Name_____

Chapter 11 & 12: Motion and Force

8.1 Motion, pgs. 252-258

1. **Reference Frame = <u>the stationary background when viewing motion</u>**

    _____

2. **Speed =<u>distance traveled divided by the time interval during which the</u>**

    <u>the motion occurred.</u>

<table>
<tr><td>Formula</td><td>Speed = <u>Distance</u>
Time</td><td>D
——
S T</td></tr>
<tr><td>Units</td><td>m/hr = <u>meters</u>   or   cm/sec = <u>centimeters</u>
hour   seconds</td></tr>
</table>

3. **Constant Speed = <u>an object that is not speeding up or slowing down.</u>**
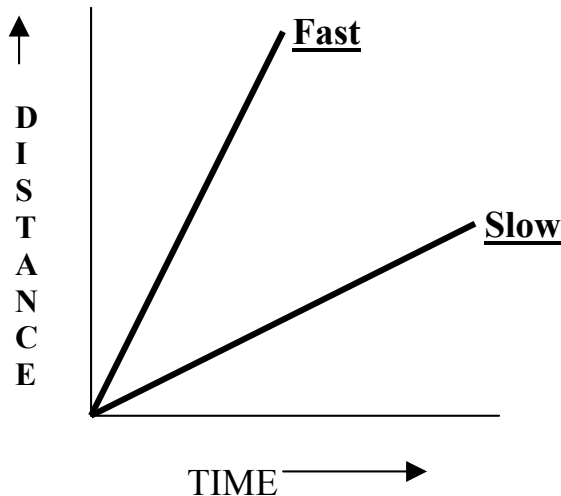
    <u>Constant Speed is shown by a straight line on a distance-time graph.</u>

    _____

    <u>The steeper the slope the faster the speed.</u>

4. **Velocity = <u>a quantity describing both the speed and direction of motion.</u>**

    <u>Direction can be east, west, south, or north.</u>

    <u>It can also be positive or negative.</u>

5.   **Momentum <u>= property that a moving object has due to its mass and velocity</u>**

    _____

<table>
<tr><td>Formula</td><td>momentum = mass x   velocity</td><td rowspan="2">Mo
——
M   V</td></tr>
<tr><td>Units</td><td>kg m/sec   = kg   x   m/sec</td></tr>
</table>

6. Law of Conservation of Momentum = <u>momentum cannot be created or</u>

    <u>destroyed.</u>

7. Acceleration = <u>change of velocity divided by the time internal in which the</u>

    <u>change occurred.</u>

    <u>Can be either a change in speed or a change in direction.</u>

    <u>Positive Acceleration – object is speeding up.</u>

    <u>Negative Acceleration – object is slowing down.</u>

    <u>Acceleration is indicated by a curve line on a distance-time graph.</u>

        Formula   **Acceleration =** <u>final velocity – initial velocity</u>
                                           time

        Units   **m/sec/sec or m/sec^2**

Positive Acceleration

D
I
S
T
A
N
C
E

Distance-Time Graph

←**Negative Acceleration**

TIME

Positive Acceleration

S
P
E
E
D

Speed-Time Graph

Negative Acceleration

TIME
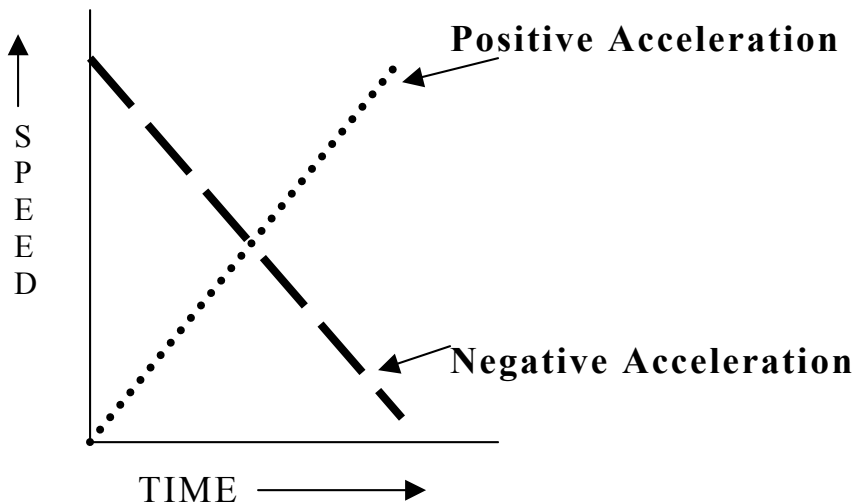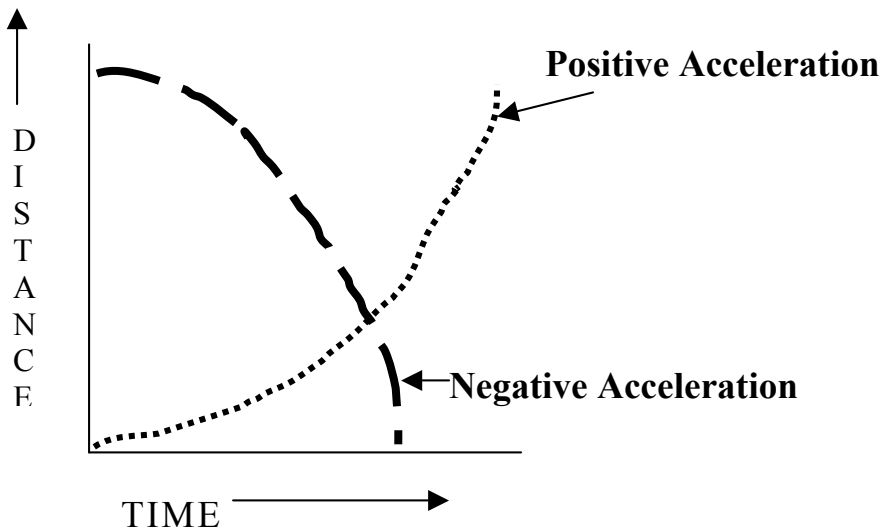
8. **Force = is either a push or a pull**

