

Scientific Law

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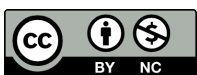
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Printed: August 7, 2016

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CHAPTER 1

Scientific Law

- Define scientific law.
- Compare scientific laws to scientific theories.
- Discuss scientific laws of physical science.
- Describe the place of laws in science.



Did you ever drive a bumper car like the one pictured here? As you drive around the track, other drivers try to bump into your car and push it out of the way. When another car bumps into yours, both cars may bounce back from the collision. The harder the two cars collide, the farther back they bounce.

It's the Law

It may seem like common sense that bumper cars change their motion when they collide. That's because all objects behave this way - it's the law! A scientific law, called Newton's third law of motion, states that for every action there is an equal and opposite reaction. Thus, when one bumper car acts by ramming another, one or both cars react by pushing apart.

Q: What are some other examples of Newton's third law of motion? What actions are always followed by reactions?

A: Other examples of actions and reactions include hitting a ball with a bat and the ball bouncing back; and pushing a swing and the swing moving away.

Laws in Science

Newton's third law of motion is just one of many scientific laws. A **scientific law** is a statement describing what always happens under certain conditions. Other examples of laws in physical science include:

- Newton's first law of motion

- Newton's second law of motion
- Newton's law of universal gravitation
- Law of conservation of mass
- Law of conservation of energy
- Law of conservation of momentum

Laws vs. Theories

Scientific laws state *what* always happens. This can be very useful. It can let you let you predict what will happen under certain circumstances. For example, Newton's third law tells you that the harder you hit a softball with a bat, the faster and farther the ball will travel away from the bat. However, scientific laws have a basic limitation. They don't explain *why* things happen. "Why" questions are answered by scientific theories, not scientific laws.

Q: You know that the sun always sets in the west. This could be expressed as a scientific law. Think of something else that always happens in nature. How could you express it as a scientific law?

A: Something else that always happens in nature is water flowing downhill rather than uphill. This could be expressed as the law, "When water flows over a hill, it always flows from a higher to a lower elevation."

Summary

- A scientific law is a statement describing what always happens under certain conditions. Newton's three laws of motion are examples of laws in physical science.
- A scientific law states what always happens but not why it happens. Scientific theories answer "why" questions.

Review

1. Define scientific law.
2. Identify three laws in physical science.
3. Which of these statements could be a scientific law?
 - a. Metals such as copper conduct electric current.
 - b. Metals can conduct electricity because they have free electrons.
4. How is a scientific law different from a scientific theory?
5. Contrast scientific laws with traffic laws or other laws devised by people.

Explore More

Watch this video comparing scientific laws and theories, and then answer the questions below.



MEDIA

Click image to the left or use the URL below.

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1. Do well-supported scientific theories eventually become scientific laws? Why or why not?
2. How are theories and laws related?