SCIENCE FOUNDATIONS

Interpreting experimental data

Difficulty level: Intermediate

Science Foundations

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Overview of the concept

This is how you read a graph of plant growth or test scores and say what pattern it actually shows, instead of just repeating the numbers back. A coach looking at a season of race times can see whether training is paying off or whether the times are just bouncing around. A shop owner reading weekly sales can spot a real trend instead of panicking over one bad week. Knowing how to interpret data tells you what the numbers are really saying, and what they are not saying.



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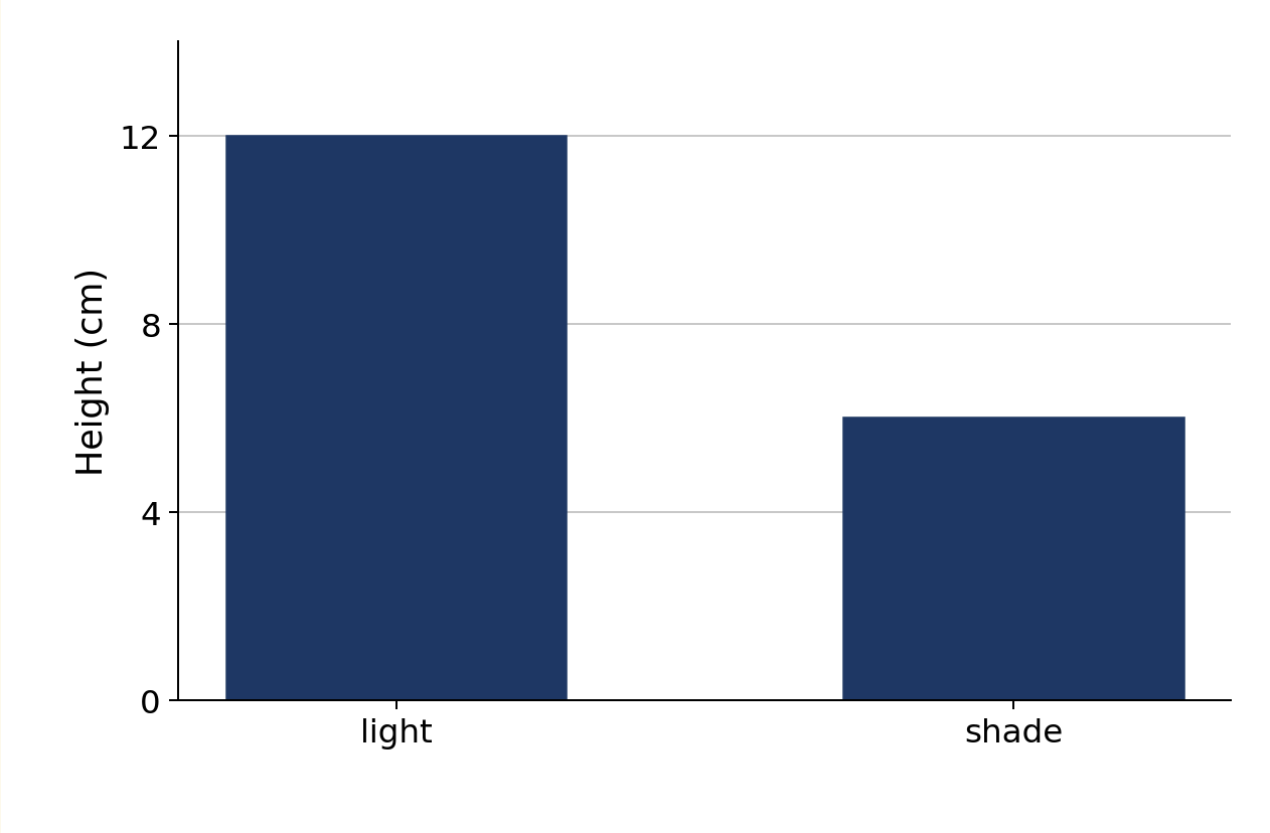
Worked examples

EXAMPLE 1

Q Plants in light grew 12 cm and plants in shade grew 6 cm. What does this suggest about light and plant growth?



SOLUTION

Compare the group averages: 12 cm against 6 cm.

Name the pattern: light group grew about twice as much.

State the suggestion: light appears to help growth here.

The result is light group grew more, suggesting light helps growth.

