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The Revised Washington State K-12 Science Standards, (12/14/2008)
(Grades 6-8)

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GRADES 6-8	
EALR 1: Systems (SYS)	
Core Content: Inputs, Outputs, Boundaries and Flows	
In prior grades, students learned about the functioning of simple systems, including inputs and outputs. In grades 6-8, students learn how to use systems thinking to simplify and analyze complex situations. Systems concepts that students learn to apply at this level include choosing system boundaries, determining if a system is open or closed, measuring the flow of matter and energy through a system, and applying systems thinking to a complex societal issue that involves science and technology. These insights and abilities can help students see the connections between and among the domains of science and among science, technology, and society.	
Content Standards	
Students know that:	
6-8 SYSA - Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	**Asteroid!** **SE:** 2, 4 **Hurricane!** **SE:** 1
6-8 SYSB - The boundaries of a system can be drawn differently depending on the features of the system being investigated, the size of the system, and the purpose of the investigation.	**Can be developed using the following:** **Tornado** **TG:** 15-16 **SE:** 24-25 **Hurricane** **TG:** 12-13 **SE:** 30-37
6-8 SYSC - The output of one system can become the input of another system.	**Asteroid!** **SE:** 6 **Fire!** **SE:** 53
6-8 SYSD - In an open system, matter flows into and out of the system. In a closed system, energy may flow into or out of the system, but matter stays within the system.	**Blackout!** **TG:** 7, 8, 9, 10, 11, 12, 13, 14 **Blight!** **SE:** 9 **Global Warming?** **SE:** 8 **Hurricane!** **SE:** 38 **Outbreak!** **SE:** 5 **TG:** 15
6-8 SYSE - If the input of matter or energy is the same as the output, then the amount of matter or energy in the system won't change; but if the input is more or less than the output, then the amount of matter or energy in the system will change.	**Fire!** SE: 54, 55

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6-8 SYSF - The natural and designed world is complex; it is too large and complicated to investigate and comprehend all at once. Scientists and students learn to define small portions for the convenience of investigation. The units of investigation can be referred to as systems.	**Asteroid!** **SE:** 2, 3, 4 **Earthquake!** **SE:** 23 **TG:** 9
Performance Expectations	
Students are expected to:	
Given a system, identify subsystems and a larger encompassing system (e.g., the heart is a system made up of tissues and cells, and is part of the larger circulatory system).	**Asteroid!** **SE:** 4
Explain how the boundaries of a system can be drawn to fit the purpose of the study (e.g., to study how insect populations change a system might be a forest, a meadow in the forest, or a single tree).	**Can be developed using the following:** **Tornado** **TG:** 15-16 **SE:** 24-25 **Hurricane** **TG:** 12-13 **SE:** 30-37
Give an example of how output of matter or energy from a system can become input for another system (e.g., household waste goes to a landfill).	**Fire!** **SE:** 53
Given a description of a system, analyze and defend whether it is open or closed.	**Blackout!** **SE:** 10, 11, 12, 18, 30 **TG:** 6, 7, 8, 9, 10, 11, 12, 13, 14, 20, 21, 24, 25, 26, 27
Measure the flow of matter into and out of an open system and predict how the system is likely to change (e.g., a bottle of water with a hole in the bottom, an ecosystem, an electric circuit).	**Blackout!** **SE:** 10, 11, 12, 18, 30 **TG:** 6, 7, 8, 9, 10, 11, 12, 13, 14, 20, 21, 24, 25, 26, 27 **Tornado!** **TG:** 7
Given a complex societal issue with strong science and technology components (e.g., overfishing, global warming), describe the issue from a systems point of view, highlighting how changes in one part of the system are likely to influence other parts of the system.	**Fire!** **SE:** 54, 55 **Global Warming?** **SE:** 8, 54, 55, 56, 57, 58, 59

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EALR 2: Inquiry (INQ)	
Core Content: Questioning and Investigating	
In prior grades, students learned to plan investigations to match a given research question. In grades 6-8, students learn to revise questions so they can be answered scientifically, and then to design an appropriate investigation to answer the question and carry out the study, using appropriate technologies, including computers. Students learn to think critically and logically to make connections between prior science knowledge and evidence produced from their investigations. Students can work well in collaborative teams, and communicate the procedures and results of their investigations and are expected to critique their own findings as well as the findings of others.	
Content Standards	
Students know that:	
6-8 INQA - Question - Scientific inquiry involves asking and answering questions and comparing the answer with what scientists already know about the world.	**First Flight!** **SE:** 12 **Fraud!** **SE:** 24
6-8 INQB - Investigate - Different kinds of questions suggest different kinds of scientific investigations.	**Blight!** **SE:** 10, 11, 19; **TG:** 6, 7, 8, 9, 10, 11, 12 **Earthquake!** **SE:** 23, 34 **TG:** 9, 13
6-8 INQC - Investigate - Collecting, analyzing, and displaying data are essential aspects of all investigations.	**Blight!** **SE:** 10, 11, 27, 35, 36, 44 **TG:** 6, 7, 10, 11, 12, 13, 14, 16 **Earthquake!** **SE:** 23 **TG:** 9 **Hurricane!** **SE: 37**
6-8 INQD - Investigate - For an experiment to be valid, all (controlled) variables must be kept the same whenever possible, except for the manipulated (independent) variable being tested, and the responding (dependent) variable being measured and recorded. If a variable cannot be controlled, it must be reported and accounted for.	**Blight!** **SE:** 35, 36 **TG:** 13, 14 **Global Warming?** **SE:** 41 **TG:** 13, 15, 16

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6-8 INQE - Model - Models are used to represent objects, events, systems, and processes. Models can be used to test hypotheses and better understand phenomena, but they have limitations.	**Asteroid!** **SE:** 10, 23, 24 **TG:** pp. 6, 7, 8, 9, 10 **Blackout!** **SE:** 10, 11 **TG:** 4, 5, 24, 25, 32, 33, 34, 35 **Earthquake!** **SE:** 23, 29, 34, 41 **TG:** 9, 11, 13 **Fire!** **SE:** 27 **TG:** 15 **First Flight!** **SE:** 8, 9, 19 **Global Warming?** **SE:** 8, 27, 28 **Outbreak!** **SE:** 5 **TG:** 15
6-8 INQF - Explain - It is important to distinguish between the results of a particular investigation and general conclusions drawn from these results.	**Can be developed using the following:** **Volcano** SE: 49-50, 61-62 TE: 18-19, 29 **Tornado** SE: 7-8 TE: 8, 9
6-8 INQG - Communicate Clearly - Scientific reports should enable another investigator to repeat the study to check the results.	**Asteroid!** **SE:** 10 **Blight!** **SE:** 27, 35, 36 **TG:** 10, 11, 12, 13, 14 **Earthquake!** **SE:** 23, 34 **Fire!** **SE:** 15 **Global Warming?** **SE:** 42 **TG:** 15, 16
6-8 INQH - Intellectual Honestly - Science advances through openness to new ideas, honesty, and legitimate Skepticism. Asking thoughtful questions, querying other scientists' explanations, and evaluating one's own thinking in response to the ideas of others are abilities of scientific inquiry.	**Fraud!** SE: 24

