

Pushing the Envelope			
2006 Science			
Grade Level Expectations			
Delaware Science			
Grade 5			
Activity/Lesson	State	Standards	
Types of Engines (pgs. 11-23)	DE	SCI.5.1.1.19	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Use rulers, meter sticks, tapes, and watches to measure the distance objects travel in a given period of time and how much time it takes for an object to travel a certain distance. Organize the measurements in tables, and construct graphs based on the measurements. Reach qualitative conclusions about the speeds of the objects (faster versus slower).
Physics and Math (pgs. 43-63)	DE	SCI.5.1.1.20	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Demonstrate and explain how forces of different sizes and directions can produce different kinds of changes in the motion of an object.
Physics and Math (pgs. 43-63)	DE	SCI.5.3.2.2	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Demonstrate and explain how forces of different sizes and directions can produce different kinds of changes in the motion of an object.
Rocket Activity (pgs. 69-75)	DE	SCI.5.1.1.20	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Demonstrate and explain how forces of different sizes and directions can produce different kinds of changes in the motion of an object.

Rocket Activity (pgs. 69-75)	DE	SCI.5.3.2.2	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Demonstrate and explain how forces of different sizes and directions can produce different kinds of changes in the motion of an object.
Pushing the Envelope			
2006 Science			
Grade Level Expectations			
Delaware Science			
Grade 6			
Activity/Lesson	State	Standards	
Types of Engines (pgs. 11-23)	DE	SCI.6.1.1.11	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Describe how the speed of an object depends on the distance traveled and the travel time. Explain how the motion of an object can be described by its position, speed, and direction of motion.
Types of Engines (pgs. 11-23)	DE	SCI.6.1.1.15	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Conduct investigations and describe how a force can be directed to increase the speed of an object, decrease the speed of the object or change the direction in which the object moves.
Physics and Math (pgs. 43-63)	DE	SCI.6.1.1.12	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Give examples of objects at rest, and identify the forces that act on an object while it remains at rest (gravity, supportive forces, friction, other pushing or pulling forces). Explain that if the object is not moving, it must have at least two forces acting on it that are balanced.

Physics and Math (pgs. 43-63)	DE	SCI.6.1.1.13	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Give examples of moving objects and identify the forces that act on these objects. Select examples where only one force acts on the object and examples where two or more forces act on the object. Explain that unbalanced forces acting on an object will change its speed, direction of motion or both.
Physics and Math (pgs. 43-63)	DE	SCI.6.1.1.14	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Conduct investigations to describe how the relative directions of forces simultaneously acting on an object (reinforce or cancel each other) will determine how strongly the combination of these forces influences the motion of the object.
Physics and Math (pgs. 43-63)	DE	SCI.6.1.1.15	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Conduct investigations and describe how a force can be directed to increase the speed of an object, decrease the speed of the object or change the direction in which the object moves.
Physics and Math (pgs. 43-63)	DE	SCI.6.1.1.17	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Explain that the transfer of energy from one object to another is caused by the exertion of a force. Use the size of the force and the distance over which the force acts to compare how much energy is transferred into a simple machine to how much energy is transferred out of a simple machine.

Physics and Math (pgs. 43-63)	DE	SCI.6.3.2.12	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Explain that an object that feels the effects of balanced forces may be at rest or may be moving in a straight line with a speed that does not change.
Rocket Activity (pgs. 69-75)	DE	SCI.6.1.1.13	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Give examples of moving objects and identify the forces that act on these objects. Select examples where only one force acts on the object and examples where two or more forces act on the object. Explain that unbalanced forces acting on an object will change its speed, direction of motion or both.
Rocket Activity (pgs. 69-75)	DE	SCI.6.1.1.14	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Conduct investigations to describe how the relative directions of forces simultaneously acting on an object (reinforce or cancel each other) will determine how strongly the combination of these forces influences the motion of the object.
Rocket Activity (pgs. 69-75)	DE	SCI.6.1.1.15	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Conduct investigations and describe how a force can be directed to increase the speed of an object, decrease the speed of the object or change the direction in which the object moves.

Rocket Activity (pgs. 69-75)	DE	SCI.6.1.1.16	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Conduct investigations using simple machines to demonstrate how forces transfer energy. Explain that simple machine may change the direction of an applied force (directional advantage) or the size of the force that is applied (mechanical advantage) but that the amount of energy transferred by the simple machine is equal to the amount of energy transferred to the simple machine.
Rocket Activity (pgs. 69-75)	DE	SCI.6.1.1.17	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Explain that the transfer of energy from one object to another is caused by the exertion of a force. Use the size of the force and the distance over which the force acts to compare how much energy is transferred into a simple machine to how much energy is transferred out of a simple machine.
Rocket Activity (pgs. 69-75)	DE	SCI.6.3.2.9	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Give examples of moving objects and identify the forces that act on these objects. Select examples where only one force acts on the object and examples where two or more forces act on the object. Explain that unbalanced forces acting on an object will change its speed, direction of motion, or both.
Rocket Activity (pgs. 69-75)	DE	SCI.6.3.2.10	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Conduct investigations to describe how the relative directions of forces simultaneously acting on an object (reinforce or cancel each other) will determine how strongly the combination of these forces influences the motion of the object.

