

# Motion

Standard 11 Objects move in ways that can be observed, described, predicted, and measured.

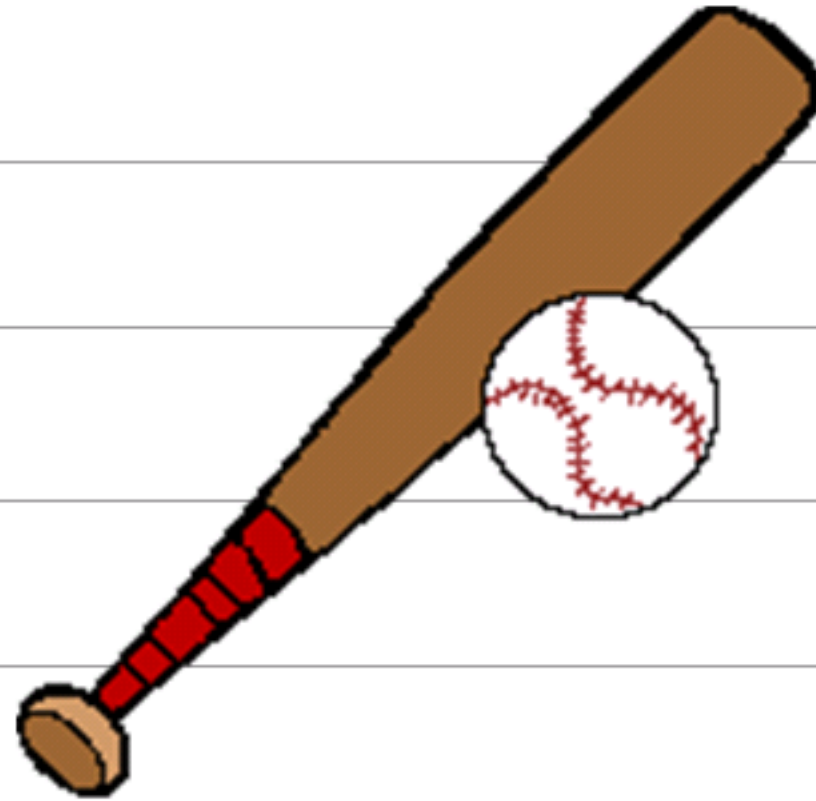
**0507.11.2** Prepare statements about the relationship among mass, applied force, and distance traveled.

# Forces in Action

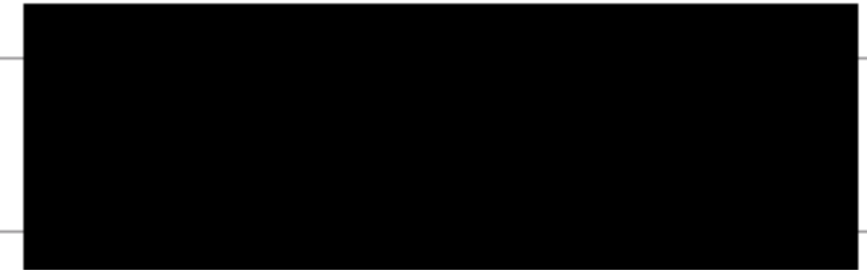


## Force

a push or pull acting on an object



What happens to this ball when the bat hits it?



Force can stop movement, begin movement, or make something change direction.



**Mass**  
the amount of  
matter in an object

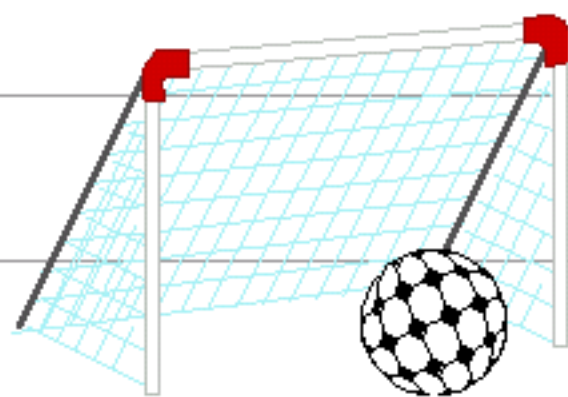


Which has more mass -  
the paddle or the ball?



## **Newton's First Law of Motion (also called the Principle of Inertia)**

**An object at rest will remain  
at rest unless a force acts on  
it.**



**This ball won't move until  
someone kicks it.**

**An object in motion will  
continue to move at a  
constant speed in the same  
direction if no forces act on it.**



**This dart will keep going in the  
same direction until it hits the  
target.**

## Newton's Second Law

This law states that a force on an object will cause it to accelerate in the direction of the force. The greater the force exerted on an object, the greater its acceleration. For any given force, the greater the mass of an object, the smaller its acceleration.

This is written as:

$$F = ma$$

Which would go faster - a baseball hit with a bat or a cannonball hit with a bat?



Of course, the baseball! This is an example of Newton's Second Law - for any given force, the greater the mass of the object, the smaller its acceleration.

When a force hits an object, it can \_\_\_\_\_ that object up or \_\_\_\_\_ it down. It can also cause it to \_\_\_\_\_ direction.

change

speed

slow

The greater (or stronger) the \_\_\_\_\_, the \_\_\_\_\_ the \_\_\_\_\_ in the direction of the object it hits.

greater

force

change

If the object has a greater \_\_\_\_\_, the force will not \_\_\_\_\_ it as much as an object with a \_\_\_\_\_ mass.

smaller

mass

change

**Think about a baseball game. What activities demonstrate Newton's Laws of Motion?**