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6-8 INQI - Consider Ethics - Scientists and engineers have ethical codes governing animal experiments, research in natural ecosystems, and studies that involve human subjects.	
Performance Expectations	
Students are expected to:	
Generate a question that can be answered through scientific investigation. This may involve refining or refocusing a broad and ill-defined question.	**Can be developed using the following** **Blackout** **TG:** 20-23, 24-27, 28-31, 32-33, 34-35, 36-42, 43-44 **SE:** 10, 15, 26, 27, 30, 48 **Flood** **TG:** 6-7, 8-11, 12-13 **SE:** 10, 20-21
Plan and conduct a scientific investigation (e.g., field study, systematic observation, controlled experiment, model, or simulation) that is appropriate for the question being asked. Propose a hypothesis and give a reason for the hypothesis and explain how the planned investigation will test the hypothesis. Work collaboratively with other students to carry out the investigations.	**Blight!** **SE:** 10, 11, 19, 27, 28, 35, 36 **TG:** 6, 7, 9, 10, 11, 12 **Earthquake!** **SE:** 34 **TG:** 13 **Flood!** **SE:** 20, 21, 48, 49 **TG:** 9, 6, 17 **Fraud!** **SE:** 21, 22, 25, 28, 29, 32 **TG:** 10, 11, 13 **Global Warming?** **SE:** 8 **TG:** 7 **Gold Rush!** **SE:** 20, 21 **TG:** 9, 11 **Hurricane!** **SE:** 37 **Oil Spill!** **SE:** 14, 39, 44 **TG:** 7 **Outbreak!** **TG:** 38 **Tornado!** **SE:** 52 **TG:** 23

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Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. *a Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.*a Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.	**Asteroid!** **SE:** 10, 51, 52, 53 **TG:** 22, 23, 24, 25 **Blackout!** **SE:** 50, 51 **TG:** 22, 23 **Blight!** **SE:** 11, 19, 27, 28, 36 **TG:** 7, 9 **Earthquake!** **SE:** 40 **First Flight!** **SE:** 9, 21 **TG:** 12, 13 **Flood!** **SE:** 20, 21 **TG:** 9 **Fraud!** **SE:** 12, 25 **Global Warming?** **SE:** 8 **Gold Rush!** **SE:** 46 **TG:** 23
Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables. *c Determine which variables should be kept the same (controlled), which (independent) variable should be systematically manipulated, and which responding (dependent) variable is to be measured and recorded. Report any variables not controlled and explain how they might affect results.	**Asteroid!** **SE:** 10, 50, 51 **Fire!** **SE:** 59 **TG:** 21 **Global Warming?** **SE:** 41, 42 **TG:** 13, 15, 16

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Create a model or simulation to represent the behavior of objects, events, systems, or processes. Use the model to explore the relationship between two variables and point out how the model or simulation is similar to or different from the actual phenomenon.	**Asteroid!** **SE:** 7, 8, 10, 42, 43, 50, 51 **TG:** 6, 7, 14, 15, 16, 18, 19, 20, 21, 22, 23 **Blackout!** **SE:** 10, 11, 14, 15, 17 **TG:** 20, 21, 22, 23, 24, 25, 30, 32, 33, 34, 35 **Earthquake!** **SE:** 23, 29, 34, 41 **TG:** 9, 11, 13, 17 **Fire!** **SE:** 27, 40, 41, 59 **TG:** 15, 17, 18, 21 **First Flight!** **SE:** 8, 9, 16, 21 **TG:** 4, 5, 6, 7, 9, 12 **Global Warming?** **SE:** 8 **TG:** 7 **Gold Rush!** **SE:** 20, 21, 28, 37, 51 **TG:** 9, 11, 13, 15, 17, 18, 19, 20, 27 **Hurricane!** **SE: 37** **Oil Spill!** **SE:** 38 **TG:** 15, 16 **Outbreak!** **SE:** 5 **TG:** 15 **Thrill Ride!** **SE:** 11, 21, 22, 28, 29, 33, 38, 39 **TG:** 5, 10, 12, 13, 14, 15, 16, 18, 19, 20, 21 **Tornado!** **SE:** 7, 12, 13, 19, 20, 41 **TG:** 12, 13, 17, 18, 19 **Toxic Spill!** **SE:** 16 **TG:** 9 **Volcano!** **SE:** 5, 14, 27, 49 **TG:** 7, 8, 9, 10, 11, 18, 19

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Generate a scientific conclusion from an investigation, using inferential logic, and clearly distinguish between results (i.e., evidence) and conclusions (e.g., explanation). Describe the differences between an objective summary of the findings and an inference made from the findings.	**Blackout!** **SE:** 48, 49, 52 **TG:** 36, 37, 38, 43, 44 **Blight!** **SE:** 36 **Earthquake!** **SE:** 23 **Global Warming?** **SE:** 42 **TG:** 15, 16
Prepare a written report of an investigation by clearly describing the question being investigated, what was done, and an objective summary of results. The report should provide evidence to accept or reject the hypothesis, explain the relationship between two or more variables, and identify limitations of the investigation.	**Asteroid!** **SE:** 10, 51, 52, 53 **TG:** 22, 23 **Blackout!** **SE:** 50 **Blight!** **SE:** 19, 36 **Earthquake!** **SE:** 23, 34 **First Flight!** **SE:** 16 **TG:** 9, 10 **Global Warming?** **SE:** 8, 42 **TG:** 7, 15, 16 **Thrill Ride!** **SE:** 21, 22, 29 **TG:** 10, 14 **Tornado!** **SE:** 41 **TG:** 18, 19
Recognize flaws in scientific claims, such as uncontrolled variables, overgeneralizations from limited data, and experimenter bias. Listen actively and respectfully to research reports by other students. Critique their presentations respectfully, using logical argument and evidence. Engage in reflection and self-evaluation.	**Asteroid!** **SE:** 52 **Earthquake!** **SE:** 20 **First Flight!** **SE:** 12, 18, 19, 28 **Fraud!** **SE:** 24

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Demonstrate ethical concerns and precautions in response to scenarios of scientific investigations involving animal experiments, research in natural ecosystems, and studies that involve human subjects.	**Global Warming?** **SE:** 40
EALR 3: Application (APP)	
Core Content: Science, Technology, and Solving Problems	
In prior grades, students learned to work individually and collaboratively to produce a product of their own design. In grades 6-8, students work with other members of a team to apply the full process of technological design, combined with relevant science concepts, to solve problems. In doing so, they learn to define a problem, conduct research on how others have solved similar problems, generate possible solutions, test the design, communicate the results. Students also investigate professions in which science and technology are required, so they can learn how the abilities they are developing in schools are valued in the world of work.	
Content Standards	
Students know that:	
6-8 APPA - People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	**Asteroid!** **SE:** 26, 28, 34, 35 **Blackout!** **SE:** 47, 50, 54, 58, 61, 62 **Blight!** **SE:** 46 **Earthquake!** **SE:** 25, 30, 38 **Fire!** **SE:** 15 **TG:** 12 **First Flight!** **SE:** 49 **Flood!** **SE:** 32, 33 **Gold Rush!** **SE:** 33, 48, 49, 50 **Hurricane!** **SE:** 41 **Oil Spill!** **SE:** 42 **Tornado!** **SE:** 15, 16 **TECH:** Blackout!; First Flight!; The Awesome Power; Give Me the Tides, Give Me the Currents; Alabama Tornado/Belated Early Warning

