

Falling Data Detectives

Find patterns, errors, and limits in experimental results.

6.2.B “analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations;”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Circle the highest and lowest mean times in the table. Underline one source of error and one limitation in the passage, then number the table values from shortest to longest time.

Paper Helicopter Test

- ① A class investigated how wing length affects a paper helicopter's falling time. Teams made helicopters from the same paper and added the same paper-clip mass. They dropped each helicopter from 1.5 meters indoors three times. The table gives the mean, or average, time for each wing length. A longer fall time means a slower descent.

MEAN FALL TIMES FOR PAPER HELICOPTERS

Wing length (cm)	Mean fall time (s)
2	1.24
4	1.61
6	1.92
8	1.68

- ② To make a fair comparison, teams tried to hold the drop height, paper type, and clip mass constant. Still, a student might release one helicopter with a small push. Different students also started and stopped stopwatches at slightly different moments. These sources of error can make a measured time higher or lower than the helicopter's usual fall time.
- ③ The results describe only these four wing lengths, this paper, one clip mass, and drops from one height indoors. Three trials per length may not show the full range of possible times. Scientists look for patterns, unusual values, errors, and limits before making a claim. A careful claim should match what the data measured, rather than predict every paper helicopter.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Which wing length had the highest mean fall time? What does that result show about its descent?

2 Describe the pattern in mean fall time as wing length increases from 2 cm to 8 cm.

3 Choose one source of error from the investigation. Explain how it could change a measured fall time.

4 State one limitation of this investigation. How should that limitation affect the claim a scientist makes?

3 YOUR TURN _____ Your own words

Plan a fair test of how water temperature affects the time for an identical ice cube to melt. Fill the table with four water temperatures, plausible mean melt times from three trials, and analysis notes that name a pattern plus one possible error or limitation.

WATER TEMPERATURE (°C)	MEAN MELT TIME (MIN)	ANALYSIS NOTE

PART 1 • READ AND MARK

Circle the highest and lowest mean times in the table. Underline one source of error and one limitation in the passage, then number the table values from shortest to longest time. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which wing length had the highest mean fall time? What does that result show about its descent?	The 6 cm wings had the highest mean fall time, 1.92 s. That helicopter had the slowest descent.
2	Describe the pattern in mean fall time as wing length increases from 2 cm to 8 cm.	Mean fall time increases from 2 cm to 6 cm, then decreases at 8 cm.
3	Choose one source of error from the investigation. Explain how it could change a measured fall time.	A student could release a helicopter with a small push, or start or stop a stopwatch at a different moment. Either error could make the measured time higher or lower.
4	State one limitation of this investigation. How should that limitation affect the claim a scientist makes?	The test used only four wing lengths, one paper type, one clip mass, and one indoor drop height. A claim should apply only to those tested conditions, not every paper helicopter.

PART 3 • YOUR TURN (SAMPLE ANSWER)

WATER TEMPERATURE (°C)	MEAN MELT TIME (MIN)	ANALYSIS NOTE
5	18	As water gets warmer, the mean melting time gets shorter.
15	11	Using identical ice cubes helps make the comparison fair.
25	7	Starting a timer late could make a melt time seem longer.
35	4	This result applies only to these temperatures and this cup type.

Accept equivalent descriptions of the table pattern, reasonable effects of the listed errors, and limitations that correctly restrict a claim. For the open task, accept plausible data if the analysis note matches the data and identifies a valid error or limitation.