STUDY GUIDE—UNIT C, CHAPTER 2
FORCES

A force is a push or a pull

Contact—directly touching

Gravity—force of attraction between two masses (the greater the mass, the greater the attraction)

Friction—force that resists movement between two surfaces
a. sliding
b. rolling
c. fluid

Force is a vector—it has both size and direction.

Represented by an arrow—the longer the arrow, the greater the force.

20N

10 N

Net force—overall force acting on an object when all forces are combined

Balanced forces = zero net force and NO change in movement

Unbalanced forces cause motion

Balanced forces cannot change an object's speed or direction; only unbalanced forces can do that.

Balanced forces act on the same object.

Example: tug of war—both forces act on the same rope

Newton's First Law of Motion

An object at rest will stay at rest and an object in motion will stay in motion unless acted upon by an unbalanced force.

Inertia—the resistance of an object to as change in its speed or direction

The greater the mass, the greater the inertia.

Newton's Second Law

Acceleration of an object increases with increased force and decreases with increased mass.

F = ma (Force = mass times acceleration)

Units for force—Newtons (N)

Units for mass = kilogram (kg) and Units for acceleration = meter per second squared (m/s^2)

Newton's Third Law

For every action there is an equal but opposite reaction.

Forces act in pairs—an action force and a reaction force.

Action and reaction forces act on different objects, while balanced forces act on a single object.

Examples of laws:

1st Law: A soccer ball on the grass -- it will stay at rest until a force acts on it such as someone kicking it.

A kicked soccer ball will keep moving until a force acts on it such as friction slowing it down or another person stopping it.

2nd Law: If a person uses the same amount of force to kick two balls (Ex. kick ball and soccer ball), the kick ball will accelerate more since it has less mass.

The more force you use to kick a ball, the more it will accelerate.

3rd Law: If you and a friend are on roller blades facing the same direction and you gently push your friend from behind, he will go forward and you will go backwards. (See picture in text p. 59C)

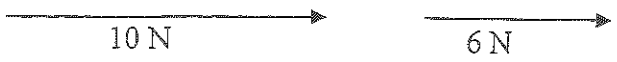
Centripetal Force

Force in a circular motion

Force points toward the center of the circle

Examples: carousel, swinging the ball for the hammer toss in track

Drawing vectors



When forces are in the **same direction**, you **add** to find the resultant force.

Resultant force:

When forces are in the **opposite direction, subtract** to find the resultant force.

Resultant force:

The direction is the direction of the greater force.

Calculations with formula

Use the formula F = ma to solve for foce, mass, and acceleration. Refer to textbook p. 51-53, Unit C.

- Calculating force: If a 5 kg ball is accelerating 1.2 m/s^2, what is the force on it?

F = ma

F = _____ x _____

F = _____

- Calculating Acceleration: A girl pulls a wheeled backpack with a force of 3 N. If the backpack has a mass of 6 kg, what is its acceleration?

F = ma (rearrange formula)

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

a = __

a = _____

- Calculating mass: A boy pushed a shopping cart with a force of 10N, and the cart accelerates 1 m/s^2. What is the mass of the cart?

F = ma (rearrange formula)

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

m =

m = _____