

Name _____ Date _____ Class _____

What are the six types of simple machines?

Guide for Reading

Simple Machines

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 multiplies your input force by allowing you to exert it 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. You can increase the efficiency of an inclined plane by decreasing friction. A wedge is a device that is thick at one end and tapers to a thin edge at the other end. For a wedge, the ideal mechanical advantage is equal to the length of the wedge divided by its width at the thick end. 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 equal to the circumference of the top of the screw divided by the distance between the threads.

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. You can calculate the ideal mechanical advantage of a lever as the distance from the fulcrum to the input force divided 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 larger object is called the wheel and the smaller object is called the axle. You can calculate the ideal mechanical advantage of a wheel and axle as the radius of the wheel divided by the radius of the axle.

A pulley consists of a rope or chain 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 system 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. For example, a mechanical pencil sharpener uses a system of gears, which turn the cutting wheels. Gears are toothed wheels that fit into one another. Gears form a compound machine with one wheel and axle linked to another wheel and axle.