1. A bottle inside another bottle.
2. Almost all of the air.
3. It bounces heat back inside.
4. It keeps warm air from getting out.
5. The walls keep the heat outside.
6. Air could get into the empty space and carry heat across.

Triangle: Why a Thermos Keeps Soup Hot

This passage · 189 words · Flesch-Kincaid grade 4.2

1. A bottle inside another bottle.
2. Almost all of the air.
3. It bounces heat back inside.
4. It keeps warm air from escaping through the opening.
5. The walls keep the outside warmth from reaching the drink.
6. Air could get into the empty space and carry heat across, so the drink would warm up or cool down faster.

Square: Why a Thermos Keeps Soup Hot

Harder · 202 words · Flesch-Kincaid grade 7.3

1. A bottle sitting inside another bottle.
2. Almost all of the air.
3. It reflects heat back inside, the way a mirror reflects light.
4. It prevents warm air from escaping through the opening.
5. The same walls keep the warmth of the day from reaching the drink.
6. Air could enter the empty space and carry heat across it, so the drink would warm up or cool down faster.