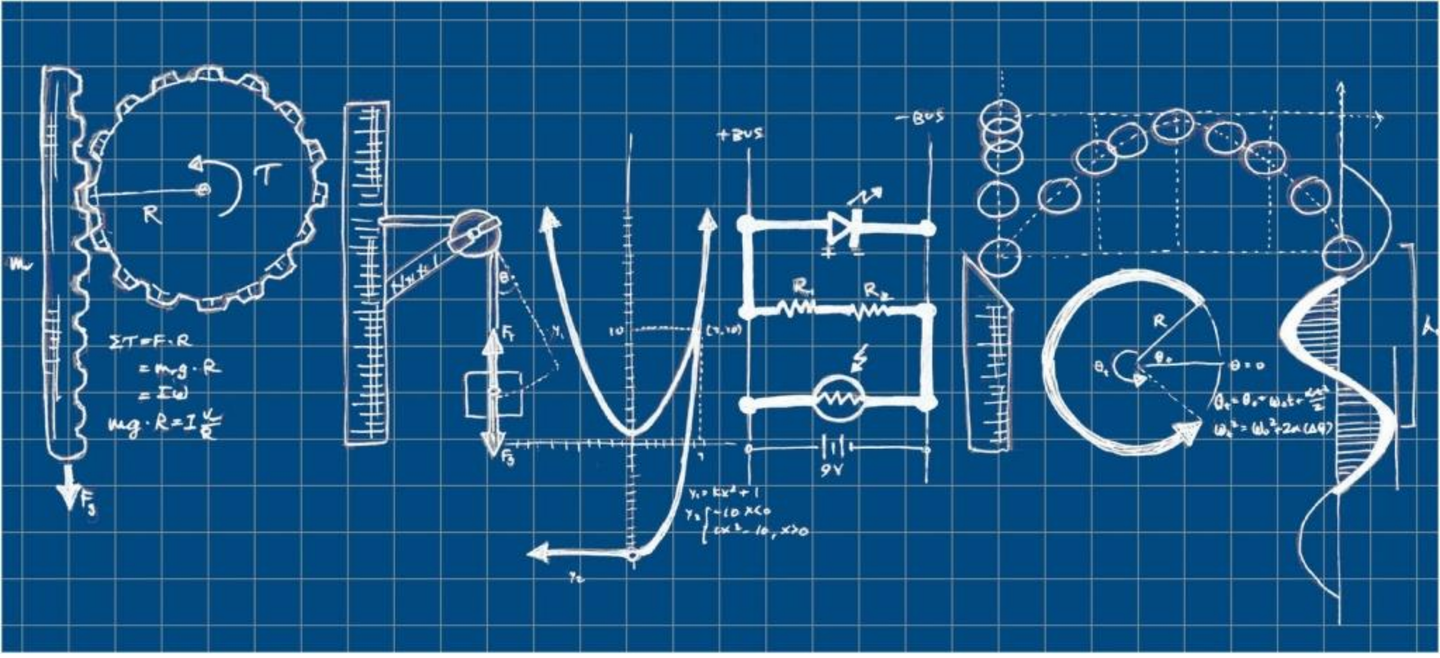


Year 8 Physics Unit 6 Knowledge Organiser

Class:

Name:


Magnets
N
S


Magnets
try
hint
0/2
002000

Week 1

Bar magnets

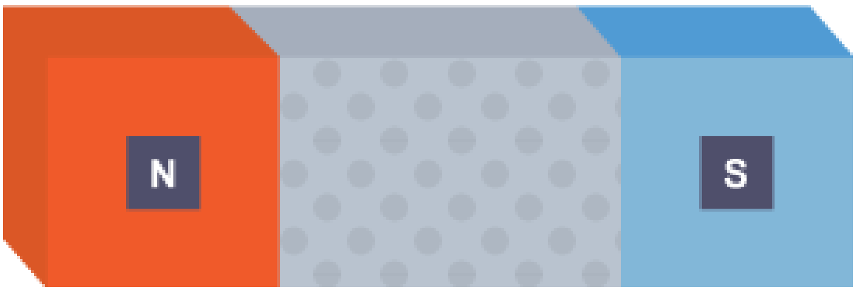
Most materials are not **magnetic**, but some are. A magnetic material can be magnetised or will be attracted to a magnet. These metals are magnetic:

- iron
- cobalt
- nickel

Steel is mostly iron, so steel is magnetic too.

A bar magnet is a **permanent magnet**. This means that its magnetism is there all the time and cannot be turned on or off. A bar magnet has two magnetic poles:

- **north pole** (or north-seeking pole)
- **south pole** (or south-seeking pole)



The north pole is normally shown as N and the south pole as S

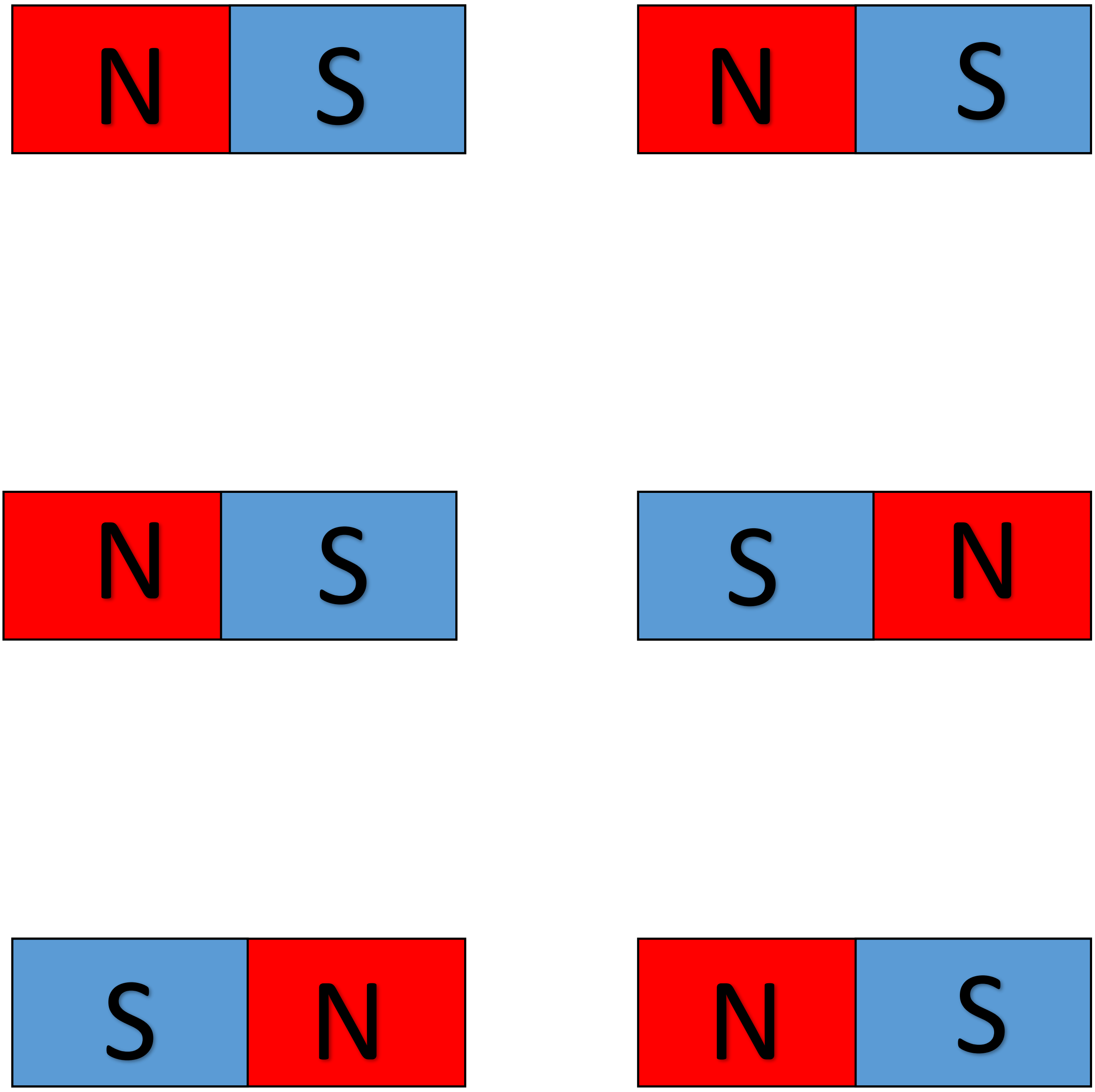
Attract and repel

If you bring two bar magnets together, there are two things that can happen, **attraction** and **repulsion**:

- if you bring a north pole and a south pole together, they attract and the magnets stick together
- if you bring two north poles together, or two south poles together, they repel and the magnets push each other away

We say that opposite poles attract, and like poles repel.

Test yourself – under each pair bar magnets, describe what will happen and use arrows to show this



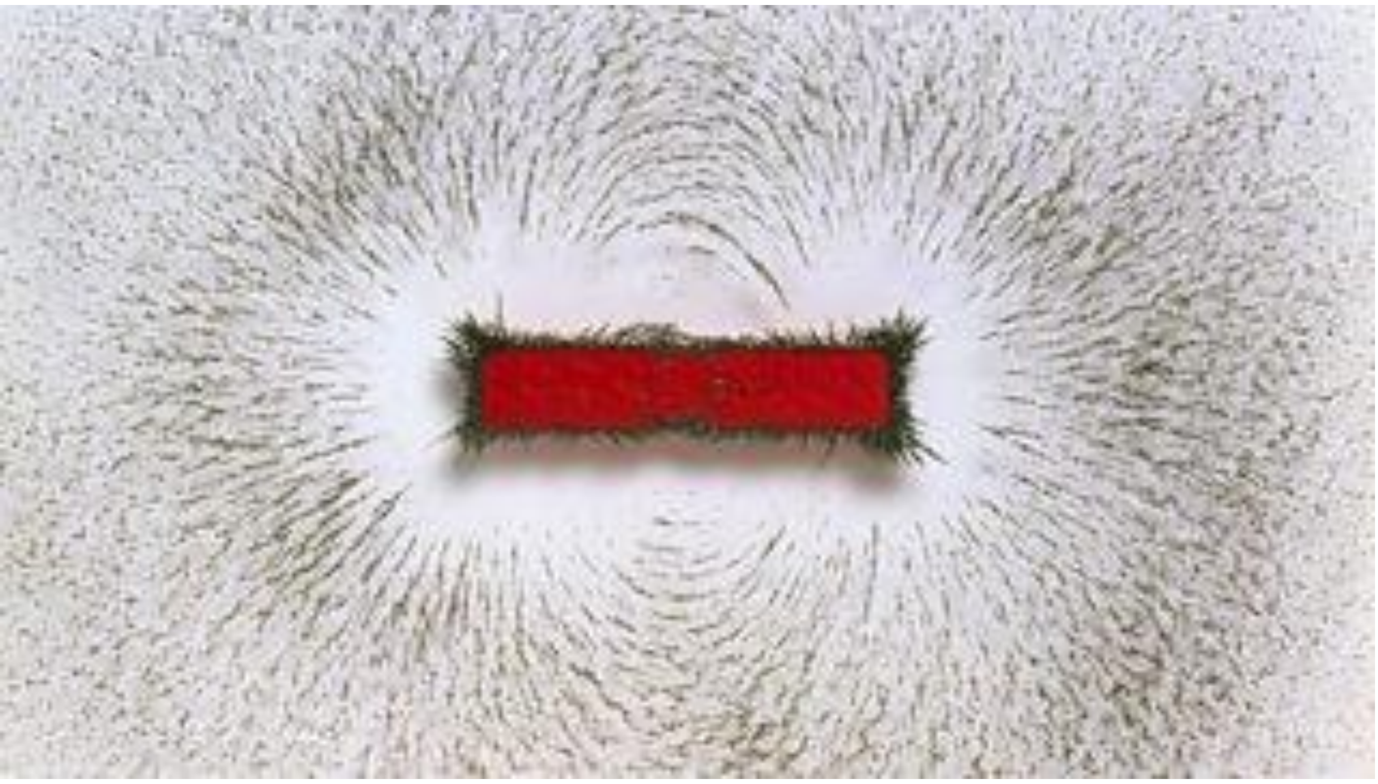
Magnetic fields

A magnet creates a **magnetic field** around it. You cannot see a magnetic field, but you can observe its effects. A force is exerted on a magnetic material brought into a magnetic field. The force is a **non-contact force** because the magnet and the material do not have to touch each other.

