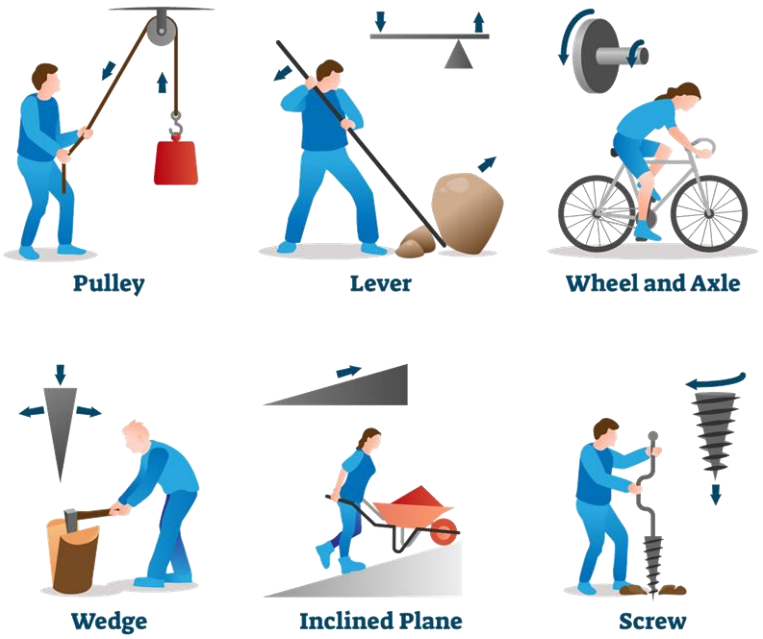
Energy, Work, & Simple Machines

Section 5: Simple Machines



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

A force is needed to move a heavy object from one location to another. The most straightforward machine for increasing power 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. You have used a pulley if you've ever put the blinds up or down in your home. 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 fixed and moveable pulleys.

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Section 5: Simple Machines Continued

Wheel and axles consist 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. The force that is applied to the wheel turns the axle. An **inclined plane** is a sloping surface, such as a ramp, that reduces the energy 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. For example, you use a screw to remove the lid from a jar of peanuts. A **wedge** is a piece of wood, metal, or material 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.