

WASHINGTON STATE LASER

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

STC/MS

Energy, Machines, & Motion

November 1, 2010

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 01**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPH	People in all cultures have made and continue to make contributions to society through science and technology.	<ul style="list-style-type: none"> Describe scientific or technological contributions to society by people in various cultures. 	SG pp 9-11 Reading Galileo ad Experimental Science	Aligned as designed	
PS1A	Average speed is defined as the distance traveled in a given period of time.	<ul style="list-style-type: none"> 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. 	SG pp 5-7 Inquiry 1.4 & Inquiry 1.6 & Inquiry 1.8	Aligned as designed	The lesson is an integral part of a learning progression. This lesson is a part of a conceptual sequence.
PS1B	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"> Demonstrate and explain the frictional force acting on an object with the use of a physical model. 	SG pp 5-6 Inquiry 1.3 & Inquiry 1.5	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. This lesson is a part of a conceptual sequence.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 01**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
PS1C	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"> • 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. 	SG pp 4-8 Inquiry 1.1 & Inquiry 1.2 & Inquiry 1.6 & Inquiry 1.7 & Inquiry 1.8	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. This lesson is a part of a conceptual sequence.
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.	<ul style="list-style-type: none"> • 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 to electrical energy in a battery, electrical to light energy in a bulb). 	SG pp 4-8 Inquiry 1.1 & Inquiry 1.2 & Inquiry 1.3 & Inquiry 1.4 & Inquiry 1.5 & Inquiry 1.6 & Inquiry 1.7 & Inquiry 1.8	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. This lesson is a part of a conceptual sequence.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 02**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
SYSA	Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	<ul style="list-style-type: none"> Given a system, identify subsystems and a larger encompassing system 	Inquiry 2.1 SG pp 14-15	Aligned as designed	Teacher must be intentional about sharing how the parts used in the investigation create a system.
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.	<ul style="list-style-type: none"> 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 to electrical energy in a battery, electrical to light energy in a bulb). 	Inquiry 2.1, SG pp 14 -15	Aligned as designed	The lesson is an integral part of a learning progression.
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.	<ul style="list-style-type: none"> 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. 	Inquiry 2.1 SG pp 14-15 Reflection A; Reading: Wet-Cell and Dry-Cell Batteries SG pp 18-19	Aligned as designed	<ul style="list-style-type: none"> The lesson contains many opportunities to discuss electrical energy needed to light the battery constructed by the students.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 03**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> • 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 to electrical energy in a battery, electrical to light energy in a bulb). 	Inquiry 3 SG pp 21-23	Aligned as designed	Teachers must be intentional about sharing the occurrences of energy transformations. Examples may include chemical energy in charged batteries is transformed into electrical energy that is then transformed into kinetic energy to run a motor, or electrical energy is transformed into chemical energy when uncharged batteries are placed into the charger.
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.	<ul style="list-style-type: none"> • 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. 	Inquiry 3 SG pp 22-23; Reading-Different Batteries for Different Needs SG pp 24-25	Aligned as designed	Teacher must be intentional about sharing where energy transformations occur. Teachers may want to have students draw light and motor system and label transformations.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 04**

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"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 4.1 SG pp 28-29	Aligned as designed	Students are asked to record data gathered during inquiry. Students are also asked to create a graph to display data and make inferences based on data.
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"> • 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. 	Inquiry 4.1 SG p 28	Aligned as designed	Teacher must be intentional about use of the terms. Student guide uses term dependent and independent variable. Teachers will need to intentionally bring in terms responding and manipulated variables.
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.	<ul style="list-style-type: none"> • 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 to electrical energy in a battery, electrical to light energy in a bulb). 	Inquiry 4.1 SG Reading-Electric Cars: Back to the Future; Reading-Putting Wind to Work SG pp 30-35	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 04**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<p>PS3E</p>	<p>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.</p>	<ul style="list-style-type: none"> • 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. 	<p>Inquiry 4 Reading Electric Cars: Back to the Future; Reading Putting the Wind to Work SG pp 30-35</p>	<p>Aligned as designed</p>	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 05**