Finding magnetic fields

You can use a **plotting compass** or iron filings to detect a magnetic field:

1. put a piece of paper over a magnet (this stops the iron filings sticking to the magnet)
2. sprinkle iron filings onto the paper
3. gently tap the paper to spread the filings out
4. observe and record the results



Task

- What are the 4 magnetic materials?

-
-
-
-

How would you set a piece of apparatus to detect a magnetic field. Below list the instructions and equipment you would need

Method:

____

____

____

____

____

____

____

____

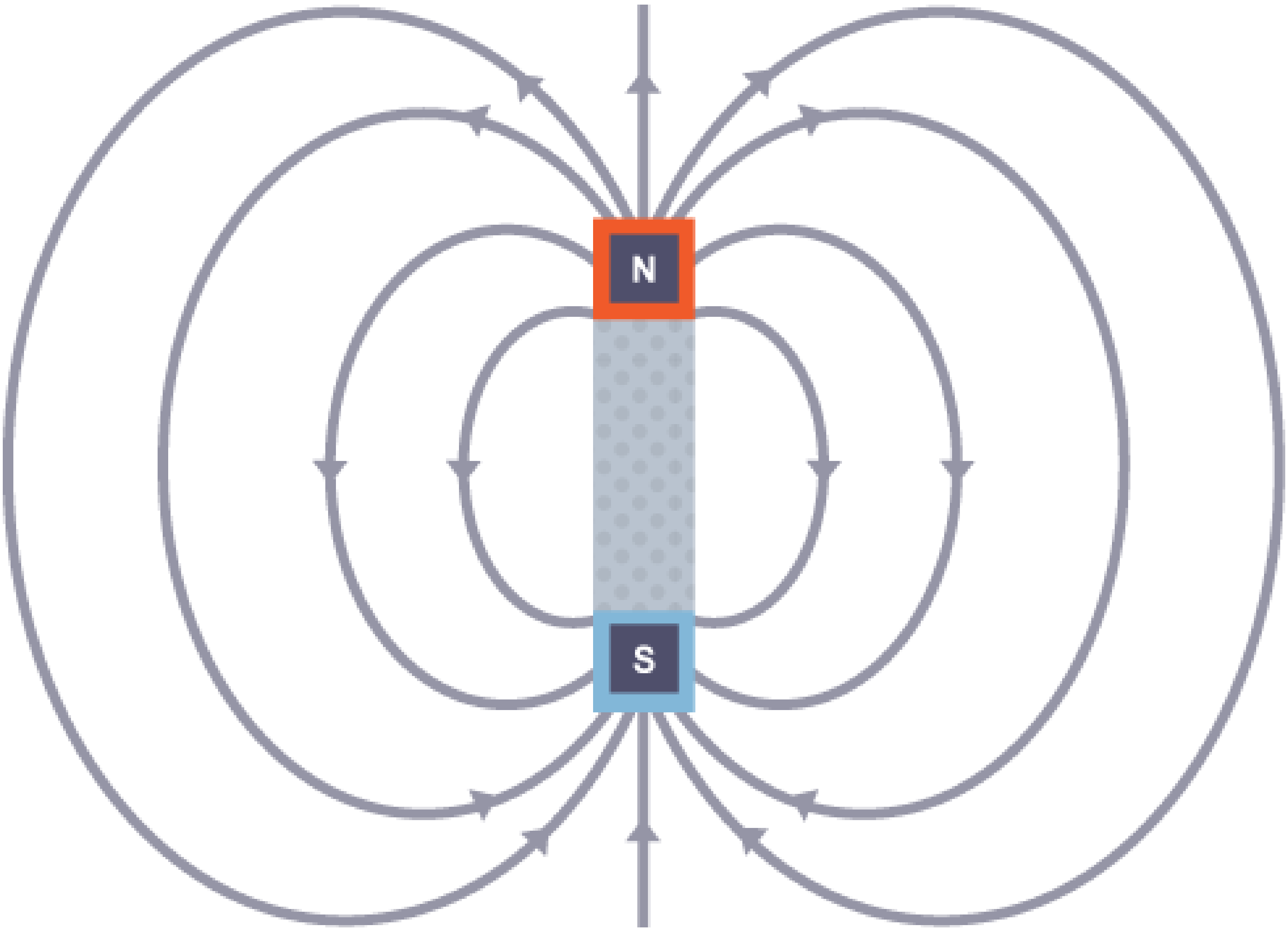
____

____

____

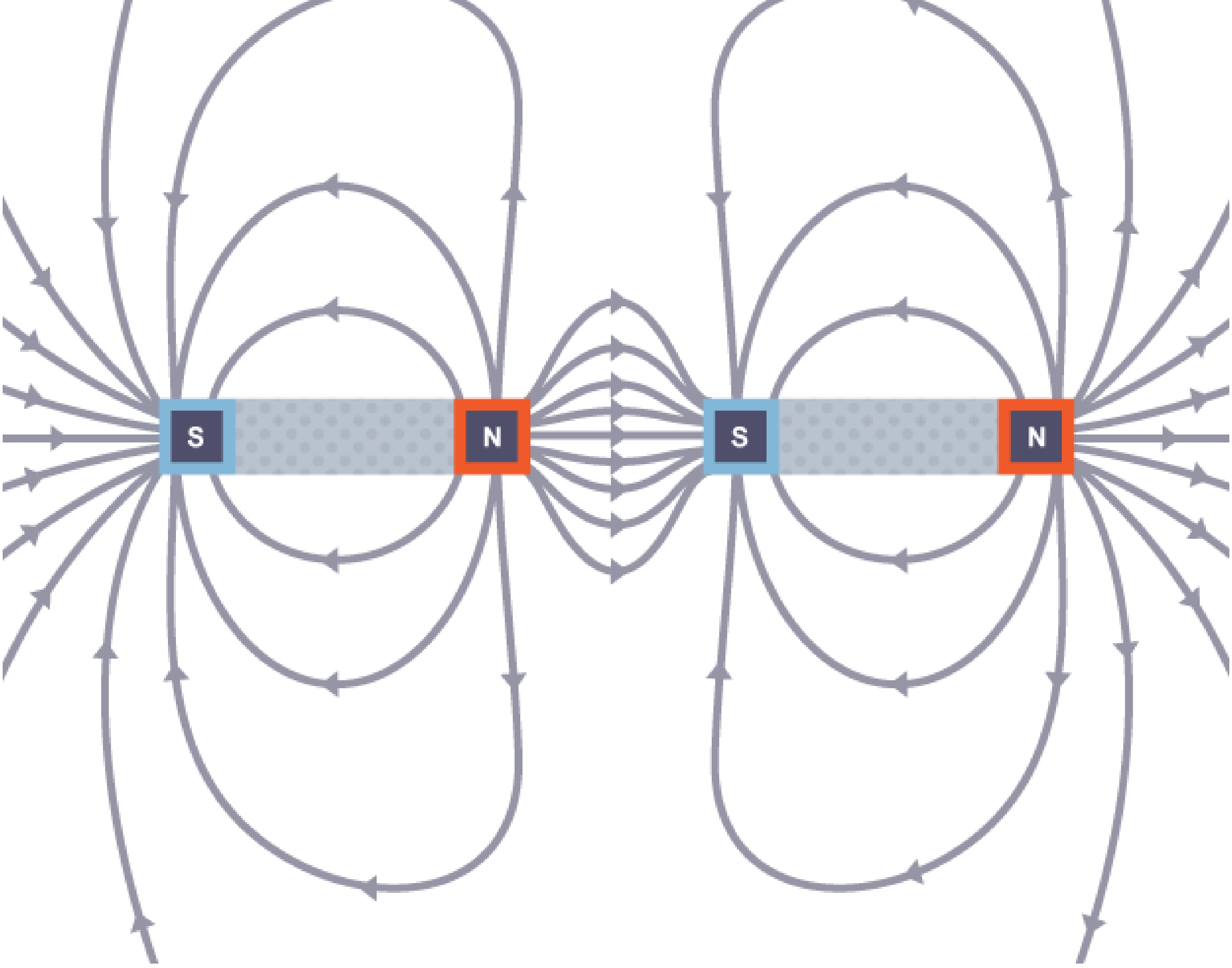
Drawing magnetic field diagrams

It would be difficult to draw the results from the sort of experiment seen in the photograph, so we draw simple magnetic field lines instead.

