

# WASHINGTON STATE LASER

Alignment of Washington 6-8  
Science Standards by Lesson Number for

SEPUP

Force & Motion

November 1, 2010

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 70**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQD</b>	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.	<ul style="list-style-type: none"> <li>• Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables. 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.</li> </ul>	SG pp E-26-27; TG pp E-60-61	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 73**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQH</b>	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.	<ul style="list-style-type: none"> <li>• Recognize flaws in scientific claims, such as uncontrolled variables, over generalizations from limited data, and experimenter bias.</li> <li>• Listen actively and respectfully to research reports by other students. Critique their presentations respectfully, using logical argument and evidence.</li> <li>• Engage in reflection and self-evaluation.</li> </ul>	SG p E-6	<b>Aligned with modifications (see comments)</b>	Teachers need to ask students to explain their ideas using logical arguments and evidence.
<b>APPB</b>	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.	<ul style="list-style-type: none"> <li>• Investigate several professions in which an understanding of science and technology is required. Explain why that understanding is necessary for success in each profession.</li> </ul>	TG p E-4	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize the different goals and points of view involved in designing or choosing a vehicle.
<b>APPD</b>	The process of technological design begins by defining a problem and identifying criteria for a successful solution, followed by research to better understand the problem and brainstorming to arrive at potential solutions.	<ul style="list-style-type: none"> <li>• Define a problem that can be solved by technological design and identify criteria for success.</li> <li>• Research how others solved similar problems.</li> <li>• Brainstorm different solutions.</li> </ul>	SG pp E-4-6; TG pp E-2-7	<b>Aligned as designed</b>	Teacher must be intentional about use of the terms (vocabulary) such as technological design.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 74**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQC</b>	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>• Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>• Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>• Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	SG pp E-9, E-10; TG pp E-15, E-16	<b>Aligned as designed</b>	
<b>INQD</b>	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.	<ul style="list-style-type: none"> <li>• Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables. 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.</li> </ul>	SG pp E-8-10; TG p E-15	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards.
<b>INQE</b>	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.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG p E-10	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize this investigation is a model of a car.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 74**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
INQG	Scientific reports should enable another investigator to repeat the study to check the results.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG pp E-8-10	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards.
INQH	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.	<ul style="list-style-type: none"> <li>• Recognize flaws in scientific claims, such as uncontrolled variables, over generalizations from limited data, and experimenter bias.</li> <li>• Listen actively and respectfully to research reports by other students. Critique their presentations respectfully, using logical argument and evidence.</li> <li>• Engage in reflection and self-evaluation.</li> </ul>	TG pp E-14, E-15	<b>Aligned with modifications (see comments)</b>	Teacher must make use of information found in teacher guide on page 14 and 15 to help students evaluate flaws in data.
PS1A	Average speed is defined as the distance traveled in a given period of time.	<ul style="list-style-type: none"> <li>• Measure the distance an object travels in a given interval of time and calculate the object's average speed, using <math>S = d/t</math>. (e.g., a battery-powered toy car travels 20 meters in 5 seconds, so its average speed is 4 meters per second).</li> <li>• 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.</li> </ul>	SG pp E-7, E-9; TG pp E-11, E-14, E-17	<b>Aligned as designed</b>	The unit/lesson is an integral part of a learning progression. This unit/lesson is a part of a conceptual sequence.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 75**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<p><b>PS1A</b></p>	<p>Average speed is defined as the distance traveled in a given period of time.</p>	<ul style="list-style-type: none"> <li>• Measure the distance an object travels in a given interval of time and calculate the object's average speed, using <math>S = d/t</math>. (e.g., a battery-powered toy car travels 20 meters in 5 seconds, so its average speed is 4 meters per second).</li> <li>• 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.</li> </ul>	<p>TG pp E-21-25; SG pp E-12-15; Student Sheet 75.1 and 75.2</p>	<p><b>Aligned as designed</b></p>	<p>The unit/lesson is an integral part of a learning progression. This unit/lesson is a part of a conceptual sequence.</p>

