

Earth's Atmosphere Unit Design

Grade 6

<p style="text-align: center;">Texts to be used:</p> <p style="text-align: center;">McDougal Littell & *Unit Resource Book (URB) where noted</p>	<h2 style="margin: 0;">Earth's Atmosphere (EA)</h2>
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RI Statements of Enduring Knowledge - (Established Goals):

ESS1 - The Earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

ESS2 - The earth is part of a solar system, made up of distinct parts that have temporal and spatial interrelationships.

PS1 - All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size or amount of substance).

PS2 - Energy is necessary for change to occur in matter. Energy can be stored, transferred, and transformed, but cannot be destroyed.

<p style="text-align: center;">Related Rhode Island GSE's (Understandings)</p>	<p style="text-align: center;">RI Assessment Targets Assessment Evidence</p>
<p>ESS1 (5-6)–2 Students demonstrate an understanding of processes and change over time within earth systems by ...</p> <p>2a <u>diagramming, labeling and explaining the processes of the water cycle including evaporation, precipitation, and run-off, condensation, transpiration, and groundwater.</u></p> <p>2b <u>explaining how condensation of water vapor forms clouds which affects climate and weather.</u></p> <p>2c <u>developing models to explain how humidity, temperature, and altitude affect air pressure and how this affects local weather.</u></p> <p>2d <u>identifying composition and layers of earth's atmosphere.</u></p> <p><i>ESS1 (5-6)–4</i></p>	<p>ESS1 (5-8) SAE–2 <i>Explain the processes that cause the cycling of water into and out of the atmosphere and their connections to our planet's weather patterns.</i></p> <ul style="list-style-type: none"> • Text reference: 2.3, pp.56-63 (EA) • Investigation: How does condensation occur? P.56 <p>Class Discussion: Water Cycle p.57 EA</p> <ul style="list-style-type: none"> • Discuss the Carbon Cycle;The nitrogen cycle • Investigation p.59, How does a cloud form? • URB P. 113 <p>ESS1 (5-8) SAE+ POC –4 <i>Explain the role of differential heating or convection in ocean currents, winds, weather and weather patterns, atmosphere, or climate.</i></p> <ul style="list-style-type: none"> • Text reference 4.0-4.3, pp. 114-139 • Investigation: How does the angle of light affect heating? P. 117, (EA) • Investigation: How quickly do soil and water heat and cool? P. 119 (EA) <p>Class discussion: Climate classification; p.127 (EA)</p>

ESS2 (7-8)-8

Students demonstrate an understanding of temporal or positional relationships between or among the Earth, sun, and moon by ...

8a Using or creating a model of the Earth, sun and moon system to show rotation and revolution.

8b explaining night/day, seasons, year, and tides as a result of the regular and predictable motion of the Earth, sun, and moon.

8c using a model of the Earth, sun, & moon to recreate the phases of the moon.

ESS2 (5-6)-8

Students demonstrate an understanding of temporal or positional relationships between or among the Earth, sun, and moon by ...

8a Using models to describe the relative position/motion of the Earth, sun, and moon.

8b explaining night/day, seasons, year, and tides as a result of the regular and predictable motion of the Earth, sun, and moon.

8c using a model of the Earth, sun, & moon to recreate the phases of the moon.

PS2 (5-8) Students demonstrate an understanding of processes and change over time within earth systems by ...

4a explaining how differential heating and convection affect Earth's weather patterns.

4b describing how differential heating of the oceans affects ocean currents which in turn influence weather and climate.

4c explaining the relationship between differential heating /convection and the production of winds.

4d analyzing global patterns of atmospheric movements to explain effects on weather.

4e predicting temperature and precipitation changes associated with the passing of various fronts.

