



Unit 3: Simple Machines

Subject Area: STE	Course: Technology & Engineering		
Unit Title: Simple Machines	Grade(s): 4	Start: January	End: February
Unit Summary: In Unit 3, students use a spring scale to measure and learn about how different simple machines affect the amount or direction of force required to move a load. With some machines they are also able to observe the relationship between distance and force in doing work - the main trade-off related to simple machines.			

Stage 1: Desired Results

Massachusetts Learning Standards

- 3-PS2-1. Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object.
- 4.3-5-ETS1-5(MA). Evaluate relevant design features that must be considered in building a model or prototype of a solution to a given design problem.*
- 4.3-5-ETS1-3. Plan and carry out tests of one or more design features of a given model or prototype in which variables are controlled and failure points are considered to identify which features need to be improved. Apply the results of tests to redesign a model or prototype.*
- 5.3-5-ETS3-2(MA). Use sketches or drawings to show how each part of a product or device relates to other parts in the product or device.

Transfer (Authentic, relevant application of learning to new situations)

Students will be able to independently use their learning to...

- test simple machines, including a lever, an inclined plane, a pulley, a double pulley, and a cart with wheels and



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axles, using a spring scale to determine how much force is needed to move a standard load.

- observe if and how each simple machine changes the amount of force needed to move a standard load and comment on the ergonomics of each simple machine.

Meaning

Enduring Understandings

Students will understand that...

- observe and describe the performances of five different simple machines - a lever, an inclined plane, a pulley, a double pulley, and a wheel and axle for - moving a load.
- analyze the performances of five kinds of simple machines for moving a standard load.
- discuss the ergonomics of each simple machine as well as if and how each simple machines changes the direction of the applied force.
- analyze the trade-offs of using each simple machine in a given situation.

Essential Questions

Students will consider...

- How are science, engineering, and technology related?
- What do creativity and careful thinking have to do with engineering?
- How do engineers use science and math?

Acquisition

Knowledge

Students will know...

- the force needed to move an object can be measured (in units called Newtons) using a spring scale.
- different simple machines make work easier in

Skills

Students will be skilled at...

- observe and describe the performances of five different simple machines - a lever, an inclined plane, a pulley, a double pulley, and a wheel and axle - for moving a load.



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different ways.

- engineers conduct experiments, much as scientists do, to collect data that will help them design and improve technologies.

- analyze the performances of five kinds of simple machines for moving a standard load.
- discuss the ergonomics of each simple machine as well as if and how each simple machine changes the direction of the applied force.
- analyze the trade-offs of using each simple machine in a given situation.