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"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 5.1 SG pp 38-39; Students Sheet 5.1; Inquiry 5.2 SG pp 40-41	Aligned as designed	This lesson is a part of a conceptual sequence to develop an understanding of forces.
APPH	People in all cultures have made and continue to make contributions to society through science and technology.	<ul style="list-style-type: none"> • Describe scientific or technological contributions to society by people in various cultures. 	Reading: Bungee Jumping: The Forces Are With You; Reading Hooke and Newton	Aligned as designed	Includes focus on how the Bunlap People on Pentecost Island use forces as part of their cultural traditions. Additionally, the contributions of Robert Hooke and Sir Isaac Newton are outlined.
PS1C	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"> • 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. 	Getting Started SG p37; Inquiry 5.1 SG pp 38-39; Student Sheet 5.1; Reading-The Difference Between Mass and Weight; Inquiry 5.2 SG pp 40-41	Aligned as designed	The lesson is an integral part of a learning progression towards understanding of forces.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 06**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
INQA	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"> • Generate a question that can be answered through scientific investigation. This may involve refining or refocusing a broad and ill-defined question. 	Inquiry 6.1-6.3 SG pp 50-53	Aligned as designed	Students are asked to work through three similar inquiries. At the end of the third inquiry students with intentional teaching could define a testable question.
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 6.1-6.3 pp 50-53; Student Sheet 6.1; Student Sheet 6.2; Student Sheet 6.3	Aligned as designed	
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"> • 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. 	Inquiry 6.1-6.3 pp 50-53; Student Sheet 6.1; Student Sheet 6.2; Student Sheet 6.3	Aligned as designed	Students perform three similar investigations for Inquiry 6.1, 6.2 and 6.3. Teacher must be intentional about sharing each investigation is changing one variable between lessons.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 06**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
INQF	It is important to distinguish between the results of a particular investigation and general conclusions drawn from these results.	<ul style="list-style-type: none"> • Generate a scientific conclusion from an investigation using inferential logic, and clearly distinguish between results (e.g., evidence) and conclusions (e.g., explanation). • Describe the differences between an objective summary of the findings and an inference made from the findings. 	Reflection A-C SG p 53	Aligned as designed	
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> • Describe how a technology has changed over time in response to societal challenges. 	Reading-Rock Climbing Two People, One Powerful Force	Aligned as designed	The reading contains many opportunities to discuss the technologies necessary for rock climbing
PS1B	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"> • Demonstrate and explain the frictional force acting on an object with the use of a physical model. 	Inquiry 6.1 SG pp 50-51, Inquiry 6.2 SG pp 51-52, Inquiry 6.3 SG pp 52-53, Reading: Nature Puts On the Brakes SG pp 54-58	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 06**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
PS1C	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"> • 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. 	Getting Started SG p 49; Inquiry 6.1, Inquiry 6.2, Inquiry 6.3 SG pp 50-53; Readings-Nature Puts on the Brakes & Rock Climbing	Aligned as designed	
PS1D	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"> • Given two different masses that receive the same unbalanced force, predict which will move more quickly. 	Inquiry 6.2 SG pp 51-52	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 07**