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6-8 APPB - Scientists and technological designers (including engineers) have different goals. Scientists answer questions about the natural world; technological designers solve problems that help people reach their goals.	**Blight!** **SE:** 46 **Earthquake!** **SE:** 30 **First Flight!** **SE:** 28, 41 **Gold Rush!** **SE:** 33, 48 **Survive?** **SE:** 32, 33
6-8 APPC - Science and technology are interdependent. Science drives technology by demanding better instruments and suggesting ideas for new designs. Technology drives science by providing instruments and research methods.	**Asteroid!** **SE:** 3, 13, 31, 33, 38, 39, 40 **Earthquake!** **SE:** 30 **First Flight!** **SE:** 28 **Hurricane!** **SE:** 16 **Survive?** **SE:** 32, 33 **Thrill Ride!** **SE:** 34 **Tornado!** **SE:** 16, 18 **Volcano!** **SE:** 39, 40, 41, 44 **TECH:** Blackout!
6-8 APPD - The process of technological design begins by defining a problem, identifying criteria for a successful solution, followed by research to better understand the problem, and brainstorming potential solutions.	**Fire!** **SE:** 15 **TG:** 12, 41, 47 **Gold Rush!** **SE:** 33, 48 **TECH:** Blackout!; The Awesome Power; Give Me the Tides, Give Me the Currents
6-8 APPE - Scientists and engineers often work together to generate creative solutions to problems and decide which ones are most promising.	**TECH:** Alabama Tornado/Belated Early Warning

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6-8 APPF - Solutions must be tested to determine whether or not they will solve the problem. Results are used to modify the design, and the best solution must be communicated persuasively.	**Can be developed using the following** **Volcano** TE: 18-19, 21-22, 29-30 **Tornado** SE: 7,8 TE: 8, 9,10, 31 **Asteroid** SE: 54-55 TE: 26-27, 29-30 **Hurricane** TE: 18-19 **Flood** TE: 30-31 **Toxic Leak** SE: 34-35, 38-39 TE: 18-19, 26-27 **Fire** SE: 8-9, 59-60, 66-67 TE: 7-10, 19-20, 24-25, 32-33 **Outbreak** SE: 8-9, 30-31, 38-39 TE: 16, 19, 20, 21,22-27 **Global Warming** SE: 8-9 TE: 6-7 **Oil Spill** SE: 15, 38-39,46-47 TE: 6-7, 14-16, 18, 19,20-21, 28-29 **Fraud** TE: 5-8 **Gold Medal** TE: 4-5 **Survive** SE: 56-57 TE: 28-29
6-8 APPG - The benefits of science and technology are not available to all the people in the world.	**Asteroid!** **SE:** 19 **TECH:** Alabama Tornado/Belated Early Warning

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6-8 APPH - People in all cultures have made and continue to make contributions to society through science and technology.	**Can be developed from the Technology Education Activities** **Earthquake** **TG:** 16-17 **Flood** **TG:** 22-23 **Volcano** **TG:** 25-26 **SE:** 59 **Oil Spill** **TG:** 30-31 **SE:** 37, 47 **Tornado** **TG:** 22-23 **SE:** 16, 52 **Asteroid** **TG:** 18-21 **SE:** 50-51 **Fraud** **SE**: 36 **Thrill Ride** **SE:** 4, 14, 23, 27 **TECH:** Video: Quake of '89; Flood; The Mt. Pinatubo Eruption; Give Me the Tides, Give Me the Currents; Alabama Tornado and Belated Early Warning; Impact Crater
Performance Expectations	
Students are expected to:	
Describe how a technology has changed over time in response to societal challenges (e.g., population increase created a need for mass communication).	**TECH:** Give Me the Tides, Give Me the Currents

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Investigate several professions in which an understanding of science and technology is required. Explain why that understanding is necessary for success in each profession.	**Asteroid!** **SE:** 14, 19, 29, 30, 46, 47 **Blackout!** **SE:** 13, 19, 51 **Blight!** **SE:** 8, 16, 23 **Earthquake!** **SE:** 18, 26, 27, 28, 35, 38, 39 **First Flight!** **SE:** 5, 14, 26, 42 **Flood!** **SE:** 7, 12, 29 **Fraud!** **SE:** 5, 19, 35 **Global Warming?** **SE:** 17, 18, 19, 32, 33, 37 **Gold Medal!** **SE:** 8, 26 **Gold Rush!** **SE:** 25, 34, 39 **Hurricane!** **SE:** 18 **Oil Spill!** **SE:** 26, 30, 41 **Outbreak!** **SE:** 11, 12, 42 **Thrill Ride!** **SE:** 15 **Tornado!** **SE:** 9, 18, 30, 31, 36, 37, 39 **Toxic Spill!** **SE:** 28, 29 **Volcano!** **SE:** 33

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Give examples to illustrate how scientists have helped solve technological problems (e.g., how the science of biology has helped sustain fisheries) and how engineers have aided science (e.g., designing telescopes to discover distant planets).	**Can be developed using the following** **Flood** SE: 33, 56-57 TE: 24-**25**, **Hurricane** SE: 52 **Volcano** SE: 59 TE: 25 **Tornado** SE: 52 TE: 22, 23 **Fire** SE: 15 TE: 11 **Earthquake** SE: 41 TE: 16 **Asteroid** SE: 38, **First Flight** SE: 12,19-20, 23, 25, 28, 31, 41, 47, 49 **Blackout** SE: 32, 55, 57-59 TE: 45, **Fraud** SE: 5, 34, 37 **Thrill Ride** SE: 8-10, 11-12, 17 TE: 4-7 **Oil Spill** SE: 45, 47 TE: 26, 27, 28, 30, 31 **Gold Medal** SE: 26-27, 34-35, 47, TE: 20, 21

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Formulate a problem that can be solved by the technological design process, and identify criteria for success. Research how others have solved similar problems. Brainstorm different solutions.	**Can be developed from the Technology Education Activities** **Earthquake** **TG:** 16-17 **SE:** 41 **Flood** **TG:** 22-23 **SE:** 55 **Volcano** **TG:** 25-26 **SE:** 59 **Oil Spill** **TG:** 30-31 **SE:** 47 **Tornado** **TG:** 22-23 **Asteroid** **TG:** 18-21 **SE:** 50-51 **TECH:** Video: Quake of '89; Flood; The Mt. Pinatubo Eruption; Give Me the Tides, Give Me the Currents; Alabama Tornado and Belated Early Warning; Impact Crater