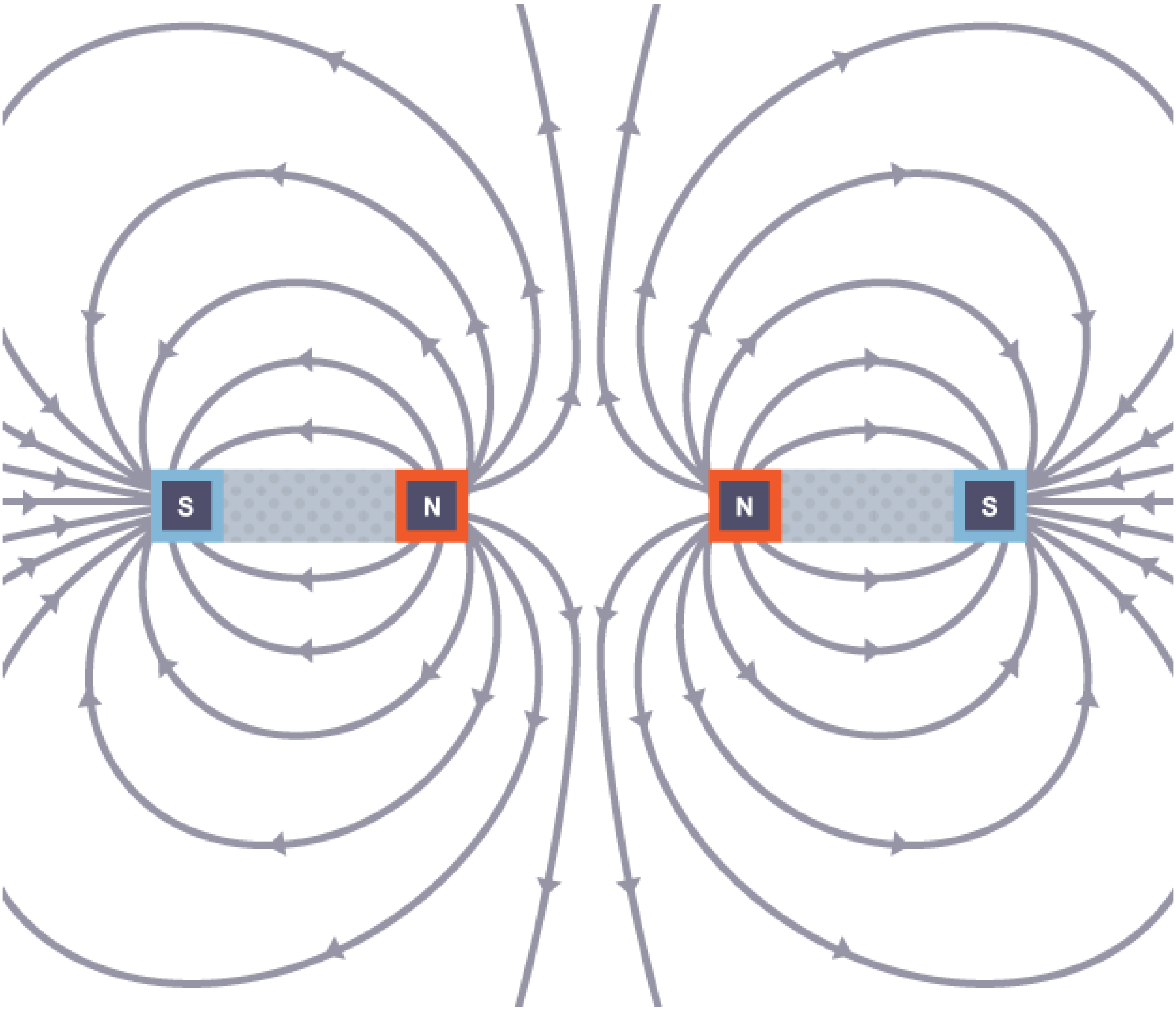


In the diagram, note that:

- each field line has an arrowhead on it
- the field lines come out of the north pole and go into the south pole
- the field lines are more concentrated at the poles



Field lines lead from one magnet to the other when the magnets attract each other



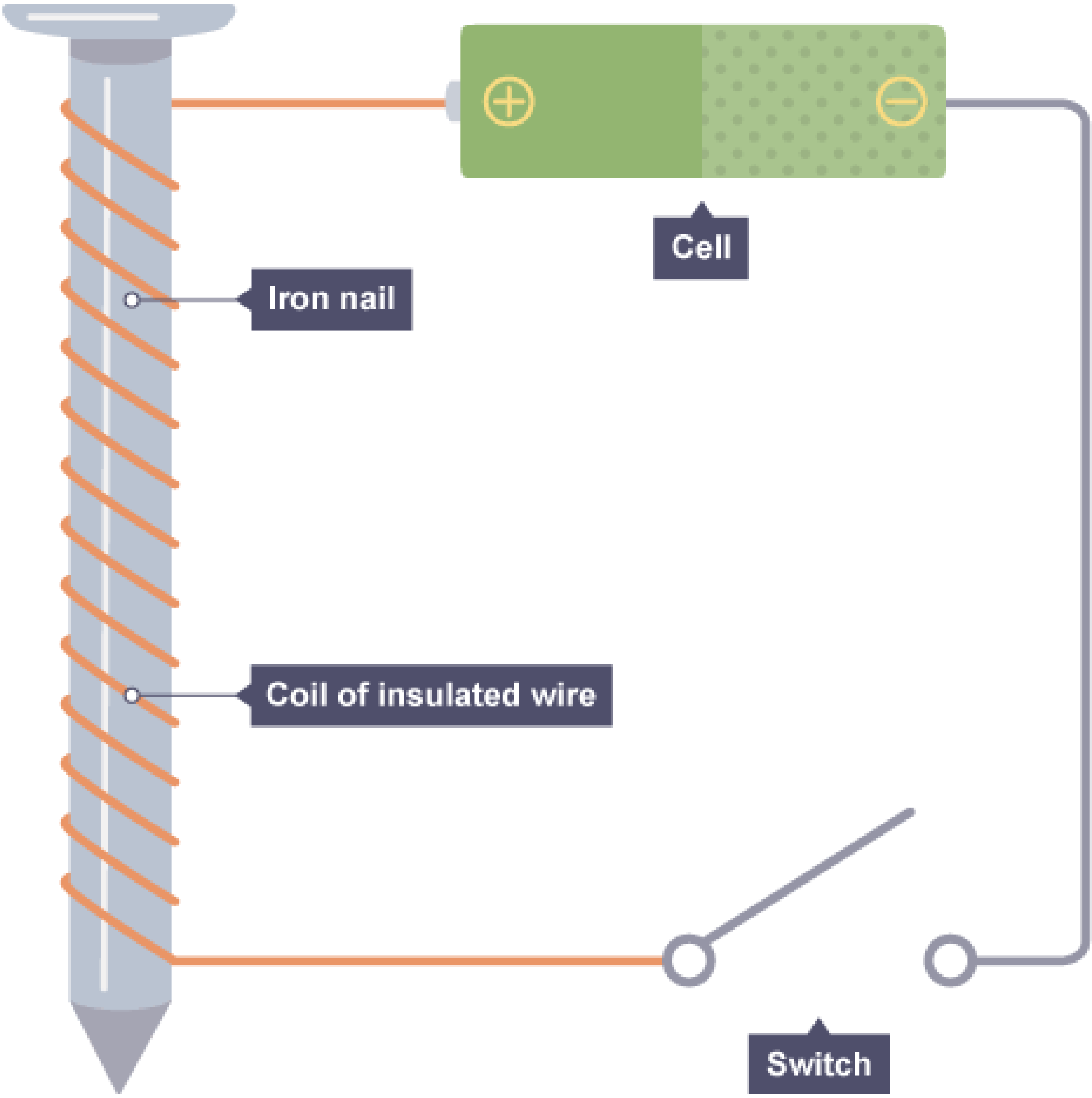
Field lines do not lead from one magnet to the other when the magnets repel each other

Add magnetic field lines to both of the diagrams below, remember to use arrows to help you

Week 2

Electromagnets

When an electric current flows in a wire, it creates a magnetic field around the wire. This effect can be used to make an **electromagnet**. A simple electromagnet comprises a length of wire turned into a coil and connected to a battery or power supply.



You can make an electromagnet stronger by doing these things:

- wrapping the coil around a piece of iron (such as an iron nail)
- adding more turns to the coil
- increasing the current flowing through the coil

Electromagnets have some advantages over permanent magnets. For example:

- they can be turned on and off
- the strength of the magnetic field can be varied

These properties make electromagnets useful for picking up scrap iron and steel in scrapyards.

An electromagnet being used in a scrapyard

Task:

- draw a circuit with an electromagnet and describe 3 way to increase the strength

Task:

- How does an electric bell use electromagnets to ring? Include a diagram

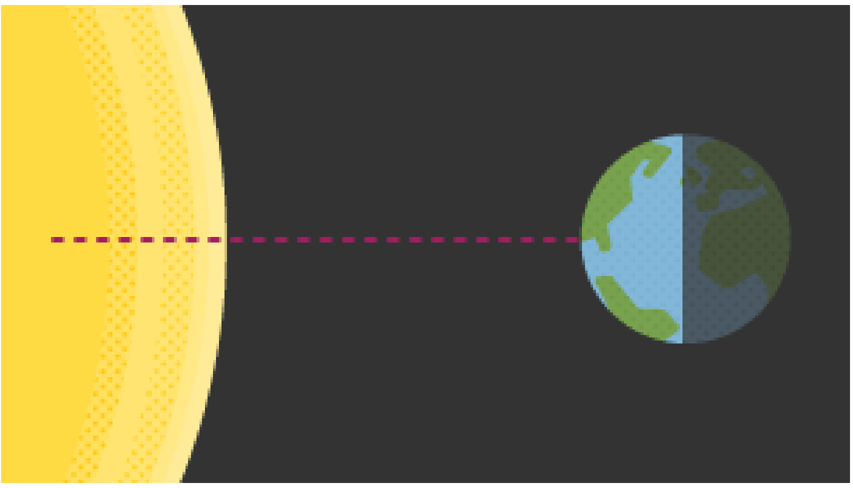
Week 3

Days and nights

A planet spins on its axis as it orbits the Sun. A **day** is the time it takes for a planet to turn once on its axis. An Earth day is 24 hours long.