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"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 7.1 SG p 65	Aligned as designed	
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"> • 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. 	Inquiry 7.1 SG pp 64-65	Aligned as designed	
INQF	It is important to distinguish between the results of a particular investigation and general conclusions drawn from these results.	<ul style="list-style-type: none"> • Generate a scientific conclusion from an investigation using inferential logic, and clearly distinguish between results (e.g., evidence) and conclusions (e.g., explanation). • Describe the differences between an objective summary of the findings and an inference made from the findings. 	Reflection SG p 67 A-D	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 07**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPC	<p>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.</p>	<ul style="list-style-type: none"> • 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). 	<p>Reading-Motors-Getting Smaller Every Day</p>	<p>Aligned as designed</p>	<p>Teacher must be intentional about sharing with students the technological advancement of motors.</p>
PS1C	<p>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.</p>	<ul style="list-style-type: none"> • 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. 	<p>Inquiry 7.1 SG pp 64-67</p>	<p>Aligned as designed</p>	
PS1D	<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"> • Given two different masses that receive the same unbalanced force, predict which will move more quickly. 	<p>Inquiry 7.1 SG pp 64-67</p>	<p>Aligned as designed</p>	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 08**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
SYSC	The output of one system can become the input of another system.	<ul style="list-style-type: none"> • Give an example of how output of matter or energy from a system can become input for another system 	Reading-Klamath Falls A Real Hot Spot	Aligned as designed	Teacher must be intentional about sharing how the energy in natural hot springs are used for practical manmade purposes.
INQF	It is important to distinguish between the results of a particular investigation and general conclusions drawn from these results.	<ul style="list-style-type: none"> • Generate a scientific conclusion from an investigation using inferential logic, and clearly distinguish between results (e.g., evidence) and conclusions (e.g., explanation). • Describe the differences between an objective summary of the findings and an inference made from the findings. 	Student Sheet 8.2	Aligned as designed	Teachers need to ask students to draw a conclusion regarding the motors ability to lift the sled.
APPH	People in all cultures have made and continue to make contributions to society through science and technology.	<ul style="list-style-type: none"> • Describe scientific or technological contributions to society by people in various cultures. 	Reading-Klamath Falls A Real Hot Spot	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 08**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
PS1D	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"> Given two different masses that receive the same unbalanced force, predict which will move more quickly. 	Inquiry 8.1 SG p 76; Inquiry 2 SG pp 77-78	Aligned as designed	Teacher must be intentional about sharing how forces change between different masses. The masses include the block from Lesson 6, two washers, and sled with 7 washers. From this information students will calculate work done on the various masses.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 09**

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"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 9.1 SG pp 85-86; Reflection SG p 86	Aligned as designed	
PS1A	Average speed is defined as the distance traveled in a given period of time.	<ul style="list-style-type: none"> • 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. 	Inquiry 9.1 SG pp 85-86	Aligned as designed	This lesson is a part of a learning progression towards understanding of speed.
PS1C	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"> • 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. 	Inquiry 9.1 SG pp 85-86	Aligned as designed	Teacher must be intentional about sharing when the load at rest the forces are balanced, when the load is being lifted the forces are no longer balanced.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 09**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> • 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 to electrical energy in a battery, electrical to light energy in a bulb). 	Reading-The Power of Nature	Aligned as designed	
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.	<ul style="list-style-type: none"> • 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. 	Reading-Work, Energy and Power	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 10**

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"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Performance Assessment 10.1	Aligned as designed	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 1-9.
INQF	It is important to distinguish between the results of a particular investigation and general conclusions drawn from these results.	<ul style="list-style-type: none"> • Generate a scientific conclusion from an investigation using inferential logic, and clearly distinguish between results (e.g., evidence) and conclusions (e.g., explanation). • Describe the differences between an objective summary of the findings and an inference made from the findings. 	Performance Assessment 10.1	Aligned as designed	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 1-9.
PS1C	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"> • 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. 	Performance Assessment Student Sheet 10.1, TG pp 122-126; Inquiry Master 10.5 Multiple Choice Short Response, TG pp 119-120	Aligned as designed	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 1-9.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 10**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
PS1D	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"> Given two different masses that receive the same unbalanced force, predict which will move more quickly. 	Performance Assessment 10.1; Inquiry Master 10.5	Aligned as designed	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 1-9.
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.	<ul style="list-style-type: none"> 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 to electrical energy in a battery, electrical to light energy in a bulb). 	Performance Assessment 10.1; Inquiry Master 10.5	Aligned as designed	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 1-9.
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.	<ul style="list-style-type: none"> 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. 	Performance Assessment 10.1; Inquiry Master 10.5	Aligned as designed	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 1-9.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 10**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
<p>PS3E</p>	<p>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.</p>	<ul style="list-style-type: none"> • 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. 	<p>Reading-Cars Energy to Burn</p>	<p>Aligned as designed</p>	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 11**