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 76**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>SYSC</b>	The output of one system can become the input of another system.	<ul style="list-style-type: none"> <li>• Give an example of how output of matter or energy from a system can become input for another system</li> </ul>	TG pp E-36, E-37, E-40, E-41	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize that two systems are present, the cart on the ramp and the block on the track with specific inputs and outputs. The output of the first system becomes the input of the second.
<b>INQC</b>	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>• Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>• Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>• Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	SG p E-17; TG p E-39	<b>Aligned as designed</b>	
<b>INQD</b>	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.	<ul style="list-style-type: none"> <li>• Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables. 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.</li> </ul>	SG pp E-17-18; TG pp E-39-40	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 76**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQE</b>	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.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG p E-18; TG p E-41	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize this investigation is a model of a car.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 77**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>SYSC</b>	The output of one system can become the input of another system.	<ul style="list-style-type: none"> <li>• Give an example of how output of matter or energy from a system can become input for another system</li> </ul>	SG p E-20; TG p E-46	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize that two systems are present, the cart on the ramp and the block on the track with specific inputs and outputs. The output of the first system becomes the input of the second.
<b>INQC</b>	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>• Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>• Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>• Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	SG p E-20; TG p E-47	<b>Aligned as designed</b>	
<b>INQD</b>	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.	<ul style="list-style-type: none"> <li>• Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables. 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.</li> </ul>	SG p E-20	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards. The unit/lesson is an integral part of a learning progression. This unit/lesson is a part of a conceptual sequence.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 77**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQE</b>	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.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG p E-20	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize this investigation is a model of a car. The unit/lesson is an integral part of a learning progression. This unit/lesson is a part of a conceptual sequence.
<b>INQG</b>	Scientific reports should enable another investigator to repeat the study to check the results.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG p E-20; TG pp E-46-47	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards.
<b>PS1C</b>	Unbalanced forces will cause changes in the speed or direction of an object's motion. The motion of an object will stay the same when forces are balanced.	<ul style="list-style-type: none"> <li>• Determine whether forces on an object are balanced or unbalanced and justify with observational evidence.</li> <li>• Given a description of forces on an object, predict the object's motion.</li> </ul>	SG pp E-19-20; TG p E-45	<b>Aligned with modifications (see comments)</b>	This unit/lesson is a part of a conceptual sequence. Teacher must be intentional about use of the terms (vocabulary), in particular balanced and unbalanced force(s).

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 77**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<p><b>PS1D</b></p>	<p>The same unbalanced force will change the motion of an object with more mass more slowly than an object with less mass.</p>	<ul style="list-style-type: none"> <li>Given two different masses that receive the same unbalanced force, predict which will move more quickly.</li> </ul>	<p>SG pp E-19-20; TG p E-45</p>	<p><b>Aligned with modifications (see comments)</b></p>	<p>This unit/lesson is a part of a conceptual sequence. Teacher must be intentional about use of the terms (vocabulary), in particular balanced and unbalanced force(s).</p>

