The Bean Test

Use plant-growth evidence to test two explanations

L.8.2B.1 "Construct an argument based on evidence for how environmental and genetic factors influence the growth of organisms."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB In paragraph 1, circle the phrases "inherited traits" and "water supply"; in paragraph 2, underline the four sentences that report average plant heights.

Why Did These Beans Grow Differently?

1 At a school greenhouse, students wondered why some bean plants grew taller than others. They planted seeds from two bean varieties, Ruby and Jade, whose inherited traits can differ. They also changed the water supply, an environmental factor. For each variety, they grew ten seedlings with 200 milliliters of water each week and ten with 100 milliliters each week. Every plant got the same kind of soil, pot size, and hours of light. After four weeks, students measured each plant from the soil to its tip.

2 The Ruby plants given 200 milliliters each week reached an average height of 22 centimeters. The Ruby plants given 100 milliliters each week reached an average height of 15 centimeters. The Jade plants given 200 milliliters each week reached an average height of 17 centimeters. The Jade plants given 100 milliliters each week reached an average height of 11 centimeters. Students compared plants within each variety to examine water supply and compared varieties receiving the same water to examine inherited differences.

3 A taller average does not mean every plant in that group was taller than every plant in another group. The results show patterns for groups, not the height of each seedling. Other conditions, such as disease or uneven light, could also affect plant growth in a different setting. Here, keeping soil, light, and pot size alike made the comparisons more useful. The data cannot reveal which genes are involved, and this one trial does not prove the same pattern will occur in every greenhouse.

2 ANSWER WITH EVIDENCE

Use the passage

1. Make a claim about how water supply affected Ruby plants. What evidence supports your claim?

2. Use the results for plants given 100 milliliters each week to argue that inherited traits may have influenced growth.

3. A student says that water supply alone explains the differences in height. Use evidence to challenge this claim.

4. Why does giving every group the same soil, pot size, and hours of light strengthen an argument about water supply and inherited traits?

3 YOUR TURN

Your own words

Imagine two tomato varieties, Sun and Shade, grown in the same soil and light for six weeks: with daily watering, they averaged 30 and 24 centimeters, while with watering every three days, they averaged 19 and 14 centimeters. Write four or five sentences arguing how both inherited traits and watering may have influenced their growth, using two numerical comparisons and naming one condition kept the same.

ANSWER KEY

The Bean Test

GRADE 8 · L.8.2B.1

PART 1 · READ AND MARK

In paragraph 1, circle the phrases “inherited traits” and “water supply”; in paragraph 2, underline the four sentences that report average plant heights. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Make a claim about how water supply affected Ruby plants. What evidence supports your claim?	**More weekly water was linked to greater average growth in Ruby plants. Those given 200 milliliters averaged 22 centimeters, compared with 15 centimeters for those given 100 milliliters.**
2	Use the results for plants given 100 milliliters each week to argue that inherited traits may have influenced growth.	**Ruby averaged 15 centimeters and Jade averaged 11 centimeters under the same watering schedule. The difference between varieties supports the idea that inherited traits influenced growth.**
3	A student says that water supply alone explains the differences in height. Use evidence to challenge this claim.	**Ruby and Jade received the same 200 milliliters each week but averaged different heights, 22 and 17 centimeters. Water supply alone does not explain that difference.**
4	Why does giving every group the same soil, pot size, and hours of light strengthen an argument about water supply and inherited traits?	**Keeping those conditions alike makes them less likely to explain the differences in average height. This strengthens comparisons between watering groups and between varieties.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Both inherited traits and watering may have influenced the tomato plants' growth. Sun averaged 30 centimeters with daily watering but 19 centimeters with watering every three days, supporting a watering effect. With daily watering, Sun averaged 30 centimeters while Shade averaged 24 centimeters, supporting an inherited-trait effect because the varieties differed. Both varieties grew in the same soil, so soil differences are less likely to explain their different average heights.

Accept claims that use the stated group averages and compare plants under matched conditions. For the tomato argument, students should describe inherited traits as a possible influence, not claim that the data identify specific genes.