

Brunswick School Department
Grade 4
Force and Motion

Essential Understandings	<ul style="list-style-type: none"> ▪ Force can change motion. ▪ Cultures have found different technological solutions to deal with needs or problems.
Essential Questions	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ <u>Terms</u>: <ul style="list-style-type: none"> ○ work, distance, force, motion, load, resistance, technology, inventor, invention ▪ <u>Forces</u>: <ul style="list-style-type: none"> ○ energy, mechanical, electrical, magnetic, friction (sliding, rolling, fluid), gravity, inertia ▪ <u>Simple Machines</u>: <ul style="list-style-type: none"> ○ lever, pulley, wheel and axle, screw, inclined plane, wedge
Essential Skills	<ul style="list-style-type: none"> ▪ 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	<p><u>Science</u></p> <p>A. Unifying Themes</p> <p>A3.Constancy and Change Students identify and represent basic patterns of change in the physical setting, the living environment, and the technological world.</p> <p>b. Make tables or graphs to represent changes.</p> <p>A4.Scale Students use mathematics to describe scale for man-made and natural things.</p> <p>a. Measure things to compare sizes, speeds, times, distances, and weights.</p> <p>B. The Skills and Traits of Scientific Inquiry and Technological Design</p> <p>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.</p> <p>a. Identify and explain a simple design problem and a solution related to the problem.</p> <p>b. Propose a solution to a design problem that recognizes constraints including cost, materials, time, space, and safety.</p> <p>c. Use appropriate tools, materials, safe techniques, and quantitative measurements to implement a proposed solution to a design problem.</p> <p>d. Balance simple constraints in carrying out a proposed solution to a design problem.</p> <p>e. Evaluate their own design results, as well as those of others, using established criteria.</p> <p>f. Modify designs based on results of evaluations.</p> <p>g. Present the design problem, process, and design or solution using oral, written, and/or pictorial means of communication.</p> <p>C. The Scientific and Technological Enterprise</p> <p>C2.Understandings About Science and Technology Students describe why people use science and technology and how scientists and engineers work.</p> <p>b. Describe how engineers seek solutions to problems through the design and production of products.</p>
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<p style="text-align: center;">Related Maine Learning Results</p>	<p>D. The Physical Setting D4. Force and Motion Students summarize how various forces affect the motion of objects.</p> <ol style="list-style-type: none"> 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.
<p style="text-align: center;">Sample Lessons And Activities</p>	<ul style="list-style-type: none"> ▪ 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.
<p style="text-align: center;">Sample Classroom Assessment Methods</p>	<ul style="list-style-type: none"> ▪ Make a diagram showing how force can change the motion of an object. ▪ Design, plan and build an invention that helps solve a problem.
<p style="text-align: center;">Sample Resources</p>	<ul style="list-style-type: none"> ▪ <u>Publications:</u> <ul style="list-style-type: none"> ○ <u>Gear Up</u> - Keith Good ○ <u>Inclined Planes and Wedges</u> - Sally Walker ○ <u>Machines and How they Work</u> - Harvey Weiss ○ <u>Movement</u> - Brenda Walpole ○ <u>Pulleys</u> - Sally Walker ○ <u>Simple Machines</u> - Deborah Hodge ○ <u>Simple Machines</u> - Anne Horvatic ○ <u>Simple Machines</u> - Fran Whittle ○ <u>So You Think You Want To Be An Inventor</u> - Judith St. George ○ <u>Wheels and Axles</u> - Sally Walker ▪ <u>Videos:</u> <ul style="list-style-type: none"> ○ <u>All About Simple Machines</u> ○ <u>Friction and Simple Machines</u> ○ <u>Simple Machines a First Look</u>