ESS2 (5-8) SAE+ POC –8

Explain temporal or positional relationships between or among the Earth, sun, and moon (e.g., night/day, seasons, year, tides) or how gravitational force affects objects in the solar system (e.g., moons, tides, orbits, satellites)

Text reference: Chapter 2.2 pp.47-55 (EA)

- Investigation: How does the Earth's shape affect solar heating? P. 47 (EA)
- Investigation: How does the Earth's rotation affect wind? (Coriolis effect) P.49 (EA)

● **URB p.102**

- Class discussion "Global Winds" p. 51 (EA)

Class discussion "Navigate the Jet Stream" p. 55 (EA)

- Text reference 4.0-4.3, pp. 114-139

- Investigation: How does the angle of light affect heating? P. 117, (EA)
- Investigation: How quickly do soil and water heat and cool? P. 119 (EA)

● **URB P. 119**

Class discussion: Climate classification; p.127 (EA)

PS1 (5-8) SAE+MAS – 4

Represent or explain the relationship between or among energy, molecular motion, temperature, and states of matter.

- Text Reference: Chapter 1 pp. 9-25(EA)
- Investigation: "How heavy is paper?"p.7 (EA)
- Investigation: How does air affect falling objects? (EA)
- Investigation: How do you know that air has different gases? P.10 (EA)
- **URB P.23**
- Discuss the Carbon Cycle;The nitrogen cycle
- Text reference: 2.3, pp.56-63 (EA)
- Text reference 2.1-2.2 pp. 43-54(EA)
- Investigation; What does air do to the egg? P. 43 (EA) or use Spangler Video
- Investigation: How can you measure changes in air pressure? P. 45, (EA)
- **URB P. 91**
- Class discussion p. 48 "How Wind Forms"

PS1 (7-8) –1

Students demonstrate an understanding of characteristic properties of matter by ...

1a measuring mass and volume of both regular and irregular objects and using those values as well as the relationship $D=m/v$ to calculate density

PS1 (7-8) – 4

Students demonstrate an understanding of states of matter by ...

4c observing the physical processes of evaporation and condensation, or freezing and melting, and accounting for these changes in terms of molecular motion and conservation of mass.

PS2 (7-8) -7

Students demonstrate an understanding of heat energy by...

7b explaining the difference among conduction, convection and radiation and creating a diagram to explain how heat energy travels in different directions and through different materials by each of these methods.

PS2 (5-8) INQ+SAE+POC – 7

Use data to draw conclusions about how heat can be transferred (convection, conduction, radiation).

- Investigation: How does heating affect air? P.7 (EA)
- Natural processes modify the atmosphere: ; The water cycle, p. 12 EA
- Text reference: 1.3 pp.22-25 (EA)
- Investigation: Can you feel radiation?
- Discuss the Ozone Layer, p. 23 (EA)

PS1 (5-8) INQ-1

Investigate the relationships among mass, volume and density

- Text reference: 2.3, pp.56-63 (EA)

Additional Resources: PBS Video Streaming

Texts to be used: McDougal Littell & *Unit Resource Book (URB) where noted		Earth's Atmosphere (EA)	
	Focus Questions (Essential Questions)	Instructional Activities & Investigations (INQ)	Big Ideas (Understandings)
1	What is the atmosphere?	<ul style="list-style-type: none"> Text Reference: Chapter 1.0 -1.3 (EA) pp.9-25 Investigation: "How heavy is paper?"p.7 (EA) Investigation: How does heating affect air? P.7 (EA) Investigation: How does air affect falling objects? (EA) p.9 Investigation: How do you know that air has different gases? P.10 (EA) URB P.23 	<ul style="list-style-type: none"> The atmosphere is the layer of gases surrounding Earth and moves energy. Weather happens in the troposphere. The troposphere is the mixture of nitrogen, oxygen and other gases, including water vapor. Air has mass and can be compressed. The atmosphere acts as a greenhouse keeping the Earth warm.
2	What is Weather?	<ul style="list-style-type: none"> Natural processes modify the atmosphere: Discuss the Carbon Cycle;The nitrogen cycle; <u>The water cycle</u> p. 12 EA 	<ul style="list-style-type: none"> Weather is the condition of Earth's atmosphere at a given time in a given place. Severe weather occurs all over the Earth. Meteorology is the science of weather, and meteorologists are the people who study Earth's weather.
3	What causes radiation and conduction?	<ul style="list-style-type: none"> Text reference: 1.3 pp.22-25 (EA) Investigation: Can you feel radiation? P.22 Discuss the Ozone Layer, p. 23 (EA) 	<ul style="list-style-type: none"> Heat is kinetic energy of atoms and molecules. The Sun is the major source of energy that heats the atmosphere. Energy moves from one material to another by radiation and conduction. Gases in the atmosphere absorb radiation

