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The National Content Standards (Grades K–4)

• *The sun provides the light and heat necessary to maintain the temperature of the Earth.*

• *Weather changes from day to day and over the seasons. Weather can be described by measurable quantities, such as temperature, wind direction and speed, and precipitation.*

The National Content Standards (Grades 5-8)

• *Water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere, in what is known as the "water cycle." Water evaporates from the Earth's surface, rises, and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.*

• *The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.*

• *Clouds, formed by the condensation of water vapor, affect weather and climate.*

• *Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.*

The 10 Big Ideas About Meterology & Corresponding Labs

1. Electromagnetic waves from the sun strike the Earth and are absorbed as different forms of energy.

2. The effects of the heat energy from the sun can be measured and recorded using an instrument called a thermometer.

3. Heat from the sun causes water to evaporate from the surface of the Earth. This is the start of the water cycle.

4. One of the most visible portions of the water cycle is made up of the clouds that are produced. These clouds not only deliver moisture, but they also produce sunrises, sunsets, and rainbows under the right conditions.

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5. The water cycle produces measurable precipitation, primarily in the form of rain, but it also creates snow, frost, fog, and freezing rain.

6. The atmosphere is composed of 5 different layers. Collectively, these layers are 100 miles thick and produce air pressure at the surface of the Earth equal to 14.7 pounds per square inch.

7. As the atmosphere is heated by the sun and the surface of the Earth, convection currents are produced that create upward movement in air masses that produce clouds, as well as lateral movement that produces wind.

8. Wind is created when the air pressure over a geographic region changes, or when there is a difference in temperature between two areas due to elevation or geography.

9. Thunderstorms are produced when cold and warm air masses collide or when hot air travels over a mountainous region and is cooled rapidly by the topography. These storms are characterized by large, dark, voluminous clouds, lightning, and thunder.

10. Weather can be very severe when tornados and hurricanes are produced. It can also have long-term effects, such as acid rain.