**10 Science: Motion**

**Newton’s Laws of Motion**

1. Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.

2. The relationship between an object's mass m, its acceleration a, and the applied force F is F = ma.

3. For every action there is an equal and opposite reaction.

**Formulas**

d = distance t = time a = acceleration

v = velocity vi = initial velocity vf = final velocity

d= v t a = v/t d = vit + ½at2  vf2 = vi2 + 2ad

v = vf + vi vf = vi + at g = 9.80 m/s2

F = ma a = F m = F

 m a

**Aspects of Motion**

**Velocity**

Velocity is a vector quantity that:

a) shows how fast an object moves from one position to another

b) indicates the direction of movement

In physics, we say that velocity is the *rate of change of position*.

***Average velocity*** is a measure of a body’s displacement over the time it took for the displacement to occur.

vave= Δd or vave= d2 – d1

 Δt t2 – t1

***Veloctiy cont.***

Average velocities are often measured in m/s (meters per second).

A***frame of reference***is something that a person uses to compare the position or motion of an object to. The motion of the object can be completely different depending on the frame of reference used.

**Illustrating Motion**

If you have a series of diagrams of an object, or a series of dots, showing the position of the object after equal intervals of time, you can determine the details of its motion.

Situation 1 – If the distance is the same between each diagram, then the object is moving at a constant speed

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Situation 2 – If the distance between is increasing, then the object is speeding up.

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Situation 3 – If the distance between is decreasing, the object is slowing down.

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**Quick References**

1km = 1000m 1min = 60sec 1hour = 3600sec