Under the Lamp

Read temperature data and test the strength of a conclusion

FSL.3A.5 "Analyze data sets from experiments for patterns and trends and identify any weaknesses in the experimental designs."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two details that helped keep the test fair, circle the words that reveal a design weakness, and number the four time rows in the table to help you track the trend.

Which Tray Warms Faster?

1 At a school science fair, Maya tested whether a dark surface warms more under a lamp than a light surface. She painted two identical metal trays, one matte black and one matte white. Each tray held the same amount of water. She placed them side by side, equally far from one lamp, and measured the water temperature.

2 The table shows temperatures from Maya's only trial. She used a separate thermometer in each tray and read both every ten minutes. She wrote the temperatures down immediately so she would not confuse readings from the two trays. The numbers show how the gap between the trays changed as the lamp stayed on.

WATER TEMPERATURE DURING ONE TRIAL

Minutes under lamp	Black tray water (°C)	White tray water (°C)
0	22	22
10	28	25
20	34	28
30	37	30

3 Maya did not repeat the test, so a small difference in paint thickness or thermometer placement might have affected the readings. The data describe these two trays under this lamp, not every black or white surface outdoors. To test whether the pattern is reliable, she could repeat the trial with new trays and compare results across trials.

2 ANSWER WITH EVIDENCE

Use the passage

1. How did the temperature gap between the trays change over time? Give the gap at each reading.

2. Did the black tray's water warm at the same rate throughout the trial? Compare its change during the first and last ten minutes.

3. Identify one weakness in Maya's design. Explain how it limits what she can conclude from the data.

4. The data support the claim that the black tray's water warmed more in this trial. Do they also show that black surfaces always warm more than white surfaces outdoors? Use a table value and a design detail to explain.

3 YOUR TURN

Your own words

Invent a possible second trial by giving the 0-minute and 30-minute water temperatures for each tray. Compare each tray's temperature change with the first trial, say whether your new data follow the same pattern, and name one limit that would still remain.

ANSWER KEY

Under the Lamp

PART 1 · READ AND MARK

Underline two details that helped keep the test fair, circle the words that reveal a design weakness, and number the four time rows in the table to help you track the trend. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How did the temperature gap between the trays change over time? Give the gap at each reading.	**The gap grew from 0°C at 0 minutes to 3°C at 10 minutes, 6°C at 20 minutes, and 7°C at 30 minutes.**
2	Did the black tray's water warm at the same rate throughout the trial? Compare its change during the first and last ten minutes.	**No. It rose 6°C during the first ten minutes, from 22°C to 28°C, but only 3°C during the last ten minutes, from 34°C to 37°C.**
3	Identify one weakness in Maya's design. Explain how it limits what she can conclude from the data.	**Maya ran only one trial. Without repeats, she cannot tell whether the temperature gap would appear again or was affected by a small difference between the trays.**
4	The data support the claim that the black tray's water warmed more in this trial. Do they also show that black surfaces always warm more than white surfaces outdoors? Use a table value and a design detail to explain.	**No. After 30 minutes, the black tray's water was 37°C and the white tray's was 30°C, but Maya tested only two trays in one trial under a lamp, not surfaces outdoors.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

In my second trial, both trays started at 23°C. After 30 minutes, the black tray's water was 36°C and the white tray's was 31°C. The black tray gained 13°C and the white tray gained 8°C, so the black tray warmed more. That follows the first trial's pattern, when the black tray gained 15°C and the white tray gained 8°C. Two trials under a lamp still cannot show what always happens outdoors.

Accept other plausible second-trial values if the student calculates both changes correctly and compares their pattern with the first trial. A valid remaining limit may concern the small number of trials or the difference between lamp and outdoor conditions.