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Collaborate with other students to generate creative solutions to a problem, and apply methods for making trade-offs to choose the best solution.	Can be developed using the following **Volcano** SE: 49-50, 57, 61 TE: 18-19, 21-22, 29-30 **Tornado** SE: 7, 56 TE: 8-10, 31 **Asteroid** SE: 54-55 TE: 26-27, 29-30 **Hurricane** SE: 47-48 TE: 18-19 **Flood** TE: 30-31 **Toxic Leak** SE: 34, 38-39 18-19, 26-27 **Fire** SE: 8-9, 59, 71 TE: 7-10, 19-20, 32-33 **Outbreak** SE: 38, 44-45 TE: 22-27 **Oil Spill** SE: 38-39, 43-44, 46 TE: 14-16, 18-21, 28-29 **Fraud** SE: 11-12 TE: 5-8 **Gold Medal** SE: 12 TE: 4-5 **Survive** SE: 56-57 TE: 28-29
Test the best solution by building a model or other representation, and using it with the intended audience. Redesign if necessary. Present the recommended design using models or drawings and an engaging presentation.	**Gold Rush!** **SE:** 51 **Thrill Ride!** **SE:** 18

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Contrast the benefits of science and technology enjoyed by people in industrialized and developing nations.	**Can be developed from the Technology Education Activities** **Earthquake** **TG:** 16-17 **SE:** 41 **Flood** **TG:** 22-23 **Volcano** **TG:** 25-26 **SE:** 59 **Oil Spill** **TG:** 30-31 **SE:** 47 **Tornado** **TG:** 22-23 **SE:** 52 **Asteroid** **TG:** 18-21 **SE:** 50-51 **TECH:** Video: Quake of '89; Flood; The Mt. Pinatubo Eruption; Give Me the Tides, Give Me the Currents; Alabama Tornado and Belated Early Warning; Impact Crater
Describe scientific or technological contributions to society by people in various cultures.	**Can be developed from the Technology Education Activities** **Earthquake** **TG:** 16-17 **SE:** 41 **Flood** **TG:** 22-23 **SE:** 55 **Volcano** **TG:** 25-26 **SE:** 59 **Oil Spill** **TG:** 30-31 **SE:** 47 **Tornado** **TG:** 22-23 **SE:** 52 **Asteroid** **TG:** 18-21 **SE:** 50-51 **TECH:** Video: Quake of '89; Flood; The Mt. Pinatubo Eruption; Give Me the Tides, Give Me the Currents; Alabama Tornado and Belated Early Warning; Impact Crater

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EALR 4: Physical Science	
Big Idea: Force and Motion (PS1)	
Core Content: Balanced and Unbalanced Forces	
In prior grades, students learned to use basic tools to measure force, time, and distance. In grades 6-8, students learn to measure, record, calculate the average speed of objects, and to tabulate and graph the results. They also develop a qualitative understanding of inertia. Students learn to predict the motion of objects subject to opposing forces along the line of travel. If the forces are balanced, the object will continue moving the same speed and direction; but if the forces are not balanced, the object's motion will change. These concepts and principles prepare students for a more formal understanding of mechanics in high school and help them make sense of the world around them.	
Content Standards	
Students know that:	
6-8 PS1A - Average speed is defined as the distance traveled in a given period of time.	**Can be developed using the following** **Thrill Ride!** **SE:** 36-37
6-8 PS1B - Friction is a force that acts to slow or stop the motion of objects.	**Thrill Ride!** **SE:** 11, 12, 17, 24
6-8 PS1C - Unbalanced forces will cause changes in the speed or direction of an object's motion.	**First Flight!** **SE:** 23, 24 **Thrill Ride!** **SE:** 23, 47
6-8 PS1D - The same unbalanced force will change the motion of an object with more mass more slowly than an object with less mass.	**Thrill Ride!** **SE:** 23
Performance Expectations	
Students are expected to:	
Measure the distance an object travels in a given interval of time and calculate the object's average speed, using S = d/t. (e.g., a battery-powered toy car travels 20 meters in 5 seconds, so its average speed is 4 meters per second). Illustrate the motion of an object, using a graph, or infer the motion of an object from a graph of the object's position vs. time or speed vs. time.	**Can be developed using the following** **Asteroid** **SE:** 51-52 **Thrill Ride!** **SE:** 36-37
Demonstrate and explain the frictional force acting on an object with the use of a physical model.	**Thrill Ride!** **SE:** 11, 12, 21, 22 **TG:** 5, 7, 9, 10
Determine whether forces on an object are balanced or unbalanced and justify with observational evidence. Given a description of forces on an object, predict the object's motion.	**Can be developed using the following** **Thrill Ride** **TG:** 15- 17 **SE:** 33, 40
Given two different masses that receive the same unbalanced force, predict which will move more quickly.	

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EALR 4: Physical Science	
Big Idea: Matter: Properties and Change (PS2)	
Core Content: Atoms and Molecules	
In prior grades, students learned the scientific meaning of the word matter, and about changes of state. In grades 6-8, students learn the basic concepts behind the atomic nature of matter. This includes the idea that elements are composed of a single kind of atom. Atoms chemically combine with each other or with atoms of other elements to form compounds. When substances are combined in physical mixtures, their chemical properties do not change; but when they combine chemically, the new product has different physical and chemical properties from any of the reacting substances. When substances interact in a closed system, the amount of mass does not change. Atomic theory also explains the ways that solids, liquids, and gases behave. These concepts about the nature of matter are fundamental to all sciences and technologies.	
Content Standards	
Students know that:	
6-8 PS2A - Substances have characteristic intrinsic properties, such as density, solubility, boiling point, and melting point, all of which are independent of the amount of the sample.	**Oil Spill!** **SE:** 35, 38
6-8 PS2B - Mixtures are combinations of substances whose chemical properties are preserved. Compounds are substances that are chemically formed and have different physical and chemical properties from the reacting substances.	**Fraud!** **SE:** 11, 12 **TG:** 5, 6 **Gold Rush!** **SE:** 20, 21
6-8 PS2C - All matter is made of atoms. Matter made of only one type of atom is called an element.	**Fraud!** **SE:** 9, 11, 12 **TG:** 5 **Gold Rush!** **SE:** 2, 4, 5, 6 **Hurricane!** **SE:** 7
6-8 PS2D - Compounds are composed of two or more kinds of atoms, which are bound together in well-defined molecules or arrays.	**Flood!** **SE:** 28 **Gold Rush!** **SE:** 2
6-8 PS2E - Solids, liquids, and gases differ in the motion of individual particles. In solids, particles are packed in a nearly rigid structure; in liquids, particles move around one another; and in gases, particles move almost independently.	**Volcano** SE: 24-26
6-8 PS2F - When substances within a closed system interact, the total mass of the system remains the same. This concept, called conservation of mass, applies to all physical and chemical changes.	

