SCIENCE FOUNDATIONS

Hypotheses, theories, and laws

Difficulty level: Intermediate

Science Foundations

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Overview of the concept

This is how you tell a single testable guess from a well-tested explanation and from a rule that always holds, so you know how much weight a science claim really carries. A hypothesis is a guess you can test, like saying a plant will grow taller with more light. A theory is an explanation that has survived test after test, like the theory of germs causing disease. Knowing the difference tells you why a scientist treats a theory as solid ground and a guess as a starting point, not the other way around.



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Rule

Hypotheses, theories, and laws: a hypothesis is a single testable guess, a prediction that has not yet been tested. A theory is an explanation that has survived test after test.

A law describes a pattern that always holds, without explaining why it happens. Ask what job the claim does: a guess to test, an explanation, or a description of a pattern.

Worked examples

EXAMPLE 1

Q **Is this a hypothesis, a theory, or a law? If plants get more light, then they will grow taller.**

SOLUTION

Read the claim: if plants get more light, then they will grow taller.

Ask: is it one prediction that can be tested? Yes.

Label it a hypothesis, because it has not yet been tested here.

The result is hypothesis.

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EXAMPLE 2

Q Classify: objects fall toward Earth at the same rate in a vacuum.

SOLUTION

Read the claim and ask what job it does.

It spells out a pattern, but says nothing about why that pattern happens.

Label it a law, because it describes a pattern that always holds and does not try to explain why it happens.

The result is a law.

Practice questions

1 Is this a hypothesis, a theory, or a law? If ice is put in warm water, then it will melt faster than in cold water.

- **A** Hypothesis
- **B** Theory
- **C** Law
- **D** Prediction

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2 Why does a scientist state a hypothesis before doing an experiment?

- **A** To give a testable idea to check
- **B** To state the conclusion before testing
- **C** To describe a pattern in nature
- **D** To explain why a pattern happens

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3 Is this a hypothesis, a theory, or a law? Metals expand when heated.

- **A** A law
- **B** A hypothesis
- **C** A theory
- **D** A prediction

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4 A hypothesis has been tested many times and has worked every time so far. Can it now be called proven true?

- **A** Yes, it is now a proven fact
- **B** No, it is well supported but could still be wrong
- **C** Yes, it is now a law
- **D** No, it must be thrown away

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5 What is a hypothesis?

- **A** A well-tested explanation
- **B** A description of a pattern
- **C** A proven fact
- **D** A testable prediction

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6 What is a scientific theory?

- **A** A well-tested explanation supported by much evidence
- **B** A guess with no evidence
- **C** A description of a pattern
- **D** A prediction for one test

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7 What is a scientific law?

- **A** An explanation of why a pattern happens
- **B** A testable prediction
- **C** A description of a pattern in nature
- **D** A guess about the future

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8 Can a theory become a law by getting more evidence?

- A Yes, with enough evidence
- B No, they do different jobs
- C Yes, after one more test
- D No, laws never change

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9 Give an example of a theory.

- A The theory of evolution by natural selection
- B Objects fall at the same rate in a vacuum
- C For every action there is an equal and opposite reaction
- D Plants grow taller with more light

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Does a law explain why something happens?

A Yes, it explains why

B No, it describes what happens

C Yes, it predicts the future

D No, it is only a guess

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ANSWER KEY

1. Hypothesis

2. To give a testable idea to check

3. A law

4. No, it is well supported but could still be wrong

5. A testable prediction

6. A well-tested explanation supported by much evidence

7. A description of a pattern in nature

8. No, they do different jobs

9. The theory of evolution by natural selection

10. No, it describes what happens

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