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 78**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQC</b>	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>• Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>• Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>• Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	SG pp E-22-24; TG pp E-51-53	<b>Aligned as designed</b>	Students are asked to analyze but not collect data.
<b>INQD</b>	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.	<ul style="list-style-type: none"> <li>• Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables. 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.</li> </ul>	SG pp E-22-24; TG pp E-51-53	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards.
<b>INQE</b>	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.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG pp E-23-24; TG pp E-52-53; TR 78.1	<b>Aligned as designed</b>	Teachers need to emphasize this investigation is a mathematical model.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 78**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>PS1D</b>	The same unbalanced force will change the motion of an object with more mass more slowly than an object with less mass.	<ul style="list-style-type: none"> <li>Given two different masses that receive the same unbalanced force, predict which will move more quickly.</li> </ul>	SG pp E-22-24; TG pp E-50-53	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards. Students are asked to use acceleration during this activity, which goes beyond the Washington State Science Learning Standards for grades 6-8.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 79**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> <li>Given a description of a system, analyze and defend whether it is open or closed.</li> </ul>	SG pp E-26-28; TG pp E-60-61	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize that prior to step 3 in the student procedure it is a closed system, and after step 3 it is open.
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	Student Sheet 79.1	<b>Aligned as designed</b>	
INQE	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.	<ul style="list-style-type: none"> <li>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.</li> </ul>	SG p E-28; TG pp E-61-62	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize this investigation is a model of a car.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 79**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQH</b>	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.	<ul style="list-style-type: none"> <li>• Recognize flaws in scientific claims, such as uncontrolled variables, over generalizations from limited data, and experimenter bias.</li> <li>• Listen actively and respectfully to research reports by other students. Critique their presentations respectfully, using logical argument and evidence.</li> <li>• Engage in reflection and self-evaluation.</li> </ul>	TG p E-60	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize factors that may influence the outcome that are uncontrollable variables.
<b>PS1B</b>	Friction is a force that that can help objects start moving, stop moving, slow down or can change the direction of the object's motion.	<ul style="list-style-type: none"> <li>• Demonstrate and explain the frictional force acting on an object with the use of a physical model.</li> </ul>	TG p E-61	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize that friction is the force slowing down the marble.
<b>PS1C</b>	Unbalanced forces will cause changes in the speed or direction of an object's motion. The motion of an object will stay the same when forces are balanced.	<ul style="list-style-type: none"> <li>• Determine whether forces on an object are balanced or unbalanced and justify with observational evidence.</li> <li>• Given a description of forces on an object, predict the object's motion.</li> </ul>	SG pp E-26-28; TG pp E-59-62; Student Sheet 79.1	<b>Aligned as designed</b>	The unit/lesson is an integral part of a learning progression. This unit/lesson is a part of a conceptual sequence.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 79**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<p><b>PS1D</b></p>	<p>The same unbalanced force will change the motion of an object with more mass more slowly than an object with less mass.</p>	<ul style="list-style-type: none"> <li>Given two different masses that receive the same unbalanced force, predict which will move more quickly.</li> </ul>	<p>SG pp E-26-28; TG pp E-59-62; Student Sheet 79.1</p>	<p><b>Aligned as designed</b></p>	<p>The unit/lesson is an integral part of a learning progression. This unit/lesson is a part of a conceptual sequence.</p>

