Physics - Forces Knowledge organiser
Year 9 – Autumn term

Force
- Forces are measured in Newtons
- Objects with balanced forces are still or moving at a constant speed

Objects with unbalanced forces change speed or direction

What is *resultant force?*

one single force that has the effect of all the other forces combined together.

1. Forces that act in the **same direction** can be **added** together
2. Forces that act **opposite** to each other must be **taken away**

Force diagrams
When drawing force diagrams there are a number of rules we must follow.
1. The direction of the force arrow represents the direction of the force.
2. The size of the force arrow represents the size of the force.

Big force up ⬆   ⬇ Little force down

Remember
If an object is accelerating it will have unbalanced forces (A resultant force).
If an object has constant velocity all forces are balanced (No resultant force).

$$\frac{distance}{speed \times time}$$

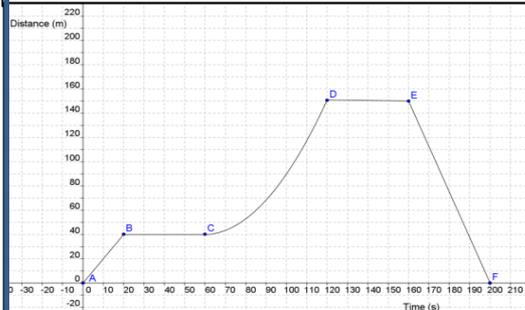### Distance-Time graphs

Horizontal line = stationary

Diagonal line = Constant speed

Steeper diagonal line = Higher constant speed

Gradient = Speed

Force and acceleration
F = Force (N)
m = mass (kg)
a = acceleration(m/s^2)

$$F = m \times a$$

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

Newton = unit of force, **Speed** = how fast something moves, **Acceleration** = how fast the speed of something changes, **Velocity** = speed with a direction, **Time** = an abstract concept, measured in seconds.

Speed
Speed (m/s)= Distance(m) / Time (s)
$v = d/t$

Elastic potential
Is the energy stored when an elastic object is deformed. For
example it is the energy stored when an elastic band is stretched.
The amount of energy stored depends on the work done when you
stretch the elastic band.

Terminal velocity
Is the maximum velocity reached by an object moving through air or
liquid e.g. something falling through air or sinking.
Terminal velocity is reached when gravitational force is equal to air resistance. Resultant force is zero so the object stops accelerating.

Work done
Work done = energy transferred
Must have movement for work to be done when applying a force
Work done (J) = Force (N) x distance (moved in the direction of the force)(m),W = F x s

Moments
When a force causes an object to turn, the turning effect is called a moment
Moment (Nm) = Force (N)
x Perpendicular distance from pivot (m)
M = F x d

Balancing
For something to balance its clockwise and anticlockwise moments must be the same!