Lightning

By Sharon Fabian

[1] People used to believe that lighting was a weapon of the gods. The god Zeus threw lightning bolts from his chariot in the sky whenever he got angry. Today, many people still visualize lightning bolts as being hurled from the sky, but in reality, lightning is more like a flip of an electric switch.

[2] To start at the beginning, lightning starts with the water cycle. As water evaporates, it absorbs heat, changes to water vapor, and begins to rise. When it reaches the colder atmosphere in the sky, it returns to a liquid state and forms drops of water or crystals of ice. These bits of liquid or frozen water build up in a huge anvil-shaped thundercloud.

[3] In the thundercloud, the movement of the water particles and the changing temperatures cause areas of positive charge and areas of negative charge to form. In these clouds five miles above the earth, electric sparks begin to occur.

[4] The sparks cause a surge of electrons that can shoot out from the cloud. This forms an electrical path known as a step leader. Several times on their way down toward the earth, step leaders stop for a fraction of a second, gather strength, and then shoot off again in another direction producing a jagged path. This path is not yet a lightning bolt, but it is preparing the way for one.

[5] As a step leader comes close to the earth, it begins to exert a pull on objects on the earth's surface. Certain objects on the earth respond to this electrical nudge by sending out charged paths of their own known as streamers. Streamers shoot up from objects including trees and even people.

[6] Streamers are one of the more recent discoveries in the study of lightning. Scientists with high speed cameras have taken pictures of streamers to prove that they do exist.

[7] A streamer stretches up into the sky, but doesn't reach all the way to the step leader. Instead, it stops and waits. Eventually, one step leader will reach far enough toward earth to connect with one of the streamers. This completes a path for electricity to flow in the same way that turning on an electric switch completes an electric circuit.

[8] As soon as the connection is made - Pow! Lightning strikes!

[9] A lightning strike is a massive flow of electric current from the cloud to the ground. Even though it often looks like one single flash, a lightning strike often occurs in stages, starting with the lower sections of the step leader first.

[10] That is what happens in a cloud to ground lightning strike, but there are other types of lightning as well. There is also cloud to cloud lightning and intra-cloud lightning. Intra-cloud lightning, the kind that occurs mainly within one cloud, is actually the most common. It can light up clouds in the night sky with beautiful colors.

[11] On earth, lightning can strike nearly anything because many different things can send out streamers. Tall objects, such as tall trees, are the most likely to be hit, but it isn't always the tallest object that gets struck by lightning. For safety in a thunder storm, it is best to find shelter in a building or car, and, of course, stay away from tall trees.

[12] Lightning causes tremendous damage each year. Most people know that lightning can cause injury or death and that it can also damage or destroy buildings. Lightning can also start wildfires, and it can damage electrical and communications systems.

[13] Maybe lightning is a little like flipping an electric switch and a little like Zeus throwing thunderbolts. Like an electric circuit, it is a path for electric current to flow, but like Zeus's thunderbolts, it packs a powerful punch.

Name _____ Science Pd _____

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1. The first step in producing lightning involves _____. (A) The water cycle (B) Circuits (C) Electrons (D) Zeus	2. Once water vapor reaches the thunder clouds, it turns into _____. (A) Either water or ice (B) Neither water or ice (C) Ice (D) Water
3. Areas of positive and negative electric charge form in a thundercloud. (A) False (B) True	4. Lightning always strikes the tallest object in the area. (A) False (B) True
5. A _____ is a path formed by a surge of electrons that shoots out of a cloud. (A) Lightning bolt (B) Streamer (C) Circuit (D) Step leader	6. A ____ is an electrically charged path sent out by an object on earth toward a thunder cloud. (A) Streamer (B) Circuit (C) Lightning bolt (D) Step leader
7. How is lightning like an electric circuit? _____ _____	8. What is the connection between lightning and the god Zeus? _____ _____