

## Catastrophic Events Pacing Guide- Part 1: Storms ( 31 instructional days)

Lesson	Recommended Number of Periods	Focus Questions	Concepts
<b>Lesson 1: Thinking About Catastrophic Events</b>	4	<ul style="list-style-type: none"> <li>• What is an example of a catastrophic event?</li> <li>• Where do catastrophic events occur?</li> </ul>	<ul style="list-style-type: none"> <li>• Earth is a system in constant change.</li> <li>• Humans are affected by catastrophic events.</li> </ul>
<b>Lesson 2: Introducing Storms</b>	3	<ul style="list-style-type: none"> <li>• What do we know about the causes and effects of storms?</li> <li>• How does a vortex tube serve as a model of a storm?</li> </ul>	<ul style="list-style-type: none"> <li>• Air of different densities can generate disturbances in the atmosphere (vortices, storms)</li> <li>• Models are useful in understanding science phenomena, but have limitations</li> </ul>
<b>Lesson 3: Heating Earth's Surfaces</b>	5	<ul style="list-style-type: none"> <li>• How do different surfaces on the Earth absorb and retain the sun's energy?</li> <li>• Describe the heat transfer in this system</li> </ul>	<ul style="list-style-type: none"> <li>• Differential heating of the Earth's surface</li> <li>• Energy transfer (radiation, conduction, convection)</li> </ul>
<b>Lesson 4: Heat Transfer and the Movement of Air</b>	3	<ul style="list-style-type: none"> <li>• Describe the interaction between the Earth's surface and the temperature of the air above it.</li> <li>• Describe the transfer of energy from the sun to the Earth's atmosphere.</li> <li>• What is the relationship between the temperature of air and its moisture content?</li> </ul>	<ul style="list-style-type: none"> <li>• Convection and conduction (Heat in a substance is transferred to and from the air around it.)</li> <li>• Heat and the density of air (The warmer the air the more the molecules spread out.)</li> <li>• Temperature and the moisture content of air</li> </ul>
<b>Lesson 5: Convection Currents in the Air</b>	5	<ul style="list-style-type: none"> <li>• Why does the wind blow?</li> <li>• How do convection currents transfer energy from one place to another?</li> </ul>	<ul style="list-style-type: none"> <li>• Convection</li> </ul>
<b>Lesson 6: Temperature, Pressure and Cloud Formation</b>	4	<ul style="list-style-type: none"> <li>• How does the sun's energy drive the water cycle?</li> <li>• How is temperature and air pressure involved in cloud formation?</li> </ul>	<ul style="list-style-type: none"> <li>• High and low air pressure</li> <li>• Water cycle</li> <li>• Clouds and storms form under low air pressure as warm, moist air rises and meets cold air.</li> </ul>
<b>Lesson 7: Ocean Currents and Global Climate</b>	5	<ul style="list-style-type: none"> <li>• What causes ocean currents?</li> <li>• Why are polar temperatures lower than equatorial temperatures?</li> </ul>	<ul style="list-style-type: none"> <li>• Convection</li> <li>• Models are useful in understanding deep ocean and surface currents.</li> </ul>
<b>Lesson 8: Storms Assessment</b>	2	<ul style="list-style-type: none"> <li>• How does energy transferred from the sun drive the processes of the atmosphere and generate weather patterns on the Earth?</li> </ul>	<ul style="list-style-type: none"> <li>• Convection</li> <li>• Vortex</li> </ul>

