Science
Unit 3: Force and Motion

Essential Understandings	▪ Force can change motion. ▪ Cultures have found different technological solutions to deal with needs or problems.
Essential Questions	▪ What forces can affect the motion of an object? ▪ How does weight affect the amount of force needed to move an object? ▪ What forces cause resistance? ▪ How do machines help us? ▪ What are some technological solutions to needs or problems that have been developed by ancient and modern cultures? (e.g., construction, clothing, agricultural tools and methods, computers). ▪ What are some examples of simple machines?
Essential Knowledge	▪ Machines help us do work. ▪ The six simple machines are lever, pulley, wheel and axle, screw, inclined plane and wedge. ▪ Mechanical, electrical, magnetic, friction and gravity are forces that can affect the motion of an object. ▪ Heavy objects require more force to move than lighter objects. ▪ Sliding, rolling and fluid friction are resistant forces. ▪ Inventors and scientists play an important role in finding technological solutions.
Vocabulary	▪ <u>Terms</u>: o work, distance, force, motion, load, resistance, technology, inventor, invention ▪ <u>Forces</u>: o energy, mechanical, electrical, magnetic, friction (sliding, rolling, fluid), gravity, inertia ▪ <u>Simple Machines</u>: o lever, pulley, wheel and axle, screw, inclined plane, wedge
Essential Skills	▪ Identify various types of forces (mechanical, electrical, magnetic, friction, gravity). ▪ Recognize different types of resistant forces (weight and friction). ▪ Create a table or graph to demonstrate how a simple machine can make work easier. ▪ Create a machine designed to solve a problem. Evaluate and present the effectiveness of the process and the product. ▪ Predict and use measurement to determine how distance is affected by size, weight, and speed.

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Related Maine Learning Results	Science A. Unifying Themes A3.Constancy and Change Students identify and represent basic patterns of change in the physical setting, the living environment, and the technological world. b. Make tables or graphs to represent changes. A4.Scale Students use mathematics to describe scale for man-made and natural things. a. Measure things to compare sizes, speeds, times, distances, and weights. B. The Skills and Traits of Scientific Inquiry and Technological Design B2.Skills and Traits of Technological Design Students use a design process, simple tools, and a variety of materials to solve a problem or create a product, recognizing the constraints that need to be considered. a. Identify and explain a simple design problem and a solution related to the problem. b. Propose a solution to a design problem that recognizes constraints including cost, materials, time, space, and safety. c. Use appropriate tools, materials, safe techniques, and quantitative measurements to implement a proposed solution to a design problem. d. Balance simple constraints in carrying out a proposed solution to a design problem. e. Evaluate their own design results, as well as those of others, using established criteria. f. Modify designs based on results of evaluations. g. Present the design problem, process, and design or solution using oral, written, and/or pictorial means of communication. C. The Scientific and Technological Enterprise C2.Understandings About Science and Technology Students describe why people use science and technology and how scientists and engineers work. b. Describe how engineers seek solutions to problems through the design and production of products.

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Related Maine Learning Results	D. The Physical Setting D4. Force and Motion Students summarize how various forces affect the motion of objects. a. Predict the effect of a given force on the motion of an object. b. Describe how fast things move by how long it takes them to go a certain distance. d. Give examples of how gravity, magnets, and electrically charged materials push and pull objects.
Sample Lessons And Activities	▪ Locate examples of simple machines in the real world. ▪ Design an experiment to show how force affects motion (ex. a block sliding over sandpaper vs. a smooth surface). ▪ Select a scientist and describe how he/she used a simple machine to contribute to our society. ▪ Create a simple machine.
Sample Classroom Assessment Methods	▪ Make a diagram showing how force can change the motion of an object. ▪ Design, plan and build an invention that helps solve a problem.
Sample Resources	▪ Publications: ○ Gear Up - Keith Good ○ Inclined Planes and Wedges - Sally Walker ○ Machines and How they Work - Harvey Weiss ○ Movement - Brenda Walpole ○ Pulleys - Sally Walker ○ Simple Machines - Deborah Hodge ○ Simple Machines - Anne Horvatic ○ Simple Machines - Fran Whittle ○ So You Think You Want To Be An Inventor - Judith St. George ○ Wheels and Axles - Sally Walker ▪ Videos: ○ All About Simple Machines ○ Friction and Simple Machines ○ Simple Machines a First Look