Electricity and lightning-Cloudburst (Grofe)

Summary
Students will connect the concept of positive and negative ions making lightning to the concept of lightning occurring in nature. The will use the music of Grofe' "Cloudburst" to aide the learning.

Additional Core Ties
Science - 5th Grade
Standard 4 Objective 1

Time Frame
1 class periods of 45 minutes each

Group Size
Large Groups

Life Skills
Aesthetics, Thinking & Reasoning, Employability

Materials
A recording of "Cloudburst" from Grand Canyon Suite by Grofe'. Pictures of Grand Canyon Pictures of rainstorms and lightning Listening map

Background for Teachers
The teacher should know the basic concepts of how lightning is formed. To put it simply, lightning is electricity. It forms in the strong up-and-down air currents inside tall dark cumulonimbus clouds as water droplets, hail, and ice crystals collide with one another. Scientists believe that these collisions build up charges of electricity in a cloud. The positive and negative electrical charges in the cloud separate from one another, the negative charges dropping to the lower part of the cloud and the positive charges staying in the middle and upper parts. Positive electrical charges also build upon the ground below. When the difference in the charges becomes large enough, a flow of electricity moves from the cloud down to the ground or from one part of the cloud to another, or from one cloud to another cloud. In typical lightning these are down-flowing negative charges, and when the positive charges on the ground leap upward to meet them, the jagged downward path of the negative charges suddenly lights up with a brilliant flash of light. Because of this, our eyes fool us into thinking that the lightning bolt shoots down from the cloud, when in fact the lightning travels up from the ground. In some cases, positive charges come to the ground from severe thunderstorms or from the anvil at the very top of a thunderstorm cloud. Be very familiar with Cloudburst. The Grand Canyon Suite is a suite for orchestra by Ferde Grofé, composed during the period from 1929 to 1931. It consists of five parts or movements, each an evocation in tone of a particular scene typical of the Grand Canyon. It consists of 5 movements: I. Sunrise II. Painted Desert III. On The Trail IV. Sunset V. Cloudburst Cloudburst uses expression to paint a musical picture of what is supposed to be happening in this movement. This is the most pictorial movement of the suite. We hear the approach of the storm. Lightning flashes across the sky and thunder roars from the darkness. The torrent of rain reaches its heights in a cloudburst, but the storm disappears rapidly and the moon comes from being the clouds. Nature again rejoices in all its grandeur. Note places where the sound is soft and where it is loud.
Also note what instruments are used and for what purpose.

**Student Prior Knowledge**

Students should have instruction on how to listen to a piece of music. They must sit as though at a formal concert. No wiggling or talking. Their eyes should be on the pictures or the teacher to practice how to be a considerate audience. Students should have been introduced to the basic concept of positive and negative charges attracting.

**Intended Learning Outcomes**

Students will understand that lightning is created by positive and negative attractions. Lightning can go from the ground to the cloud, cloud to the ground and cloud to cloud. Students will connect occurrences in nature being displayed in music compositions. Students will use this experience to understand the elements of music, including melody, rhythm, harmony, dynamics, tone color, texture, and form;

**Instructional Procedures**

The classroom teacher will teach a lesson to demonstrate the process of electrical charges in nature. Introduce the class to positive and negative charges attracting each other by demonstrating with magnets. Draw two clouds in the air and put positive signs for positive charges and minus signs for the negative. The whole process takes less than a millionth of a second. Kinds of Lightning There are words to describe different kinds of lightning. Here are some of them: In-Cloud Lightning: The most common type, it travels between positive and negative charge centers within the thunderstorm. Cloud-to-Ground Lightning: This is lightning that reaches from a thunderstorm cloud to the ground. Cloud-to-Cloud Lightning: A rare event, it is lightning that travels from one cloud to another. The music teacher will introduce the music of Grofe'. Tell students about the different sections of the Grand Canyon suite and that Grofe' wanted to create a picture in our minds about the Grand Canyon. Ask them what an orchestra could do to create the sounds of a thunderstorm. List their suggestions and have them listen for the parts they suggested. As they listen, show pictures of Grand Canyon and of thunder storms. Listen once more and display the listening map for them to follow. You may do this as a group or print of individually and give them a token to move along the map as they listen.

**Strategies for Diverse Learners**

Have students replicate the drawing of lightning. Then have them make a "map" of Cloudburst using visual representation to create a picture of the progression of the song.

**Assessment Plan**

Ask students to name instruments that they heard that created the lightning and thunder sounds. Ask for any instruments and what they did that created a thunderstorm sound. Address the use of melody, rhythm, harmony, dynamics, tone color, texture, and form; Students should be able to name the louder sound, faster rhythm, and the dark sound for the storm. They should be able to describe melody and texture using terms like calm, more scary and the place where the storm is at it's worst. They should be able to replicate the drawing of the clouds to show the positive and negative charges and how they make the three kinds of lightning.

**Bibliography**

Grofe' Grand Canyon Suite "Cloudburst" listening map
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