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 80**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>PS1B</b>	Friction is a force that that can help objects start moving, stop moving, slow down or can change the direction of the object's motion.	<ul style="list-style-type: none"> <li>• Demonstrate and explain the frictional force acting on an object with the use of a physical model.</li> </ul>	SG pp E-31-32; TG pp E-69; Student Sheet 80.1	<b>Aligned as designed</b>	
<b>PS1C</b>	Unbalanced forces will cause changes in the speed or direction of an object's motion. The motion of an object will stay the same when forces are balanced.	<ul style="list-style-type: none"> <li>• Determine whether forces on an object are balanced or unbalanced and justify with observational evidence.</li> <li>• Given a description of forces on an object, predict the object's motion.</li> </ul>	SG pp E-33-36; TG pp E-69-72; Student Sheet 80.1	<b>Aligned as designed</b>	
<b>PS1D</b>	The same unbalanced force will change the motion of an object with more mass more slowly than an object with less mass.	<ul style="list-style-type: none"> <li>• Given two different masses that receive the same unbalanced force, predict which will move more quickly.</li> </ul>	SG pp E-34-36; TG pp E-69-72; Student Sheet 80.1	<b>Aligned as designed</b>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 81**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>SYSB</b>	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.	<ul style="list-style-type: none"> <li>• 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).</li> </ul>	SG pp E-37-40; TG pp E-76-80	<b>Aligned with modifications (see comments)</b>	Teachers need to ask students to explain what the boundary of their systems are. Teachers need to emphasize that the table is included within the boundary of the system and its importance.
<b>INQA</b>	Scientific inquiry involves asking and answering questions and comparing the answer with what scientists already know about the world.	<ul style="list-style-type: none"> <li>• Generate a question that can be answered through scientific investigation. This may involve refining or refocusing a broad and ill-defined question.</li> </ul>	SG pp E-37-39; TG pp E-77-78	<b>Aligned with modifications (see comments)</b>	The teacher needs to intentionally take advantage of multiple opportunities to have students ask and refine questions.
<b>INQC</b>	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>• Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>• Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>• Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	SG pp E-38-40; TG pp E-77-79	<b>Aligned with modifications (see comments)</b>	The teacher needs to be intentional about discussing the standard and encouraging careful observations.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 81**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>PS1B</b>	Friction is a force that that can help objects start moving, stop moving, slow down or can change the direction of the object's motion.	<ul style="list-style-type: none"> <li>• Demonstrate and explain the frictional force acting on an object with the use of a physical model.</li> </ul>	SG p E-40; TG pp E-76, E-78, E-79	<b>Aligned as designed</b>	
<b>PS1C</b>	Unbalanced forces will cause changes in the speed or direction of an object's motion. The motion of an object will stay the same when forces are balanced.	<ul style="list-style-type: none"> <li>• Determine whether forces on an object are balanced or unbalanced and justify with observational evidence.</li> <li>• Given a description of forces on an object, predict the object's motion.</li> </ul>	SG pp E-37-40; TG pp E-76-80	<b>Aligned as designed</b>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 82**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>• Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>• Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>• Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	SG p E-42; TG p E-83	<b>Aligned as designed</b>	
INQD	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.	<ul style="list-style-type: none"> <li>• Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables. 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.</li> </ul>	SG pp E-41-43; TG pp E-82-83	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards.
INQE	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.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG pp E-41-44; TG pp E-83-85	<b>Aligned as designed</b>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 82**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>PS1B</b>	Friction is a force that that can help objects start moving, stop moving, slow down or can change the direction of the object's motion.	<ul style="list-style-type: none"> <li>• Demonstrate and explain the frictional force acting on an object with the use of a physical model.</li> </ul>	SG pp E-41-44; TG pp E-81, E-83-85	<b>Aligned as designed</b>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 83**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>SYSA</b>	Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	<ul style="list-style-type: none"> <li>Given a system, identify subsystems and a larger encompassing system</li> </ul>	SG pp E-45-48; TG pp E-89-93;	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) systems and subsystems. The unit/lesson contains many opportunities to discuss many subsystems within the main scenario system.
<b>SYSB</b>	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.	<ul style="list-style-type: none"> <li>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).</li> </ul>	SG pp E-45-48; TG pp E-89-93;	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) systems and boundaries. The unit/lesson contains many opportunities to discuss boundaries and systems.
<b>SYSC</b>	The output of one system can become the input of another system.	<ul style="list-style-type: none"> <li>Give an example of how output of matter or energy from a system can become input for another system</li> </ul>	SG pp E-45-48; TG pp E-89-93; TR 83.1; Student Sheet 83.1	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) input and output, with particular attention to the relationship between the driver-car system and the car-road system.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 83**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<p><b>SYSD</b></p>	<p>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.</p>	<ul style="list-style-type: none"> <li>Given a description of a system, analyze and defend whether it is open or closed.</li> </ul>	<p>SG pp E-45-48; TG pp E-89-93</p>	<p><b>Aligned with modifications (see comments)</b></p>	<p>The unit/lesson contains many opportunities to discuss factors that affect open systems.</p>
<p><b>SYSF</b></p>	<p>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.”</p>	<ul style="list-style-type: none"> <li>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.</li> </ul>	<p>SG pp E-45-48; TG pp E-89-93</p>	<p><b>Aligned with modifications (see comments)</b></p>	<p>The unit/lesson contains many opportunities to discuss the social and scientific factors involved in driving a car safely.</p>