## Catastrophic Events Pacing Guide- Part 2: Earthquakes (28 - 32 instructional days)

Lesson	Recommended Number of Periods	Focus Questions	Concepts
<b>Lesson 9: Exploring Risk through an Anchor Activity</b>	4-8 (take-home project or in-class)	<ul style="list-style-type: none"> <li>• What risks from natural catastrophic events exist for people living in the Seattle area?</li> <li>• How might these risks be reduced or eliminated?</li> </ul>	<ul style="list-style-type: none"> <li>• Risk Assessment</li> <li>• Probability</li> </ul>
<b>Lesson 10: Introducing Earthquakes</b>	2	<ul style="list-style-type: none"> <li>• What is an earthquake and where do they occur?</li> <li>• What are the constructive and destructive effects of earthquakes?</li> <li>• What do you know about catastrophic events that you can apply to earthquakes?</li> </ul>	<ul style="list-style-type: none"> <li>• The Solid Earth is a system in constant change</li> </ul>
<b>Lesson 11: When the Earth Shakes</b>	3	<ul style="list-style-type: none"> <li>• What are the characteristics of a wave?</li> <li>• What are the similarities and differences in P and S waves?</li> <li>• How do earthquake waves affect structures?</li> </ul>	<ul style="list-style-type: none"> <li>• Waves transmit energy</li> <li>• After a wave passes, matter is in its original place. Only the energy moved through.</li> <li>• Design effects stability</li> </ul>
<b>Lesson 12: Recording Earthquake Waves</b>	3	<ul style="list-style-type: none"> <li>• How does a seismograph record wave action?</li> <li>• Why is it necessary to have a global network of seismographic stations?</li> </ul>	<ul style="list-style-type: none"> <li>• Earthquake waves radiate from the focus outward in all directions</li> <li>• Earthquake energy can be quantified</li> </ul>
<b>Lesson 13: Plotting Earthquakes</b>	3	<ul style="list-style-type: none"> <li>• Where on earth are earthquakes likely to occur?</li> <li>• What can the patterns in earthquake locations tell us about the structure of the earth?</li> </ul>	<ul style="list-style-type: none"> <li>• Plate tectonics</li> <li>• Patterns exist in natural events</li> </ul>
<b>Lesson 14: Using Earthquakes to Study the Earth's Interior</b>	3	<ul style="list-style-type: none"> <li>• What is the structure of the earth?</li> <li>• How do earthquakes help us in visualizing the interior of the earth?</li> </ul>	<ul style="list-style-type: none"> <li>• Structure of the Earth</li> </ul>
<b>Lesson 15: Investigating Plate Movement and Faults</b>	5	<ul style="list-style-type: none"> <li>• What evidence is there to support the theory of plate tectonics?</li> <li>• What energy source drives the movement of the oceanic and continental plates?</li> <li>• How do rocks respond to the forces caused by plate tectonics?</li> </ul>	<ul style="list-style-type: none"> <li>• Plate tectonics: The solid earth is in constant change</li> </ul>
<b>Lesson 16: Convection in the Mantle</b>	3	<ul style="list-style-type: none"> <li>• Why do the earth's plates move?</li> </ul>	<ul style="list-style-type: none"> <li>• Convection</li> <li>• Plate tectonics</li> </ul>
<b>Lesson 17: Earthquakes Assessment</b>	2	<ul style="list-style-type: none"> <li>• What is an earthquake?</li> <li>• What evidence do we have for the cause of earthquakes?</li> <li>• What impact on humans can earthquakes have?</li> </ul>	

- How can we mitigate that impact?

## Catastrophic Events Pacing Guide- Part 3: Volcanoes (20 instructional days - optional)

(Teachers must request delivery of Catastrophic Events Part 3 from the Science Materials Center)

Lesson	Recommended Number of Periods	Focus Questions	Concepts
<b>Lesson 18: Introducing Volcanoes</b>	2	<ul style="list-style-type: none"> <li>• What are some of the risks posed by a possible volcanic eruption?</li> <li>• What is the role/responsibility of scientists in deciding whether to issue an alert?</li> </ul>	<ul style="list-style-type: none"> <li>• Constructive and destructive effects of volcanoes</li> <li>• Volcanic effects on weather</li> <li>• Human Interactions: Risk Assessment</li> </ul>
<b>Lesson 19: Forming New Land</b>	2	<ul style="list-style-type: none"> <li>• How do magma and lava influence surface changes on the earth?</li> </ul>	<ul style="list-style-type: none"> <li>• Constructive and destructive effects of volcanoes</li> <li>• Volcanic influences on surface changes on the Earth</li> </ul>
<b>Lesson 20: Viscosity</b>	3	<ul style="list-style-type: none"> <li>• How does lava viscosity affect the shape of a volcano?</li> </ul>	<ul style="list-style-type: none"> <li>• Viscosity (Properties of Substances; Processes and interactions in the earth system)</li> <li>• Nature and properties of earth materials</li> </ul>
<b>Lesson 21: Igneous Rocks and Crystallization</b>	1	<ul style="list-style-type: none"> <li>• What are three properties used for classifying igneous rock?</li> </ul>	<ul style="list-style-type: none"> <li>• Nature and properties of earth materials</li> <li>• Classification</li> </ul>
<b>Lesson 22: Exploring Igneous Rock Formation</b>	3	<ul style="list-style-type: none"> <li>• What is an igneous rock and how are they formed?</li> <li>• How does igneous rock crystal formation identify the conditions under which the rock was formed?</li> </ul>	<ul style="list-style-type: none"> <li>• Nature and properties of earth materials</li> <li>• Rock Cycle (Processes and interactions in the earth system)</li> </ul>
<b>Lesson 23: Properties of Ash</b>	2	<ul style="list-style-type: none"> <li>• What is volcanic ash?</li> <li>• What are six properties of volcanic ash?</li> <li>• What are risk factors associated with these properties of volcanic ash?</li> </ul>	
<b>Lesson 24: Ash Fall and Weather</b>	4	<ul style="list-style-type: none"> <li>• What factors can influence the distribution of ash after a volcanic eruption?</li> <li>• What are the beneficial and detrimental effects of ash fall?</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation rate and particle size</li> <li>• Constructive and destructive forces of volcanoes</li> <li>• Local weather conditions effect on ash distribution</li> <li>• Ash distribution effects on global weather</li> </ul>
<b>Lesson 25: Volcanoes Assessment</b>	3		<ul style="list-style-type: none"> <li>• Effects of ash fall on the temperature of earth's surface</li> <li>• Conditions that cause the formation of four types of rock</li> <li>• Locations of tornadoes, hurricanes, earthquakes, and volcanoes, and why these events occur where they do</li> </ul>