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Performance Expectations	
Students are expected to:	
Use characteristic intrinsic properties such as density, boiling point, and melting point to identify an unknown substance.	
Separate a mixture using differences in properties (e.g., solubility, size, magnetic attraction) of the substances used to make the mixture. Demonstrate that the properties of a compound are different from the properties of the reactants from which it was formed.	**Can be developed using the following** **Fraud** SE:11-12 TG: 5-8 **Gold Rush** SE: 20-21
Explain that all matter is made of atoms, and give examples of common elements—substances composed of just one kind of atom.	**Gold Rush!** **SE:** 4, 5, 6
Demonstrate with a labeled diagram and explain the relationship among atoms, molecules, elements, and compounds.	**Can be developed using the following** **Fraud** SE: 9-11 **Gold Rush** SE: 2
Describe how solids, liquids, and gases behave when put into a container (e.g., a gas fills the entire volume of the container). Relate these properties to the relative movement of the particles in the three states of matter.	**Can be developed using the following** **Fraud** **TG:** 5-8
Apply the concept of how to correctly predict changes in mass before and after chemical reactions, including reactions that occur in closed containers, and reactions that occur in open containers where a gas is given off.	
EALR 4: Physical Science	
Big Idea: Energy: Transfer, Transformation, and Conservation (PS3)	
Core Content: Interactions of Energy and Matter	
In prior grades, students learned how heat, light, sound, and electrical energy are generated and can be transferred from place to place. In grades 6-8, students learn how energy and matter interact in various settings. Heat (thermal energy) always moves from a warmer to a cooler place through solids (by conduction) and through liquids and gases (mostly by convection or mechanical mixing). Light energy interacts with matter and with our eyes and allows us to see things. Electrical energy provides a convenient way to transfer energy to where and when the energy is needed. Sound is yet another form of energy produced by a vibrating object. These fundamental concepts of how matter and energy interact have broad application in all of the other sciences.	
Content Standards	
Students know that:	
6-8 PS3A - Energy exists in many forms: heat, light, chemical, electrical, motion of objects, and sound. Energy can be transformed from one form to another and transferred from one place to another.	**Blackout!** **SE:** 1, 2, 3, 7, 9, 18, 21, 34, 35 **Fire!** **SE:** 53 **Global Warming?** **SE:** 20 **Thrill Ride!** **SE:** 17, 24 **TECH:** Blackout!

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6-8 PS3B - Heat (thermal energy) flows from warmer to cooler objects until both reach the same temperature. Conduction, radiation, and convection, or mechanical mixing, are the means of heat transfer.	**Blackout!** **SE:** 21 **Fraud!** **SE:** 29
6-8 PS3C - Heat (thermal energy) consists of random motion and the vibrations of atoms and molecules. The higher the temperature, the greater the atomic or molecular motion. Thermal insulators are materials that resist the flow of heat.	**Blackout!** **SE:** 21
6-8 PS3D - Visible light from the Sun is made up of a mixture of all colors of light. To see an object, light emitted or reflected by that object must enter the eye.	**Blight!** **SE:** 13 **Thrill Ride!** **SE:** 14
6-8 PS3E - Energy from a variety of sources can be transformed into electrical energy, and then to almost any other form of energy. Electricity can also be distributed quickly to distant locations.	**Blackout!** **SE:** 2, 7, 8, 9, 18, 34, 35
6-8 PS3F - Energy can be transferred from one place to another through waves. Waves include vibrations in materials. Sound and earthquake waves are examples. These and other waves move at different speeds in different materials.	**Blackout!** **SE:** 21
Performance Expectations	
Students are expected to:	
List different forms of energy (e.g., thermal, light, chemical, electrical, kinetic, and sound energy). Describe ways in which energy is transformed from one form to another and transferred from one place to another (e.g., chemical energy to electricity in a battery, electrical to light energy in a bulb).	**Blackout!** **SE:** 1, 2, 8, 9, 21 **Fire!** **SE:** 53
Use everyday examples of conduction, radiation, and convection, or mechanical mixing, to illustrate the transfer of heat energy from warmer objects to cooler ones, until the objects reach the same temperature.	**Can be developed using the following** **Global Warming** SE: 9-10, **Blackout** SE: 21
Explain how various types of insulation slow transfer of heat energy, based on the atomic-molecular model of heat (thermal energy).	
Describe how to demonstrate that visible light from the Sun is made up of different colors. Draw and label a diagram showing that to see an object, light must come directly from the object or from an external source reflected from the object, and enter the eye.	**Can be developed using the following** **Thrill Ride** SE: 14
Illustrate the transformations of energy in an electric circuit when heat, light, and sound are produced. Describe the transformation of energy in a battery within an electric circuit.	**Blackout!** **SE:** 10, 11, 30, 31 **Fraud!** **SE:** 30

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Contrast a light wave with a sound wave by identifying that both have characteristic wavelengths, but light waves can travel through a vacuum while sound waves cannot. Explain that sound results from the vibration of an object.	
EALR 4: Earth and Space Science	
Big Idea: Earth and Space (ES1)	
Core Content: The Solar System	
In prior years, students learned the implications of the spherical-Earth concept and Earth's relationship to the Sun. In grades 6-8, students study the Moon's changing phases and learn to distinguish between phases and eclipses. They also learn about other objects in the Solar System, and how they are held together by a force called —gravity. Students also learn about the Sun's position in the Milky Way, which is just one of many galaxies in the universe. This broad overview of Earth in space will provide a useful framework for students to understand new discoveries in astronomy and new milestones in the exploration of space.	
Content Standards	
Students know that:	
6-8 ES1A - The Moon's monthly cycle of phases can be explained by its changing relative position as it orbits Earth. An eclipse of the Moon occurs when the Moon enters Earth's shadow. An eclipse of the Sun occurs when the Moon is between the Earth and Sun, and the Moon's shadow falls on the Earth.	**Asteroid!** **SE:** 28, 29
6-8 ES1B - Earth is the third planet from the sun in a system that includes the Moon, the Sun, seven other major planets and their moons, and smaller objects, such as asteroids, plutoids, and comets. These bodies differ in many characteristics (e.g., size, composition, relative position).	**Asteroid!** **SE:** 4, 12, 13, 20, 32, 33, 34, 37, 45, 47, 48, 49 **Toxic Spill!** **SE:** 21 **Volcano!** **SE:** 52, 53
6-8 ES1C - Most objects in the Solar System are in regular and predictable motion. These motions explain such phenomena as the day, the year, phases of the moon, and eclipses.	**Asteroid!** **SE:** 15, 20, 21 **Global Warming?** **SE:** 46, 47
6-8 ES1D - Gravity is the force that keeps planets in orbit around the Sun and governs the rest of the motion in the Solar System. Gravity alone holds us to the Earth's surface.	**Asteroid!** **SE:** 11, 22 **Thrill Ride!** **SE:** 32
6-8 ES1E - Our Sun is one of hundreds of billions of stars in the Milky Way galaxy. Many of these stars have planets orbiting around them. The Milky Way galaxy is one of hundreds of billions of galaxies in the universe.	**Asteroid!** **SE:** 22 **TECH:** Blackout!

