Done in class	Revised	Assessed

I can use the formula which links distance, speed and time

distance = speed x time

$$d = v \times t$$

where

d = distance (measured in **metres**, **m**)

v = speed (measured in **metres per second, ms^{-1}**)

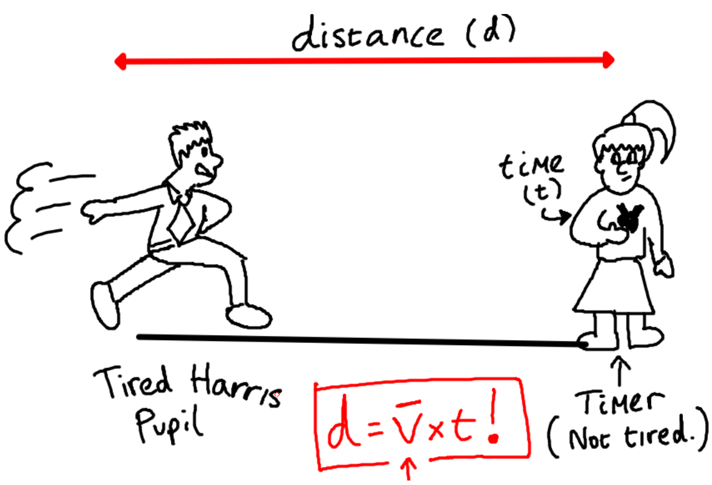
t = time (measured in **seconds**, **s**)

I know what "average speed" means

Average speed is the distance an object travels per second

Average speed is usually measured over a certain distance

$$d = \bar{v} \times t$$



where

d = distance travelled (measured in **metres**, **m**)

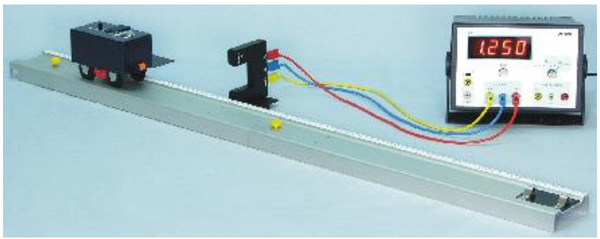
$\bar{v}$ = average speed (measured in **metres per second, ms^{-1}**)

t = time taken between two points (measured in **seconds**, **s**)

I know what "instantaneous speed" means ○○○

Instantaneous speed is the speed at one precise moment ("instant") in time

$$d = v \times t$$



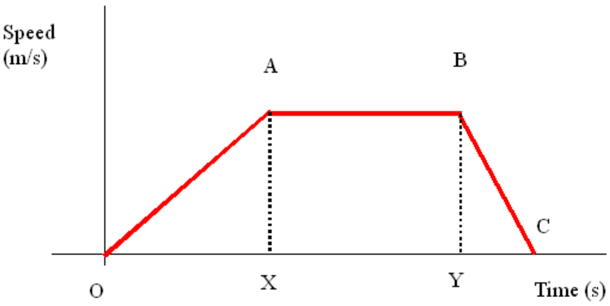
where

d = length of object (measured in **metres**, **m**)

v = instantaneous speed (measured in **metres per second, ms^{-1}**)

t = time to pass a point (measured in **seconds**, **s**)

I know how to get information from speed-time graphs ○○○



Car is speeding up (accelerating) from O to A

Car is going at a constant speed from A to B

Car is slowing down (decelerating) from B to C

Distance travelled = area under speed-time graph

I can use the formula which links acceleration, change in speed and time.

$$a = \frac{v-u}{t}$$

$$acceleration = \frac{change\ in\ speed}{time}$$

where

a = acceleration (measured in **metres per second squared, ms^{-2}**)

v = final speed (measured in **metres per second, ms^{-1}**)

u = initial speed (measured in **metres per second, ms^{-1}**)

t = time (measured in **seconds, s**)

I know what is meant by a 'Force'.

A 'Force' can change the speed, direction or shape of an object.

Force can be measured using a **newton balance.**

Force is measured in **Newtons (N).**

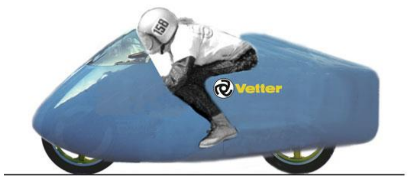
I know that 'friction' is a type of force.

Friction is caused by two objects move while in contact with each other.

The force of friction is always in the opposite direction to movement.

Air resistance and **drag** are also types of frictional forces.

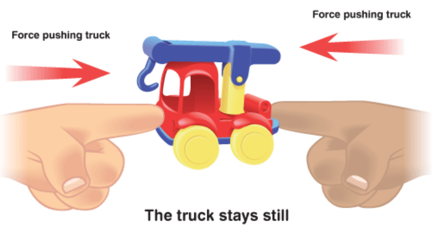
I can describe some ways in which we can reduce frictional forces

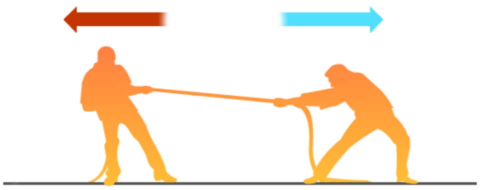


Streamlining Lubrication Smoothing surfaces

I know what is meant by 'balanced forces.'

If two forces are the **same size** but act in **opposite directions**, they are known as **balanced forces.**





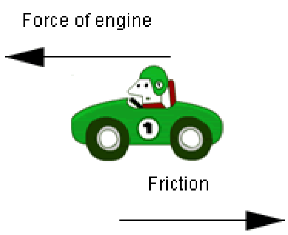
I understand what 'Newton's 1st law' tells us about balanced forces and speed.

