

Evidence Keeps Heat

Use test data and scientific reasoning to build a careful claim.

PS.1.f.iii "obtaining, evaluating, and communicating information construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning"

NAME _____ DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Box the one sentence that states what the results support, then circle the six temperature values in the table that provide evidence for it.

Which Covering Kept Water Warmer?

- ① A science class investigated whether thick felt slows thermal energy transfer from warm water more than aluminum foil. Students covered identical glass jars, poured 200 milliliters of water at 70°C into each jar, and measured the water after 20 minutes. For a fair comparison, they kept the jar size, water volume, starting temperature, room location, and test time the same.

WATER TEMPERATURE AFTER 20 MINUTES

Covering	Trial 1 (°C)	Trial 2 (°C)	Trial 3 (°C)
Thick felt	61	62	62
Aluminum foil	49	50	49

- ② The three felt results were 61°C, 62°C, and 62°C. The foil results were 49°C, 50°C, and 49°C, so the felt jars finished 12°C to 13°C warmer in every trial. Because each jar began with the same amount of equally warm water and was tested for the same time, the higher final temperatures indicate less net thermal energy transferred from the water to the surroundings.
- ③ The results support the claim that, in this test, thick felt slowed thermal energy transfer from the water more than aluminum foil. Repeated trials made the pattern more convincing because it appeared each time, rather than in one unusual measurement. However, the study compared only these two coverings, at these thicknesses, for 20 minutes. It cannot prove that felt will outperform every foil or every other material in all conditions.

2 ANSWER WITH EVIDENCE Use the passage

- 1 What variable did the students change? Name two conditions they kept the same, and explain why keeping conditions the same matters.

- 2 Use results from the table to describe the pattern that supports the claim.

- 3 Explain why higher final water temperatures are evidence that less thermal energy transferred from the water to the surroundings.

- 4 What limit does the passage place on the conclusion?

3 YOUR TURN Your own words

Write a four-sentence statement for a school materials committee. Recommend thick felt or aluminum foil for keeping water warm in a 20-minute jar test, include at least two numerical data values, explain the scientific reasoning, and state one limit on your recommendation.

PART 1 • READ AND MARK

Box the one sentence that states what the results support, then circle the six temperature values in the table that provide evidence for it. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What variable did the students change? Name two conditions they kept the same, and explain why keeping conditions the same matters.	They changed the covering material, thick felt or aluminum foil. They kept conditions such as jar size, water volume, starting temperature, room location, and test time the same. This makes the comparison fair because the covering is the main difference.
2	Use results from the table to describe the pattern that supports the claim.	In every trial, water in the felt jar was warmer than water in the foil jar. Felt measured 61°C, 62°C, and 62°C, while foil measured 49°C, 50°C, and 49°C.
3	Explain why higher final water temperatures are evidence that less thermal energy transferred from the water to the surroundings.	The jars started with the same amount of water at the same temperature and were tested for the same time. A higher final temperature means the water lost less thermal energy to the surroundings during the test.
4	What limit does the passage place on the conclusion?	The study tested only these two coverings, at these thicknesses, for 20 minutes. The results cannot prove that felt works better than every foil or every material in all conditions.

PART 3 • YOUR TURN (SAMPLE ANSWER)

In this 20-minute test, thick felt is the better choice for keeping water warm. Its trials finished at 61°C, 62°C, and 62°C, while foil finished at 49°C, 50°C, and 49°C. Because felt jars had higher final temperatures after equal starts and times, less thermal energy moved from the water to the surroundings. This recommendation is limited to these coverings and thicknesses under the tested conditions.

Accept equivalent evidence-based explanations that connect controlled conditions, final temperatures, and thermal energy transfer. For the open response, require a clear recommendation, accurate numerical evidence, reasoning, and a stated limit on the claim.