9. **Balanced Forces = forces on an object that are equal in size and opposite in**
    in direction. The net force is zero

10. **Unbalanced Forces = when unequal forces are acting in opposite directions and a**
    net force occurs in the direction of the larger force

11. **Friction = the force between two objects in contact that opposes**
    the motion of either object.
    Friction is an unbalanced force.
    The amount of friction depends on:
        1. the kind of surface
        2. the force pushing the two surfaces together (the weight)
    Types of friction:
        1. Sliding friction = opposes motion of two surfaces sliding past
          each other
        2. Rolling friction = opposes motion of two surfaces rolling past
          each other
    Air Resistance = acts in the direction opposite to that of the objects motion

    Amount of air resistance depends on speed, size, and shape of object

    If there is no air resistance, all objects fall at the same acceleration.

12. **Gravity=the attraction between two particles of matter due to their mass and the**
    distance between objects.
    The larger the mass, the more the gravitational attraction.
    The greater the distance, the less the gravitational attraction.

13. **Newton's First Law (The Law of Inertia)=an object at rest remains at rest and**

    an object in motion maintains its velocity unless an unbalanced force

    act on it.

    Inertia = the tendency of an object to remain at rest or in motion with

    a constant velocity. The greater the mass of an object, the great the

    inertia.

    Projectile Motion = projectiles fall in a curve path due to inertia and

    gravitation pull

14. **Centripetal Force = acceleration towards the center of a curved or**

    circular path

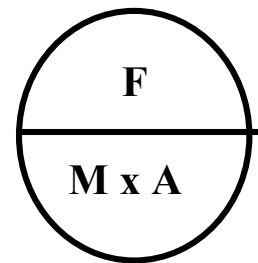   **Acceleration can be a change in speed or direction**

    Sun's gravity exerts a centripetal force on the earth to keep it in orbit

15. **Newton's Second Law of Motion=the unbalanced force acting on an object equals**

    the object's mass times its acceleration.

Formula	**Force = Mass x Acceleration**	
Units	$kg \ m/sec^2 = kg \quad x \quad m/sec^2$	
Force units =	$kg \ m/sec^2 = N$ or **Newtons**	

    $$\frac{F}{M \times A}$$

16. **Free Fall = the motion of a body when only the force of gravity is**

    acting on it.

17. **Gravitational Acceleration = objects fall to the earth at 9.8 m/sec^2**

    All objects fall at the same rate on earth

18. **Weight <u>= the gravitational force exerted on an object</u>**

 <u>Weight is a force so F = ma</u>

       Formula   **gravitational force or weight = mass x 9.8 m/sec^2**

       Units   **Newtons (N) =   kg   x   m/sec^2**

       <u>Weight and mass are not the same thing:</u>

            <u>Weight is the gravitational force so it will change if the force of</u>

               <u>gravity changes</u>

            <u>Mass is the amount of matter an object contains so it will not change</u>
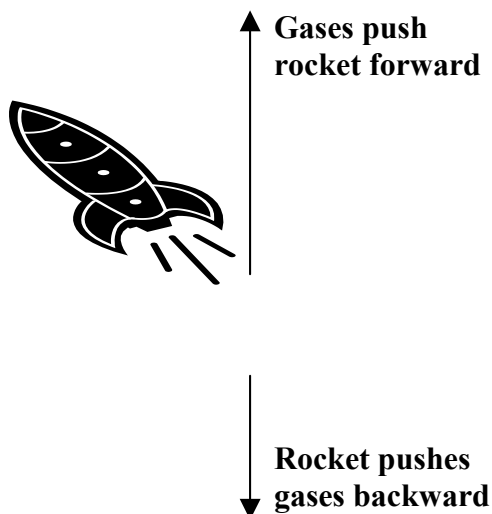
               <u>if the force of gravity changes</u>

19. **Terminal Velocity <u>= is the highest velocity when the air resistance</u>**

 <u>cancels out the force of gravity</u>

20. **Newton's Third Law = <u>For every action force, there is an equal or opposite</u>**

 <u>reaction force.</u>

Gases push
rocket forward

Rocket pushes
gases backward

CIM BENCHMARKS

Describe & explain the effects of multiple forces acting on an object.

Understand and apply the relationship F=ma in situation in which one force acts on an object.

Recognize that equal and opposite forces occur when one object exerts a force on another.

Describe the forces acting on an object, based on the motion of that object.

Describe the relationship of mass and distance to gravitational force.