

Grade 6 Reading - SCIENCE

The Science behind Lightning

Lightning is a powerful and awe-inspiring natural phenomenon that occurs during thunderstorms. Let's delve into how lightning is created and its impact on the environment.

During a thunderstorm, strong updrafts and downdrafts within clouds cause water droplets and ice particles to collide. This collision leads to charge separation, with positive charges accumulating at the top of the cloud and negative charges building up at the bottom.

As the electrical charge in the cloud intensifies, a negatively charged channel called a stepped leader begins to form. This invisible channel descends from the cloud towards the ground, seeking a path for discharge.

When the stepped leader nears the ground, it induces a positive charge to build up on objects such as trees, buildings, or even people. As this positive charge intensifies, upward streamers emerge, reaching towards the stepped leader. Once a connection is made, a powerful electrical current, known as the return stroke, travels from the ground to the cloud.

The rapid movement of electrons during a lightning strike generates intense heat, reaching temperatures hotter than the surface of the Sun. This heat causes the surrounding air to expand rapidly, resulting in a shockwave that creates the characteristic thunderclap accompanying lightning.

Lightning has both positive and negative effects on the environment. On the positive side, lightning helps to balance the electrical charge in the atmosphere. It also plays a vital role in the nitrogen cycle, as the intense heat of lightning converts atmospheric nitrogen into a usable form for plants and other organisms.

However, lightning can also have negative consequences. During dry conditions, lightning strikes can ignite forest fires, leading to significant damage to ecosystems. These fires can spread rapidly, causing harm to plant and animal life and posing risks to human communities.

1. What causes charge separation during a thunderstorm?
 - A) Collision of water droplets and ice particles
 - B) Heat generated by lightning strikes
 - C) Upward movement of air currents
 - D) Accumulation of positive charges in the cloud

2. What is the purpose of the stepped leader in the lightning formation process?
 - A) To induce positive charges on objects near the ground
 - B) To create an intense heat that generates a shockwave
 - C) To generate an electrical current from the ground to the cloud
 - D) To establish a path for discharge from the cloud to the ground

3. What creates the thunderclap sound during a lightning strike?
 - A) Collisions between water droplets and ice particles
 - B) The expansion of air due to the rapid heat generated by electrons
 - C) The movement of electrons along the stepped leader
 - D) The shockwave caused by positive charges building up on objects

4. What does the term “updrafts” mean in the passage?
 - A) Strong winds that move upward
 - B) Rapid expansion of air due to heat
 - C) The formation of electrical charges
 - D) Intense collisions of water droplets

5. What is one positive effect of lightning on the environment?
- A) Creation of shockwaves that breaks up storms
 - B) Cooling of the atmosphere during hot weather
 - C) Balancing the electrical charge in the atmosphere
 - D) Conversion of atmospheric oxygen into a usable form
6. What can be a negative consequence of lightning strikes during dry conditions?
- A) Formation of rainbows in the sky
 - B) Disruption of radio and television signals
 - C) Ignition of forest fires
 - D) Creation of hailstorms
7. What does the term “electrical current” mean in the passage?
- A) The flow of electrons in a circuit
 - B) The release of heat during a lightning strike
 - C) The movement of water droplets in a thunderstorm
 - D) The vibration of air particles during a thunderclap
8. What is the purpose of this passage?
- A) To describe the different types of lightning strikes
 - B) To explain the impact of lightning on human health
 - C) To explore the formation of thunderstorms
 - D) To discuss how lightning is created in nature and its effect on the environment

Answers:

1. A) Collision of water droplets and ice particles
2. D) To establish a path for discharge from the cloud to the ground
3. B) The expansion of air due to the rapid heat generated by electrons
4. A) Strong winds that move upward
5. C) Balancing the electrical charge in the atmosphere
6. C) Ignition of forest fires
7. A) The flow of electrons in a circuit
8. D) To discuss how lightning is created in nature and its effect on the environment