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Performance Expectations	
Students are expected to:	
Use a physical model or diagram to explain how the Moon's changing position in its orbit results in the changing phases of the Moon as observed from Earth. Explain how the cause of an eclipse of the Moon is different from the cause of the Moon's phases.	
Compare the relative sizes and distances of the Sun, Moon, Earth, other major planets, moons, asteroids, plutoids, and comets.	**Asteroid!** **SE:** 20
Use a simple physical model of the Earth, Sun, Moon system or labeled drawing to explain day and night, phases of the Moon, and eclipses of the Moon and Sun.	
Predict what would happen to an orbiting object if gravity were increased, decreased, or taken away.	**Can be developed using the following** **Thrill Ride** SE: 14 ,24, 32, 47
Construct a physical model or diagram showing Earth's position in the Solar System, the Solar System's position in the Milky Way, and the Milky Way among other galaxies.	**Can be developed using the following** **Asteroid** **TG**: 8-11 **SE**: 20, 22
EALR 4: Earth and Space Science	
Big Idea: Earth Systems, Structures, and Processes (ES2)	
Core Content: Cycles in Earth Systems	
In prior grades, students learned how Earth materials change and how they can be used for various purposes. In grades 6-8, students learn about planet Earth as an interacting system of solids, liquids, and gases. Solar energy powers the water cycle and drives the weather system and ocean currents. Energy from within the planet drives the rock cycle and moves huge plates on the Earth's surface, causing earthquakes, volcanoes. The landforms we see result from processes that build up and break down Earth structures. These foundational ideas will enable students to understand the history of their planet, Earth processes occurring today, and future geologic events.	
Content Standards	
Students know that:	
6-8 ES2A - The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.	**Fire!** **SE:** 24 **Global Warming?** **SE:** 10 **Hurricane!** **SE:** 7
6-8 ES2B - The Sun is the major source of energy for phenomena on Earth's surface, such as winds, ocean currents, and the water cycle.	**Flood!** **SE:** 8 **Hurricane!** **SE:** 8, 9, 19, 37 **Oil Spill!** **SE:** 13, 14 **Tornado!** **SE:** 3 **TECH:** Blackout!

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6-8 ES2C - In the water cycle, water evaporates from Earth's surface, rises and cools, forms clouds, then condenses and falls as rain or snow, and collects in bodies of water.	**Flood!** **SE:** 8 **Hurricane!** **SE:** 17, 28, 29, 38 **Tornado!** **SE:** 42, 43 **Toxic Spill!** **SE:** 30
6-8 ES2D - Water is a solvent. As it passes through the water cycle, it dissolves minerals and gases and carries them to the oceans.	**Can be developed using the following** **Toxic Leak** SE: 30 **Tornado** SE: 43 **Hurricane** SE: 38 **Flood** SE: 8-9
6-8 ES2E - The solid Earth is composed of a relatively thin crust, a dense metallic core, and a layer called the mantle between the crust and core that is very hot and partially melted.	**Earthquake!** **SE:** 13 **Volcano!** **SE:** 19
6-8 ES2F - The crust is composed of huge crustal plates on the scale of continents and oceans, which move centimeters per year, pushed by convection in the upper mantle, causing earthquakes, volcanoes, and mountains.	**Earthquake!** **SE:** 10, 11, 13, 16, 17 **Volcano!** **SE:** 19, 20
6-8 ES2G - Landforms are created by processes that build up structures and processes that break down and carry away material through erosion and weathering.	**Flood!** **SE:** 16, 17, 18, 19, 32 **Toxic Spill!** **SE:** 29
6-8 ES2H - The rock cycle describes the formation of igneous rock from magma or lava, sedimentary rock from compaction of eroded particles, and metamorphic rock by heating and pressure.	**Gold Rush!** **SE:** 22 **Volcano!** **SE:** 38
Performance Expectations	
Students are expected to:	
Describe the composition and properties of the troposphere and stratosphere.	
Connect the uneven heating of Earth's surface by the Sun to global wind and ocean currents. Describe the role of the Sun in the water cycle.	**Oil Spill!** **SE:** 13 **Tornado!** **SE:** 3

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Describe the water cycle and give local examples of where parts of the water cycle can be seen.	**Can be developed using the following** **Toxic Leak** SE: 30 **Tornado** SE: 43 **Hurricane** SE: 38 **Flood** SE: 8-9
Distinguish between bodies of saltwater and fresh water and explain how saltwater become salty.	**Oil Spill!** **SE:** 13, 28, 35
Sketch and label the major layers of Earth, showing the approximate relative thicknesses and consistency of the crust, core, and mantle.	**Can be developed using the following** **Earthquake** SE: 13, 16 **Gold Rush** SE: 22 **Oil Spill** **Volcano** SE: 19
Draw a labeled diagram showing how convection in the upper mantle drives movement of crustal plates. Describe what may happen when plate boundaries meet (e.g., earthquakes, tsunami, faults, mountain building), with examples from the Pacific Northwest.	**Can be developed using the following** **Earthquake** **SE:** 13, 16-17 **Volcano** **SE:** 19, 20, 22
Explain how a given landform (e.g. mountain) has been shaped by processes that build up structures (e.g., uplift) and by processes that break down and carry away material (e.g., weathering and erosion).	**Volcano!** **SE:** 17, 19
Identify samples of igneous, sedimentary, and metamorphic rock from their properties, and describe how their properties provide evidence of how they were formed. Explain how one kind of rock could eventually become a different kind of rock.	**Gold Rush!** **SE:** 46 **TG:** 23, 24, 25 **Volcano!** **SE:** 37 **TG:** 15
EALR 4: Earth and Space Science	
Big Idea: Earth History (ES3)	
Core Content: Evidence of Change	
In prior grades, students learned that fossils provide evidence of environmental conditions that existed long ago. In grades 6-8, students learn a few of the methods that have made it possible to uncover the history of our planet. That history includes both slow, gradual changes, and rapid, catastrophic events, such as an asteroid or comet striking the Earth. It is possible to read a great deal of that history from rocks, including layers of sedimentary rock, some of which contain fossils. Understanding Earth's history is a valuable complement to the study of biological evolution.	
Content Standards	
Students know that:	
6-8 ES3A - Our understanding of Earth history is based on the assumption that processes we see today are similar to those that occurred in the past.	**Can be developed using the following** **Toxic Leak** SE: 29 **Flood** SE: 42