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"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 11.1 SG pp 102-103; Inquiry 11.2 SG pp 104-105	Aligned as designed	
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"> • 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. 	Inquiry 11.2 SG pp 104-105	Aligned with modifications (see comments)	The lesson contains opportunities for the use of term controlled variable, manipulated variable and responding variable but it requires the intentional use by teachers.
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"> • 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. 	Inquiry 11.1 SG pp 102-103; Inquiry 11.2 SG pp 104-105	Aligned with modifications (see comments)	Teacher must be intentional about connecting the sled/cart and inclined plane as a model.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 11**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> Describe how a technology has changed over time in response to societal challenges. 	Reading-Escape Route in Johnstown	Aligned as designed	
PS1B	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"> Demonstrate and explain the frictional force acting on an object with the use of a physical model. 	Getting Started SG p 101; Inquiry 11.1; Inquiry 11.2 SG pp 102-105; Reflection SG p 105	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 12**

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"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 12.1 SG pp 112-115	Aligned as designed	
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"> • 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. 	Inquiry 12.1 SG pp 112-115; Student Sheet 12.1	Aligned with modifications (see comments)	The lesson contains opportunities for the use of term controlled variable, manipulated variable and responding variable but it requires the intentional use by teachers.
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"> • 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. 	Inquiry 12.1 SG pp 112-115	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. Teacher must be intentional about use of the term model for the sled/cart and pulley system.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 12**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> Describe how a technology has changed over time in response to societal challenges. 	Reading-Uses of Pulleys; Reading-Going Up	Aligned as designed	
PS1C	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"> 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. 	Inquiry 12.1 SG pp 112-115	Aligned with modifications (see comments)	Teacher must be intentional about sharing when sled is at rest in the system the forces are balanced, when the sled is lifting the forces are unbalanced.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 13**

