

Stratford Public Schools Unit Design
6th Grade

Unit Name: Weather and Climate Science **Est. # of Weeks: 6/7 weeks**
Synopsis: – Students will explain how the sun’s energy affect weather patterns.

STUDENT LEARNING GOALS

Content-Specific Powered Standards	Interdisciplinary Standards (as appropriate)	
6.3.a Local and regional weather are affected by the amount of solar energy the area receives and proximity to a large body of water	Key Vocabulary air mass air pressure cold/warm front condense dense evaporate freezing gas	global wind humidity land breeze liquid melting molecule precipitation sea breeze solid

<p>Enduring Understandings</p> <ol style="list-style-type: none"> 1. Earth is surrounded by layers of gases (atmosphere) that influence the environment and support life. Weather on Earth is caused by the daily changes in the temperature, pressure and amount of moisture in the lower atmosphere. Regions of the earth experience distinct long-term climate conditions caused, in part, by different amounts of solar energy they receive. 2. Heat energy causes molecules to move. The molecules that make up all matter are in constant motion. Solids, liquids and gases differ in the movement and arrangements of their molecules. Molecules in gases move randomly and independently of one another. Molecules in liquids move around each other randomly, but are loosely held together by an attraction force. Molecules in solids are closely locked in a patterned position and can only vibrate back and forth. 3. When heat energy is added to a substance, its molecules move faster (increased temperature) and spread apart from each other (become less densely arranged). When heat energy is removed, molecules move slower (decreased temperature) and come together (become more densely arranged). 4. If enough heat energy is absorbed by a solid or a liquid, the molecules may overcome the forces holding them together and change to a new state of matter. Solids change to liquids (melt) and liquids change to gases (vaporization) when heat energy is absorbed from the surroundings. Conversely, heat energy is given off when gases change to liquids (condensation) or liquids change to solid (freezing). 5. Different surfaces on Earth absorb and release solar energy at different rates. Land has a lower heat capacity than water; therefore land temperatures change more rapidly than water temperatures do. The surface temperature of large bodies of water, such as the oceans that cover a great deal of the earth, affects the temperature of the air above them. 	<p>Essential Questions:</p> <p>What variations in the amount of the sun’s energy hitting the earth’s surface, affects daily and seasonal weather patterns?</p> <p>How do external and internal sources of energy affect the Earth’s systems?</p>
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6. Earth's atmosphere (air) is a mixture of different amounts of gases (mainly nitrogen, followed by oxygen, carbon dioxide and water vapor). Air molecules constantly press on and around objects
7. Due to the pulling force of Earth's gravity, air close to Earth is more dense than air higher in the atmosphere; denser air causes greater air pressure.
8. Wind is caused by air moving from areas of high pressure to low pressure. Cool, dense air is high pressure and tends to sink; warm, less dense air is low pressure and tends to rise. Local and global winds move in predictable patterns based on uneven heating of Earth's surface.
9. Local winds can be influenced by atmospheric conditions, terrain (mountain, deserts) and closeness to large bodies of water. Near coastal areas, the day to night temperature and pressure differences between land and water cause local winds to blow from ocean to land ("sea breeze") during day and from land to ocean ("land breeze") at night.
10. Global winds are caused by the circulation of cold, dense polar air and warm, less dense equatorial air. The rotation of the earth, combined with the location of the continents, causes bands of wind patterns on the earth. For example, weather tends to move generally from west to east.
11. Large bodies of water absorb heat energy, causing water to evaporate. The amount of water vapor in the atmosphere (humidity) is dependant on the temperature of the air. Warm air holds more water vapor than cool air. As warm, humid air rises and cools, its molecules become more closely spaced and the water vapor condenses into tiny water droplets that are less dense than air (clouds).
12. Weather on Earth is caused by daily variations in the temperature, pressure and humidity of different bodies of air (air masses). Warm, moist, less dense air masses rise, thus decreasing air pressure usually indicates that cloudy, wet, warmer weather is approaching. Cool, dry, denser air masses sink, thus increasing air pressure usually indicates clear, dry, cooler weather is approaching.
13. When masses of warm, moist air interact with masses of cool, dry air, the boundary is called a warm front. The way in which the air masses move past one another influences the type of weather that results. Weather predictions can be made based on the pattern of warm, wet, low pressure air being typically followed by cool, dry, high pressure air.
14. Connecticut, and the northeast in general, often has rapidly changing weather because three patterns of moving air interact here: cold, dry air from the north, warm, moist air from the Atlantic ocean coastline, and air moving across the US from west to east.

Learning Objectives / Grade Level Expectations

1. Compare the composition and structure of the Earth's atmospheric layers.
2. Demonstrate how changes in temperature, pressure, moisture and density of air affect weather patterns (e.g., air masses and air pressure.)
3. Describe in writing how solar energy drives Earth's weather systems.
4. Investigate and report on how the introduction of heat affects the motion of particles and the distance between them.
5. Illustrate the transfer of energy as matter changes phase.

6. Design, conduct and report in writing an investigation that reveals different substances absorb and release heat at different rates.
7. Research and give examples of heat transfer and local weather differences in Connecticut.
8. Investigate and explain the movement of local winds, including “sea breezes” and “land breezes,” based upon the uneven heating of the Earth’s surface and a change in air pressure.
9. Examine and explain that global winds are caused by uneven heating of the Earth’s surface and the rotation of the Earth.
10. Design a weather forecast based upon collected weather data.

ASSESSMENT PLAN

Summative Assessment(s)

- Unit Test
- Student Notebooks
- Project Completion

Formative and Diagnostic Assessment(s)

Pre and Post Tests by Chapter

LEARNING PLAN COMPONENTS

Prentice Hall: **Weather & Climate** Text Book, Adapted book, Transparencies

“Active Art” on Phschool.com

Discovery School Field Trip – Prentice Hall video

“Weather and Climate”: “Working Under Pressure” segment– 5 ½ minutes

D. Zikes - Science Foldables book – PG 118

Active Art: “Global Winds activity”- PHSchool.com - Web Code: cfp-4023

Prentice Hall Discovery Video Field Trip- “ Weather Factors” www.SciLinks.org

Active Art online - Phschool.com - web code: cfp-4031

Unitedstreaming: “Weather Smart: Forecasting and Weather Instruments”(15:00)

http://gtmmedia.discoveryeducation.com/videos/10347/10347_BM.pdf

<http://wilstar.com/skywatch.htm#indicators>

Unitedstreaming: “Understanding Weather: “Meteorology: A Brief History of the Science of Weather ”(6:00)

Weather and Climate: Delta Science Reader (purple)

www.Noaa.gov site for daily forecast

For blank CT map:

<http://www.nationalgeographic.com/xpeditions/atlas/index.html?Parent=usofam&Rootmap=usct&Mode=b&SubMode=w>

Weather Forecasting Delta Science Reader (purple)