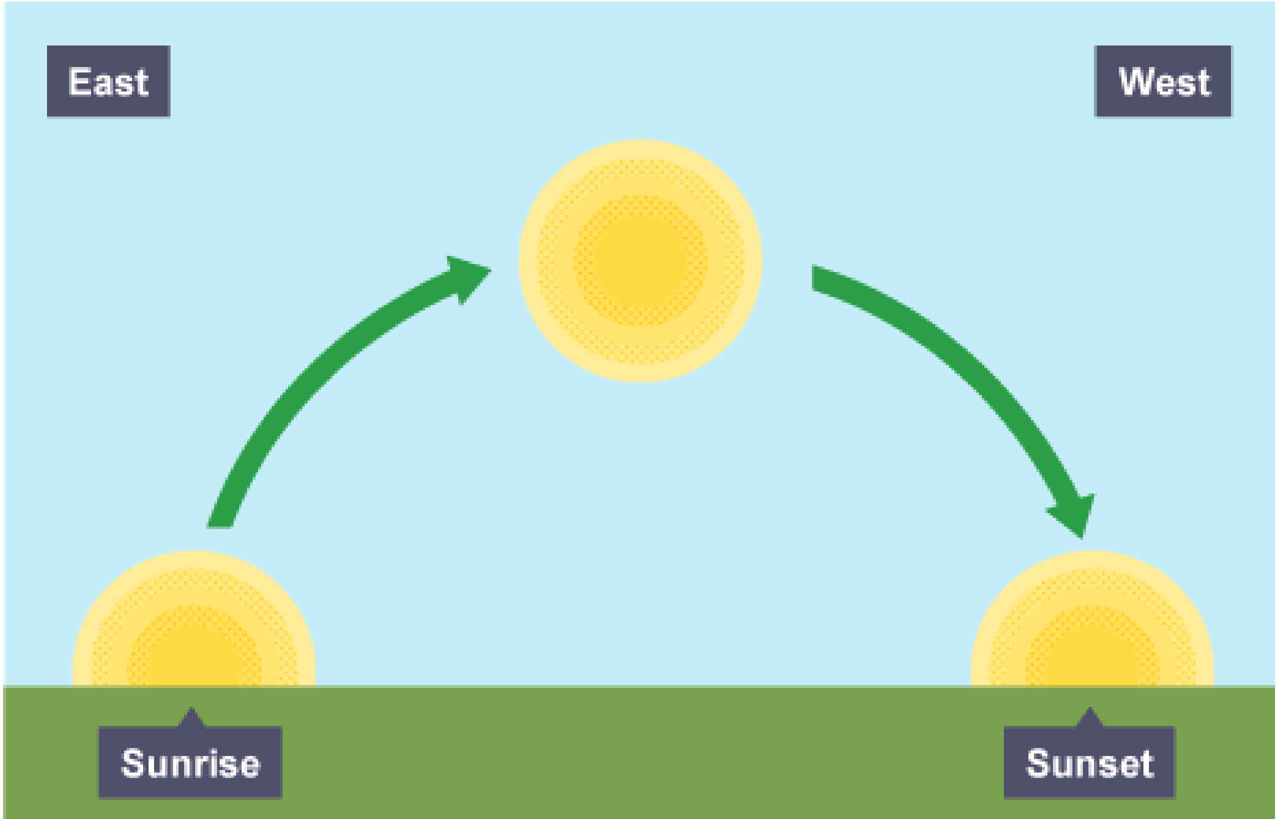
Day and night

The Sun lights up one half of the Earth, and the other half is in shadow. As the Earth spins we move from shadow to light and back to shadow and so on. It is daytime in the UK when our part of the planet is lit by the Sun. And it is night in the UK when our part of the planet is facing away from the Sun.



Path of the Sun

During the day, the Sun appears to move through the sky. Remember that this happens because the Earth is spinning on i axis. In the UK, if we look south and follow the path of the Sun the sky during the day, it looks like this:



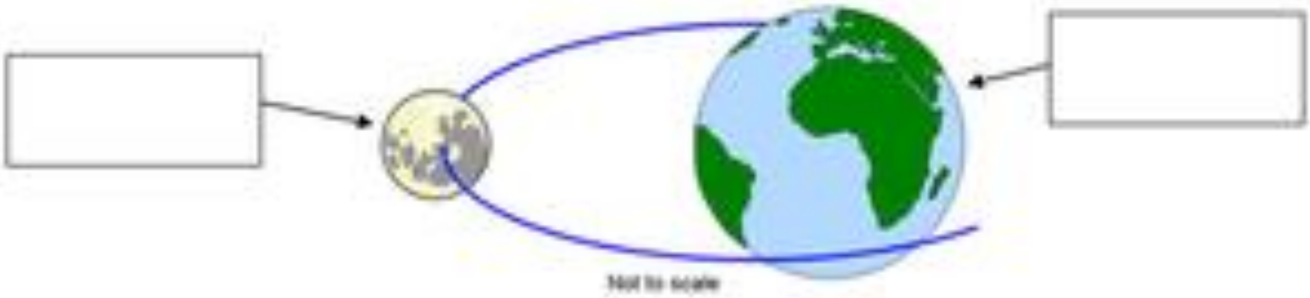
Days, Nights and Years

We experience day and night here on __________ because the planet ______ (spins). Countries having day-time are the ones that are ________ the Sun. No light reaches the countries not facing the Sun (on the 'Dark Side') and so it is __________ - _______. Those countries in daylight will be in darkness 12 hours later.

Every day the Earth spins on it's ________. It takes ___hrs for one whole spin.

Draw the diagram and shade on where it is night

Every ___ days the ________ orbits the Earth.



A year is ________ days. The _______ orbits the _______ once a year.

Key Words:

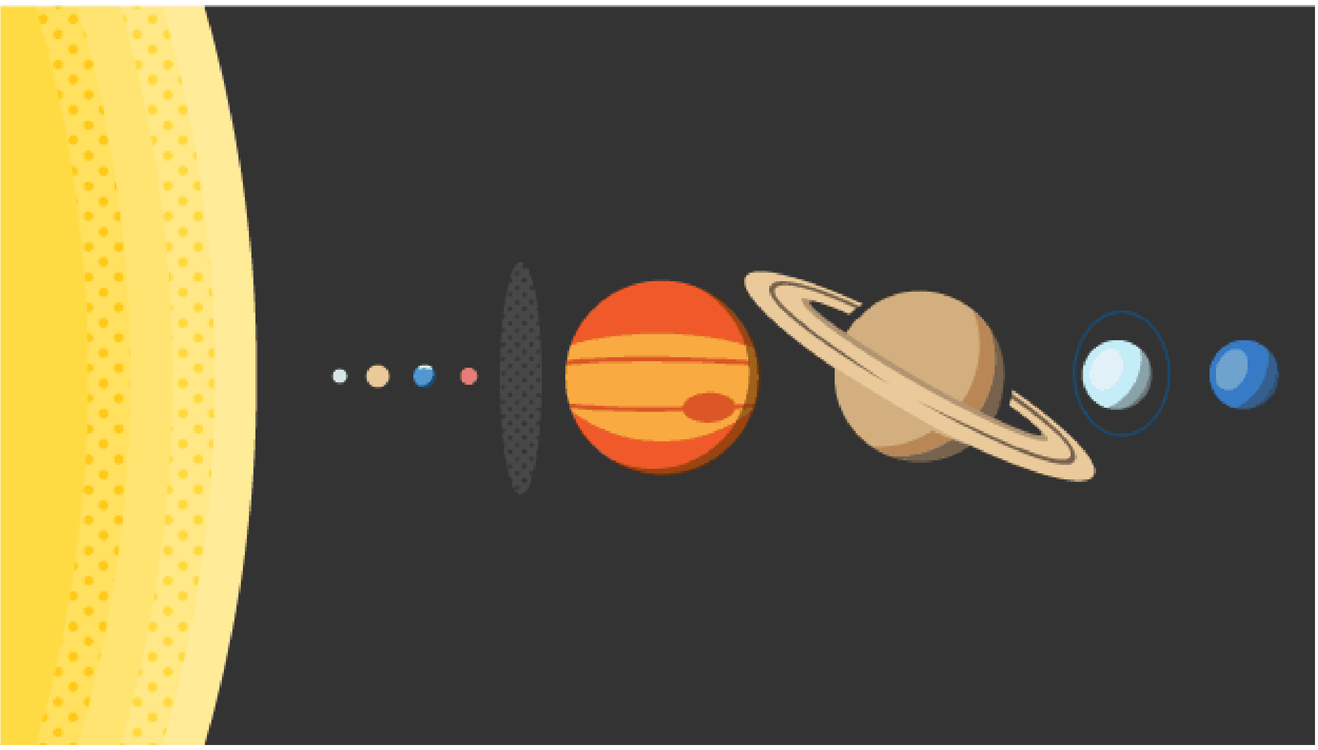
24, moon, rotates, Earth, 28, axis, night-time, Earth, facing, 365, sun

The Sun

The Sun is the largest object in the Solar System. The Sun's huge gravitational field keeps many other objects - planets, dwarf planets, asteroids and comets - in orbit around it.

Planets

The Earth is one of eight planets in the Solar System. The planets orbit the Sun at different distances.



The Sun and its planets - Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune

The different planets have different properties and conditions. In general, as the distance from the Sun increases:

- the temperature decreases, for example, Mercury is 430 °C whereas Neptune is -200 °C
- the time taken to orbit the Sun increases, for example, Mercury orbits once every 88 Earth days, but Neptune orbits once every 165 Earth years

For a planet to form, its own gravity must be strong enough to make it round or spherical in shape. Its gravitational field must also be strong enough to 'clear the neighbourhood', pulling smaller nearby objects into its orbit.

Moons

Moons are natural **satellites** that orbit a planet. Many planets have moons, and some planets have many moons - Saturn has more than 50. The Earth has just one moon - the Moon.

Dwarf planets

Pluto is a **dwarf planet**. The gravitational field of a dwarf planet is not strong enough to clear the neighbourhood, so there may be other objects in its orbit around the Sun. The Solar System contains hundreds of dwarf planets, including Ceres (the only dwarf planet in the asteroid belt).

LUMINOUS	28 DAYS	365¼	YEAR
DAY AND NIGHT		REFLECTS	
SUMMER AND WINTER			24 HOURS

Complete the sheet using the words in the box

The moon orbits the Earth every ____________________.

The moon is a non-luminous object which we can see because it ________________ the light from the Sun. The Sun is a ________________________ object because the light we see from it travels to Earth directly.

The Earth orbits the Sun every __________________ days. This length of time gives us our _______________. The Earth is tilted on its axis, which gives us _________________________________. The Earth rotates on its own axis once every _________________ and this is what gives us __________________________________.

1.The Sun is much bigger than the Moon, so why do they both look the same size from Earth?

____

____

What is the Star of our Solar System (the Milky Way) called?

____

1.The Moon is a natural satellite of Earth – what does this mean?