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"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 13.2 SG pp 123-124; Student Sheet 13.2, TG p165	Aligned as designed	
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"> • 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. 	Inquiry 13.2 SG p 123; Student Sheet 13.2, TG p165	Aligned with modifications (see comments)	The lesson contains opportunities for the use of term controlled variable, manipulated variable and responding variable but it requires the intentional use by teachers.
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"> • 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. 	Getting Started SG p 121; Inquiry 13.1 SG pp 122-123; Inquiry 13.2 SG pp 123-124	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. Teacher must be intentional about use of the term model for the sled/cart and lever system.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 13**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> Describe how a technology has changed over time in response to societal challenges. 	Reading-Understanding Levers As Easy As 1 2 3	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 14**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> • 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). 	Reading-Mechanical Advantage SG p 132; Student Sheet 14.1, TG p 175	Aligned with modifications (see comments)	Teacher must be intentional about use of the terms system, input and output. The actual mechanical advantage (output) is less than the ideal mechanical advantage (input) because some effort force must overcome friction in the system.
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Student Sheet 14.1, TG p 175	Aligned as designed	
INQF	It is important to distinguish between the results of a particular investigation and general conclusions drawn from these results.	<ul style="list-style-type: none"> • Generate a scientific conclusion from an investigation using inferential logic, and clearly distinguish between results (e.g., evidence) and conclusions (e.g., explanation). • Describe the differences between an objective summary of the findings and an inference made from the findings. 	Student Sheet 14.1, TG p 175; Reflection p 134	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 14**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> Describe how a technology has changed over time in response to societal challenges. 	Reading-Secret Wheelbarrow Technology; Reading-More Simple Machines: The Wedge, Screw and Wheel and Axle	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 15**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> • 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). 	Reading-Meaning of Efficiency; Inquiry 15.1 SG p 142	Aligned as designed	
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Student Sheet 15.1, TG p 183	Aligned as designed	
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> • Describe how a technology has changed over time in response to societal challenges. 	Reading-Harnes sing the Power of Nature James Watt and the Steam Engine; Reading-Energy Star: A Bright Idea	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 15**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPC	<p>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.</p>	<ul style="list-style-type: none"> • 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). 	<p>Reading-Harnessing the Power of Nature James Watt and the Steam Engine; Reading-Energy Star: A Bright Idea</p>	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 16**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> • 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). 	Inquiry 16.1 SG p 151; Student Sheet 16.1A, TG p 195	Aligned as designed	
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	Inquiry 16.1 SG p 151	Aligned as designed	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 11-15.
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"> • 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. 	Inquiry 16.1 SG p 151	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 11-15.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 16**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> • Describe how a technology has changed over time in response to societal challenges. 	Inquiry 16.1 SG p 151; Student Sheet 16.1A, TG p195	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 11-16.
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.	<ul style="list-style-type: none"> • 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). 	Reading-Science and Technology SG p 150; Reading Technology-It's Not Just the Computer SG p 152; Reading-Linking a Country to a Continent	Aligned as designed	
APPD	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"> • Define a problem that can be solved by technological design and identify criteria for success. • Research how others solved similar problems. • Brainstorm different solutions. 	Inquiry 16.1, SG p 151; Student Sheet 16.1A, TG p 195	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 16**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> • Test the best solution by building a model or other representation and using it with the intended audience. Redesign as necessary. • Present the recommended design using models or drawings and an engaging presentation. 	Inquiry 16.1 SG p 151; Student Sheet 16.1A, TG p 195	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 11-15. Teacher must be intentional about the term solution as part of the design process.
PS1B	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"> • Demonstrate and explain the frictional force acting on an object with the use of a physical model. 	Inquiry 16.1 SG pp 151, Student Sheet 16.1A, TG p 195	Aligned as designed	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 11-15.
PS1C	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"> • 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. 	Inquiry 16.1 SG p 151; Student Sheet 16.1A, TG p 195	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression. Students are asked to demonstrate conceptual understanding of standards in Lessons 11-15.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 17**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
SYSA	Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	<ul style="list-style-type: none"> Given a system, identify subsystems and a larger encompassing system 	SG pp 171-173 Reading How to Do a Simple Task-in Just 13 Steps	Aligned as designed	
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"> 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. 	Inquiry 17.1 SE pp 165-166; Inquiry Master 17.1a; Inquiry Master 17.1b	Aligned with modifications (see comments)	The Anchor Activity contains multiple opportunities for student involvement. Students may choose to engage in a research project or developing a model through the design process and will cover multiple learning standards with this ongoing lesson.
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.	<ul style="list-style-type: none"> Investigate several professions in which an understanding of science and technology is required. Explain why that understanding is necessary for success in each profession. 	SG pp 168-170 Reading Civil Engineering Danelle Bernard's Bridge to the Future	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 17**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPD	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"> • Define a problem that can be solved by technological design and identify criteria for success. • Research how others solved similar problems. • Brainstorm different solutions. 	Inquiry 17.1 SE pp 165-166; Inquiry Master 17.1a; Inquiry Master 17.1b	Aligned with modifications (see comments)	The Anchor Activity contains multiple opportunities for student involvement. Students may choose to engage in a research project or developing a model through the design process and will cover multiple learning standards with this ongoing lesson.
APPE	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"> • Collaborate with other students to generate creative solutions to a problem, and apply methods for making tradeoffs to choose the best solution. 	Inquiry 17.1 SE pp 165-166; Inquiry Master 17.1a; Inquiry Master 17.1b	Aligned as designed	The Anchor Activity contains multiple opportunities for student involvement. Students may choose to engage in a research project or developing a model through the design process and will cover multiple learning standards with this ongoing lesson.
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.	<ul style="list-style-type: none"> • Test the best solution by building a model or other representation and using it with the intended audience. Redesign as necessary. • Present the recommended design using models or drawings and an engaging presentation. 	Inquiry 17.1 SE pp 165-166; Inquiry Master 17.1a; Inquiry Master 17.1b	Aligned with modifications (see comments)	The Anchor Activity contains multiple opportunities for student involvement. Students may choose to engage in a research project or developing a model through the design process and will cover multiple learning standards with this ongoing lesson.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 18**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
SYSA	Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	<ul style="list-style-type: none"> Given a system, identify subsystems and a larger encompassing system 	SG pp 181-183 Reading Propellers: Vehicles in Motion	Aligned with modifications (see comments)	Teacher must be intentional about use of the terms "system" and "subsystem" describing the idea that propellers are a subsystem of a larger vehicle system.
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	SG pp 179-180 Inquiry 18.2; TG p 227 Student Sheet 18.2	Aligned as designed	
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"> 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. 	SG pp 178-180 Inquiry 18.1 & 18.2	Aligned with modifications (see comments)	Teacher must be intentional about sharing the fact that the fan car is a model.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 18**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> • 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). 	SG pp 184-187 Reading Sailing Through the Solar System	Aligned as designed	
PS1A	Average speed is defined as the distance traveled in a given period of time.	<ul style="list-style-type: none"> • 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. 	SG p 175 Getting Started; SG p 177 Reading Measuring Motion; SG pp 179-180 Inquiry 18.2	Aligned as designed	
PS1B	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"> • Demonstrate and explain the frictional force acting on an object with the use of a physical model. 	SG pp 178-180 Inquiry 18.1 & Inquiry 18.2; SG pp 184-187 Reading Sailing Through the Solar System	Aligned with modifications (see comments)	Teachers need to ask students to explain what force (friction) slows the vehicle. Teachers need to ask students to explain what forces are acting on the vehicle along different sections of the track.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 18**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
PS1C	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"> • 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. 	SG pp 178-180 Inquiry 18.1 & 18.2	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 19**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
INQB	Different kinds of questions suggest different kinds of scientific investigations.	<ul style="list-style-type: none"> • 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, 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. 	SG pp 192-193 Inquiry 19.1 & 19.2	Aligned as designed	
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> • Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. • Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. • Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	SG pp 192-193 Inquiry 19.1 & 19.2	Aligned as designed	
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"> • 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. 	SG pp 192-193 Inquiry 19.1 & 19.2	Aligned with modifications (see comments)	When students are designing their investigations they should note the controlled, manipulated, and responding variables.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 19**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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"> • 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. 	SG pp 192-193 Inquiry 19.1 & 19.2	Aligned with modifications (see comments)	Teachers must be intentional about sharing the idea that the mousetrap car is a model of a vehicle.
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"> • Recognize flaws in scientific claims, such as uncontrolled variables, over generalizations 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. 	SG pp 192-193 Inquiry 19.1 & 19.2	Aligned with modifications (see comments)	Teacher needs to emphasize that students should report their data accurately. Students tend to be competitive regarding the speed of their vehicle and may skew their data.
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> • Describe how a technology has changed over time in response to societal challenges. 	SG pp 194-197 Reading Rocket Science 101	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 19**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPH	People in all cultures have made and continue to make contributions to society through science and technology.	<ul style="list-style-type: none"> Describe scientific or technological contributions to society by people in various cultures. 	SG pp 198-199 Reading Medieval Warfare in Modern Times	Aligned as designed	
PS1A	Average speed is defined as the distance traveled in a given period of time.	<ul style="list-style-type: none"> 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. 	SG pp 192-193 Inquiry 19.1 & 19.2	Aligned as designed	
PS1B	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"> Demonstrate and explain the frictional force acting on an object with the use of a physical model. 	SG pp 192-193 Inquiry 19.1 & 19.2	Aligned with modifications (see comments)	Teachers need to ask students to explain the forces (friction) present that slow the vehicle.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 19**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
PS1C	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"> • 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. 	SG pp 192-193 Inquiry 19.1 & Inquiry 19.2	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 20**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
SYSA	Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	<ul style="list-style-type: none"> Given a system, identify subsystems and a larger encompassing system 	SG pp 200-213 Inquiry 20.1	Aligned with modifications (see comments)	Students are asked to build sections of a roller coaster. When sections are placed together, an opportunity is presented for students to see their section as a subsystem of a larger complete system.
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.	<ul style="list-style-type: none"> 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 to electrical energy in a battery, electrical to light energy in a bulb). 	SG p 200 Introduction	Aligned with modifications (see comments)	The lesson is an integral part of a learning progression.

