Test 2 Study Guide **Test Date:** **Name:**_____

Newton's First Law-
Objects at rest stay at rest, and objects in motion stay in motion until acted on by an unbalanced force.

-inertia: objects resist changing their state of motion

-objects in a moving vehicle continue to fly forward when the vehicle stops

-unbalanced forces can stop moving objects

-Examples:

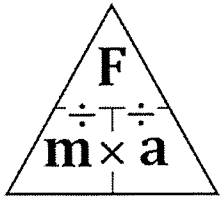
1. flying over your handles bars when the bike hits a rock

2. rocket stays in motion in the sky until acted on by a force to slow it down

3. dishes sit still on a table when the table cloth is pulled out

4. a washer falls into a cup when the notecard is pulled

Newton's Second Law- Acceleration of an object depends on the mass of the object and the force applied.



-larger force means greater acceleration

-larger mass means less acceleration

-Examples:

1. a baseball moves faster than a bowling ball because baseball has less mass

2. Professional golfer has more force than Mrs. Williamson and hits the ball farther.

Newton's Third Law- For every action there is an equal and opposite reaction.

-can be called the law of action and reaction

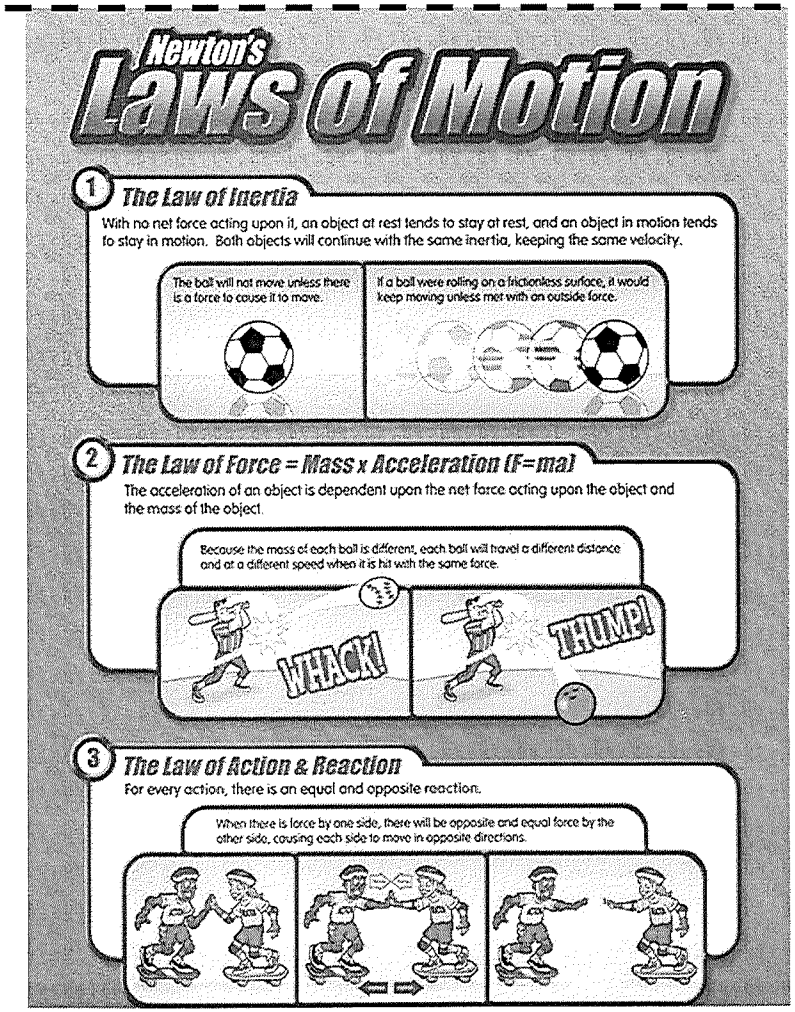
-forces come in pairs

-Examples:

1. 2 marbles rolled on the ruler when 2 were pushed.

