

In science, a **force** is either a push or a pull. A scientist named Isaac Newton studied the way things work, and he discovered three laws related to motion. The first one says that an object at rest stays at rest, or an object in motion stays in motion, unless it's acted on by an outside force. That means if you have a ball sitting on the floor, it will never move unless it is acted on by an outside force. It also means if you roll a ball, it will continue rolling forever or until it's acted on by an outside force.



That may not seem true, because we all know that if you roll a ball across the floor, even if the floor is clear and nothing is in the ball's way, it will eventually slow down and come to a stop. Or, if you have a ball on a slanted floor, it can roll down the slant even if no one touches it. So how can Newton's law be true?

Force

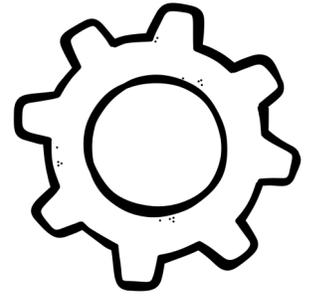
Newton's law is true because of two forces that we can't see but that affect everything in the world we live in. These two forces are **friction** and **gravity**.

Friction happens when two objects rub against each other. When you roll a ball on the floor, the surface of the ball rubs against the surface of the floor. The friction between them slows the ball down until it eventually stops. Think of it this way. If you have to push a big, heavy box across the floor, it's very hard. You know it would be hard to lift the box because it's heavy, but why is it hard to simply push the box? The answer is friction. The friction between the box and the floor makes it harder for you to make the box move.



Friction

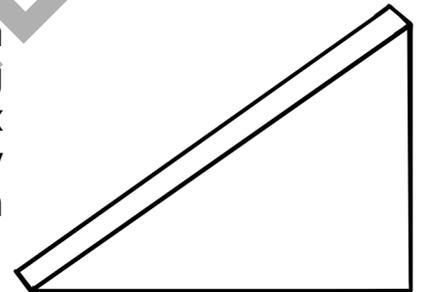
You can probably think of lots more machines, but let's think about what they are made up of. I don't mean just the gears and hinges and things like that. Those are parts of a machine. I mean the principles the machine uses to get the job done. What do I mean by principles? Let's find out!



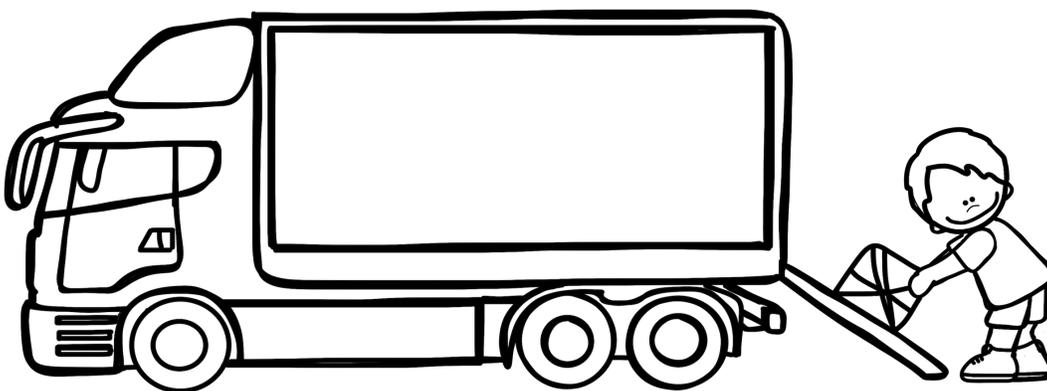
Most of the machines we use every day are called complex machines. A complex machine is made up of one or more **simple machines**. The simple machines are what I mean by the principles of how complex machines work. There are six different types of simple machines. They are the inclined plane, the wheel and axle, the lever, the wedge, the pulley, and the screw. We'll start with the inclined plane.

Simple machines

An **inclined plane** is a ramp. It doesn't look like a machine that does something, but it can make moving things a LOT easier! Imagine you had a really heavy box you have to put in the back of a big truck. There's no way you can lift it high enough to get it in the truck. How can you get it there?

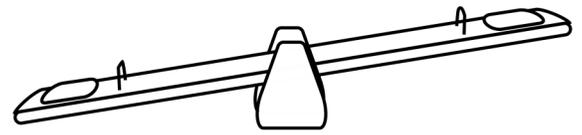


If you use an inclined plane, you could slide the box up into the truck. You would have to move the box farther, but it would be easier to do because the inclined plane is helping you do the job.

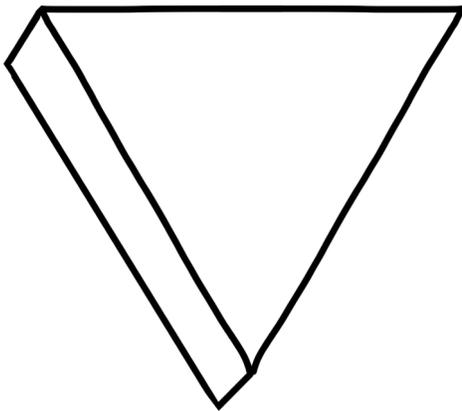


Inclined plane

A **lever** is another kind of simple machine. We use it when we want to turn downward force into upward force. If you want to lift your friend, you probably can't just pick him or her up (and it's not a good idea to try, because one or both of you could get hurt!). But if your friend was sitting on one end of a seesaw, and you sat down on the other end, the force of you pushing the seesaw down would lift your friend up. The seesaw is a lever.



