

MAPPING GRADE 6 SCIENCE INSTRUCTION

Concept: Energy in the Atmosphere

PWC Objective: 6.3

The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on the Earth's surface. Key concepts include:

- the Earth's energy budget **(SOL 6.3a)**
- the role of radiation and convection in the distribution of energy **(SOL 6.3b)**
- the motion of the atmosphere and the oceans **(SOL 6.3c)**
- cloud formation **(SOL 6.3d)**
- the role of heat energy in weather-related phenomena (thunderstorms, hurricanes) **(SOL 6.3e)**

What Students Should Know (Critical Attributes)	What Students Should Be Able To Do (Essential Skills)
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> • How is the energy from the sun used to power Earth processes? • What might happen if the energy balance between the Earth and space is disrupted? • How are radiation and convection involved in the transfer of energy? • What role does heat energy distribution play in weather phenomena? <p><u>Critical Attributes:</u></p> <p>6.3a The Earth receives only a very small portion of the sun's energy, yet this energy is responsible for powering the motion of the atmosphere, the oceans, and many processes at the Earth's surface.</p> <p>6.3b Solar radiation is made up of different types of radiation (including infrared, visible light, and ultraviolet).</p> <p>6.3b Incoming solar radiation is in close balance with the energy that leaves the atmosphere; otherwise, the Earth would heat up or cool down. Excess carbon dioxide and other gases may disrupt this balance, creating a Greenhouse Effect.</p>	<ul style="list-style-type: none"> • Comprehend and apply basic terminology related to solar energy including wavelength; ultraviolet, visible and infrared radiation; and reflection and absorption. • Analyze, model, and explain the Greenhouse Effect in terms of the energy entering and leaving the atmosphere.

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What Students Should Know (Critical Attributes)	What Students Should Be Able To Do (Essential Skills)
6.3b About one third of the sun's incoming energy is reflected back out to space. About one half of the energy striking the Earth is absorbed by the Earth's surface.	<ul style="list-style-type: none">• Design an investigation to determine the effect of sunlight on the heating of a surface.
6.3b The Earth is heated unequally.	
6.3c When air or water is heated, the molecules move faster and farther apart, reducing their density, causing them to rise. Cooler air or water molecules move more slowly and are denser than warm air or water. Warm air or water rising coupled with cooler air or water descending forms a cyclic rising/falling pattern called <i>convection</i> .	<ul style="list-style-type: none">• Analyze and explain how convection currents occur and how they distribute heat energy in the atmosphere and oceans.
6.3d As bodies of water such as oceans, lakes, and rivers, absorb energy, the water evaporates, forming clouds.	<ul style="list-style-type: none">• Analyze the role of heating and cooling in the formation of clouds.• Order the sequence of events that takes place in the formation of a cloud.
6.3e Some thunderstorms are formed when the land is strongly heated. Hurricanes form over warm, tropical water and are fed by the energy of the water.	<ul style="list-style-type: none">• Explain how heating and cooling of land, air, and water contributes to the formation of thunderstorms and hurricanes.