

Energy, Work, & Simple Machines

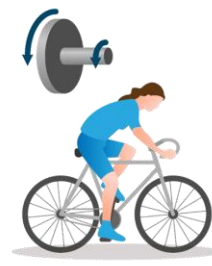
Section 5: Simple Machines



Pulley



Lever



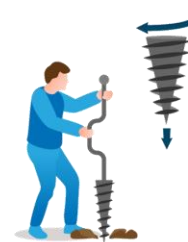
Wheel and Axle



Wedge



Inclined Plane



Screw

A **simple machine** is a machine that can do work in a single movement. Many machines are called **compound machines** since they are a combination of two or more simple machines.

A force is needed to move a heavy object from one location to another. The simplest machine for increasing force is the **lever**. A lever is a bar that is free to pivot around a fixed point called a fulcrum. It's often used to lift objects or to pry something loose. When you push one end down, the other end lifts the object.

There are three classes of levers, and the differences between them concern the location of the fulcrum as well as the input and output force. A first-class lever is when the fulcrum is between the input and output force. A see saw is an example of a first-class lever. A second-class lever can be seen in a wheelbarrow where the output force is between the fulcrum and the input force. Finally, a third-class lever is when the input force is between the fulcrum and the output force. A fishing rod is one example.

A **pulley** is a grooved wheel with a rope, chain, or cable running along the groove. A pulley changes a downward pull on one end into an upward pull at the other end. If you've ever put the blinds up or down in your home, you have used a pulley. A **fixed pulley** is attached to something that doesn't move. A **moveable pulley** is when one end of the rope is fixed and the other wheel is free to move. A **block and tackle** is a system of pulleys consisting of fixed and moveable pulleys.

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Section 5: Simple Machines Continued

A **wheel and axle** consists of an axle attached to the center of a larger wheel so that the wheel and axle rotate together. Both turn in the same direction around a single point like a steering wheel in a car. Force that is applied to the wheel turns the axle. An **inclined plane** is a sloping surface, such as a ramp, that reduces the amount of force necessary to do work. A **screw** is an inclined plane wrapped in a spiral around a cylindrical post. Its ridges or threads allow movement in a circular direction, providing a mechanical advantage. You use a screw to remove the lid from a jar of peanuts. A **wedge** is a piece of wood, metal, or another material that is thicker at one end than the other. A wedge is an inclined plane with one or two sloping sides. It changes the direction of the input force. Nails, chisels, and even our front teeth are all kinds of wedges.

Review:

1. What is a compound machine?
2. Identify the three classes of levers.
3. Give an example of an inclined plane.