

Wrap It Up

Use test evidence to build and critique a scientific conclusion.

PS.1.d “constructing and critiquing conclusions and explanations construct scientific explanations based on valid and reliable evidence obtained from sources (including the students’ own investigations) construct arguments supported by empirical...”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each claim or conclusion, circle the evidence that supports it, and number the limits that keep the evidence from supporting a bigger claim.

Testing Cup Wraps

- ① Engineers at a school tested four cup wraps to keep hot water warm. Each cup began at 80°C and sat for 20 minutes in the same room. Students used the same cup size and measured temperature with the same thermometer. They repeated each test three times and calculated an average. Their results appear in the table.

AVERAGE FINAL WATER TEMPERATURE AFTER 20 MINUTES

Cup wrap	Average final temperature
No wrap	58°C
Aluminum foil	61°C
Cotton cloth	68°C
Bubble wrap	72°C

- ② Bubble wrap had the highest average final temperature, 72°C. A supported conclusion is that, among these four wraps, bubble wrap reduced heat loss best during this test. The evidence is the repeated temperature data. The reasoning is that a higher final temperature means less thermal energy left the cup, when starting temperatures and test conditions were controlled.
- ③ A weak claim would say, “Bubble wrap always prevents heat loss.” The test lasted only 20 minutes and used one cup type, so the evidence cannot support always. Before testing, a student might state a hypothesis, a testable proposed explanation. A scientific theory is a broad explanation supported by extensive evidence. A scientific law describes a consistent pattern in nature.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What conclusion about the four wraps is supported by the data? Include one piece of evidence from the table.

2 Name two parts of the procedure that made the test evidence more reliable.

3 Why is the claim "Bubble wrap always prevents heat loss" too strong? Rewrite it as a conclusion the evidence can support.

4 How does the passage distinguish a scientific hypothesis, theory, and law?

3 YOUR TURN _____ Your own words

A lunchroom tests three apple sleeves for the same amount of time. A cloth sleeve keeps apples at 10°C and costs \$1, a foam sleeve keeps apples at 7°C and costs \$3, and an insulated pouch keeps apples at 5°C and costs \$8. Write three sentences that choose the best sleeve if apples must be 7°C or colder and the sleeve must cost no more than \$4. Use the data to compare all three choices.

PART 1 • READ AND MARK

Underline each claim or conclusion, circle the evidence that supports it, and number the limits that keep the evidence from supporting a bigger claim. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What conclusion about the four wraps is supported by the data? Include one piece of evidence from the table.	Bubble wrap reduced heat loss best during this test. It had the highest average final temperature, 72°C.
2	Name two parts of the procedure that made the test evidence more reliable.	Answers include using the same starting temperature, room, cup size, and thermometer, and repeating each test three times and averaging the results.
3	Why is the claim “Bubble wrap always prevents heat loss” too strong? Rewrite it as a conclusion the evidence can support.	The test lasted only 20 minutes and used one cup type, so it cannot support “always.” A supported revision is: Among these four wraps, bubble wrap reduced heat loss best during this test.
4	How does the passage distinguish a scientific hypothesis, theory, and law?	A hypothesis is a testable proposed explanation. A theory is a broad explanation supported by extensive evidence. A law describes a consistent pattern in nature.

PART 3 • YOUR TURN (SAMPLE ANSWER)

The foam sleeve is the best choice because its apples measured 7°C and it costs \$3. The cloth sleeve costs less but does not meet the temperature criterion, while the insulated pouch is colder but exceeds the \$4 limit. I conclude that the foam sleeve best meets both stated constraints based on the trial data.

Accept any conclusion that selects the foam sleeve and accurately compares its temperature and cost with both criteria. Students should use the data as evidence and explain why the cloth sleeve and insulated pouch fail different constraints.