

# Meteorology

## Unit 1 The Atmosphere (Chapter 11)

Estimated Time Frame for sections	Big Ideas	Essential Question	Concept (Know)	Competency (Do)	Suggested Resources	Vocabulary	PA Content / Keystone Standard	Suggested Lessons & Activities
45 days	The composition, structure, and properties of Earth's atmosphere form the basis of Earth's weather and climate.	<p>What is the atmosphere and what does it do?</p> <p>What are the layers of the atmosphere and what distinguishes them apart?</p> <p>Compare and contrast conduction, convection and radiation.</p>	Energy is transferred throughout Earth's atmosphere and surface.	<p>Describe the gas and particle composition of the atmosphere.</p> <p>Compare and contrast the five layers of the atmosphere.</p> <p>Identify three ways energy is transferred in the atmosphere.</p>	<p>Earth science</p> <p>Geology, the environment, and the universe</p> <p>textbook</p> <p>Weather bug</p> <p>Ahrens</p> <p>Essentials of Meteorology</p>	<p>Troposphere</p> <p>Stratosphere</p> <p>Mesosphere</p> <p>Thermosphere</p> <p>Exosphere</p> <p>Radiation</p> <p>Conduction</p> <p>Convection</p> <p>Ozone</p>	<p>3.3.10.A4</p> <p>3.3.10.A8</p> <p>3.3.12.A1</p> <p>3.3.12.A4</p> <p>3.3.12.A6</p>	<p>Radiation lab</p> <p>Radiation demo</p> <p>Soil vs water demo</p> <p>Convection demo</p> <p>Conduction demo</p>
	The composition, structure, and properties of	What are the three properties that are dependent on one another	Atmospheric properties, such as temperature, air pressure,	Identify three properties of the atmosphere and how they	<p>Earth science</p> <p>Geology, the environment, and the</p>	<p>Temperature inversion</p> <p>Humidity</p> <p>Saturation</p> <p>Relative</p>	<p>3.3.10.A8</p> <p>3.3.12.A4</p> <p>3.3.12.A6</p>	<p>Demo/labs on temperature/pressure and humidity interaction</p> <p>Pressure charts</p>

	Earth's atmosphere form the basis of Earth's weather and climate.	and how do they interact?  What happens to the different atmospheric properties as you increase in elevation above sea level?	and humidity describe weather conditions.	interact.  Explain why the atmospheric properties change with changes in altitude.	universe textbook Weather bug Ahrens Essentials of Meteorology	humidity Dew point Latent heat Thermometer Hydrometer Barometer Anemometer		
	The composition, structure, and properties of Earth's atmosphere form the basis of Earth's weather and climate.	What is the difference between stable and unstable air?  Compare and contrast low, middle and high clouds.  How does precipitation form?  What is the water cycle?	Clouds vary in shape, size, height of formation, and type of precipitation.	Explain the difference between stable and unstable air.  Compare and contrast low, middle and high clouds.  Explain how precipitation forms.	Earth science Geology, the environment, and the universe textbook Weather bug Ahrens Essentials of Meteorology	Condensation nucleus Orographic lifting Cumulus Stratus Cirrus Precipitation Coalescence	<b>3.3.10.A5</b> <b>3.3.10.A8</b> <b>3.3.12.A4</b> <b>3.3.12.A6</b>	Precipitation labs: snow, rain  Water cycle lab

**Unit 1 The Atmosphere (Chapter 11) Review**

**Assessment Unit 1 The Atmosphere (Chapter 11)**

## Unit 2 The Atmosphere (Chapter 12)

Estimated Time Frame for sections	Big Ideas	Essential Question	Concept (Know)	Competency (Do)	Suggested Resources	Vocabulary	PA Content / Keystone Standard	Suggested Lessons & Activities
15 days	Weather patterns can be observed, analyzed and predicted.	<p>What is meteorology?</p> <p>How does unequal heating of the Earth cause weather?</p> <p>What is an air mass?</p> <p>What are the types of air masses?</p>	Air masses have different temperature and amounts of moisture because of uneven heating of Earth's surface.	<p>Compare and contrast weather and climate.</p> <p>Analyze how imbalances in the heating of Earth's surface created weather.</p> <p>Describe how air masses form.</p> <p>Identify five types of air masses.</p>	Earth science Geology, the environment, and the universe textbook Weather bug Ahrens Essentials of Meteorology	Weather Climate Air mass Source region	<p>3.3.10.A8</p> <p>3.3.12.A4</p> <p>3.3.12.A6</p>	<p>Insolation lab</p> <p>Air mass charts</p>
	Weather patterns can be observed, analyzed and predicted.	What are the major wind systems, where are they located, and how do they form?	Weather results when air masses with different pressure and temperatures move, change, and collide.	<p>Compare and contrast the three major wind systems</p> <p>Identify four types of fronts.</p>	Earth science Geology, the environment, and the universe textbook Weather bug	Coriolis effect Polar easterlies Prevailing westerlies Trade winds Jet stream front	<p>3.3.10.A8</p> <p>3.3.12.A4</p> <p>3.3.12.A6</p>	<p>Wind system labs</p> <p>Fronts demos</p> <p>High and low pressure demos</p>