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 21**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
SYSA	Any system may be thought of as containing subsystems and as being a subsystem of a larger system.	<ul style="list-style-type: none"> Given a system, identify subsystems and a larger encompassing system 	SG pp 218-219 Inquiry 21.1 & 21.2	Aligned with modifications (see comments)	Teachers need to emphasize that the car and track are both subsystems that operate together to create a larger system.
INQB	Different kinds of questions suggest different kinds of scientific investigations.	<ul style="list-style-type: none"> 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, 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. 	SG pp 218-219 Inquiry 21.1 & 21.2	Aligned as designed	
INQC	Collecting, analyzing, and displaying data are essential aspects of all investigations.	<ul style="list-style-type: none"> Communicate results using pictures, tables, charts, diagrams, graphic displays, and text that are clear, accurate, and informative. Recognize and interpret patterns – as well as variations from previously learned or observed patterns – in data, diagrams, symbols, and words. Use statistical procedures (e.g., median, mean, or mode) to analyze data and make inferences about relationships. 	SG pp 218-219 Inquiry 21.1 & 21.2	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 21**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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"> • 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. 	SG pp 218-219 Inquiry 21.1 & 21.2	Aligned as designed	
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> • Describe how a technology has changed over time in response to societal challenges. 	SG pp 220-221 Reading Twists, Turns, and Loops	Aligned as designed	
PS1A	Average speed is defined as the distance traveled in a given period of time.	<ul style="list-style-type: none"> • 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. 	SG pp 218-219 Inquiry 21.1 & 21.2; SG pp 222-225 Reading Isaac Newton Goes Skiing	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 21**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
PS1B	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"> • Demonstrate and explain the frictional force acting on an object with the use of a physical model. 	SG pp 218-219 Inquiry 21.1 & 21.2; SG pp 222-225 Reading Isaac Newton Goes Skiing	Aligned as designed	
PS1C	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"> • 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. 	SG pp 218-219 Inquiry 21.1 & 21.2; SG pp 222-225 Reading Isaac Newton Goes Skiing	Aligned as designed	
PS1D	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"> • Given two different masses that receive the same unbalanced force, predict which will move more quickly. 	SG pp 222-225 Reading Isaac Newton Goes Skiing	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 21**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
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.	<ul style="list-style-type: none"> • 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 to electrical energy in a battery, electrical to light energy in a bulb). 	SG pp 216-217 Reading Potential and Kinetic Energy; SG pp 218-219 Inquiry 21.1 & 21.2; SG pp 220-221 Reading Twists, Turns, and Loops; SG pp 222-225 Reading Isaac Newton Goes Skiing	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 22**