____

____

Week 4

Life Cycle of a Star

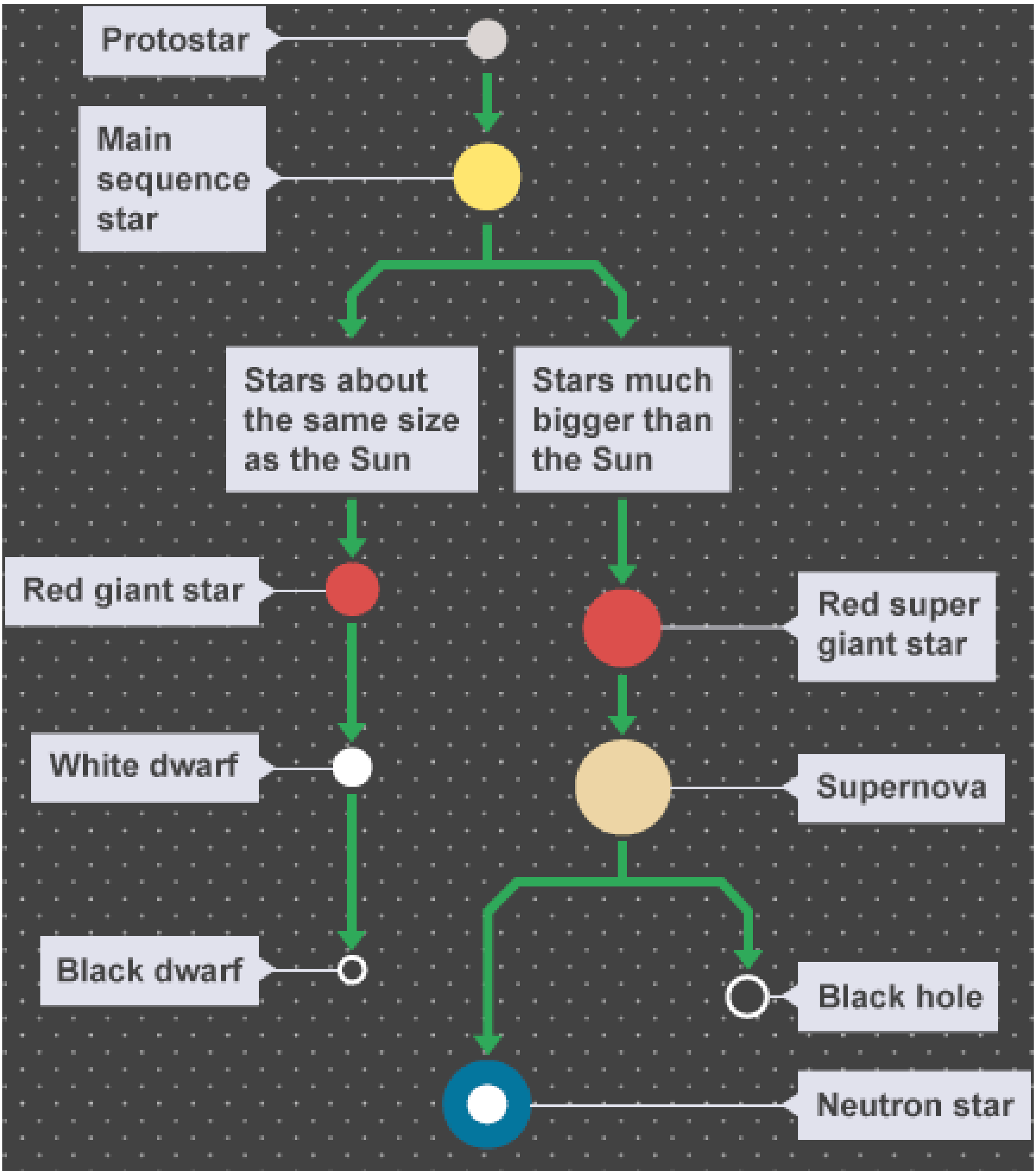
All stars begin life in the same way. A cloud of dust and gas, also known as a **nebula**, becomes a protostar, which goes on to become a **main sequence** star. Following this, stars develop in different ways depending on their size.

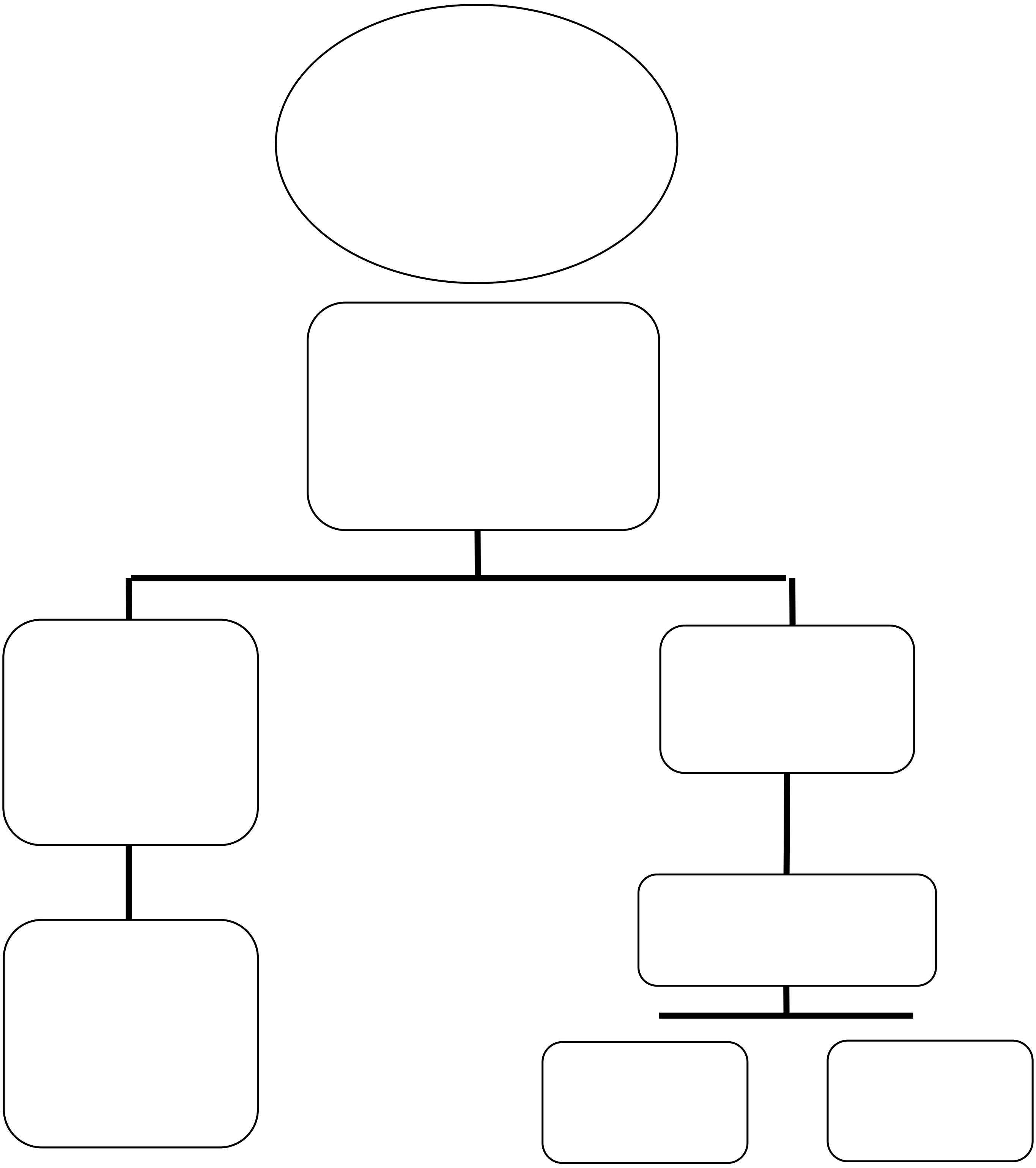
Stars that are a similar size to the Sun follow the left hand path:

red giant star → white dwarf → black dwarf

Stars that are far greater in mass than the Sun follow the right hand path:

red super giant star → **supernova** → neutron star, or a black hole (depending on size)

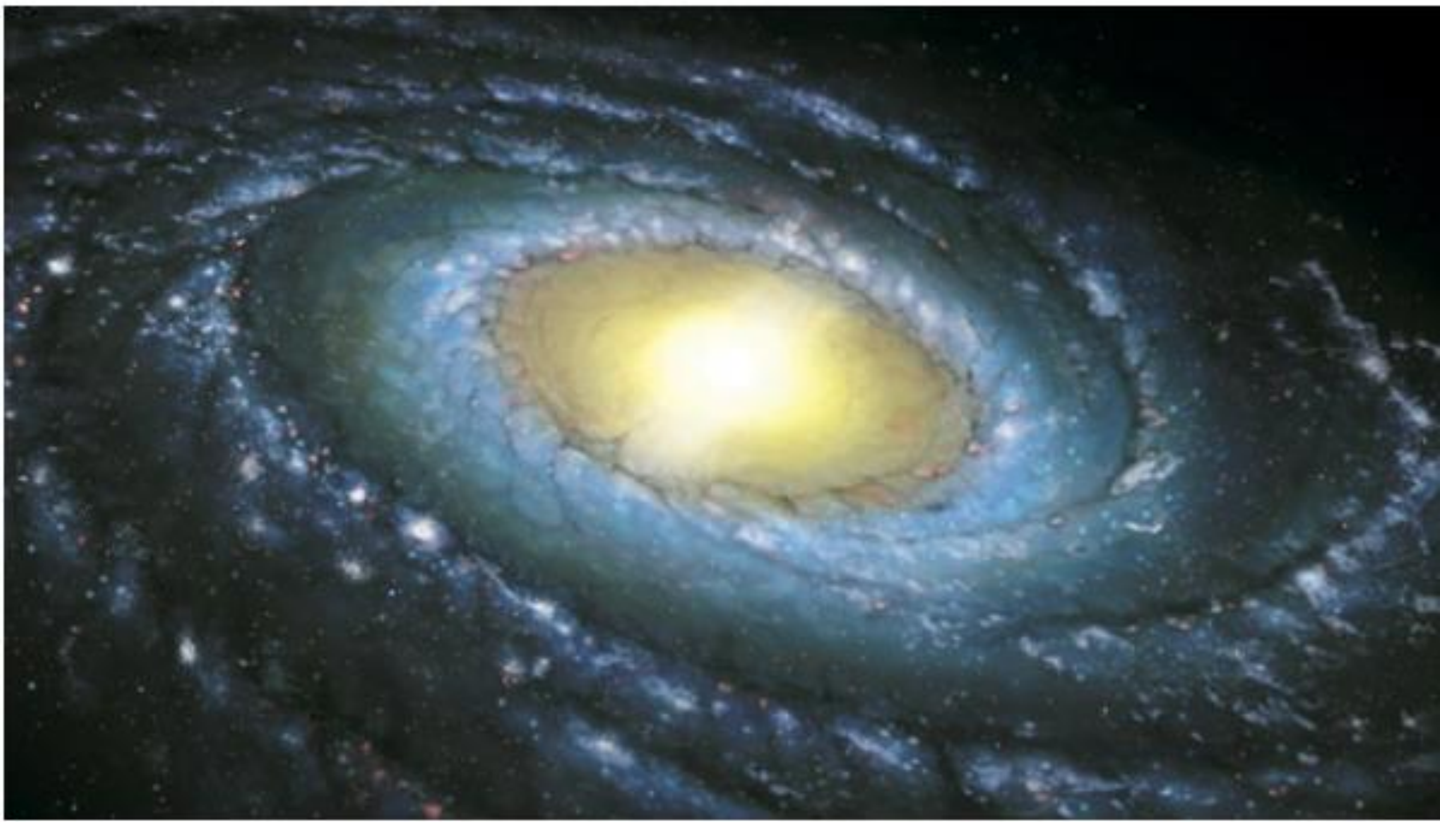




- Using this flow chart, fill in the information to show the life cycle of a star

The Big Bang

Scientists have gathered a lot of evidence and information about the universe. They have used their observations to develop a theory called the Big Bang. The theory states that originally all the matter in the universe was concentrated into a single incredibly tiny point. This began to enlarge rapidly in a hot explosion, and it is still expanding today. This explosion is called the Big Bang, and happened about 13.7 billion years ago (that's 13,700,000,000 years using the scientific definition of 1 billion = 1,000 million).