		<p>What are the four types of fronts?</p> <p>Compare and contrast high and low pressure systems.</p>		<p>Distinguish between high- and low pressure systems.</p>	<p>Ahrens Essentials of Meteorology</p>			
	<p>Weather patterns can be observed, analyzed and predicted.</p>	<p>Why do we need accurate weather data?</p> <p>What instruments are used to collect the weather data to create accurate forecasts?</p> <p>What are the pros and cons of weather satellites?</p>	<p>Accurate measurements of atmospheric properties are a critical part of weather of weather analyze and prediction.</p>	<p>State the importance of accurate weather data</p> <p>Summarize the instruments used to collect weather data form Earth's surface</p> <p>Analyze the strengths and weaknesses of weather satellites.</p>	<p>Earth science Geology, the environment, and the universe textbook Weather bug Ahrens Essentials of Meteorology</p>	<p>Thermometer Barometer Anemometer Hygrometer Radiosonde Doppler effect</p>	<p><b>3.3.10.A6</b> <b>3.3.10.A8</b> <b>3.3.12.A4</b> <b>3.3.12.A6</b> <b>3.3.12.A7</b></p>	<p>Weather bug</p>
	<p>Weather patterns can be observed, analyzed and predicted.</p>	<p>Why do we need accurate weather data?</p> <p>What instruments are used to collect the weather</p>	<p>Several methods are used to develop short-terms and long terms weather forecasts.</p>	<p>Analyze a basic surface weather chart.</p> <p>Distinguish between digital and analog</p>	<p>Earth science Geology, the environment, and the universe textbook Weather bug</p>	<p>Station model Isobar Isotherm Digital forecast Analog forecast</p>	<p><b>3.3.10.A8</b> <b>3.3.12.A4</b> <b>3.3.12.A6</b> <b>3.3.12.A7</b> <b>3.3.12.A8</b></p>	<p>Weather bug</p>

		data to create accurate forecasts?  What are the pros and cons of weather satellites?		forecasting.  Describe problems with long- term forecasting.	Ahrens Essentials of Meteorology			
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**Unit 2 The Atmosphere (Chapter 12) Review**

**Assessment Unit 2 The Atmosphere (Chapter 12)**

**Unit 3 The Nature of Storms (Chapter 13)**

<b>Estimated Time Frame for sections</b>	<b>Big Ideas</b>	<b>Essential Question</b>	<b>Concept (Know)</b>	<b>Competency (Do)</b>	<b>Suggested Resources</b>	<b>Vocabulary</b>	<b>PA Content / Keystone Standard</b>	<b>Suggested Lessons &amp; Activities</b>
15 days	The exchange of thermal energy in the atmosphere sometimes occurs with great violence that varies in form, size, and duration.	How does a thunderstorm form?  What are the different types of thunderstorms?  Describe the life of a thunderstorm?	The intensity and duration of thunderstorms depend on the local conditions that created them.	Identify the processes that form thunderstorms  Compare and contrast different types of thunderstorms  Describe the life cycle of a	Earth science Geology, the environment, and the universe textbook Weather bug Ahrens Essentials of Meteorology	Aim mass thunderstorm Mountain thunderstorm Sea-breeze thunderstorm Frontal thunderstorm Stepped leader Return stroke	<b>3.3.10.A8</b> <b>3.3.12.A4</b> <b>3.3.12.A6</b>	Weather bug YouTube Noaa

