Knowledge Organiser Focus: Forces

I should already know:

Examples of some forces.

The name of some of the planets in the solar system.

How to record times and distances.

I will learn:

Calculate speed from different given examples.

Interpret a distance-time and velocity-time graph for a range of journeys.

Use force diagrams to support an explanation of forces in action.

Experiment with Hooke's law to describe how forces deform objects.

Identify similarities and differences between objects in the universe.

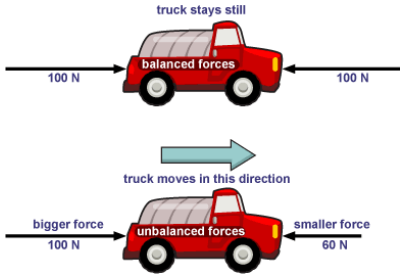
Explain the effects of the motion of the Sun, Earth, and Moon.

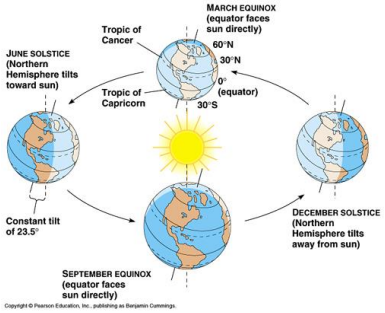
This will help in the future:

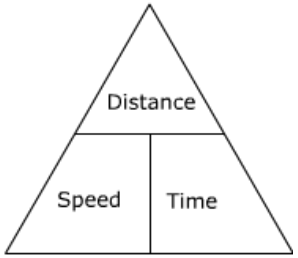
Careers in Physics such as astronomers, researchers, medical technology.

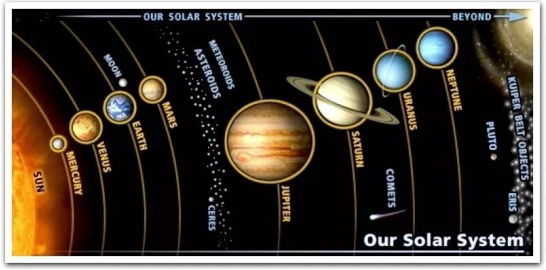
Key Words

Force	A push or a pull that acts on an object due to the interaction with another object; units: Newtons, N
Balanced forces	Two forces acting in opposite directions on an object, equal in size. Object stays still or continues to move at the same speed and in the same direction.
Resultant force	Single force that can replace all the forces acting on an object and have the same effect
Friction	Force opposing motion which is caused by the interaction of surfaces moving over each other
Speed	How much distance is covered in a given time; speed = distance ÷ time
Gravity	The force that keeps planets and moons in orbit around larger objects; gravitational field strength on Earth = 9.8 N/kg
Weight	The force of gravity on an object; units: Newtons, N
Mass	The amount of matter in a body; units: kilograms, kg
Orbit	An orbit is the path that an object takes in space when it goes around a star, a planet, or a moon.
Air resistance/drag	The forces that are in opposition to the motion of an object as it passes through the air. Slow the object down.
Satellite	Natural: a moon or asteroid; Artificial: manmade objects that orbit Earth, used for communications
Contact force	A force that acts when objects are physically touching, e.g. friction
Non-contact force	A force that acts when objects are physically separated, e.g. gravitational force
Acceleration	How much speed increases or decreases in a given time, acceleration = change in speed ÷ time
Light year	The distance travelled by light in one year
Spring constant	A measure of how easy it is to compress or stretch a material; units: N/m









Greater Depth Challenge

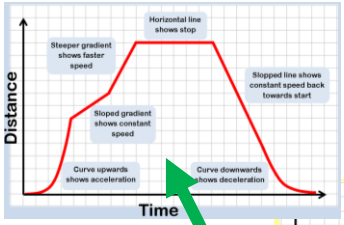
Are we alone in the Universe?

How does an aeroplane stay up in the air?

Further Reading

BBC Bitesize, Educake.

Interpret a distance-time and velocity-time graph for a range of journeys.



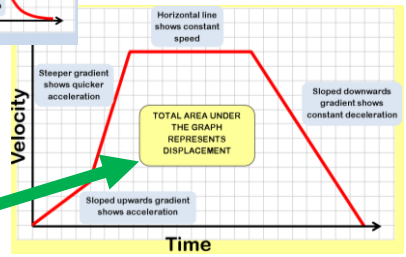
Key definition

Speed – how fast an object is travelling (m/s).