Big Bang Theory

According to the **Big Bang** theory, about 13.8 billion years ago the whole Universe was a very small, extremely hot and dense region. From this tiny point, the whole Universe expanded outwards to what exists today.

Evidence from red-shift

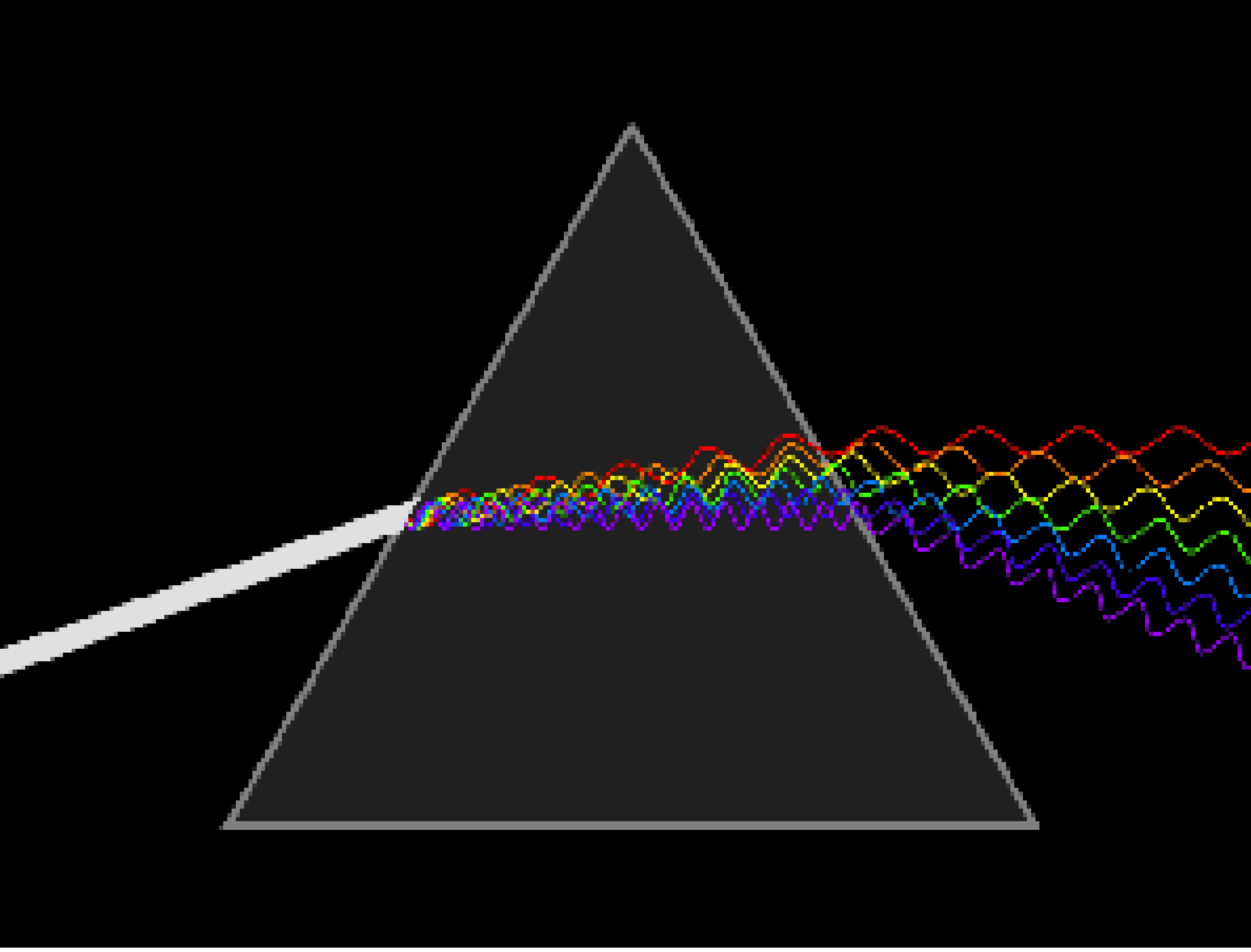
Astronomers have discovered that, in general, the further away a galaxy is, the more red-shifted its light is. This means that the further away the galaxies are, the faster they are moving. This is similar to an explosion, where the bits moving fastest travel furthest from the explosion. Red-shift data provides evidence that the Universe, including space itself, is expanding.

The Big Bang Theory

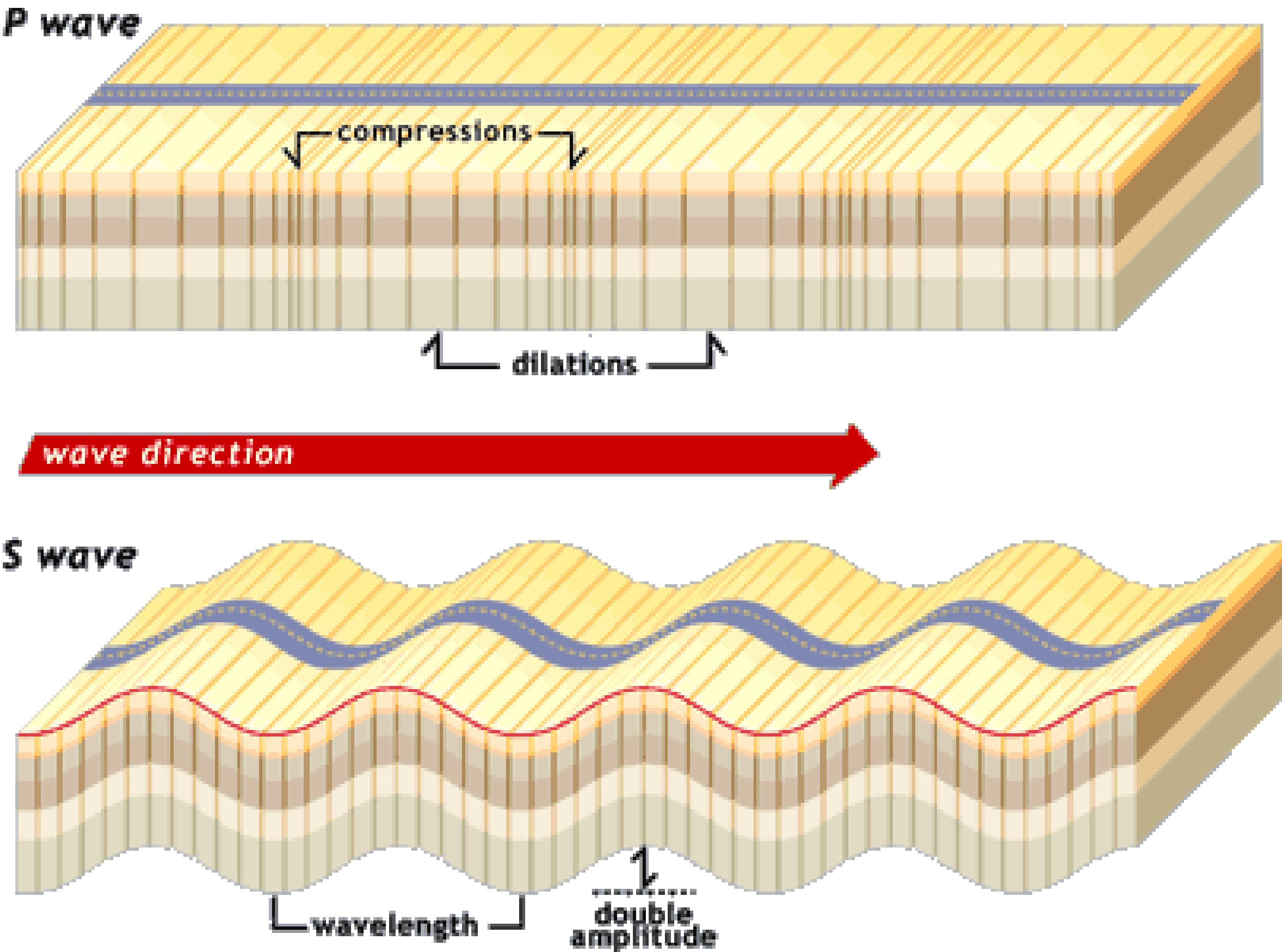
- State 2 facts about the present state of the Universe.
- How does an expanding Universe provide evidence for the Big bang theory?
- What is the Cosmic Microwave Background radiation?
- What other evidence is there for the Big Bang theory?
- What could you say about the future of the Universe if the galaxies were slowing down?
- Galaxy X has a larger red-shift than galaxy Y.
- Which galaxy, X or Y, is nearer to us?
- Which is moving away faster?

The light from the Andromeda galaxy is not red-shifted. What does this tell you about Andromeda?

Week 5



Waves

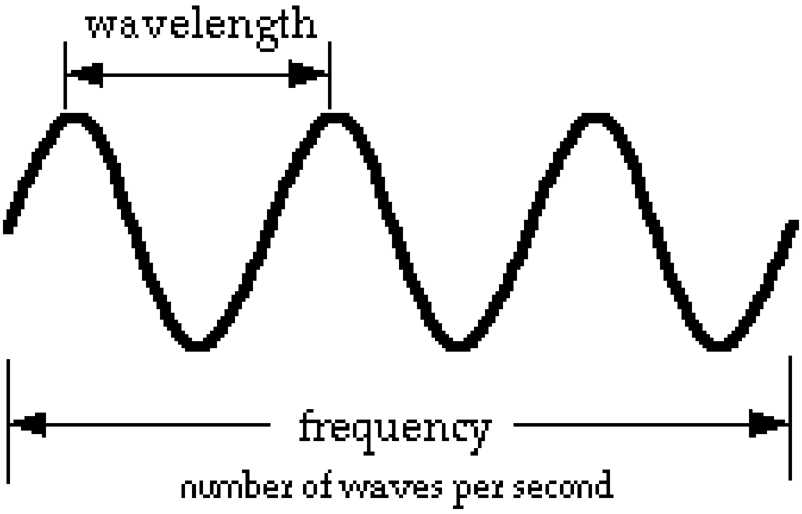

P wave
compressions
dilations
wave direction
S wave
wavelength
double
amplitude

Light Waves

- Light travels in **waves.**
- Light waves travel in **straight lines.**
- Light waves travel **faster** than sound waves.

- **How does light move?**
- Light travels as waves. Light waves don't always need particles to travel through. They can also travel through **outer space** or a **vacuum.**
- Light waves travel in straight lines. You can detect them with your eyes, and also with instruments such as cameras. They are **reflected** by mirrors and **change direction** when they travel from the air into glass or water.

