

Name \_\_\_\_\_  
Science 7

Date \_\_\_\_\_  
Chapter 2 Study Guide

- A force that causes an object to accelerate is unbalanced.
- When two forces act in the same direction, they add together.
- Mass can be measured by force.
- In order to determine speed, you must know time and distance.
- Gravity on Earth equals  $9.8\text{m/s}^2$ .
- The length of a straight line path between two points is the distance.
- Weight is mass times gravity.
- Weight is a force using a specific acceleration ( $9.8\text{ m/s}^2$  on Earth).
- The unit label for speed is meters per second.
- A carpenter hammering a nail is an example of exerting a force.
- Friction is the force that brakes use to stop a car.
- A push or a pull on an object is called force.
- Inertia is the resistance to change in motion.
- Acceleration is the change in velocity divided by the change in time.
- Bike tires on the road are an example of rolling friction.
- The speed of an object at rest is  $0\text{ m/s}$ .
- Average speed is calculated by dividing total distance by total time.
- The law concerning the tendency to stay in motion unless acted upon by an outside force is the Law of Inertia, (Newton's First Law)
- The standard unit of force is  $\text{kg}\cdot\text{m/s}^2$  and Newtons.
- The difference between speed and velocity is that velocity includes direction.
- The law concerning the tendency to remain at rest is Newton's First Law.

- The S.I. unit for speed is m/s.
- When you throw a ball your hand applies force to the ball.
- You can increase the momentum of an object by increasing its mass or its velocity.
- The laws of motion were discovered by Isaac Newton.
- The total momentum of a group of objects is conserved unless outside forces, such as friction, are acting upon them.
- Mass times acceleration equals force.
- For every action force, a reaction force occurs that is equal and opposite to the action force.
- Forces can be added together only if they are acting on the same object.
- Newton's Laws of Motion:
  - An object at rest or moving at a constant velocity in a straight path will continue to do so until acted upon by an outside force.
  - An object acted upon by a net force will accelerate in the direction of the force due to the amount of mass.
  - For every action there is an opposite and equal reaction.

## Chapter 2

### Formula Sheet

1. Speed = distance divided by time
- Unit label – meters per second (m/s)
  - $S = d/t$
  - Use the wheel



$$S = \frac{d}{t}$$

$$t = \frac{d}{S}$$

$$d = S \cdot t$$

2. Velocity = distance divided by time
- Unit label – meters per second (plus direction) (m/s + direction)
  - $V = d/t$
  - Use the wheel



$$V = \frac{d}{t} + \text{direction}$$

$$t = \frac{d}{V} + \text{direction}$$

$$d = V \cdot t$$

plus direction

3. Acceleration = change in velocity divided by time
- Unit label – meters per second squared ( $m/s^2$ )
  - $A = \frac{v_f - v_i}{t}$
  - Look for key words to help determine final velocity and initial velocity

4. Momentum = mass x velocity
- Unit label -  $kg \cdot m/s$  (+direction if possible)
  - $P = mv$
  - Use the wheel



$$P = m \cdot v$$

$$m = \frac{P}{v}$$

$$v = \frac{P}{m}$$

5. Force = mass x acceleration
- Unit label =  $kg \cdot m/s^2$  or N
  - $F = ma$
  - Use the wheel



$$f = m \cdot a$$

$$m = \frac{f}{a}$$

$$a = \frac{f}{m}$$

## Chapter 2 Forces—Review

### Test Thursday 10/28

You must be able to define:

#### Force:

- push or pull on an object
- label: SI Units is Newtons  
(Metric System Unit:  $1\text{N}=1\text{kg} \times \text{m}/\text{s}^2$ )
- Arrows Show a force's direction and magnitude called vectors
- Free Body Diagrams (FBD) to show forces acting on an object.  
Ex: boat

- Math formula for force:  $F=ma$   
\*(FEMA....Force Equals Mass times Acceleration)

When forces are balanced, is there motion?

-No

Friction is a type of force that opposes motion.

There are 4 types: (text page 45)

- 1) Sliding- sliding hands together—both objects move
- 2) Static- only 1 object moves—this friction over comes being stationary.
- 3) Rolling- roller skates
- 4) Fluid- anything that moves easily

#### Gravity:

- A force that pulls objects together.
- Gravity as we know it is the force between the Earth and the moon.

Know the difference between weight and mass: (possible essay question)

- \*Weight =  $mg$  (mass times the force of gravity)
- \*Mass – stuff that objects are made of.

### Newton's 3 Laws:

-Example 1: A seatbelt would demonstrate Newton's first law. An object in motion stays in motion OR an object in rest stays in rest unless they are acted upon by an outside force. (Inertia)

Example 2: Picture of a bowling ball weighing 8kg and a baseball that weighs 800 g. Their acceleration is the same. This would demonstrate Newton's second law. ( $F=ma$ ) The mass is different: the greater the mass the greater the force.

Example 3: Action – Reaction