Science
Unit 5: Physics Challenges

Essential Understandings	▪ Materials and design affect how objects travel. ▪ Design is important to the building process. ▪ Leverage is a key component of many building designs.
Essential Questions	▪ What materials and designs positively affect a product and why? ▪ Why is a detailed design important to the building process? ▪ How can leverage be used to improve a product?
Essential Knowledge	▪ Certain materials and/or designs affect the efficiency of a product. ▪ Incomplete designs can negatively affect a product. ▪ Leverage can be tested and modified to improve the performance of a product.
Vocabulary	▪ <u>Terms</u>: ○ pulley, simple and compound machines, friction, fulcrum (pivot), force, levers (three types), load, mechanical advantage.
Essential Skills	▪ Identify materials and designs that work. ▪ Recognize when modifications are needed. ▪ Create detailed designs and follow the plans. ▪ Identify appropriate leverage to improve product performance.
Related Maine Learning Results	<u>Science</u> B. The Skills and Traits of Scientific Inquiry and Technological Design B2. Skills and Traits of Technological Design Students use a systematic process, tools, equipment, and a variety of materials to design and produce a solution or product to meet a specified need, using established criteria. a. Identify appropriate problems for technological design. b. Design a solution or product. c. Communicate a proposed design using drawings and simple models. d. Implement a proposed design. e. Evaluate a completed design or product. f. Suggest improvements for their own and others' designs and try out proposed modifications. g. Explain the design process including the solution design, implementation, and evaluation.
Sample Lessons And Activities	▪ Design and build mousetrap cars to demonstrate energy forms and conversion and to describe motion mathematically. ▪ Design and build marshmallow catapults, identifying the proper lever class. ▪ Design and build a bridge.
Sample Classroom Assessment Methods	▪ Test and record the distance and accuracy a mousetrap car travels along a roadway. ▪ Test and record the distance a catapult throws a marshmallow. ▪ Test and record the strength of bridges using different materials

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	and different designs.

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Sample Resources	▪ Publications: ○ http://www.pbs.org/wgbh/nova/lostempires/trebuchet/destroy.html ○ http://www.pbs.org/wgbh/nova/lostempires/trebuchet/trebworks.html ○ http://www.forgefx.com/casestudies/prenticehall/ph/catapult/design-test-simulation.htm ○ http://www.pbs.org/wgbh/buildingbig/bridge/index.html ○ http://www.faculty.fairfield.edu/jmac/rs/bridges.htm ○ http://www.docfizzix.com/help.htm ○ http://www.hypography.com/hypography.cfm?id=103