

## Highsted Knowledge Organiser, Science, Term 3, Year 8: Earth

### What I need to know

Earth Structure-  
Rock Cycle-  
Solar System-  
Seasons-  
Atmosphere-  
Climate Change-  
Acid Rain-  
Carbon Cycle-  
Metal Extraction-  
Reuse, Recycle and Reduce-

### Key Vocabulary: Sedimentary Rocks

1. **Weathering** (rock sediments are loosened from the surface of the rock e.g. by rain, ice, heat etc.)
2. **Erosion** (rock sediments are worn away/ broken off)
3. **Transportation** (rock pieces moved further away, e.g. by a river)
4. **Sedimentation** (rock pieces collect in layers)
5. **Compaction** (sediments squashed together)
6. **Cementation** (sediments 'glued' together by minerals)

### Igneous Rocks

**Extrusive rock** – when the rock forms above the surface of the earth from lava after a volcanic eruption.

**Intrusive rock** – when the rock forms underground from magma.

**Deforestation**- the cutting down of large areas of forest

**Green house effect**- the solar radiation that is trapped by the green house gases in Earth's atmosphere

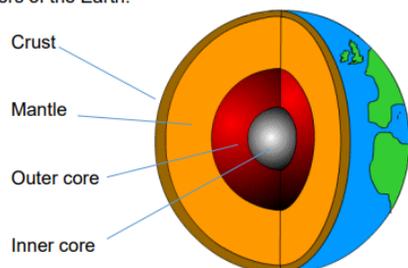
**Greenhouse gases**- carbon dioxide, methane, water vapour

**Climate Change**- the local term change in weather patterns, also called Global Warming due the rise in the average temperature of the Earth

**Ore**- rock containing mineral and metal oxides that can be extracted to become pure metals

### Student reference point

The layers of the Earth:



### Sedimentary Rocks:

Formed from layers of sediment, and can contain fossils. Examples are limestone, chalk and sandstone.

### Igneous Rocks

Formed from cooled magma, with minerals arranged in crystals.

Examples are granite, basalt and obsidian.

The size of the crystals depends on how quickly they cooled. Large = it cooled slowly, small = it cooled quickly.



### **Metamorphic Rocks**

Formed from existing rocks exposed to heat and pressure over a long time.

Earth movements can put pressure on buried rocks and proximity to magma can cause chemical changes.

Examples are marble, slate and schist.

### **Solar System**

The Earth orbits the Sun, the Moon orbits the Earth. The rotation of the Earth takes 24 hours and is the reason for day and night time. It takes 365 days (1 year) for the Earth to orbit the Sun.

There are eight planets in our solar system: **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune**

**Seasons:** Opposite halves of the hemisphere experience different seasons. The tilt of the Earth causes the seasons. More direct sunlight causes the Earth to be warmer.

**Atmosphere:** The air is: 78% nitrogen; 21% oxygen; 0.04% carbon dioxide; and other gases

**Climate Change:** Caused by the combustion (burning fossil fuels); population growth; deforestation; intensive farming; rice fields; decomposition

The raising of carbon dioxide levels (and other greenhouse gases)

**Acid rain:** sulphur dioxide and nitric oxides are released into the air, mix with water and oxygen to form sulfuric and nitric acid to then fall to the Earth in rain

**Respiration-** glucose + oxygen -> carbon dioxide + water

**Photosynthesis-** carbon dioxide + water -> glucose + oxygen

**Combustion-** the burning of fuel with oxygen to release carbon dioxide and water

Adding carbon dioxide to the atmosphere: respiration, combustion

Removing carbon dioxide from the atmosphere: photosynthesis, dissolving in oceans

**Carbon stores:** plants and animals; atmosphere; fossil fuels; sedimentary rock; oceans, soil

Metal extraction: Electrolysis (using electricity); Smelting with carbon; appear as pure metals

Displacement reaction- carbon steals the oxygen from the metal oxide leaving a pure metal

### **Challenge question**

How can we, as a society, reduce our carbon footprint?

### **Suggested reading**

[The Earth and atmosphere - KS3 Chemistry - BBC Bitesize](http://bbc.co.uk/bitesize/topics/z3fv4wx), [bbc.co.uk/bitesize/topics/z3fv4wx](http://bbc.co.uk/bitesize/topics/z3fv4wx)

[Climate change - KS3 Geography - BBC Bitesize - BBC Bitesize](http://bbc.co.uk/bitesize/topics/zx38q6f/articles/z773ydm), [bbc.co.uk/bitesize/topics/zx38q6f/articles/z773ydm](http://bbc.co.uk/bitesize/topics/zx38q6f/articles/z773ydm)

[Extracting metals - The reactivity series - KS3 Chemistry - BBC Bitesize - BBC Bitesize](http://bbc.co.uk/bitesize/topics/z3ksp4j/articles/zwdxtrd), [bbc.co.uk/bitesize/topics/z3ksp4j/articles/zwdxtrd](http://bbc.co.uk/bitesize/topics/z3ksp4j/articles/zwdxtrd)

## Highsted Knowledge Organiser, Science, Term 4, Year 8: Waves

### What I need to know

#### Waves

Frequency and pitch

The ear and hearing

Echoes

How age affects hearing

Electromagnetic spectrum

Transmission and absorption

Reflecting and refracting light

Colour

### Key Vocabulary:

amplitude; angle of incidence;  
 angle of reflection; auditory canal;  
 auditory nerve; diffuse scattering;  
 ear drum; frequency; hertz; law of  
 reflection; lens; longitudinal;  
 oscillation; peak; photoreceptors;  
 primary colour; refraction;  
 secondary colour; transverse;  
 trough; ultrasound; wave;  
 wavelength

### Challenge question:

What are the links between types of waves and their uses?