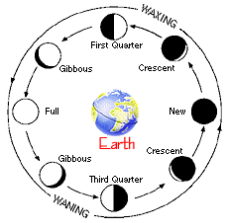
Velocity – how fast an object is going in a given direction (m/s).

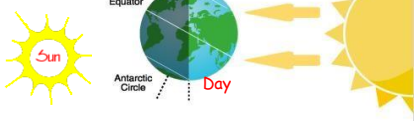
Area under the graph is equal to the average speed the object travels.

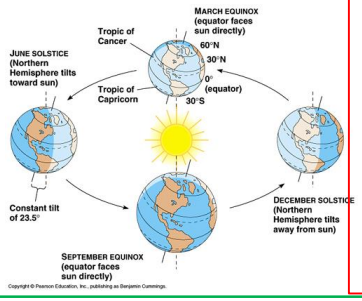
Area under the graph is equal to the total distance travelled displacement).



Explain the effects of the motion of the Sun, Earth and Moon.







Key facts

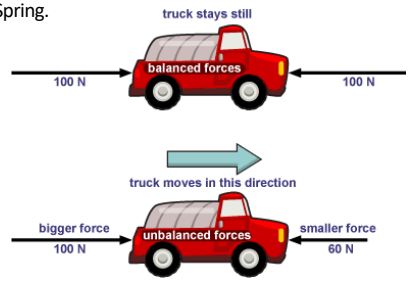
- The Earth rotates once every **24 hours**.
- The Earth orbits the Sun once every **365 days** (a year).
- The Moon orbits the Earth every **28 days**.
- The Earth tilts on its axis (23.5°)which causes **seasons**.

Use force diagrams to support an explanation of forces in action.

We measure force using a newton meter. The unit of force is the Newton, which is represented by the symbol N. A newton meter works by stretching a Spring.

Mass is a measurement of how much of something there is. It's measured in grams (g) or kilograms (kg).

Weight, on the other hand, is a measure of the force acting downwards on an object, due to gravity. Likeall forces, the units for weight are Newtons (N).



Balanced Forces: a non-moving object will stay stationary and a moving object will stay travelling at the same speed.

Unbalanced Forces: If there is a resultant force (e.g. 8-3= 5N upwards in the example on the left), the object will accelerate in that particular direction.

Contact Forces: Between two objects which are touching (e.g. friction)

Non-contact forces: Between two objects which aren't touching (e.g. gravity)

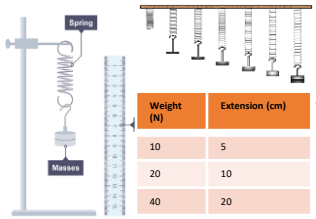
Forces can make things move. They can act to push or pull on an object.

Friction is a force that transforms kinetic (movement) energy into heat. This can be useful if we need to grip onto a surface or slow down quickly. Creating a 'rough' surface will increase the amount of friction between two objects. Objects can become streamlined to reduce friction.

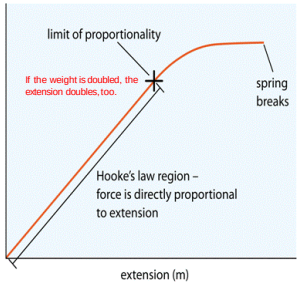
Experiment with Hooke's law to describe how forces deform objects.

Method

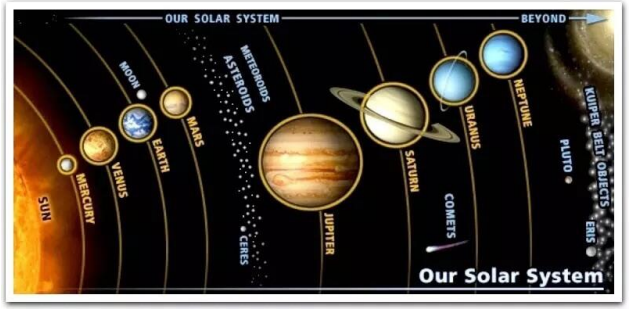
1. Set up the equipment as shown in the diagram.
2. Measure the length of the spring with nothing on it.
3. Hang a 10N mass from the spring and measure the new length.
4. Take the length with no mass on away from the new length to calculate extension.
5. Repeat for 20N, 30N, 40N and 50N (at least five values).



Weight (N)	Extension (cm)
10	5
20	10
40	20



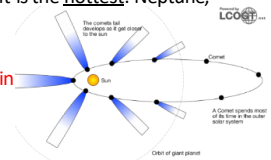
Identify similarities and differences between objects in the Universe.