If the forces on an object are **balanced**, then the object will either

- **stay at rest** (not move).

or

- will move with a **constant speed**.



I understand what 'Newton's 2nd law' tells us about unbalanced forces and acceleration. ○○○

If the forces on an object are **unbalanced**, then there is more force acting in one direction than the other.

The object will **accelerate** in the direction of the unbalanced force.

I can use the formula which links unbalanced force, mass and acceleration. ○○○

$$F = m \times a$$

where

F = unbalanced force (measured in **Newtons, N**)

m = mass (measured in **kilograms, kg**)

a = acceleration (measured in **metres per second squared, ms^{-2}**)

I know the difference between the mass of an object and its weight. ○○○

Mass is a measure of the amount of 'stuff' that makes up an object, and is measured in kilograms.

Weight is force acting on an object caused by gravity, and is measured in Newtons.

The weight of an object may be different on different objects in our solar system, but the mass remains the same everywhere.

I can use the formula which links weight, mass and gravitational field strength for different objects in our solar system ○○○

$$W = m \times g$$

where

W = Weight (measured in **Newtons, N**)

m = mass (measured in **kilograms, kg**)

g = gravitational field strength (measured in **Newtons per kilogram, Nkg^{-1}**)

I can describe some of the risks and benefits of space exploration. ○○○

Risks

Re-entry to a planet's atmosphere is challenging because

- It creates a large amount of heat due to air resistance. Thermal protection systems must be used to ensure the spacecraft is protected on re-entry.
- The angle of re-entry must be precisely calculated so the spacecraft doesn't 'bounce off' the atmosphere.

Benefits

Space exploration has helped to develop

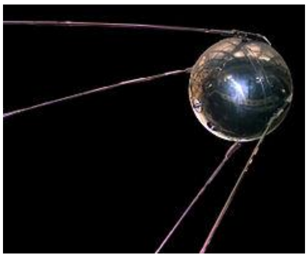
- The accuracy of weather forecasting
- Telecommunications via Satellites
- Analysis of our environment
- National security
- Sat-Nav systems

- Robotics

I know what is meant by a satellite, and that there are many types of satellite with different uses.

A satellite is an object which is in orbit around a planet.

Satellites can be man-made or natural (such as the moon).



Satellites can be used for:

- Telecommunications (TV, telephone, Internet etc.)
- Weather monitoring and reporting
- Global positioning systems (e.g. sat-navs.)
- Environmental monitoring.

The period of a satellite is how long it takes to orbit a planet once.

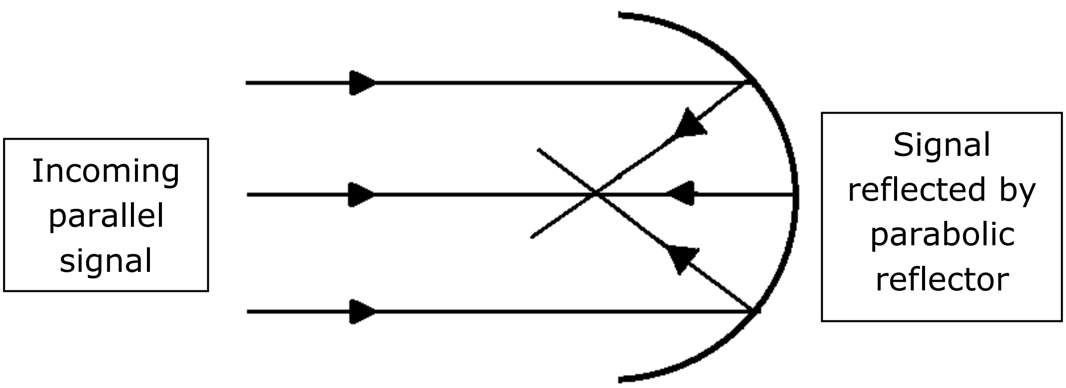
A satellites height above a planet will affect its period.

Geostationary satellites on Earth have a period of 24 hours, and will stay above the same point on the Earth's surface at a height of 36,000 km.

I know what is meant by 'parabolic reflectors' and how they can send or receive signals.

'Satellite dishes' are a common example of a parabolic reflector:

Parabolic reflector 'receiver'



Signal is focused to a single point called the focus.

I know how satellites can help us better understand the global impact of mankind's actions.

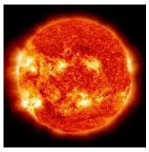
- Urbanisation of rural areas
- Deforestation
- Pollution
- Ice-caps melting

I can correctly describe objects in our solar system and beyond

- A planet is an object in orbit around a star.

- A moon is a natural satellite of a planet.

- A star is an object that shines due to nuclear reactions at its core.



- A solar system is a collection of objects orbiting a star.

- An exo-planet is a planet outwith our solar system.
- A galaxy is a group of stars, gases and dust held together by gravity.

- The universe is all existing matter and space considered as a whole.

I know that large distances in space are measured in light years. ○○○

A light year is the **distance** that light will travel in one year:

- One light year = 9.5 $\times 10^{15}$ metres.

Our solar system measures only a small fraction of a light year, yet the universe measures many billions of light years.

I know that liquid water and an oxygen-rich atmosphere is required on a planet to sustain life. ○○○

I can discuss the impact that space exploration has had on our understanding of the universe and of planet Earth. ○○○

Space telescopes (e.g. Hubble), Space probes (e.g. Voyager) and Space rovers (e.g. Spirit) have all contributed to our understanding of the universe in different ways. For example:

- Hubble's deep field lens allows us to capture images across many wavelengths of EM radiation from deep space.
- Voyager has performed 'fly pasts' of many objects in our solar system giving up close, detailed images never seen before.
- Spirit analysed the terrain on Mars to help determine if life had ever existed there.