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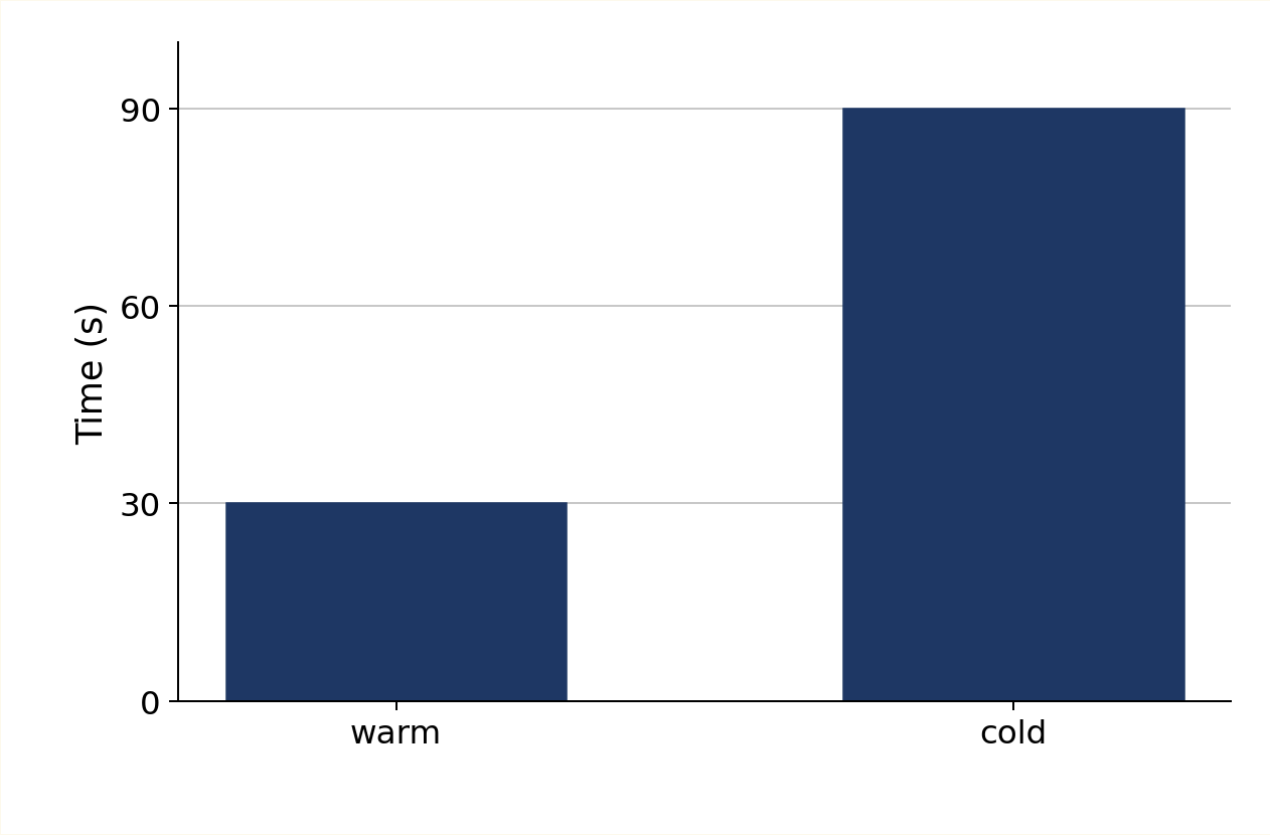
EXAMPLE 2

Q Sugar took 30 s to dissolve in warm water and 90 s in cold water. What does this suggest about temperature and dissolving speed?



SOLUTION

Compare the two times: $30 \div 90 = \frac{1}{3}$, so warm water took one third of the cold time.

Name the pattern: warmer water dissolved sugar faster.

State the limit: this test used one sugar amount only.

The result is warmer water dissolved sugar faster in this test.

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Practice questions

1 **Plants in light grew 16 cm, plants in shade grew 8 cm. What pattern does this show, and what does it suggest?**

- **A** The light group grew about twice as much, suggesting light helps growth
- **B** The shade group grew about twice as much, suggesting shade helps growth
- **C** Both groups grew the same, suggesting light makes no difference
- **D** The light group grew a little less, suggesting light slows growth

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2 **Two groups grew the same amount on average: 10 cm each. What does this suggest?**

- **A** The treatment made no difference in this test
- **B** The treatment helped growth
- **C** The treatment slowed growth
- **D** The test was done wrong

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3 **A gardener claims fertilizer always doubles plant growth, based on one test where fertilized plants grew 15 cm and unfertilized plants grew 9 cm. Is her claim supported?**

- **A** No, one test cannot prove 'always', and 15 cm is not double 9 cm
- **B** Yes, the fertilizer group grew more
- **C** Yes, 15 cm proves doubling
- **D** No, the fertilizer slowed growth

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4 Warm water took 20 s to dissolve sugar, cold water took 80 s. Which dissolved faster, and by how much?

- **A** Warm water, in one quarter of the time
- **B** Cold water, in one quarter of the time
- **C** Warm water, in four times the time
- **D** Cold water, in one half of the time

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5 Why compare averages, not single plants?

- **A** Single readings can be flukes
- **B** Averages are always exactly right
- **C** Single plants grow faster
- **D** Averages need no repeats

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In a growth test most plants grew 10 to 12 cm, but one grew 25 cm. What is that one result called?

A Outlier

B Average

C Pattern

D Control

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7

Should a conclusion claim more than the test shows?

A Yes

B No

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8 Data rise then fall. What trend words fit?

- A Rise then fall
- B Fall then rise
- C Rise then stay level
- D Stay level then fall

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9 Two groups differ by 1 mm. Is that a big difference?

- A Probably not, it is tiny
- B Yes, 1 mm is a large difference
- C Yes, it proves the treatment worked
- D No, the groups are identical

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What should you note about a result that breaks the pattern?

A Note it as a possible error or outlier

B Delete it and say nothing

C Change it to match the pattern

D Ignore it, patterns never break

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ANSWER KEY

1. The light group grew about twice as much, suggesting light helps growth
2. The treatment made no difference in this test
3. No, one test cannot prove 'always', and 15 cm is not double 9 cm
4. Warm water, in one quarter of the time
5. Single readings can be flukes
6. Outlier
7. No
8. Rise then fall
9. Probably not, it is tiny
10. Note it as a possible error or outlier

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