My	Very	Easy	Method	Just	Speeds	Up	Naming
e	e	a	a	u	a	r	e
r	n	r	r	p	t	a	p
c	u	t	s	i	u	n	t
u	s	h		t	r	u	u
r				e	n	s	n
y				r			e

The planets in our Solar System travel, in orbit, around a star (the Sun). Their orbits are described as being elliptical - like a squashed circle.

As Mercury is the closest planet to the Sun, it is the hottest. Neptune, as the furthest away planet, is the coldest.



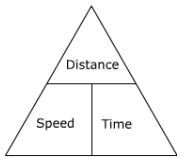
An object's mass stays the same, anywhere in the Universe, whereas its weight will vary epending on the strength of gravity.

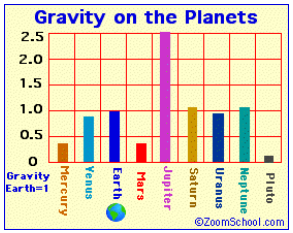
Calculate speed from different examples.

Formula	Write the formula you are using.
Numbers	Substitute in the known numbers.
Answer	Calculate the answer.
Unit	Add units if appropriate.

A car travels 100m in 4 seconds, what is the speed of the car?

F Speed = Distance / Time
N Speed = 100 / 4
A Speed = 25
U Speed = 25 m/s





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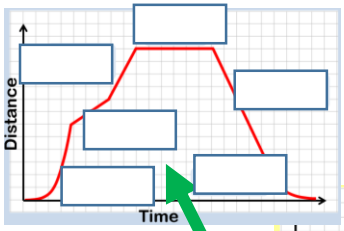

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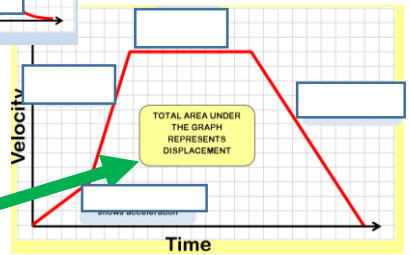

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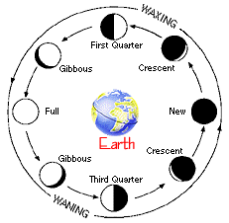

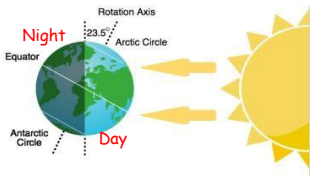

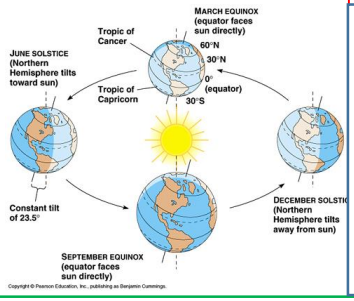

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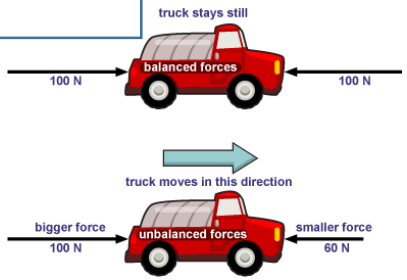

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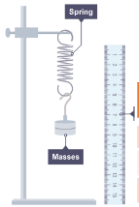
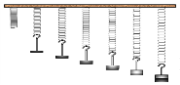
5.





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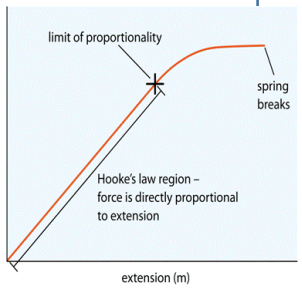

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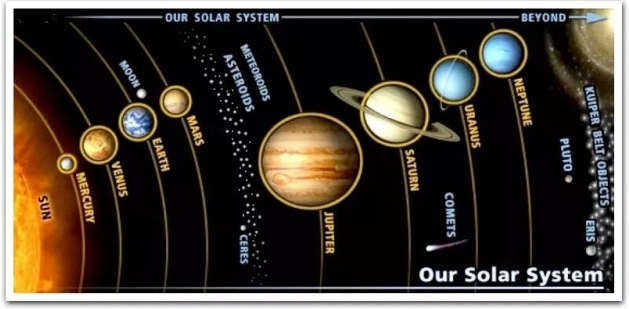

My Very Easy Method Just Speeds Up Naming

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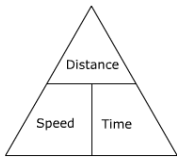

