

Bean Test Detectives

Find patterns, possible errors, and limits in a seed investigation.

7.2.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 Underline the sentence that describes the data pattern. Circle the possible source of error, and number two limitations of the investigation to separate what the data suggest from what they cannot prove.

How Much Light?

① To test whether light affects bean germination, Maya placed ten bean seeds in each of four identical cups with damp paper towels. Cups received 0, 4, 8, or 12 hours of lamp light daily. After seven days, she counted seeds with a visible root. Her results are listed in the table. She kept the paper towels moist and used seeds from one package.

BEAN GERMINATION RESULTS

Lamp light each day	Seeds with visible roots after 7 days
0 hours	2
4 hours	6
8 hours	9
12 hours	7

- ② The counts rise from 2 to 9 as light increases from 0 to 8 hours, then fall to 7 at 12 hours. This suggests that, in this test, 8 hours may have produced the most germination. One cup was beside a warm window, and Maya did not measure its temperature. Temperature could affect germination too.
- ③ These results have limits. Each light level had only one cup, so a spilled drop of water or an unusual seed could change a count. The test lasted only seven days and used one bean package indoors. Maya cannot claim that 8 hours is best for every bean variety or season. Repeating each light level would make the conclusion stronger.

2

ANSWER WITH EVIDENCE

Use the passage

1

Describe the pattern in the seed counts as the number of light hours increased.

2

What possible source of error did Maya identify? Explain how it could affect the results.

3

State one limitation of Maya's investigation and explain why it limits her conclusion.

4

What change would make Maya's conclusion about light and germination stronger?

3

YOUR TURN

Your own words

A basil study used one pot for each fertilizer amount. Plants were 12 cm tall with 0 mL, 18 cm with 5 mL, and 16 cm with 10 mL of fertilizer. The 10 mL pot sat near an air vent. Complete the table with one pattern, one possible source of error, and one limitation with an improvement.

ANALYSIS TYPE	EVIDENCE OR EXPLANATION	IMPROVEMENT, IF NEEDED

PART 1 • READ AND MARK

Underline the sentence that describes the data pattern. Circle the possible source of error, and number two limitations of the investigation to separate what the data suggest from what they cannot prove. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Describe the pattern in the seed counts as the number of light hours increased.	The count increased from 2 seeds at 0 hours to 9 seeds at 8 hours, then decreased to 7 seeds at 12 hours.
2	What possible source of error did Maya identify? Explain how it could affect the results.	One cup was beside a warm window. A different temperature could affect germination, so light was not the only condition that may have changed.
3	State one limitation of Maya's investigation and explain why it limits her conclusion.	Each light level had only one cup. One unusual seed or an accidental change in that cup could strongly affect its count.
4	What change would make Maya's conclusion about light and germination stronger?	She should repeat each light level with several cups.

PART 3 • YOUR TURN (SAMPLE ANSWER)

ANALYSIS TYPE	EVIDENCE OR EXPLANATION	IMPROVEMENT, IF NEEDED
Pattern	Basil height increased from 12 cm at 0 mL to 18 cm at 5 mL, then decreased to 16 cm at 10 mL.	Test several pots at each fertilizer amount to check the pattern.
Possible source of error	The 10 mL pot near the air vent may have had different airflow or temperature.	Keep all pots in the same location.
Limitation	Only one pot was tested for each fertilizer amount.	Use several pots for every fertilizer amount.

Accept accurate descriptions of the increase through 8 hours and decrease at 12 hours. For limitations, accept the single cup per light level, the short seven-day test, or use of one bean package indoors when the student explains why it restricts the conclusion.