<p><b>INQC</b></p>	<p>Collecting, analyzing, and displaying data are essential aspects of all investigations.</p>	<ul style="list-style-type: none"> <li>Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	<p>SG pp E-45-48; TG pp E-89-93; TR 83.1; Student Sheet 83.1</p>	<p><b>Aligned as designed</b></p>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 83**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQE</b>	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.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG p E-46; TG p E-90; TR 83.1; Student Sheet 83.1	<b>Aligned as designed</b>	Teachers need to emphasize this investigation is a mathematical model.
<b>PS1B</b>	Friction is a force that that can help objects start moving, stop moving, slow down or can change the direction of the object's motion.	<ul style="list-style-type: none"> <li>• Demonstrate and explain the frictional force acting on an object with the use of a physical model.</li> </ul>	SG pp E-46-48; TG pp E-89, E-92-93; Student Sheet 83.1	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize that different road conditions have different coefficients of friction.
<b>PS1C</b>	Unbalanced forces will cause changes in the speed or direction of an object's motion. The motion of an object will stay the same when forces are balanced.	<ul style="list-style-type: none"> <li>• Determine whether forces on an object are balanced or unbalanced and justify with observational evidence.</li> <li>• Given a description of forces on an object, predict the object's motion.</li> </ul>	SG pp E-46-48; TG pp E-89-93;	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize that different road conditions provide different frictional forces that affect motion.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 84**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>SYSA</b>	Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	<ul style="list-style-type: none"> <li>Given a system, identify subsystems and a larger encompassing system</li> </ul>	SG pp E-50-54; TG pp E-103-104; Student Sheet 84.1; Student Sheet 84.2	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) systems and subsystems. The unit/lesson contains many opportunities to discuss many subsystems within the main scenario system.
<b>SYSC</b>	The output of one system can become the input of another system.	<ul style="list-style-type: none"> <li>Give an example of how output of matter or energy from a system can become input for another system</li> </ul>	SG pp E-50-54; TG pp E-103-104; Student Sheet 84.1; Student Sheet 84.2	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) input and output, with particular attention to the safety systems and their effect on the driver and car systems.
<b>APPA</b>	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> <li>Describe how a technology has changed over time in response to societal challenges.</li> </ul>	SG pp E-50-54; TG pp E-103-104; Student Sheet 84.1; Student Sheet 84.2	<b>Aligned as designed</b>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 84**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>APPB</b>	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.	<ul style="list-style-type: none"> <li>Investigate several professions in which an understanding of science and technology is required. Explain why that understanding is necessary for success in each profession.</li> </ul>	SG pp E-50-54; TG pp E-103-104; Student Sheet 84.1; Student Sheet 84.2	<b>Aligned as designed</b>	The unit contains many opportunities to address the standards but the teacher must be intentional in using the terms science and technological design.
<b>PS1B</b>	Friction is a force that that can help objects start moving, stop moving, slow down or can change the direction of the object's motion.	<ul style="list-style-type: none"> <li>Demonstrate and explain the frictional force acting on an object with the use of a physical model.</li> </ul>	SG pp E-50-51; TG pp E-103-104; Student Sheet 84.2	<b>Aligned as designed</b>	
<b>PS1C</b>	Unbalanced forces will cause changes in the speed or direction of an object's motion. The motion of an object will stay the same when forces are balanced.	<ul style="list-style-type: none"> <li>Determine whether forces on an object are balanced or unbalanced and justify with observational evidence.</li> <li>Given a description of forces on an object, predict the object's motion.</li> </ul>	SG pp E-50-53; TG pp E-103-104; Student Sheet 84.2	<b>Aligned as designed</b>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 85**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>SYSF</b>	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.”	<ul style="list-style-type: none"> <li>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.</li> </ul>	SG pp E-55-57; TG pp E-112-115	<b>Aligned as designed</b>	
<b>INQE</b>	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.	<ul style="list-style-type: none"> <li>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.</li> </ul>	SG pp E-55-57; TG pp E-112-115	<b>Aligned as designed</b>	
<b>INQH</b>	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.	<ul style="list-style-type: none"> <li>Recognize flaws in scientific claims, such as uncontrolled variables, over generalizations from limited data, and experimenter bias.</li> <li>Listen actively and respectfully to research reports by other students. Critique their presentations respectfully, using logical argument and evidence.</li> <li>Engage in reflection and self-evaluation.</li> </ul>	SG pp E-56-57; TG p E-115	<b>Aligned as designed</b>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 85**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>APPA</b>	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> <li>• Describe how a technology has changed over time in response to societal challenges.</li> </ul>	SG pp E-55-57; TG pp E-112-115	<b>Aligned as designed</b>	Teachers need to emphasize crash testing is a technological solution to a human problem.
<b>APPD</b>	The process of technological design begins by defining a problem and identifying criteria for a successful solution, followed by research to better understand the problem and brainstorming to arrive at potential solutions.	<ul style="list-style-type: none"> <li>• Define a problem that can be solved by technological design and identify criteria for success.</li> <li>• Research how others solved similar problems.</li> <li>• Brainstorm different solutions.</li> </ul>	SG pp E-55-57; TG pp E-112-115; Issues and Physical Science page of the SEPUP web site	<b>Aligned as designed</b>	
<b>APPE</b>	Scientists and engineers often work together to generate creative solutions to problems and decide which ones are most promising.	<ul style="list-style-type: none"> <li>• Collaborate with other students to generate creative solutions to a problem, and apply methods for making tradeoffs to choose the best solution.</li> </ul>	SG pp E-55-57; TG pp E-112-115	<b>Aligned as designed</b>	

