

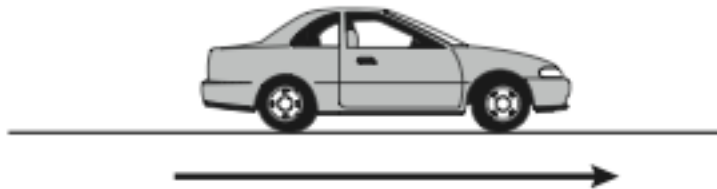
# Key Concepts

## Force, Motion, Energy, and Matter (SOL 4.2)

### Energy

- The position of an object can be described by locating it relative to another object or to the background.
- Tracing and measuring an object's position over time can describe its motion.
- **Speed** describes how fast an object is moving.
- Energy may exist in two states: **kinetic** or **potential**.
- **Kinetic energy** is the energy of motion.

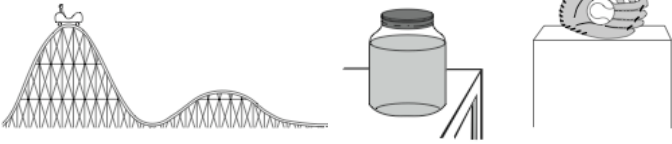
- A **force** is any push or pull that causes an object to move, stop, or change speed or direction.



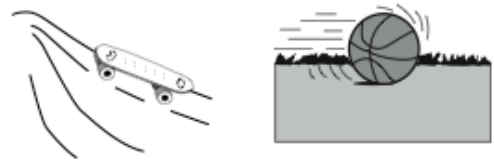
- The greater the force, the greater the change in motion will be. The more massive an object, the less effect a given force will have on the object.
- **Friction** is the resistance to motion created by two objects moving against each other. Friction creates heat.
- Unless acted on by a force, objects in motion tend to stay in motion, and objects at rest remain at rest. (Inertia)

# Potential and Kinetic Energy

## Potential Energy



## Kinetic Energy



When a roller coaster is stopped at the top of a hill, it has potential energy. **Potential energy** is the energy stored in an object because of its position. The roller coaster has the potential for motion when it is stopped at the top of a hill. As the roller coaster descends, its potential energy is converted to **kinetic energy**.

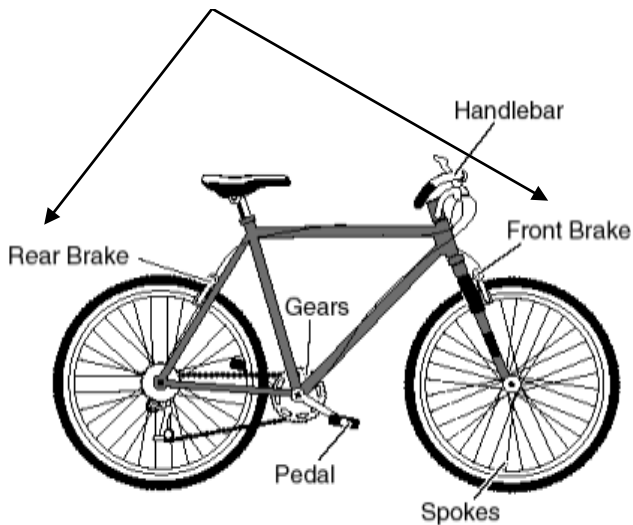


An object's energy may change form from kinetic energy to potential energy and back again:

- **Kinetic energy** - energy of motion
- **Potential energy** - stored energy

# Friction

## Friction Created Here

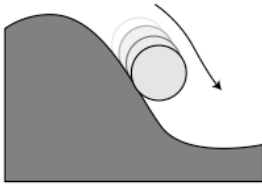


**Friction** is the resistance to motion created by two objects moving against each other. Friction creates heat. The brakes on this bike can create friction to help a bike slow down.



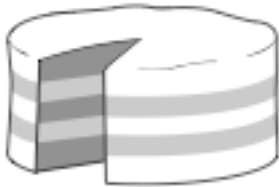
**Directions:** In the pictures below, identify if the objects have **potential** energy or **kinetic** energy.

1.



\_\_\_\_\_

2.



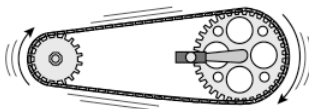
\_\_\_\_\_

3.



\_\_\_\_\_

4.



\_\_\_\_\_

5.



\_\_\_\_\_

6.



\_\_\_\_\_

7.



\_\_\_\_\_

8.



\_\_\_\_\_



**Directions:** Fill in the blanks using the word bank below.  
Some words may be used more than once.

*force*

*direction*

*kinetic*

*potential*

*speed*

*gravity*

*heat*

*friction*

*inertia*

1. If a car travels 100 miles in 2 hours, its average \_\_\_\_\_ is 50 miles per hour.
2. Rubbing your hands together creates \_\_\_\_\_ which makes your hands feel warm.
3. A \_\_\_\_\_ is a push or pull.
4. A moving school bus has more \_\_\_\_\_ than a moving bicycle because the school bus has more mass.
5. An object's motion can be described by its \_\_\_\_\_ and \_\_\_\_\_.
6. If the wind is moving an anemometer, then it has \_\_\_\_\_ energy.
7. \_\_\_\_\_ energy is stored energy.
8. Friction creates \_\_\_\_\_.
9. \_\_\_\_\_ is an unseen force that pulls two objects toward each other.
10. The brakes on a bike can create \_\_\_\_\_ to help the bike slow down or stop.