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6-8 ES3B - Thousands of layers of sedimentary rock provide evidence that allows us to determine the age of Earth's changing surface and to estimate the age of fossils found in the rocks.	**Can be developed using the following** **Flood!** **SE:** 42
6-8 ES3C - In most locations sedimentary rocks are in horizontal formations with the oldest layers on the bottom. However, in some locations, rock layers are folded, tipped, or even inverted, providing evidence of geologic events in the distant past.	**Can be developed using the following** **Flood** SE: 42
6-8 ES3D - Earth has been shaped by many natural catastrophes, including earthquakes, volcanic eruptions, glaciers, floods, storms, tsunami, and the impacts of asteroids.	**Earthquake!** **SE:** 21, 22 **Fire!** **SE:** 12, 13, 17, 23, 39 **Global Warming?** **SE:** 48, 49, 50, 51
6-8 ES3E - Living organisms have played several critical roles in shaping landforms that we see today.	**Fire!** **SE:** 17, 18, 19
Performance Expectations	
Students are expected to:	
Describe Earth processes that we can observe and measure today (e.g., rate of sedimentation, movement of crustal plates, and changes in composition of the atmosphere) that provide clues to Earth's past.	**Can be developed using the following** **Gold Rush** SE: 22 **Flood** SE: 16-19 **Earthquake** TE: 6-7 **SE:** 13-16 **Volcano** **TG:** 8-9 **SE:** 19-23, 38
Explain how the age of landforms can be estimated by studying the number and thickness of rock layers, as well as fossils found within rock layers.	
Explain why younger layers of sedimentary rocks are usually on top of older layers, and hypothesize what geologic events could have caused huge blocks of horizontal sedimentary layers to be tipped or older rock layers to be on top of younger rock layers.	**Earthquake** **TG:** 6-7 **Volcano** **TG:** 8-9 **Flood:** **SE:** 42 **Gold Rush** **SE:** 22
Interpret current landforms of the Pacific Northwest as evidence of past geologic events (e.g., Mount St. Helens and Crater Lake provide evidence of volcanism, the Channeled Scablands provides evidence of floods that resulted from melting of glaciers).	**Can be developed using the following** **Volcano** SE: 3, 4, 24-26, 28, 31-32, 43

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List several ways that living organisms have shaped landforms (e.g., coral islands, limestone deposits, oil and coal deposits).	**Can be developed using the following** **Flood:** **SE:** 42 **Gold Rush:** **SE:** 24 **Fire:** **SE:** 17-19
EALR 4: Life Science	
Big Idea: Structure and Function of Organisms (LS1)	
Core Content: From Cells to Organisms	
In prior grades, students learned how structures in the body work together to respond to internal and external needs. In grades 6-8, students learn that all living systems are composed of cells, which make up tissues, organs, and organ systems. At each level of organization, the structures enable specific functions required by the organism. Lifestyle choices and environmental conditions can affect parts of the human body, which may affect the health of the body as a whole. Understanding how organisms operate as systems helps students understand the commonalities among life forms, provides an introduction to further study of biology, and offers scientific insights into the ways that personal choices may affect health.	
Content Standards	
Students know that:	
6-8 LS1A - All organisms are composed of cells, which carry on the many functions needed to sustain life.	**Blight!** **SE:** 5
6-8 LS1B - One-celled organisms must contain parts to carry out all life functions.	
6-8 LS1C - Multicellular organisms have specialized cells that perform different functions. These cells join together to form tissues that give organs their structure and enable the organs to perform specialized functions within organ systems.	**Blight!** **SE:** 5 **Gold Medal!** **SE:** 13, 17
6-8 LS1D - Both plant and animal cells must carry on life functions, so they have parts in common, such as nuclei, cytoplasm, cell membranes, and mitochondria. But plants have specialized cell parts, such as chloroplasts and cell walls, because they are producers and do not move.	**Blight!** **SE:** 5
6-8 LS1E - In classifying organisms, scientists consider both internal and external structures and behaviors.	**Blight!** **SE:** 18 **Gold Medal!** **SE:** 17
6-8 LS1F - Lifestyle choices and living environments can damage structures at any level of organization of the human body and can significantly harm the whole organism.	**Gold Medal!** **SE:** 25, 33, 41

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Performance Expectations	
Students are expected to:	
Draw and describe observations made with a microscope, showing that plants and animals are made of cells, and explain that cells are the fundamental unit of life. Describe the functions performed by cells to sustain a living organism (e.g., division to produce more cells, taking in nutrients, releasing waste, using energy to do work, and producing materials the organism needs).	**Blight!** **SE:** 11 **TECH:** Outbreak!
Draw and describe observations made with a microscope, showing that a single-celled organism (e.g., paramecium) contains parts used for all life functions.	**Can be developed using the following** **Outbreak** **SE:** 30 **TG:** 19-21
Relate the structure of a specialized cell (i.e., nerve and muscle cells) to the function that the cell performs. Explain the relationship between tissues that make up individual organs and the functions the organ performs (e.g., valves in the heart control blood flow, air sacs in the lungs maximize surface area for transfer of gases). Describe the components and functions of the digestive, circulatory, and respiratory systems in humans, and how these systems interact.	**Gold Medal!** **SE:** 17
Use labeled diagrams or models to illustrate similarities and differences between plant and animal cell structures and describe their functions (e.g., both have nuclei, cytoplasm, cell membranes, and mitochondria, while only plants have chloroplasts and cell walls).	**Can be developed from:** **Outbreak** **TG:** 19-21 **Blight** **TG:** 5-7 **SE:** 5
Use a classification key to identify organisms, noting use of both internal and external structures as well as behaviors.	**Can be developed using the following** **Blight** SE: 7, 35, 44 **Survive** SE: 7 **Outbreak** SE: 28, 30 **Survive** SE: 36-37 TE: 18-21
Evaluate how lifestyle choices and living environments (e.g., tobacco, drug, and alcohol use, amount of exercise, quality of air, and kinds of food) affect parts of the human body and the organism as a whole.	**Can be developed using the following** **Gold Medal** SE: 20-21, 24-25 **Outbreak** SE: 39-40

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EALR 4: Life Science	
Big Idea: Ecosystems (LS2)	
Core Content: Flow of Energy Through Ecosystems	
In prior grades, students learned how ecosystems change and how these changes affect the capacity of an ecosystem to support populations. In grades 6-8, students learn to apply key concepts about ecosystems to understand the interactions among organisms and the nonliving environment. Essential concepts include the process of photosynthesis used by plants to transform the energy of sunlight into food energy and possible causes of environmental change. Students also learn to investigate environmental issues and to use science to evaluate different solutions to the problem. Knowledge of how energy flows through ecosystems is a critical aspect of students' understanding of how energy sustains life on the planet, including human life.	
Content Standards	
Students know that:	
6-8 LS2A - An ecosystem consists of all the populations living within a specific area and the nonliving factors they interact with. One geographical area may contain many ecosystems.	**Flood!** **SE:** 9 **Oil Spill!** **SE:** 27, 28, 29 **TG:** 13 **Survive?** **SE:** 54
6-8 LS2B - Energy flows through an ecosystem from producers to consumers to decomposers. These relationships can be shown for specific populations on a food web.	**Fire!** **SE:** 53 **Oil Spill!** **SE:** 27, 28, 29, 43 **Survive?** **SE:** 20, 21
6-8 LS2C - The major source of energy for ecosystems on Earth's surface is sunlight. Producers (plants) transform the energy of sunlight into the chemical energy of food through photosynthesis. This food energy is used by plants, animals, and all other organisms to carry on life processes. Nearly all organisms on the surface of Earth depend on this energy source.	**Blight!** **SE:** 5, 13 **Fire!** **SE:** 53, 54, 55 **Global Warming?** **SE:** 12, 13, 20 **Oil Spill!** **SE:** 27, 28, 29
6-8 LS2D - Ecosystems are continuously changing. Causes of these changes include nonliving factors such as the amount of light, range of temperatures, and availability of water, as well as living factors such as the disappearance of different species through disease, predation, and overuse of resources or the introduction of new species.	**Blight!** **SE:** 15, 20, 21, 22, 23, 24, 25, 36, 48 **Global Warming?** **SE:** 50, 56 **Hurricane!** **SE:** 32, 33 **TECH:** Blight!; Survive?; Paw Creek: Neighbors in Fear; The Mt. Pinatubo Eruption

