



Keep It Hot: Cup Test

Name: _____

Date: _____

Class: _____

My level: ☐ Explorer ☐ Investigator ☐ Legend

Mission: Customers complain their cocoa gets cold too fast. Test four cups side by side, with and without lids, and pick the cup that keeps cocoa hot the longest.

Big question: Which materials slow thermal energy transfer, and why?

★ Warm-up: Estimation station

Estimate, then explain.

Hot cocoa starts at 80 °C. What temperature will it reach if left for a whole day?

Does a thermos keep things hot or cold?

Key vocabulary

Insulator	A material that slows heat transfer.
Convection	Heat transfer by moving liquid or gas (warm rises, cool sinks).
Rate	How fast something changes.
Room temperature	About 20 °C; things cool toward it.

1 Box 1

Predict

PREDICTION Which cup will keep cocoa hottest after 20 minutes?

☐ Foam cup ☐ Ceramic mug ☐ Glass cup ☐ Metal cup

Race the cups

In the simulator: Run the test WITHOUT lids for 30 minutes.

Record the temperatures at 20 minutes (no lids).

Cup	At 20 min (°C)
Foam	
Ceramic	
Metal	

2 Box 2

Read the graph

All four lines curve and level off. Why do they level off?

- ☐ They approach room temperature, so heat transfer slows ☐ The cups run out of cocoa
- ☐ The thermometer breaks

3 Box 3

Add lids

In the simulator: Reset, turn ON lids, and run 30 minutes.

What was the foam cup's temperature at 20 minutes WITH a lid?

Answer: _____ °C

Why lids help

Why did lids keep every cup hotter?

- ☐ They stop warm air and steam from rising away (convection/evaporation) ☐ Lids make the cocoa heavier
☐ Lids add heat

4 Box 4

Legend: iced drinks Legend only

For an ICED drink, which cup keeps it cold longest, and why?

- ☐ Foam: insulators slow heat from the warm room getting IN ☐ Metal: it is cold to touch
☐ It doesn't matter for cold drinks

5 Box 5

Café recommendation (CER)

Which cup should the café use?

Claim Start: "The café should use..."

Evidence Start: "After 20 minutes,..."

Reasoning Start: "Foam works because..."

Exit ticket: answer the big question in your own words

Which materials slow thermal energy transfer, and why?

Completion code:

Shown on the last screen of the simulator.