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2006 Science			
Grade Level Expectations			
Delaware Science			
Grade 8			
Activity/Lesson	State	Standards	
Types of Engines (pgs. 11-23)	DE	SCI.8.3.1.1	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Explain that kinetic energy is the energy an object has because of its motion and identify that kinetic energy depends upon the object's speed and mass.
Physics and Math (pgs. 43-63)	DE	SCI.8.1.1.19	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Explain that the transfer of energy from one object to another is caused by the exertion of a force. Create an energy chain to show how forces can change the mechanical energy of an object. Describe how the distance over which the forces act will influence the amount of energy transferred (and when appropriate, the amount of energy transformed).
Physics and Math (pgs. 43-63)	DE	SCI.8.3.2.2	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Explain that the transfer of energy from one object to another is caused by the exertion of a force. Create an energy chain to show how forces can change the mechanical energy of an object. Describe how the distance over which the forces act will influence the amount of energy transferred (and when appropriate, the amount of energy transformed).

Rocket Activity (pgs. 69-75)	DE	SCI.8.1.1.19	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Explain that the transfer of energy from one object to another is caused by the exertion of a force. Create an energy chain to show how forces can change the mechanical energy of an object. Describe how the distance over which the forces act will influence the amount of energy transferred (and when appropriate, the amount of energy transformed).
Rocket Activity (pgs. 69-75)	DE	SCI.8.3.2.2	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Explain that the transfer of energy from one object to another is caused by the exertion of a force. Create an energy chain to show how forces can change the mechanical energy of an object. Describe how the distance over which the forces act will influence the amount of energy transferred (and when appropriate, the amount of energy transformed).
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2006 Science			
Grade Level Expectations			
Delaware Science			
Grade 9			
Activity/Lesson	State	Standards	
Types of Engines (pgs. 11-23)	DE	SCI.9.1.1.27	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Conduct investigations involving moving objects to examine the influence that the mass and the speed have on the kinetic energy of the object. Collect and graph data that supports that the kinetic energy depends linearly upon the mass, but nonlinearly upon the speed.

Types of Engines (pgs. 11-23)	DE	SCI.9.1.1.28	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Recognize that the kinetic energy of an object depends on the square of its speed, and that $KE = \frac{1}{2} mv^2$.
Types of Engines (pgs. 11-23)	DE	SCI.9.3.2.15	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Recognize that power is a quantity that tells us how quickly energy is transferred to an object or transferred away from the object. Give examples that illustrate the differences between power, force and energy (for example, the energy needed to propel a vehicle is stored in the chemical energy of the fuel. Static friction is the force that propels the vehicle, and the power of the vehicle's engine helps to determine how quickly the vehicle can speed up and how quickly its engine uses fuel!).
Chemistry (pgs. 25-41)	DE	SCI.9.1.1.9	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Classify various common materials as an element, compound or mixture.
Chemistry (pgs. 25-41)	DE	SCI.9.1.1.25	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Balance simple chemical equations and explain how these balanced chemical equations represent the conservation of matter.
Chemistry (pgs. 25-41)	DE	SCI.9.2.1.4	The structures of materials determine their properties. Students will be able to: Explain that elements are pure substances that cannot be separated by chemical or physical means. Recognize that compounds are pure substances that can be separated by chemical means into elements.

Chemistry (pgs. 25-41)	DE	SCI.9.2.1.18	The structures of materials determine their properties. Students will be able to: Apply the kinetic molecular theory to explain that a change in the energy of the particles may result in a temperature change or a change of phase (change in state).
Chemistry (pgs. 25-41)	DE	SCI.9.2.4.1	The structures of materials determine their properties. Students will be able to: Recognize that chemical changes alter the chemical composition of a substance forming one or more new substances. The new substance may be a solid, liquid, or gas.
Physics and Math (pgs. 43-63)	DE	SCI.9.1.1.37	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Describe the role that forces play when energy is transferred between interacting objects and explain how the amount of energy transferred can be calculated from measurable quantities.
Physics and Math (pgs. 43-63)	DE	SCI.9.1.1.38	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Identify that 'work' is the process by which a force transfers energy to an object, and use measured quantities to make calculations of the work done by forces ($W = \text{energy transferred} = F \cdot D$).
Physics and Math (pgs. 43-63)	DE	SCI.9.3.2.13	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Identify that "work" is the process by which a force transfers energy to an object, and use measured quantities to make calculations of the work done by forces ($W = \text{energy transferred} = F \cdot D$).

Physics and Math (pgs. 43-63)	DE	SCI.9.3.2.14	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Conduct investigations to determine what factors influence whether a force transfers energy to an object or away from the object, and how the direction of the force (relative to the direction of motion) influences the quantity of energy transferred by the force.
Rocket Activity (pgs. 69-75)	DE	SCI.9.1.1.37	Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Students will be able to: Describe the role that forces play when energy is transferred between interacting objects and explain how the amount of energy transferred can be calculated from measurable quantities.
Rocket Activity (pgs. 69-75)	DE	SCI.9.3.2.11	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Describe the role that forces play when energy is transferred between interacting objects and explain how the amount of energy transferred can be calculated from measurable quantities.
Rocket Activity (pgs. 69-75)	DE	SCI.9.3.2.12	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass and with energy fields (potential energy). Students will be able to: Give examples of common forces transferring energy to (or away from) objects. For example; a pulling force can transfer energy to an object (when the object is pulled along a floor), a pushing force can transfer energy away from an object (to slow its motion), and friction and air resistance always transfer kinetic energy away from moving objects.