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6-8 LS2E - Investigations of environmental issues should uncover factors causing the problem and relevant scientific concepts and findings that may inform an analysis of different ways to address the issue.	**Blight!** **SE:** 15, 20, 21, 23 **Fire!** **SE:** 54, 55 **Global Warming?** **SE:** 54, 55, 56, 57, 58 **TECH:** Blight!; Paw Creek: Neighbors in Fear
Performance Expectations	
Students are expected to:	
Explain that an ecosystem is a defined area that contains populations of organisms and nonliving factors. Give examples of ecosystems (e.g., Olympic National Forest, Puget Sound, one square foot of lawn) and describe their boundaries and contents.	**Oil Spill!** **SE:** 27, 28, 29 **Survive?** **SE:** 54
Analyze the flow of energy in a local ecosystem, and draw a labeled food web showing the relationships among all of the ecosystem's plant and animal populations.	**Oil Spill!** **SE:** 29
Explain how energy from the Sun is transformed through photosynthesis to produce chemical energy in food. Explain that plants are the only organisms that make their own food. Animals cannot survive without plants because animals, including humans, get food by eating plants or other animals that eat plants.	**Blight!** **SE:** 5, 13, 18 **Fire!** **SE:** 53 **Global Warming?** **SE:** 20 **Oil Spill!** **SE:** 27
Predict what may happen to an ecosystem if nonliving factors change (e.g., the amount of light, range of temperatures, or availability of water), or if one or more populations are removed from or added to the ecosystem.	**Blight!** **SE:** 15, 23, 24
Investigate a local environmental issue by defining the problem, researching possible causative factors, understanding the underlying science, and evaluating the benefits and risks of alternative solutions. Identify resource uses that reduce the capacity of ecosystems to support various populations (e.g., use of pesticides, construction).	**Can be developed using the following** **Global Warming** SE: 40-42, 43, 54, 56, 57-60

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EALR 4: Life Science	
Big Idea: Biological Evolution (LS3)	
Core Content: Variation and Adaptation	
In prior years, students learned that differences in inherited characteristics might help organisms survive and reproduce. In grades 6-8, students learn how the traits of organisms are passed on through the transfer of genetic information during reproduction and how inherited variations can become adaptations to a changing environment. Sexual reproduction produces variations because genes are inherited from two parents. Variations can be either physical or behavioral and some have adaptive value in a changing environment. In the theory of biological evolution, the processes of inheritance, variation, and adaptation explain both the diversity and unity of all life.	
Content Standards	
Students know that:	
6-8 LS3A - The scientific theory of evolution underlies the study of biology and explains both the diversity of life on Earth and similarities of all organisms at the chemical, cellular (and molecular) level. Evolution is supported by multiple forms of scientific evidence.	**Survive?** **SE:** 3, 9, 17, 29, 39, 40, 41, 46, 47, 50
6-8 LS3B - Every organism contains a set of genetic information (instructions) to specify its traits. This information is contained within genes in the chromosomes in the nucleus of each cell.	**Gold Medal!** **SE:** 20 **Survive?** **SE:** 7, 10, 28
6-8 LS3C - Reproduction is essential for every species to continue to exist. Some plants and animals reproduce sexually while others reproduce asexually. Sexual reproduction leads to greater diversity of characteristics because children inherit genes from both parents.	**Blight!** **SE:** 27, 32, 33 **Survive?** **SE:** 30, 31, 45
6-8 LS3D - In sexual reproduction, the new organism receives half of its genetic information from each parent, resulting in offspring that are similar but not identical to either parent. In asexual reproduction, just one parent is involved, and genetic information is passed on nearly unchanged.	**Blight!** **SE:** 32 **Survive?** **SE:** 12, 30, 31, 45, 52, 53
6-8 LS3E - Adaptations are physical or behavioral changes that are inherited and enhance the ability of an organism to survive and reproduce in a particular environment.	**Blight!** **SE:**16, 34, 37 **Fire!** **SE:** 46 **Outbreak!** **SE:** 27, 29, 46 **Survive?** **SE:** 3, 13, 23, 30, 35, 36, 37, 38 **TG:** 21
6-8 LS3F - Extinction occurs when the environment changes and the adaptive characteristics of a species, including its behaviors, are insufficient to allow its survival.	**Survive?** **SE:** 26

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Correlated to:
The Revised Washington State K-12 Science Standards, (12/14/2008)
(Grades 6-8)

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6-8 LS3G - Evidence for evolution includes similarities among anatomical and cell structures and patterns of development make it possible to infer degree of relatedness among organisms	**Gold Medal!** **SE:** 18, 19
Performance Expectations	
Students are expected to:	
Explain and provide evidence of how biological evolution accounts for the diversity of species on Earth today.	**Can be developed using the following** **Survive** **TG:** 18-22 **SE:** 23, 36-43, 45 **TECH:** Video: Survive
Explain that information on how cells are to grow and function is contained in genes in the chromosomes of each cell nucleus and that during the process of reproduction the genes are passed from the parent cells to offspring.	**Can be developed using the following** **Survive** SE: 10, 12, 29-31, 52 TE: 15-17 **Outbreak** SE: 40
Identify sexually and asexually reproducing plants and animals. Explain why offspring that result from sexual reproduction are likely to have more diverse characteristics than offspring that result from asexual reproduction.	**Blight!** **SE:** 27, 32, 33
Describe that in sexual reproduction the offspring receive genetic information from both parents and therefore differ from the parents. Predict the outcome of specific genetic crosses involving one characteristic (using principles of Mendelian genetics). Explain the survival value of genetic variation.	**Survive?** **SE:** 30, 31
Give an example of a plant or animal adaptation that would confer a survival and reproductive advantage during a given environmental change.	**Blight!** **SE:** 1, 16, 34, 37 **Fire!** **SE:** 46 **Survive?** **SE:** 3, 13
Given an ecosystem, predict which organisms are most likely to disappear from that environment when the environment changes in specific ways.	**Can be developed using the following** **Survive** **TG:** 18-23 **SE:** 36-51
Infer the degree of relatedness of two species, given diagrams of anatomical features of the two species (e.g., chicken wing, whale flipper, human hand, bee leg).	**Gold Medal!** **SE:** 18, 19