



Firrhill High School



Summary Files P3: Exploring the Universe

WHAT SHOULD I KNOW?

Success Criteria	Before reading	After reading	Before my test
I can state what a solar system is.			
I can name the planets of our solar system in order.			
I can explain what the goldilocks zone is.			
I can tell the difference between terrestrial and gas giant planets.			
I can state the name of an instrument used to see into space.			
I can explain what reflection is.			
I can identify different parts of a reflection diagram.			
I can explain what refraction is.			
I can name and draw the two types of lens.			
I can measure the focal point of a lens.			
I can calculate the power of a lens.			
I can select the correct lens to correct short or long sightedness.			
I can explain what happens to light as it passes through a prism.			
I can compare the spectra from different light sources.			
I can explain the difference between mass and weight.			
I can calculate the weight of different objects.			
I can identify the different forces acting on a rocket.			
I can consider the challenges of living on a different planet.			
I can form my own opinion on whether there was once life on Mars.			

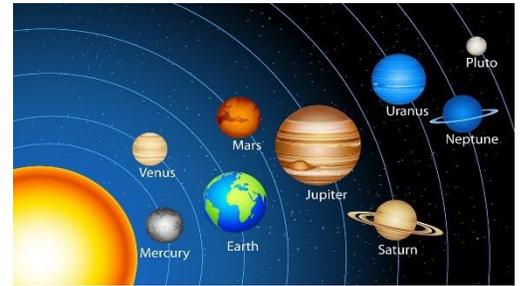
LOOKING INTO SPACE

What is around us?

Our earth is in a **solar system**. A solar system is a star and all the planets that orbit, including any moons the planets have.

The **goldilocks zone** is where life is most likely to exist, it is not too hot and not too cold.

A terrestrial planet is a rocky planet that is similar to earth. Mercury, Venus, Earth and Mars are all rocky planets.



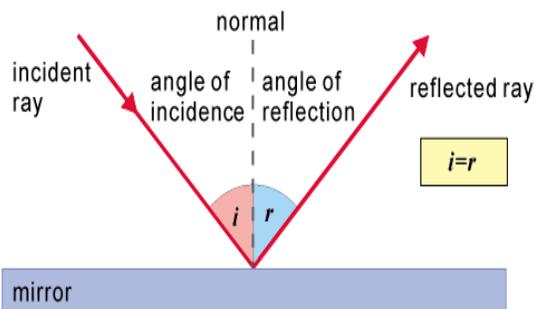
A gas giant is a planet that is made of mainly liquid and gas. These planets do not have a solid surface. Jupiter, Saturn, Uranus and Neptune are all gas giants. Pluto is a dwarf planet – it is too small to be counted as a planet.

A **telescope** is used to see stars, planets and other objects far away in space.

LIGHT - REFLECTION

Reflections are formed when light bounces off shiny objects.

Light **bounces off** shiny surfaces, this is called a reflection.



Light is always reflected at the same angle it enters the mirror. This is called the law of reflection.

The normal line is always drawn as a dotted line – this line is at right angles to the mirror.

Law of reflection:

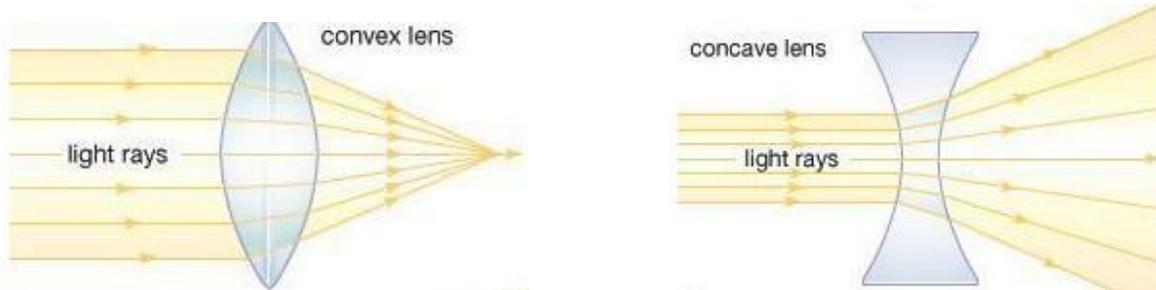
The angle of incidence = The angle of reflection

Light travels in straight lines, you always have to use a ruler when drawing light diagrams.