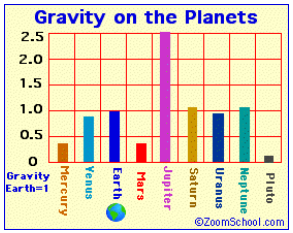

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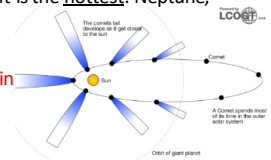


Scientific equipment

Name	Use
Bunsen burner	**Heating by burning a gas**
Conical flask	To measure volume of liquids
Beaker	**To hold, pour and heat liquids**
Measuring cylinder	To measure precise volume of liquid
Evaporating basin	**To heat and evaporate liquids**

Name	Use
Stopwatch	**To measure time**
Tongs	To hold hot things (not test tubes)
Thermometer	**To measure temperature**
Safety Goggles	To protect your eyes
Tripod	**To hold a beaker above a Bunsen burner**
Gauze	Used to support a beaker

Risk assessment

Hazard / Chemical	Risks	Control measures	Emergency measures

Hazard – something that has the potential to cause harm to a person, property or environment.

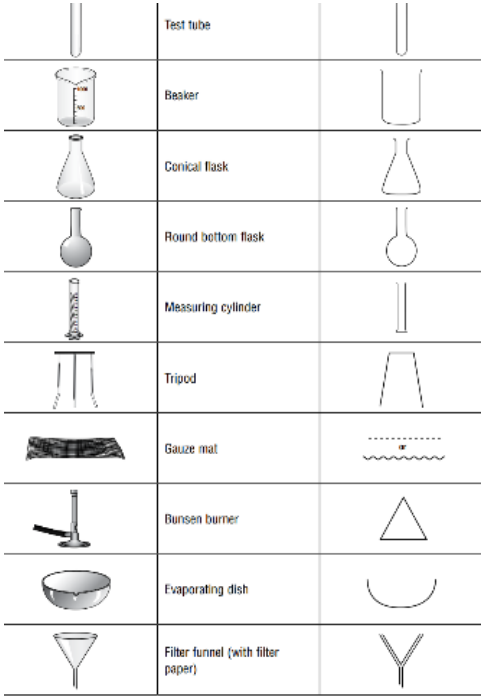
Risk – is the chance or probability of the hazard causing harm or damage to people, property or the environment.

Control measures – minimises the risk of the hazard causing harm.

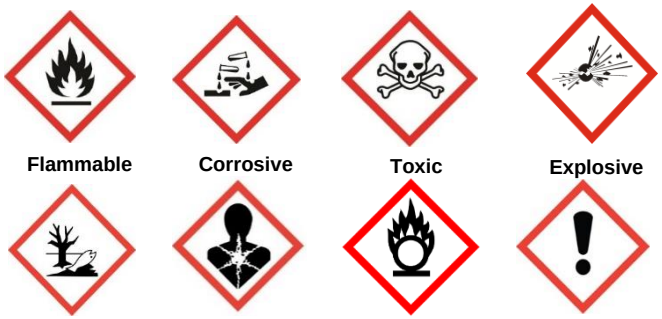
Drawing equipment

When drawing scientific equipment it must be drawn in 2D and not 3D.

Equipment diagrams should be drawn as part of the method for the experiment.



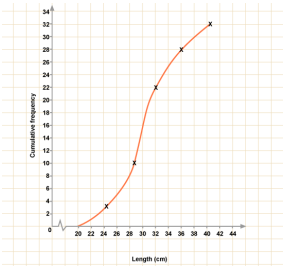
Hazard symbols



Flammable | Corrosive | Toxic | Explosive

Harmful to the environment | Serious health hazard | Oxidising | Harmful

Graphs



Rules for a graph

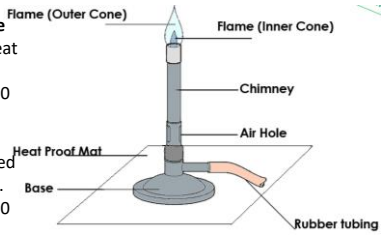
1. Title
2. Size
3. Appropriate scale
4. Labelled axis
5. Plot points accurately
6. Line of best fit

When describing graphs make sure you…

- Identifying if it's an increasing or decreasing trend.
- Support your chosen trend with evidence from the graph.
- Give a reason or opinion for the observed trend.

Bunsen burner

Different flames:
Collar open= Blue flame- used to heat substances
Temperature= 500 degrees
Collar closed= Yellow flame: used as a safety flame .
Temperature= 300 degrees



Calculation

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