4	<p>What affects weather throughout the world?</p> <p>&</p> <p>What causes the seasons?</p>	<ul style="list-style-type: none"> • Text reference: Chapter 2.2 pp.47-55 (EA) • Investigation: How does the Earth's shape affect solar heating? P. 47 (EA) • Investigation: How does the Earth's rotation affect wind? (Coriolis effect) P.49 (EA) • URB p.102 • Class discussion "Global Winds" p. 51 (EA) • Class discussion "Navigate the Jet Stream" p. 55 (EA) 	<ul style="list-style-type: none"> • Earth's axis of rotation tilted at an angle of 23.5 degrees and always points at the North Star. • The angle at which light from the Sun strikes the surface of Earth is the solar angle. • Coriolis effect • Jet stream and weather patterns
5	<p>What is energy transfer?</p> <p>How does energy transfer cause convection?</p>	<ul style="list-style-type: none"> • Text reference: 2.3, pp.56-63 (EA) 	<ul style="list-style-type: none"> • Density is the ratio of a mass and its volume. • As matter heats up, it expands, causing the matter to become less dense. • Convection is the circulation of fluid that results from energy transfer.
6	<p>How does water does water get into the air?</p> <p>How does water condense out of the air?</p>	<ul style="list-style-type: none"> • Text reference: 2.3, pp.56-63 (EA) • Investigation: How does condensation occur? P.56 • Class Discussion: Water Cycle p.57 (EA) • Investigation: How does a cloud form? P.59 • URB P. 113 	<ul style="list-style-type: none"> • Water changes from gas to liquid by condensation. • Water changes from liquid to gas by evaporation of water; water condenses to form clouds; water falls to the earth's surface via precipitation. The process involves heat from the surroundings. • A water molecule might follow many different paths as it travels in the water cycle.

7	<p>What is the relationship between air pressure and wind?</p>	<ul style="list-style-type: none"> • Text reference 2.1-2.2 (EA) pp.43-54 • Investigation; What does air do to the egg? P. 43 (EA) • Investigation: How can you measure changes in air pressure? P. 45, (EA) • URB P.91 • Class discussion p. 48 “How Wind Forms” 	<ul style="list-style-type: none"> • Pressure exerted on a gas reduces its volume and increases its density. • Differential heating of Earth’s surface by the Sun can create high- and low- pressure areas. • Wind is a movement of air from an area of high pressure to an area of low pressure. • Local winds blow in predictable ways determined by local differential heating. • Wind speed is measured with an instrument called an anemometer. • Air pressure is represented on a map by contour lines called isobars.
8	<p>What is climate? What is the difference between weather and climate?</p>	<ul style="list-style-type: none"> • Text reference 4.1-4.3, pp. 114-139 • Investigation: How does the angle of light affect heating? P. 117, (EA) • Investigation: How quickly do soil and water heat and cool? P. 119 (EA) • URB p.119 • Class discussion: Climate classification; p.127 (EA) 	<ul style="list-style-type: none"> • Air masses are large bodies of air that are uniform in temperature and humidity. • A front is a boundary that separates two air masses. • Weather conditions change as a front passes by. • Climate is the average weather over time.