

Test, Measure, Decide

Plan fair tests and use data patterns.

GRADE 6 • 6.1

6.1 "The student will demonstrate an understanding of scientific and engineering practices by asking questions and defining problems ask questions to determine relationships between independent and dependent variables develop hypotheses and..."

NAME _____

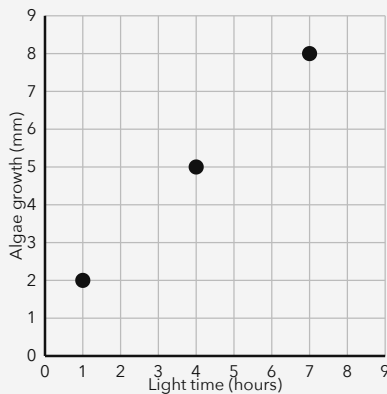
DATE _____

FIND THE PATTERN

In a fair test, change one independent variable, measure the dependent variable, and keep constants steady. To describe a pattern, compare equal changes in the tested variable and the measured result.

WORKED EXAMPLE

Use the graph. Name the independent and dependent variables.
How much does algae growth increase for each 3 hours of light?



1. Light time is changed, so it is independent.
2. Algae growth is measured, so it is dependent.
3. From 1 to 4 hours, growth changes from 2 to 5 mm: $5 - 2 = 3$ mm.

Answer: Independent variable: light time. Dependent variable: algae growth. Growth increases 3 mm for each 3 hours.

PRACTICE 4 problems

- 1** A student changes the water amount for bean plants and measures plant height after 16 days. What are the independent and dependent variables?

ANSWER _____

- 2** A car rolls 28 cm from a 10 cm ramp. From a 15 cm ramp, it rolls 43 cm. How much farther does it roll?

ANSWER _____

- 3** A robot travels 120 cm in 10 s. What is its rate?

ANSWER _____

- 4** To test whether soil type affects radish height, which factor should remain constant: soil type, pot size, or plant height?

ANSWER _____

APPLY IT Show your work

- 1** A simulated device test changes screen brightness. Use the table. What is the independent variable? How does device response time change for each 10-percentage-point increase in brightness?

SCREEN TEST DATA

Brightness (%)	Device response time (ms)
10	45
20	39
30	33

EXPLAIN THE VARIABLE AND PATTERN

ANSWER _____

- 2** A design team needs an ice pack that keeps lunch at 15°C or below after 40 minutes and uses 60 g of gel or less. Pack A uses 50 g and ends at 14°C. Pack B uses 60 g and ends at 16°C. Pack C uses 55 g and ends at 13°C. Which pack keeps lunch coldest while meeting the criteria?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two groups grow identical plants in the same light for 20 days. Group A gives plants 20 mL of plain water and gets an average height of 18 cm. Group B gives plants 30 mL of fertilizer solution and gets an average height of 25 cm. Can they claim fertilizer caused the difference? Explain and state one fix.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A student changes the water amount for bean plants and measures plant height after 16 days. What are the independent and dependent variables?	Independent variable: water amount. Dependent variable: bean plant height.
2	A car rolls 28 cm from a 10 cm ramp. From a 15 cm ramp, it rolls 43 cm. How much farther does it roll?	15 cm
3	A robot travels 120 cm in 10 s. What is its rate?	12 cm/s
4	To test whether soil type affects radish height, which factor should remain constant: soil type, pot size, or plant height?	pot size

PART 2 • APPLY IT

1. **Independent variable: screen brightness. Device response time decreases 6 ms for each 10-percentage-point increase.**
Brightness rises from 10% to 20%, then to 30%: 10 percentage points each step. Response time falls from 45 to 39, then to 33 ms: 6 ms each step.
2. **Pack C** Packs A and C meet the temperature and gel limits. Pack C has the lower final temperature, 13°C.

CHALLENGE

No. The fertilizer and liquid amount both changed. Give both groups the same amount of liquid, such as 20 mL, and change only whether fertilizer is present.

Accept equivalent descriptions of the variables, such as water given and plant growth. For the challenge, accept any response that identifies both changed variables and holds the liquid amount constant.