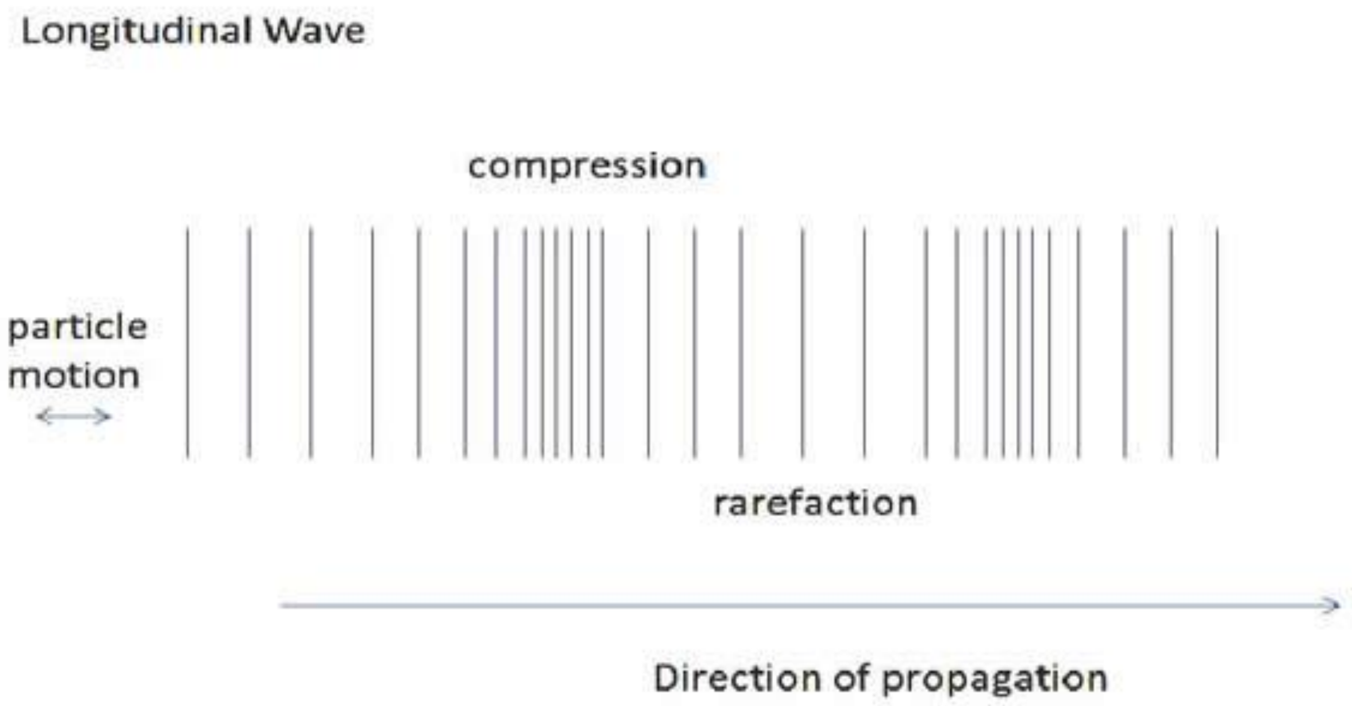
- In **transverse waves**, the vibrations are at right angles to the direction of wave travel.



Sound Waves

- Sounds are produced by **vibrations**.
- Sound travels as **waves**, which are vibrating particles.
- Sound waves are **reflected** by surfaces.

- **How is sound produced?**
- When you bang a drum its skin vibrates. The harder you bang, the bigger the vibrations. The vibrating drum skin causes nearby **air particles** to vibrate, which in turn causes other nearby air particles to vibrate. These vibrating particles make up a **sound wave**.



Test Yourself

What are the main differences longitudinal and transverse waves?

- use a diagram to show this

Week 6

Reflection of waves

Waves - including sound and light - can be reflected at the boundary between two different materials. The reflection of sound causes echoes.

The law of reflection states that:

angle of incidence = angle of reflection

For example, if a light ray hits a surface at 32°, it will be reflected at 32°.

The **angles of incidence** and **reflection** are measured between the light ray and the **normal** - an imaginary line at 90° to the surface. The diagrams show a water wave being reflected at a barrier, and a light ray being reflected at a **plane** mirror.

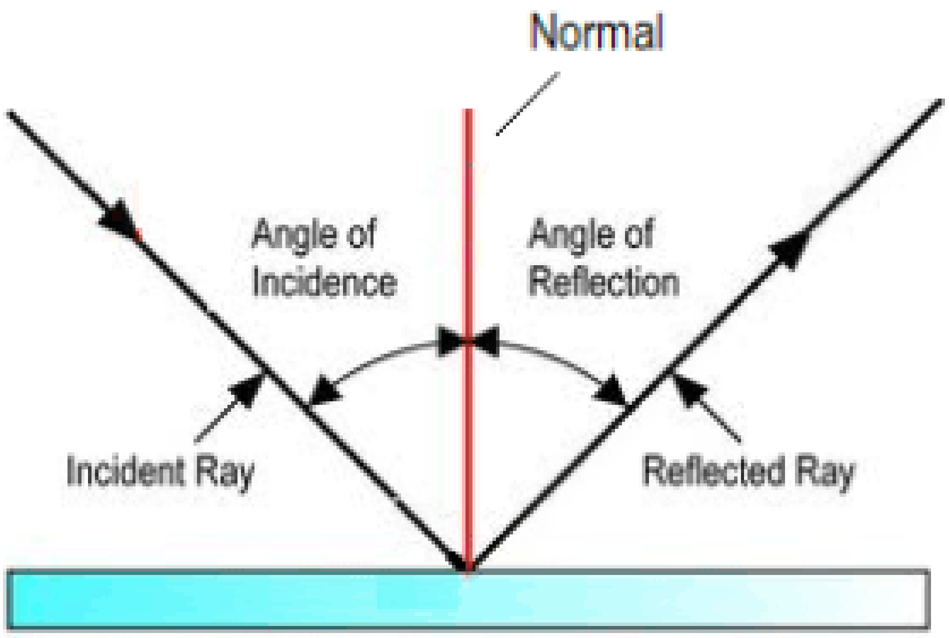
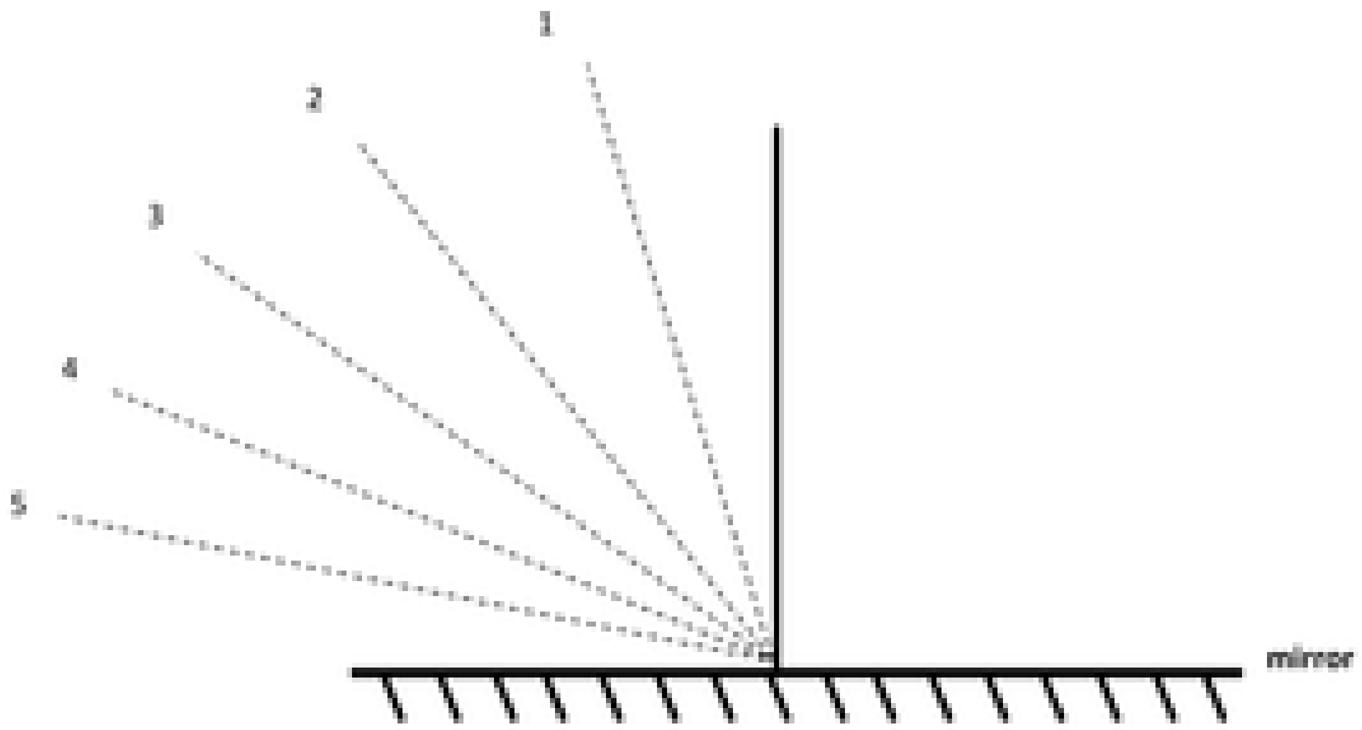