				thunderstorm.				
	The exchange of thermal energy in the atmosphere sometimes occurs with great violence that varies in form, size, and duration.	<p>Why are some thunderstorms more severe than others?</p> <p>What are the dangers of a thunderstorm?</p> <p>When do we here in Pittsburgh experience the most thunderstorms?</p>	All thunderstorms produce wind, rain, and lightning which can have dangerous and damaging effects under certain circumstances.	<p>Explain why some thunderstorms are more severe than others</p> <p>Recognize the dangers of severe weather, including lightning, hail, and high winds.</p>	Earth science Geology, the environment, and the universe textbook Weather bug Ahrens Essentials of Meteorology	Supercell Downburst Tornado Fujita tornado intensity scale	<p><b>3.3.10.A8</b></p> <p><b>3.3.12.A4</b></p> <p><b>3.3.12.A6</b></p>	Noaa website Weather bug
	The exchange of thermal energy in the atmosphere sometimes occurs with great violence that varies in form, size, and duration.	<p>What are the conditions required for a tropical storm to begin to form?</p> <p>Describe the life of a tropical cyclone?</p> <p>What are the dangers of a hurricane?</p>	Normally peaceful, tropical oceans are capable of producing one of Earth's most violent weather systems – the Tropical cyclone	<p>Identify the conditions required for tropical cyclones to form.</p> <p>Describe the life cycle of a tropical cyclone.</p> <p>Recognize the dangers of hurricanes.</p>	Earth science Geology, the environment, and the universe textbook Weather bug Ahrens Essentials of Meteorology	Tropical cyclone Eye Eye wall Saffir-Simpson Hurricane Scale Storm surge	<p><b>3.3.10.A8</b></p> <p><b>3.3.12.A4</b></p> <p><b>3.3.12.A6</b></p>	Noaa web site

**Review Unit 3 The Nature of Storms (Chapter 13)**

**Assessment Unit 3 The Nature of Storms (Chapter 13)**

**Unit 4 Climate (Chapter 14)**

<b>Estimated Time Frame for sections</b>	<b>Big Ideas</b>	<b>Essential Question</b>	<b>Concept (Know)</b>	<b>Competency (Do)</b>	<b>Suggested Resources</b>	<b>Vocabulary</b>	<b>PA Content / Keystone Standard</b>	<b>Suggested Lessons &amp; Activities</b>
<b>15 days</b>	The different climates on Earth are influenced by natural factors as well as human activities.	<p>What is normal?</p> <p>What is a climate?</p> <p>Explain why temperature and rain fall affect climate.</p> <p>Compare and contrast temperatures in different regions on Earth.</p>	Climate is affected by several factors including latitude and elevation.	<p>Recognize limits associated with the use of normal.</p> <p>Explain why climates vary.</p> <p>Compare and contrast temperatures in different regions on Earth.</p>	<p>Earth science</p> <p>Geology, the environment, and the universe</p> <p>textbook</p> <p>Weather bug</p> <p>Ahrens</p> <p>Essentials of Meteorology</p>	<p><b>Climatology</b></p> <p><b>Normal</b></p> <p><b>Tropics</b></p> <p><b>Temperature zones</b></p> <p><b>Polar zones</b></p>	<p><b>3.3.10.A8</b></p> <p><b>3.3.12.A4</b></p> <p><b>3.3.12.A6</b></p>	
		How do we determine what the climate of a region is?	Climates are categorized according to the average temperatures and precipitation	<p>Describe the criteria used to classify climates</p> <p>Compare and contrast</p>	<p>Earth science</p> <p>Geology, the environment, and the universe</p> <p>textbook</p>	<p>Koppen</p> <p>Classification system</p> <p>Microclimate</p> <p>Heat island</p>	<p><b>3.3.10.A8</b></p> <p><b>3.3.12.A4</b></p> <p><b>3.3.12.A6</b></p>	

		Compare and contrast different climates.  What is a microclimate?	amounts.	different climates.  Explain and give examples of microclimates.	Weather bug Ahrens Essentials of Meteorology			
		What is a climate change?  What can cause a climate to change?  Why do climate changes occur?	Earth's climate is constantly changing on many different timescales	Distinguish between long-term and short-term climatic changes.  Identify natural caused of climate change  Recognize why climatic changes occur.	Earth science Geology, the environment, and the universe textbook Weather bug Ahrens Essentials of Meteorology	Ice age Season El Nino Maunder minimum	<b>3.3.10.A8</b> <b>3.3.12.A4</b> <b>3.3.12.A6</b>	
		What is the greenhouse effect?  What is global warming?  Describe how humans impact climate?	Over time, human activities can alter atmospheric conditions enough to influence changes in weather and climates.	Explain the greenhouse effect.  Describe global warming.  Describe how humans impact climate.	Earth science Geology, the environment, and the universe textbook Weather bug Ahrens Essentials of Meteorology	Greenhouse effect Global warming	<b>3.3.10.A8</b> <b>3.3.12.A4</b> <b>3.3.12.A6</b>	

**Review Unit 4 Climate (Chapter 14)**

**Assessment Unit 4 Climate (Chapter 14)**

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