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"> • 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. 	SG pp 226-227 Inquiry 22.1	Aligned as designed	The Anchor Activity contains multiple opportunities for student involvement. Students may choose to engage in a research project or developing a model through the design process and will cover multiple learning standards with this ongoing lesson.
APPA	People have always used technology to solve problems. Advances in human civilization are linked to advances in technology.	<ul style="list-style-type: none"> • Describe how a technology has changed over time in response to societal challenges. 	SG pp 228-230 Reading Unusual Inventions; SG pp 231-233 Reading Building a Better Bicycle Rack the Man Behind Patent Number 3,847,317	Aligned as designed	
APPD	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"> • Define a problem that can be solved by technological design and identify criteria for success. • Research how others solved similar problems. • Brainstorm different solutions. 	SG pp 231-233 Reading Building a Better Bicycle Rack the Man Behind Patent Number 3,847,317	Aligned as designed	

**Alignment of Washington 6-8 Science Standards with
STC/MS Energy, Machines, & Motion ~ Lesson 22**

Standard	Content Standard	Performance Expectation	Evidence of Alignment	Alignment	Alignment Comments
APPE	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"> • Collaborate with other students to generate creative solutions to a problem, and apply methods for making tradeoffs to choose the best solution. 	SG pp 231-233 Reading Building a Better Bicycle Rack the Man Behind Patent Number 3,847,317	Aligned with modifications (see comments)	Teachers need to emphasize the idea that Bob Burruss acted as both a scientist and an engineer in his invention.
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.	<ul style="list-style-type: none"> • Test the best solution by building a model or other representation and using it with the intended audience. Redesign as necessary. • Present the recommended design using models or drawings and an engaging presentation. 	SG pp 231-233 Reading Building a Better Bicycle Rack the Man Behind Patent Number 3,847,317	Aligned as designed	