LIGHT - LENSES

Lenses can be used to change the direction of light

Light **refracts** when it moves from one substance to another (for example from air to glass), this means the light changes speed and direction.

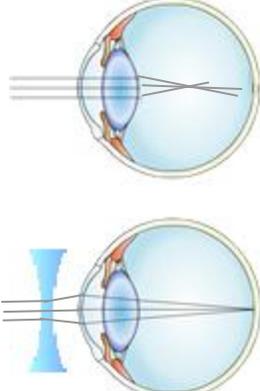
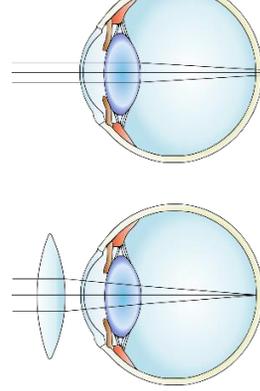


The focal point of a lens is where the rays of light meet at one point. Different lenses have different focal points.

The power ('strength') of a lens is measured in Diopters (D) and is using:

$$\text{Power of lens} = \frac{1}{\text{focal length}} \quad P = \frac{1}{f}$$

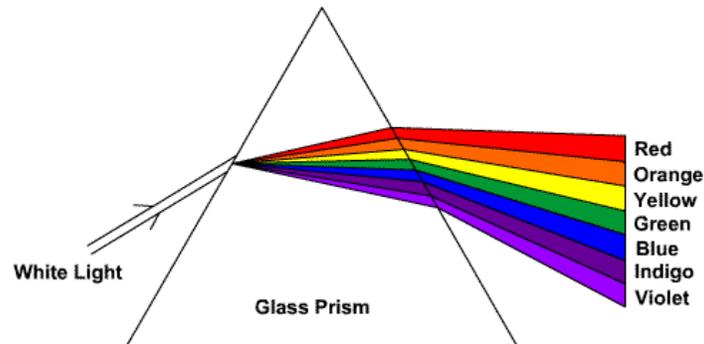
For perfect vision light should focus on the retina of the eye.

Short-Sightedness	Long-Sightedness
<ul style="list-style-type: none">○ People can see close-up objects but can't see far away objects○ Light focus in front of the retina○ Corrected by using a concave lens	<ul style="list-style-type: none">○ People can see far-away objects but can't see close-up objects○ Light focuses behind the retina○ Corrected by using a convex lens
	

LIGHT-SPECTRA

Viewing colours of light

Light **refracts** when it travels through a glass prism. This means the light changes speed (slows down) and changes direction. In a prism this makes the different colours of light separate and we can see a spectra of different colours.



In class we used a spectroscope to view the spectra from different sources. When looking at the spectra of a light bulb we saw a continuous spectra (a rainbow). When we looked at the spectra of glowing Neon we saw only a few lines of colour.

Astronomers use the spectra of stars to find out what elements different stars are made of.

FORCES

Mass and Weight are not the same thing



Mass is how heavy something is. It is measured in kilograms (kg).

Weight is a force due to gravity. It is measured in Newtons (N).



To calculate the weight we use another equation:

$$\textit{Weight} = \textit{mass} \times \textit{gravity}$$

$$W = m \times g$$

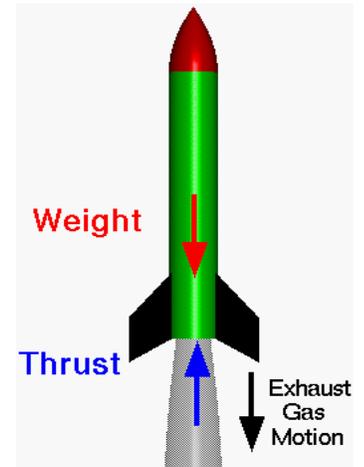
There is no gravity in deep space so your weight would be 0 N but you would still be the same mass!

Rockets

Many different forces act on a rocket.

Thrust force is supplied by the rocket engine gases pushing down on the air particles and the air particles pushing back on the rocket.

Weight is a force due to gravity. The thrust forces must be bigger than the weight force for the rocket to launch.



Life in Space

NASA will have astronauts living on Mars by 2030. NASA chose Mars because it is the planet that it is most likely that humans could survive on.

There are many challenges that people living on Mars would face:

Do your own research to find out how NASA plan to deal with these challenges.

No food currently grows on Mars



Almost no liquid water



No atmosphere



Could we live on Mars?



Freezing temperatures



Dangerous UV radiation