2. When swimming, you push back on the water and the water pushes you forward.

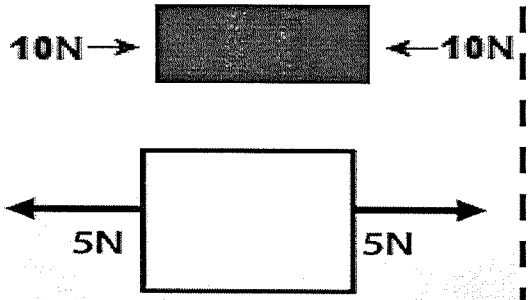
3. When playing basketball, you dribble the ball down to the floor and it bounces up with equal force



Balanced Forces-

- Forces acting on an object that are equal and opposite

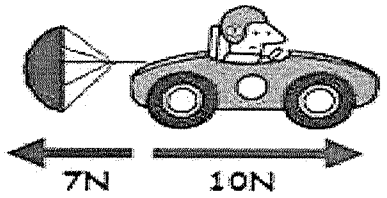
-No motion or constant speed



Unbalanced Forces-

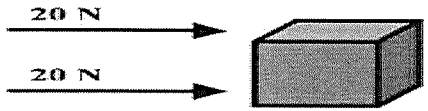
- Forces acting on an object are NOT equal

-causes change in motion/movement

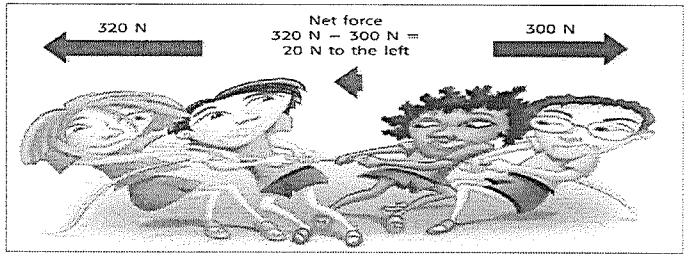


Net Force-

- Forces moving in the SAME direction are ADDED together.



-Forces moving in OPPOSITE directions are SUBTRACTED.



Speed-- How fast an object is moving

Running 3km/hr

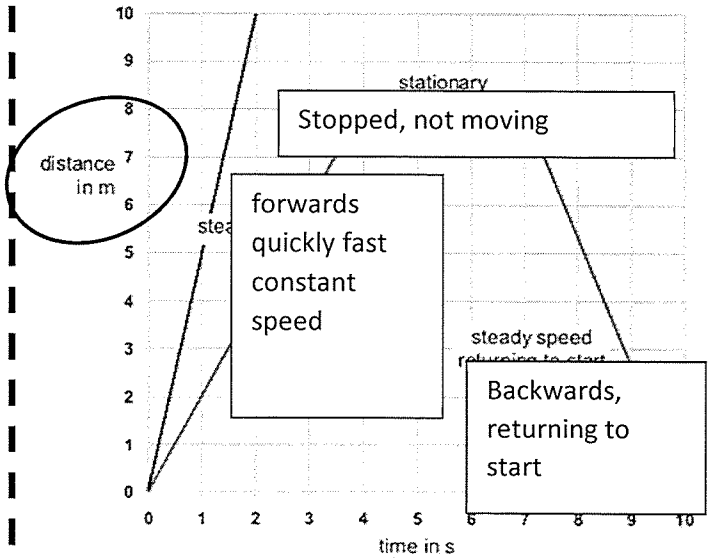
Velocity- How fast in a direction

Running 3km/hr WEST

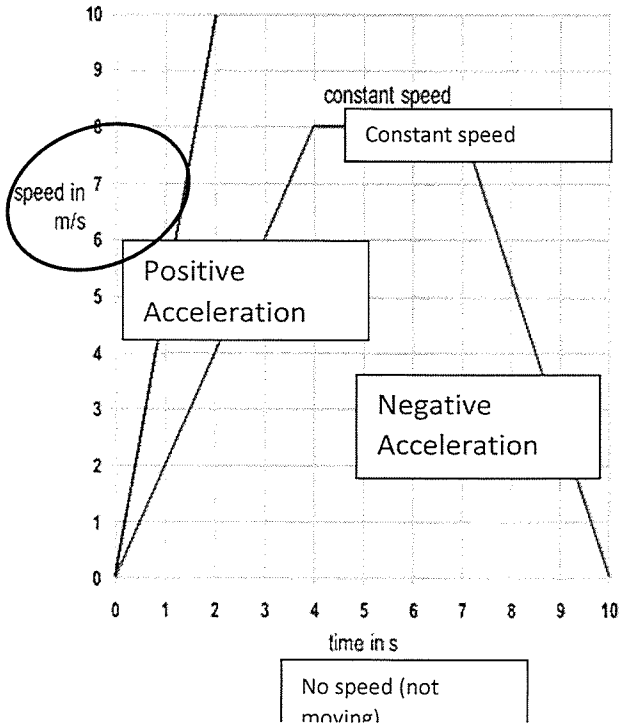
Accele... change in velocity; change is speed and/or direction