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 86**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQB</b>	Different kinds of questions suggest different kinds of scientific investigations.	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Propose a hypothesis, give a reason for the hypothesis, and explain how the planned investigation will test the hypothesis.</li> <li>• Work collaboratively with other students to carry out the investigations.</li> </ul>	SG p E-61	<b>Aligned with modifications (see comments)</b>	The teacher needs to be intentional about discussing the standard using the Extension.
<b>INQC</b>	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>• Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>• Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>• Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	SG p E-59; TG p E-120	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize careful observations and repeat trials.
<b>INQD</b>	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.	<ul style="list-style-type: none"> <li>• Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables. 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.</li> </ul>	SG p E-59; TG p E-120	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) according to the Washington State Science Learning Standards.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 86**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQE</b>	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.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	SG pp E-59, E-60-61; TG pp E-120-122	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize that this is a model.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 87**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>SYSA</b>	Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	<ul style="list-style-type: none"> <li>Given a system, identify subsystems and a larger encompassing system</li> </ul>	SG pp E-62-64; TG pp E-125-129; TR 87.1; Student Sheet 87.1	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) regarding systems and subsystems.
<b>SYSB</b>	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.	<ul style="list-style-type: none"> <li>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).</li> </ul>	SG pp E-62-64; TG pp E-125-129; TR 87.1; Student Sheet 87.1	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about use of the terms (vocabulary) regarding systems and boundaries.
<b>SYSF</b>	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.”	<ul style="list-style-type: none"> <li>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.</li> </ul>	SG pp E-62-64; TG pp E-125-129; TR 87.1; Student Sheet 87.1	<b>Aligned with modifications (see comments)</b>	The unit/lesson contains many opportunities to discuss the social and scientific aspects of this issue.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 87**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQC</b>	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> <li>• Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative.</li> <li>• Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words.</li> <li>• Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships.</li> </ul>	SG pp E-62-64; TG pp E-125-129; TR 87.1; Student Sheet 87.1	<b>Aligned as designed</b>	
<b>INQH</b>	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.	<ul style="list-style-type: none"> <li>• Recognize flaws in scientific claims, such as uncontrolled variables, over generalizations from limited data, and experimenter bias.</li> <li>• Listen actively and respectfully to research reports by other students. Critique their presentations respectfully, using logical argument and evidence.</li> <li>• Engage in reflection and self-evaluation.</li> </ul>	SG pp E-63-64; TG pp E-126-129; Student Sheet 87.1	<b>Aligned with modifications (see comments)</b>	The teacher needs to be intentional about discussing the standard and probing students' thinking.
<b>PS1D</b>	The same unbalanced force will change the motion of an object with more mass more slowly than an object with less mass.	<ul style="list-style-type: none"> <li>• Given two different masses that receive the same unbalanced force, predict which will move more quickly.</li> </ul>	TG p E-125	<b>Aligned with modifications (see comments)</b>	Teacher must be intentional about sharing the mass data in order to meet the standard.

**Alignment of Washington 6-8 Science Standards with  
SEPUP Force & Motion ~ Activity 88**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<b>INQH</b>	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.	<ul style="list-style-type: none"> <li>• Recognize flaws in scientific claims, such as uncontrolled variables, over generalizations from limited data, and experimenter bias.</li> <li>• Listen actively and respectfully to research reports by other students. Critique their presentations respectfully, using logical argument and evidence.</li> <li>• Engage in reflection and self-evaluation.</li> </ul>	SG pp E-65-68; TG pp E-136-139; TR 88.1; Student Sheet 88.1; Student Sheet 88.2	<b>Aligned as designed</b>	
<b>APPE</b>	Scientists and engineers often work together to generate creative solutions to problems and decide which ones are most promising.	<ul style="list-style-type: none"> <li>• Collaborate with other students to generate creative solutions to a problem, and apply methods for making tradeoffs to choose the best solution.</li> </ul>	SG pp E-65-68; TG pp E-136-139; TR 88.1; Student Sheet 88.1; Student Sheet 88.2	<b>Aligned with modifications (see comments)</b>	Teachers need to emphasize the scientific and social aspects of the solutions to this problem.