Simple Machines

Guide for Reading

- What are the six types of simple machines, and how are they used?
- What is the ideal mechanical advantage of each simple machine?
- What is a compound machine?

There are six basic types of simple machines: the inclined plane, the wedge, the screw, the lever, the wheel and axle, and the pulley.

An **inclined plane** is a flat, slanted surface. An inclined plane allows you to exert your input force over a longer distance. **You can determine the ideal mechanical advantage of an inclined plane by dividing the length of the incline by its height.**

A **wedge** is a device that is thick at one end and tapers to a thin edge at the other end. **The ideal mechanical advantage of a wedge is determined by dividing the length of the wedge by its width.**

A **screw** can be thought of as an inclined plane wrapped around a central cylinder, forming a spiral. This spiral inclined plane forms the threads of the screw. **The ideal mechanical advantage of a screw is the length around the threads divided by the length of the screw.**

A **lever** is a rigid bar that is free to pivot, or rotate, about a fixed point. The fixed point that a lever rotates around is called the **fulcrum**. **The ideal mechanical advantage of a lever is determined by dividing the distance from the fulcrum to the input force by the distance from the fulcrum to the output force.**

A **wheel and axle** is a simple machine made of two circular or cylindrical objects that are fastened together and that rotate about a common axis. The object with the larger diameter is called the wheel. The object with the smaller diameter is called the axle. **You can find the ideal mechanical advantage of a wheel and axle by dividing the radius of the wheel by the radius of the axle.**

A **pulley** consists of a rope or cable that is wrapped around a grooved wheel. A pulley that you attach to a structure is called a fixed pulley. If you attach a pulley to the object you wish to move, you are using a moveable pulley. Several pulleys can be combined to make a pulley system, or "block and tackle." **The ideal mechanical advantage of a pulley is equal to the number of sections of rope that support the object.**

More complex machines consist of combinations of simple machines. A machine that utilizes two or more simple machines is called a **compound machine. The ideal mechanical advantage of a compound machine is the product of the individual ideal mechanical advantages of the simple machines that make it up.**