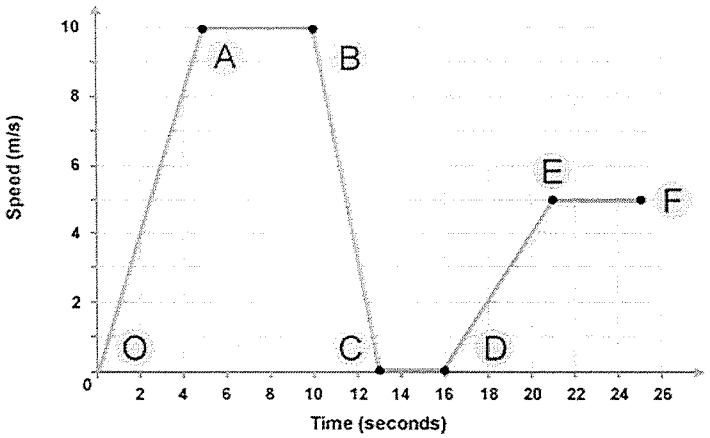
Running around a track and speeding up

Speed Graphs-



Acceleration Graphs-





Describe the motion of the bus above as it travels through Sugar Land.

Segment O to A: increasing speed

Segment A to B: constant speed

Segment B to C: decreasing speed

Segment C to D: at rest, speed is 0

Segment D to E: increasing speed

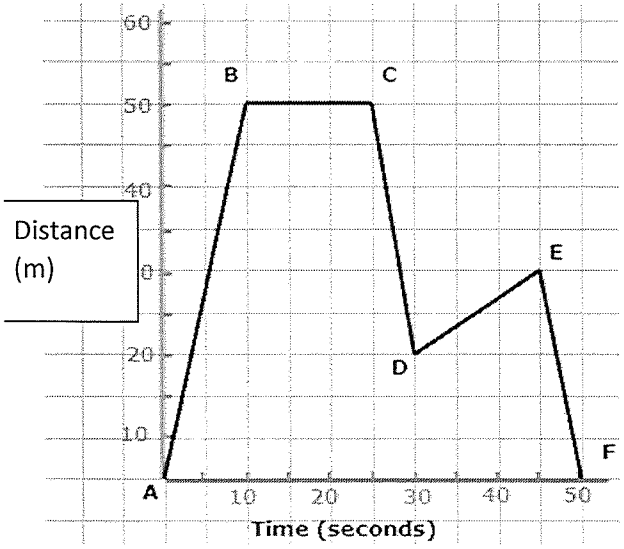
Segment E to F: constant speed

Which line segments are experiencing an unbalanced force?

O-A, B-C, D-E

Which line segments are experiencing a balanced force?

A-B, C-D, E-F



Describe the motion of the bicyclist above as it travels through Cypress.

Segment A to B: constant speed, moving quickly, away from home

Segment B to C: at rest, speed is zero

Segment C to D: constant speed, backwards

Segment D to E: constant speed, traveling slowly

Segment E to F: constant speed, moving quickly, back towards start

What is the average speed for segment D-E?

Total distance = 10 m

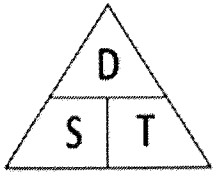
Total time = 15 s

Average speed = 0.67 m/s

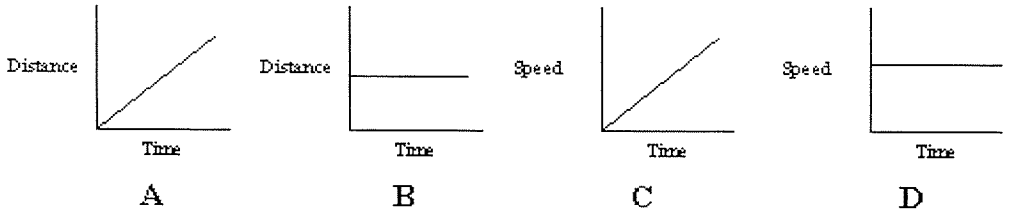
S:

D:

T:

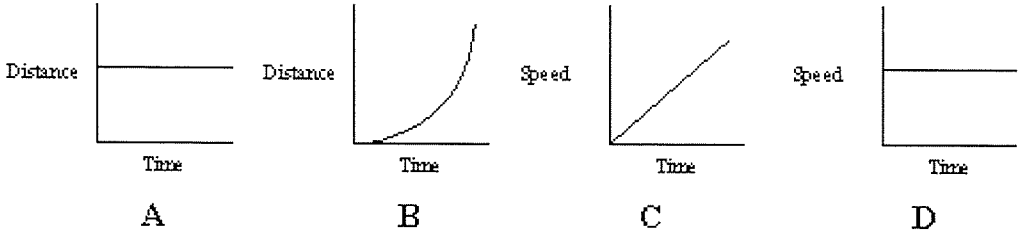


1. Which pair of graphs show the motion of an object moving at a constant speed ?



A and D

2. Which pair of graphs shows the same motion ?



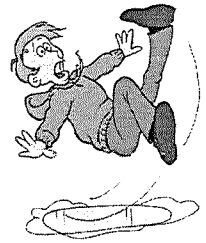
B and C

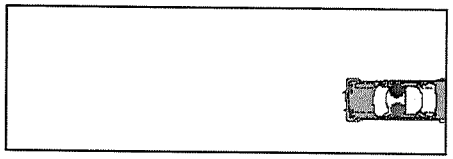
Determine if the following examples are speed, velocity, or acceleration.

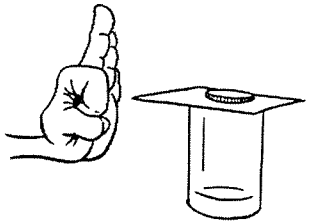
A car turns left while maintaining the same speed.	acceleration
Monarch butterflies fly 12 mi/hr south as they migrate.	Velocity
A trip from Austin to Dallas takes about 3 hours going 65 mi/hr north.	velocity
A car increases speed from 30 mi/hr to 65 mi/hr.	acceleration
A greyhound dog can run about 40 mi/hr.	speed

Newton's Law of inertia:

Explain how the following images demonstrate Newton's Law of Inertia (1st Law).







An unbalanced force is applied to object at rest or objects in constant motion.

Use the formula to solve the problems below:

1. What is the **force** of an object that accelerates $10 m/s^2$ and has a mass of 2kg?

F = mxa

= 2 kg x 10 m/s^2

= 20 N

2. What is the **mass** of an object that has a force of 25N and accelerates at a rate of $5m/s^2$?

m = F/a

= $25N/5m/s^2$

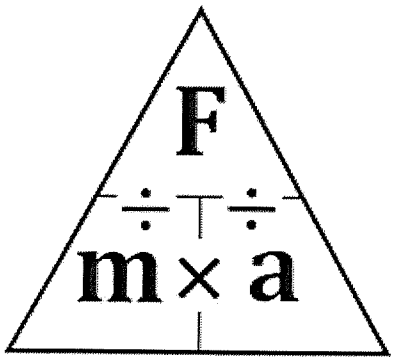
= 5 kg

3. What is the **acceleration** of a 3 kg object that receives a force of 90N?

a = F/m

= 90N/3kg

= 30 m/s^2



Newton's Law of Force, mass, and acceleration (2nd law):

1. Which would require a greater force to accelerate? Why?

a. a hockey puck on ice **or** a hockey puck on uncut grass?

friction

b. An empty suitcase **or** a suitcase full of bricks?

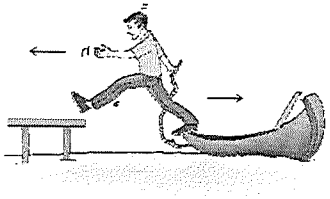
More mass

2. If the mass of a rock is doubled, what happens to its acceleration if the force does **NOT** change?

Acceleration decreases

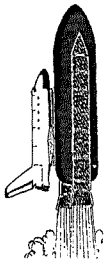
Newton's Law of Action-Reaction:

Explain how the following images demonstrate Newton's Law of Action-Reaction (3rd Law).



Guy pushes against boat, boat pushes back

Opposite directions



Thrust/explosion pushes against ground

rocket goes up

Foot pushes against

ground, goes forward

Which of Newton's Laws applies? (**1st**- Law of Inertia **2nd**- Law of Force, Mass, and Acceleration **3rd**- Law of Action-Reaction)

1. When you put a book on a table gravity pulls down on the book and the table pushes up on the book. ____3_____

2. A larger car takes more force to move. ____2_____

3. A person is pushed forward in their seatbelt when the car stops. ____1_____