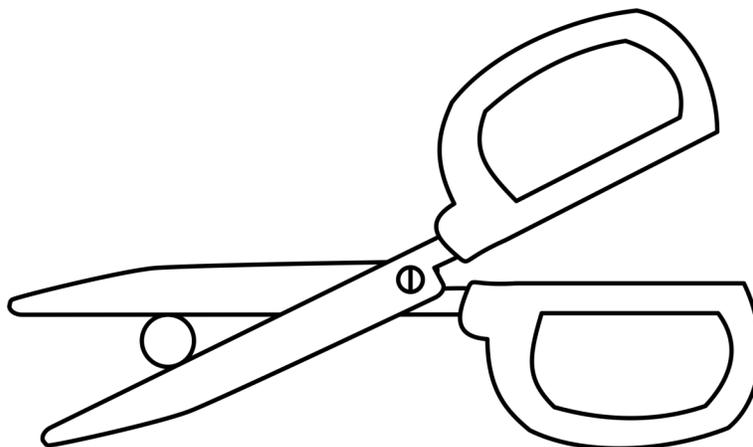
L E V E R



The job of a **wedge** is to split things apart. If you push down on a wedge and push it into something else, the wedge can split the object apart. If you put a knife into a stick of butter, you push down on the knife, but the butter moves apart, to the right and the left. If you are chopping wood, it's easier if you put a wedge of wood on top of the log you need to chop. When you hit the wedge with an axe, it forces the log to split apart.

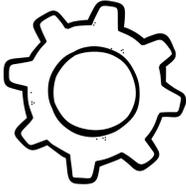
W E D G E S

A pair of scissors are levers and wedges working together. The wedges are the blades of the scissors. When you cut into a piece of paper, the blades move up and down, but the wedges push the paper apart to the left and right. Pushing down on one handle moves one blade up, and pushing up on the other handle pulls the other blade down, because they are levers. By working together, these simple machines make a more complex machine that makes our lives easier.



Review

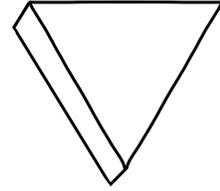
Which simple machine has the job of splitting things apart? Draw a circle around it.



Gear



Pulley



Wedge

What word describes the way an object is going? Draw a circle around it.



Direction

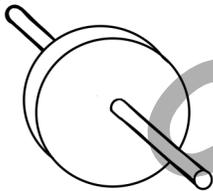


Force

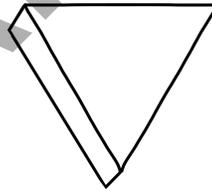


Gravity

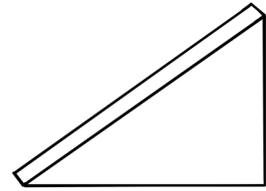
Which of the following is the simple machine that has the job of splitting things apart? Draw a circle around it.



Wheel and Axle



Wedge

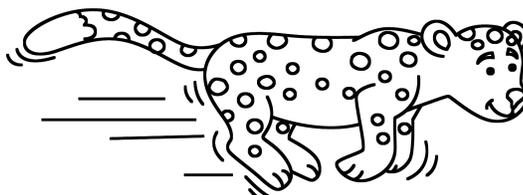


Inclined Plane

What is the name of the force that causes things to fall to earth? Draw a circle around it.



Pull

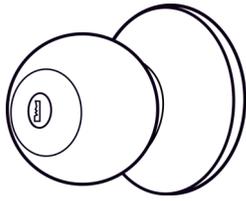


Speed

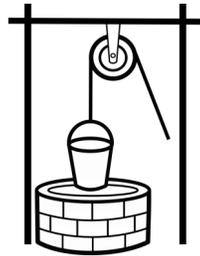


Gravity

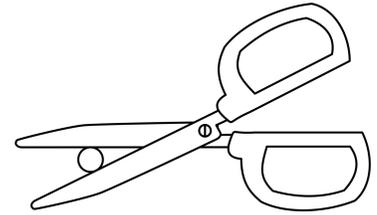
Which machine uses a pulley? Draw a circle around it.



Door knob



Well



Scissors

Which force is what happens when two objects rub against each other? Draw a circle around it.



Push

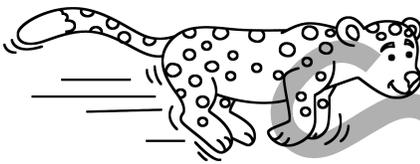


Pull



Friction

What is the word for the distance an object moves in a certain amount of time? Draw a circle around it.



Speed

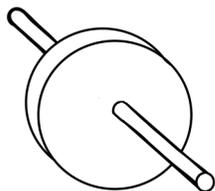


Friction

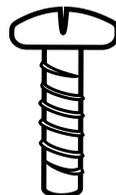


Gravity

Which of the following is a special kind of inclined plane? Draw a circle around it.



Wheel and axle



Screw



Pulley