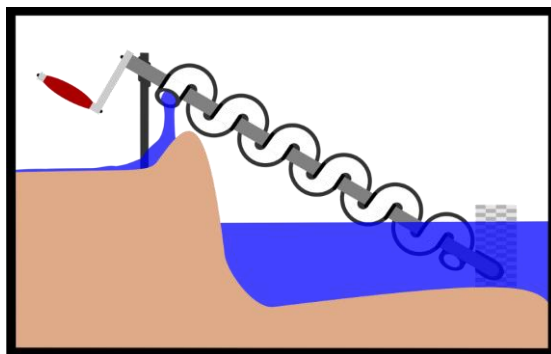


## SIMPLE MACHINES

Work, work, work! Most people do some kind of work every day. In physics, **work** is defined as a force acting on an object to move it over a distance. Scientists use a formula to describe this:

$$\text{Force} \times \text{Distance} \div \text{Time} = \text{Work}$$

Simple machines are devices used by humans, and even some animals, that make work easier. They change the direction of a force or the amount of force needed to move something. These devices have been used for centuries. The ancient Egyptians are thought to have used levers, ramps, and pulleys to build the Pyramids. An ancient Greek scientist named Archimedes invented the Archimedes screw (see image below) to help lift water in about 250 BC!

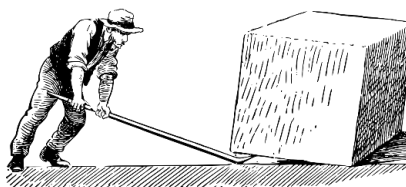


The six types of simple machines are:

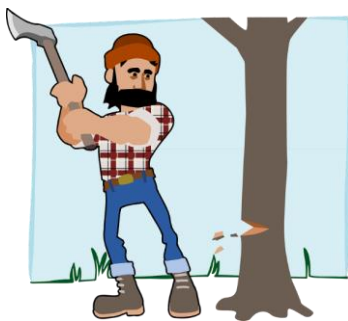
- **Pulley:** A pulley uses a wheel and some kind of rope, cord or belt. The rope is looped over the wheel. One end of the rope goes around the load; a person pulls on the other end. It is used to pull things up or lower them. One example of a pulley is the rope that lifts a bucket of water out of a well.



- **Lever:** A lever uses a long rigid object to help lift something. It is often used with a **fulcrum**, or turning point, to brace that long tool. One example of a lever is a teeter-totter.



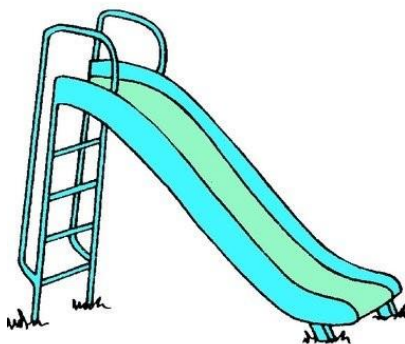
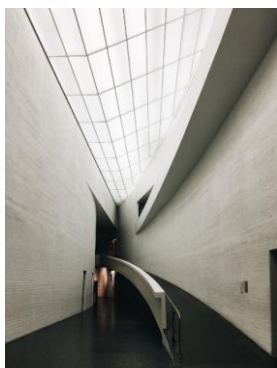
- **Wedge:** A wedge is a tool used to push two things apart. It has a pointed end that can be driven into something. Axes and nails are some examples of wedges.



- **Wheel and Axle:** A wheel with a rod or axle running through it makes up this simple machine. This makes work easier as it helps move objects across a distance. You can see these on cars, bicycles, and in the picture of the wagon below.



- **Inclined Plane:** Another name for an inclined plane is a ramp. Inclined planes make it easier to move something from a lower surface to a higher one, and visa-versa. Examples include wheelchair ramps and ramps to get things in and out of trucks.



- **Screw:** Another way to think about a screw is a twisted inclined plane, or an inclined plane wrapped around a cylinder. A screw can be easily turned to move through something, like a piece of wood, so it helps do work. Some examples of screws that you might be familiar with are jar lids, and bottle caps. Some water faucets also use a screw mechanism.



**ACTIVITY: Simple Machines Scavenger Hunt**

During the next week, look around and see how many simple machines you can find! It should be easy; they are everywhere! For starters, try to find three of each, and then keep on going!

Pulley:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Lever:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Wedge:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Wheel & Axle:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Inclined Plane:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Screw:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

The next time you have some work to do, think about which of these simple machines can help to make your job easier!



## ADDITIONAL RESOURCES

### **Books available from the Washoe County Library**

[\*Castle Under Siege!: Simple Machines\*](#) by Andrew Solway

[\*Experiments with Simple Machines\*](#) by Salvatore Tocci

[\*How Pulleys Work\*](#) by Jim Mezzanotte

[\*How Ramps, Wedges, and Screws work\*](#) by Jim Mezzanotte

[\*Inclined Planes to the Rescue\*](#) by Sharon Thales

[\*Levers to the Rescue\*](#) by Sharon Thales

[\*Pulleys to the Rescue\*](#) by Sharon Thales

[\*Screws to the Rescue\*](#) by Sharon Thales

[\*Sensational Science Projects with Simple Machines\*](#) by Robert Gardner and Tom LaBaff

[\*Simple Machines\*](#) by Dana Meachen Rau

[\*Wedges to the Rescue\*](#) by Sharon Thales

[\*Wheels and Axles to the Rescue\*](#) by Sharon Thales

### Videos

Guinness World Records, "World's Largest Rube Goldberg Machine Lights Up Christmas Tree" (how many simple machines can you spot in this video?) <https://youtu.be/RBOqfLVCDv8>

Science Buddies, "How to Make an Archimedes Screw: STEM Activity" <https://youtu.be/PszGCm1PqSo>

SciShow Kids, "Super Simple Machines: Levers" <https://youtu.be/lueqE0lxLyc>

### Websites

LiveScience, 6 Simple Machines: Making Work Easier <https://www.livescience.com/49106-simple-machines.html>

PBS LearningMedia, Simple Machines –Science Trek  
<https://knpb.pbslearningmedia.org/resource/idptv11.sci.phys.maf.d4ksim/simple-machines/>

