

Life Data Detectives

Use rates to support evidence-based conclusions.

GRADES 7-8 • LS.1.d

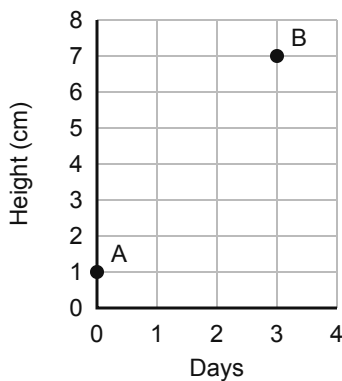
LS.1.d "constructing and critiquing conclusions and explanations construct explanations that include qualitative or quantitative relationships between variables construct scientific explanations based on valid and reliable evidence obtained from..."

NAME _____

DATE _____

RATE SHOWS CHANGE

To describe a relationship, divide the change in the measured result by the change in the tested factor, then include units. Use the rate to state whether the result rises or falls, and make only a conclusion the data supports. A hypothesis is a testable possible explanation, while a scientific theory is a broad explanation supported by much evidence.



WORKED EXAMPLE

Use the graph to find the bean plant's average growth rate from day 0 to day 3.

1. Find height change: $7 - 1 = 6$ cm.
2. Find time change: $3 - 0 = 3$ days.
3. Divide: $6/3 = 2$ cm/day.

Answer: 2 cm/day

PRACTICE 4 problems

- 1** A mold colony's diameter increases 5 mm in 4 days. Find its average growth rate.

ANSWER _____

- 2** At 9°C, an aquatic plant makes 15 oxygen bubbles per minute. At 14°C, it makes 23 bubbles per minute. Find the average change in bubbles per minute for each 1°C increase.

ANSWER _____

- 3** Group P gains 9 g in 5 days. Group Q gains 11 g in 5 days. Which group gains mass faster? Show both rates.

ANSWER _____

- 4** In a controlled test, fertilizer group F grows 13 mm in 4 days. Group N grows 8 mm in 5 days. Which result supports the claim that the fertilizer increased growth?

ANSWER _____

APPLY IT Show your work

- 1** After a sprint, a student records heart rate. Find the average change per minute. Then write a conclusion about the relationship between recovery time and heart rate.

HEART RATE RECOVERY

Time after sprint (min)	Heart rate (beats/min)
5	150
9	130

WORK SPACE

ANSWER _____

- 2** An eco-club tests basil plants under different lamps. Each group has the same soil, water, and number of plants. The blue-lamp group average rises from 18 to 43 leaves in 5 weeks. The green-lamp group average rises from 16 to 36 leaves in 5 weeks. Which lamp supports faster leaf production? State the evidence.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student tests the hypothesis that more nitrate makes duckweed grow faster. Every cup starts with 12 fronds. After 4 days, low-nitrate cups have 20 and 22 fronds. High-nitrate cups have 28 and 30 fronds. Find the mean growth rate for each treatment. Then state a conclusion and one reason this evidence is more reliable than results from a single cup.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A mold colony's diameter increases 5 mm in 4 days. Find its average growth rate.	5/4 mm/day
2	At 9°C, an aquatic plant makes 15 oxygen bubbles per minute. At 14°C, it makes 23 bubbles per minute. Find the average change in bubbles per minute for each 1°C increase.	8/5 more bubbles per minute per °C
3	Group P gains 9 g in 5 days. Group Q gains 11 g in 5 days. Which group gains mass faster? Show both rates.	Group Q. Group P: 9/5 g/day; Group Q: 11/5 g/day.
4	In a controlled test, fertilizer group F grows 13 mm in 4 days. Group N grows 8 mm in 5 days. Which result supports the claim that the fertilizer increased growth?	Group F, because it grew 13/4 mm/day, compared with 8/5 mm/day for group N.

PART 2 • APPLY IT

- Heart rate decreases by 5 beats per minute each minute. As recovery time increases, heart rate decreases.** The heart rate drops 20 beats/min in 4 minutes. Divide 20 by 4 to get a decrease of 5 beats/min each minute.
- The blue lamp supports faster leaf production. Blue: 5 leaves/week; green: 4 leaves/week.** The blue-lamp average changes by 25 leaves, and the green-lamp average changes by 20 leaves. Divide each change by 5 weeks.

CHALLENGE

Low nitrate: 9/4 fronds/day. High nitrate: 17/4 fronds/day. The high-nitrate group grew faster in this investigation, which supports the hypothesis. Replicate cups make the evidence more reliable than a single cup.

Accept equivalent fraction wording and correct units. For conclusions, require both the direction of the relationship and numerical evidence from the data.