

What Bars Reveal

Use a bar graph to compare evidence and notice what the data cannot show.

PS.1.c.ii “interpreting, analyzing, and evaluating data construct, analyze, and interpret graphical displays of data and consider limitations of data analysis”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline the graph details that make a comparison fair. Circle each limitation or reason the graph cannot prove a cause, then number the improvement the class could make.

Warming Under a Lamp

- ① A class investigated how surface color and material affect warming. Each group put the same size sample under one lamp for ten minutes. They recorded each sample's temperature increase. A bar graph makes category labels and measured values easier to compare. The graph below shows the class average for four samples.



- ② A taller bar represents a larger temperature increase for that tested sample. The graph can support a comparison under these conditions, but it cannot prove why the bars differ. Because color and material both changed, the class cannot tell which factor caused the pattern. A better design would compare samples made of one material in different colors.
- ③ The bars show averages, not every trial. An average can hide spread, so the class should repeat trials and report the individual measurements or a range. Other limits include thermometer reading error, different distances from the lamp, and small sample sizes. When you interpret a graph, separate a supported claim from a cause that needs more evidence.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Which sample had the largest average temperature increase, and what was the increase?

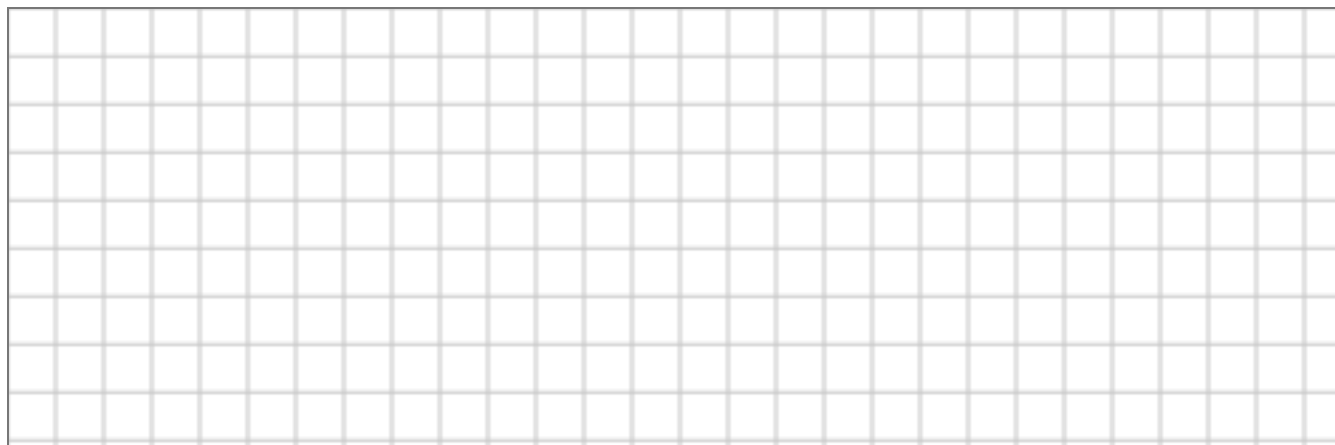
2 How many degrees Celsius more did dark cloth warm than white paper? Show how you found the difference.

3 Write one claim supported by the graph about aluminum foil compared with the other tested samples.

4 Name one limitation of this investigation and explain one change that would make the data stronger.

3 YOUR TURN _____ Your own words

A second class used identical metal cans painted different colors and measured the temperature increase after ten minutes under the same lamp: blue, 5°C; yellow, 2°C; red, 6°C; white, 3°C. Construct a bar graph starting at 0, then write one supported comparison and one limitation of these data.



PART 1 • READ AND MARK

Underline the graph details that make a comparison fair. Circle each limitation or reason the graph cannot prove a cause, then number the improvement the class could make. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which sample had the largest average temperature increase, and what was the increase?	Black paper, 8°C.
2	How many degrees Celsius more did dark cloth warm than white paper? Show how you found the difference.	4°C. Dark cloth increased 7°C and white paper increased 3°C, so $7 - 3 = 4$.
3	Write one claim supported by the graph about aluminum foil compared with the other tested samples.	Aluminum foil had the smallest average temperature increase, 2°C, of the four tested samples.
4	Name one limitation of this investigation and explain one change that would make the data stronger.	Answers vary. Accept a stated limitation, such as changing both color and material, using averages that hide spread, thermometer error, lamp-distance differences, or small sample size, plus a matching improvement.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Bar graph with blue at 5°C, yellow at 2°C, red at 6°C, and white at 3°C. The red can had the largest temperature increase. Because each color has only one measurement, repeated trials are needed to know whether the pattern is reliable.

Accept accurate bar graphs with color categories on the horizontal axis, temperature increase in °C on the vertical axis, a scale beginning at 0, and correctly plotted values. Accept any comparison supported by the graph and a valid limitation, such as no repeated trials, measurement error, or uncontrolled conditions.