Fig. 1

Complete the table and angles below, you need to use a protractor



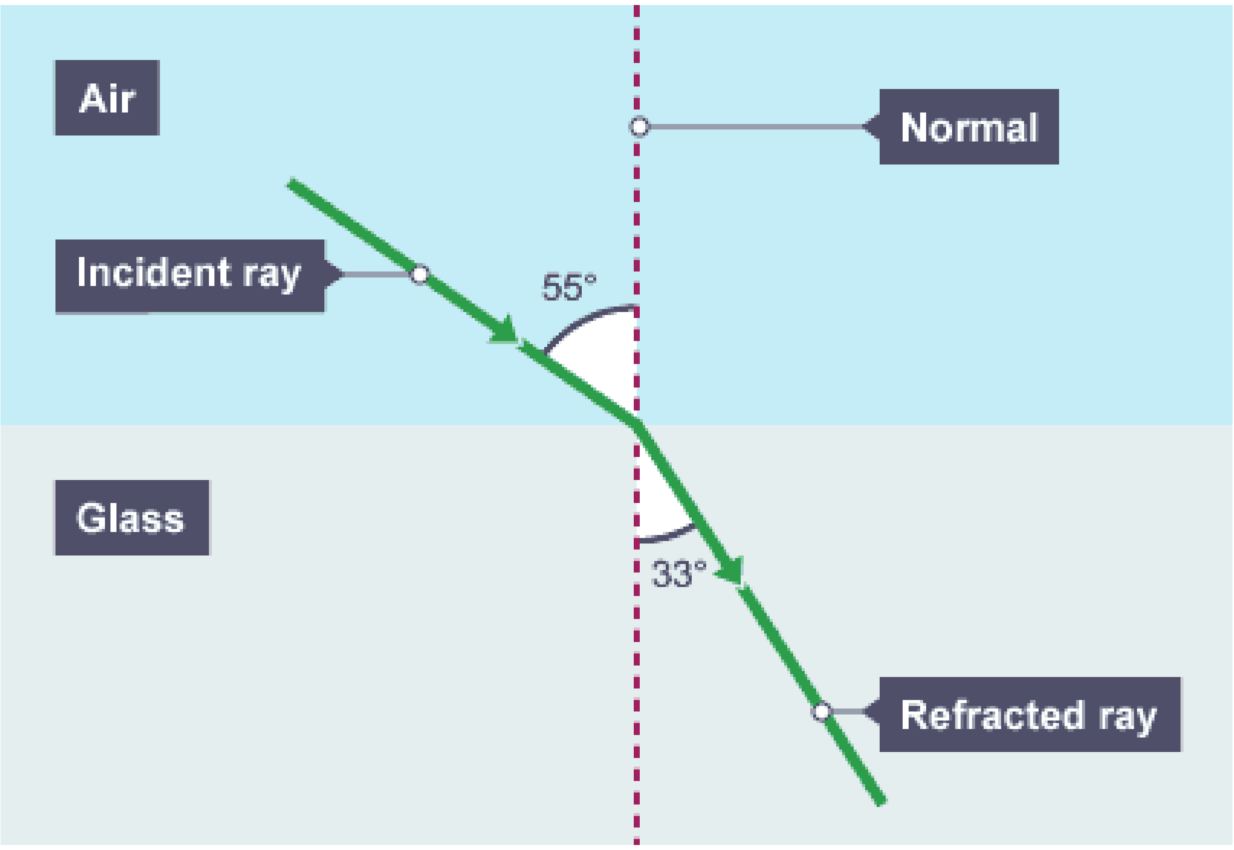
Measuring angles using protractor:

	Angle of incidence	Angle of reflection
1		
2		
3		
4		
5		

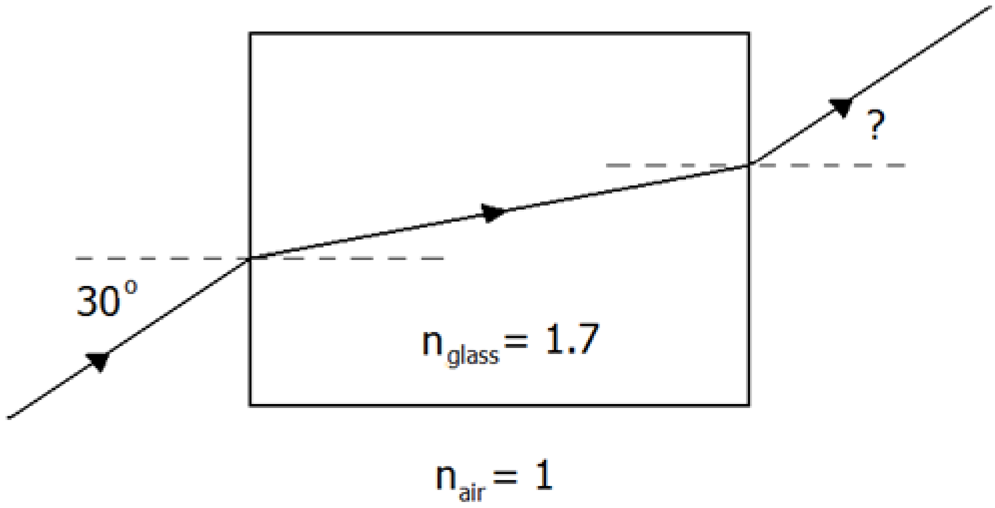
Refraction of waves

Different materials have different densities. Light waves may change direction at the boundary between two transparent materials. **Refraction** is the change in direction of a wave at such a boundary.

It is important to be able to draw **ray diagrams** to show the refraction of a wave at a boundary.



- Using your knowledge, find ?



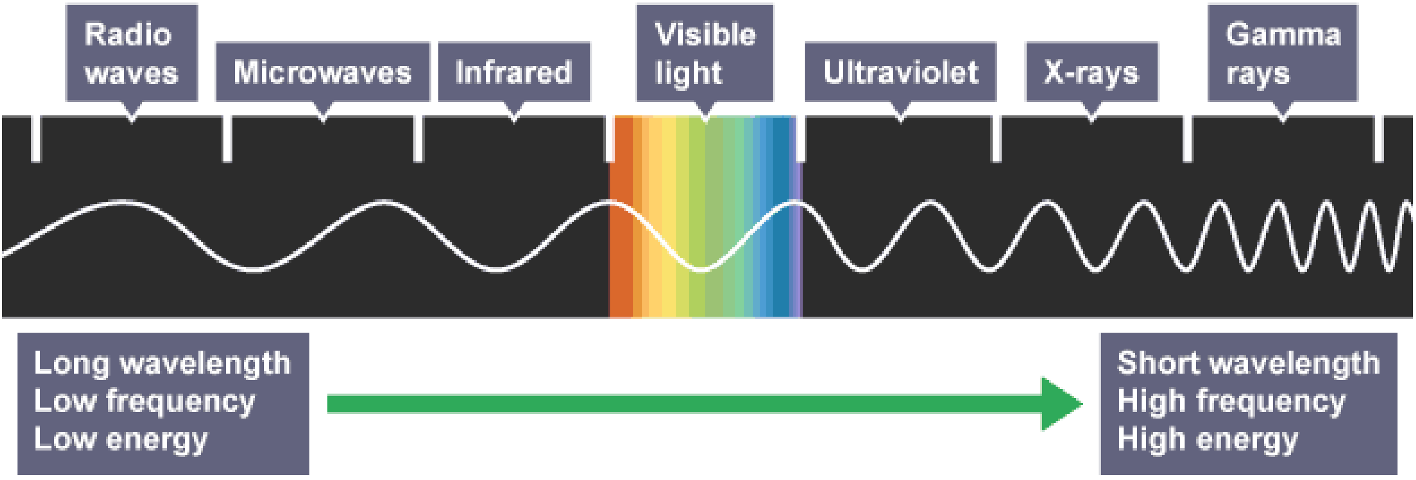
Week 7

Electromagnetic spectrum

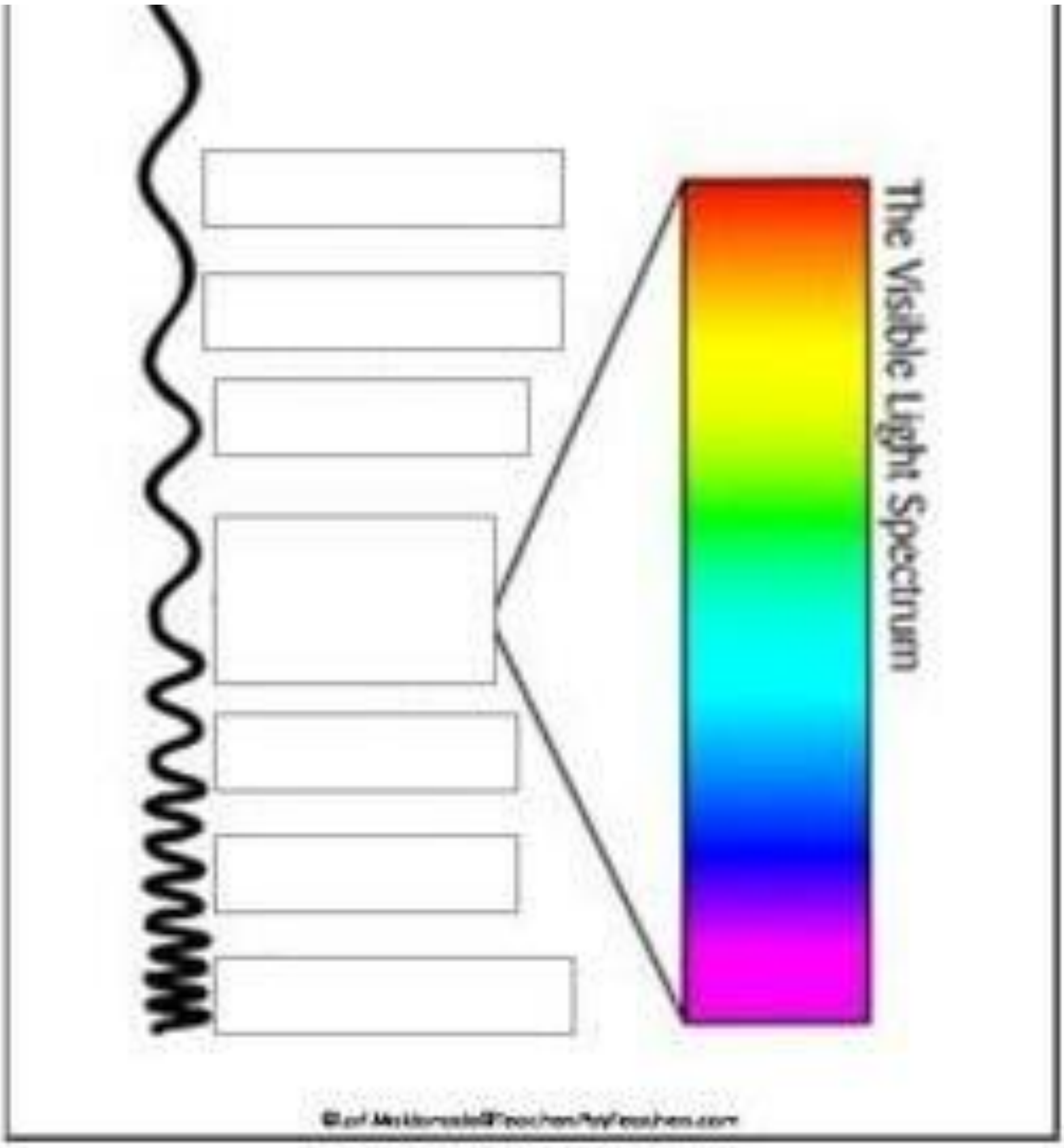
Electromagnetic waves form a continuous **spectrum** of waves. This includes:

- waves with a very short **wavelength**, high **frequency** and high energy
- waves with a very long wavelength, low frequency and low energy

Electromagnetic waves can be separated into seven distinct groups in the spectrum.



Test Yourself



Uses

Gamma Rays	• kill bacteria in food • sterilise medical equipment • treat tumours	 
X-Ray	• imaging internal structures in the body • studying the atomic structure of materials	
Ultraviolet (UV)	• fluorescent tubes • tanning • security marking	 
Visible Light	• seeing • optical fibres communication	 
Infrared (IR)	• radiant heaters • grills • remote controls • thermal imaging	 
Microwaves	• satellite communication • cooking	 
Radio Waves	• communication • broadcasting • radar	 

11.2 Essential Questions

- What are the main divisions of the electromagnetic spectrum?
- What are the properties of each type of electromagnetic wave?
- What are some common uses of each type of electromagnetic wave?