

## Motion and Speed

- Motion is movement. It describes the speed and direction of an object.
- Motion can be described as up, down, forward or backward, for example.
- Speed is the distance an object moves in a certain amount of time.
- You can measure the speed of an object if you know two things:
  1. distance traveled
  2. time spent moving

**distance traveled ÷ time spent moving = speed**

## Force and Gravity

Force: any push or pull that can change the motion of an object (make an object start moving, stop moving, speed up, slow down or change directions).

**The more massive an object,  
the harder it is  
to force it to move.**

*To put it simply: An enormous elephant will not be moved by a fourth grader even if the student pushes with all of his or her strength.*



**The greater the force,  
the greater  
the change in motion will be.**

*To put it simply: If an enormous elephant pushes a fourth grader, that student is going to go flying!*

Forces can be big (crane lifting a truck) or small (feather floating to the ground). A large force will cause a large change in speed or direction. A small force will cause a small change.

Gravity: the pulling force between two objects

Gravity pulls things towards Earth's surface. Imagine that you are hanging from the monkey bars on the playground. What happens when you let go??

you fall to the ground

## Friction and Inertia

friction \_\_\_\_\_: a force that brings objects to a stop

Friction works against motion. It acts between surfaces of objects that touch or rub against each other, slowing the object or stopping it from moving.

How much friction is at work depends upon the objects. For example, there is a great deal of friction between a cardboard box rubbing along a sidewalk. There is less friction between the blade of an ice skate and an icy surface.

inertia \_\_\_\_\_: Says that a moving object will continue to move until a force is applied to it and an object that is still will not start to move unless a force acts upon it.



A skate board placed on the floor will not start moving unless you push it. It won't turn, speed up or slow down unless a force acts upon it. The skateboard has inertia.

\*an object in motion \_\_\_\_\_ will **stay** in motion and an object at rest \_\_\_\_\_ will **stay** at rest\*

## Energy

- In science, energy is the ability to do work.
- Work is the use of a force to move an object.
- Energy is needed to apply a force to an object to make it move.
- force is any push or pull that can change the motion of an object (make an object start moving, stop moving, speed up, slow down or change directions).
- Two things are always part of work: energy and force (moving an object over a distance).

## Kinetic

Energy: **This is the energy of motion.** It is the energy an object has because it is moving. A rolling ball, a swinging hammer and a moving bulldozer all have energy because they are moving.

## Potential

Energy: **This is stored energy** that is waiting to be used, giving an object the future ability to do work. A ball sitting at the top of a staircase and an apple hanging from a branch of a tree have potential energy.

## Changing

Energy: When the bow is stretched backward, the arrow has potential energy or stored energy. When the archer releases the bow and it begins to move its potential energy will become kinetic energy.