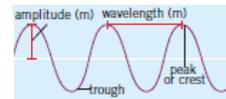
### Suggested reading:

[www.kerboodle.com](http://www.kerboodle.com)

<https://www.bbc.co.uk/bitesize/topics/zw982hv>

### Properties of waves

- A **wave** is an **oscillation** or **vibration** which transfers energy from one place to another
- Amplitude** – the distance from the middle to the top or bottom of the wave
- Wavelength** – the distance between a point on the wave to the same point on the next wave
- Trough** – The bottom of the wave
- Peak** – The top of the wave
- Frequency** – How many waves pass a fixed point per second, measured in Hertz (Hz)



There are two main types of waves:

#### Transverse waves, e.g. light

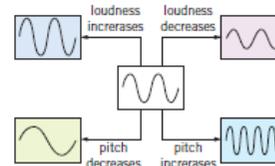
- Travel at 90° direction of energy transfer
- Do not need a medium to travel through

#### Longitudinal waves, e.g. sound

- Travel in the direction of energy transfer
- Need a medium to travel through

### Sound waves

- Sound waves are caused by the vibration of particles, sound travels quicker in a solid than a gas as the particles are closer together
- Oscilloscopes** display sound waves on a screen
- Humans can hear between 20–20000 **hertz** (Hz), but other animals have different ranges of hearing
- Sound waves above 20000 Hz are known as **ultrasound**, these sound waves are too high pitched for humans to hear

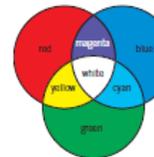


### Hearing

- The **pinna** directs sound along the **auditory canal** to the **eardrum** which will vibrate
- The vibration from the ear drum moves onto the ossicles which amplifies the sound
- This passes the sound to the cochlea where tiny hairs detect the vibrations and passes this along to the **auditory nerve** as electrical signals for our brain

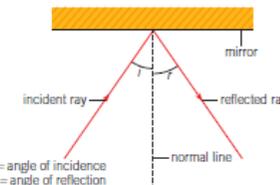
### Colour

- Light can be split using a prism and is made up from different colours of light
- Primary colours** can be mixed in order to form **secondary colours**
- Objects appear a certain colour as they absorb all other colours of light, but reflect the colour of light which they appear.

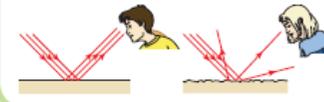


### Reflection

- The **law of reflection** states that the **angle of incidence** will be equal to the **angle of reflection**

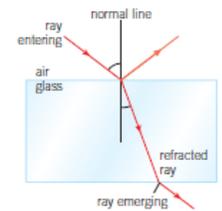


- For light reflecting off a smooth surface will form an image is called **specular reflection**
- Reflection off of a rough surface will not form an image and is known as **diffuse scattering**



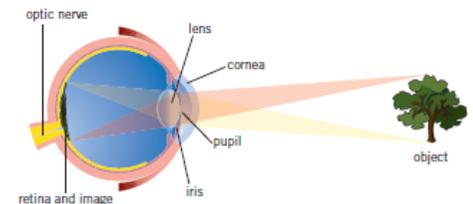
### Refraction

- Refraction** occurs when a wave passes between two different substances
- This happens as the wave will travel at different speeds in the different materials
- When the wave passes into a more dense material it will bend towards the **normal**, e.g. air into glass
- When the wave passes into a less dense material from the normal e.g. glass to air



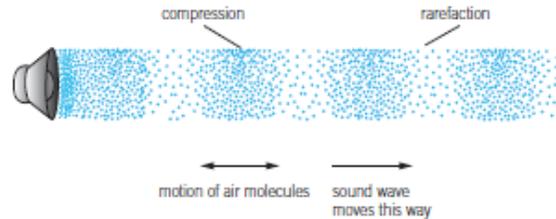
### Light and the eye

- Light entering your eye is refracted by the **lens**, focusing it on the retina and creating an inverted image
- Photoreceptors** detect the light hitting your retina and send an electrical impulse to your brain
- If the light is not focussed on the retina or the eye, people cannot see properly
- Long sighted people have the light focus behind the eye, short sighted people have the light focus in front of the retina.
- Lenses can be used to refract the light in a way in which it will focus on the retina.



### Sound waves

- Any **wave** transfers energy from one place to another
- Sound waves cause particles to vibrate backwards and forwards in the direction of the wave, this produces areas of high pressure (**compression**) and low pressure (**rarefaction**)
- As there are areas where the air pressure is different in a sound wave, we can call sound waves a type of **pressure wave**

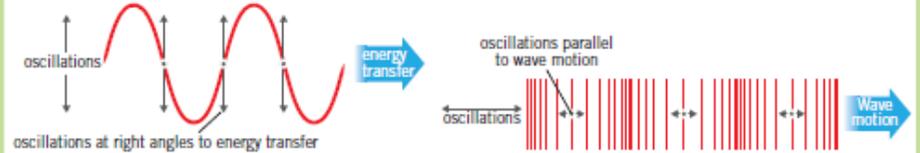


- Sound can be detected with a **microphone**, the microphone will change air pressure into a changing potential difference
- Sound can be produced with a **loudspeaker**, the changing potential difference causes changes in air pressure
- Changes in air pressure will be caused by the diaphragm of the loudspeaker vibrating and causing the movement of the air particles

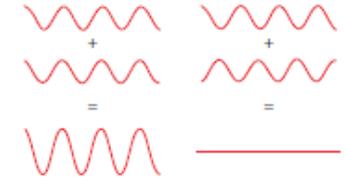


### Types of waves

- Transverse waves** vibrate at 90° to the direction at which they are travelling, they move up and down as well as forward
- Longitudinal waves** vibrate in the direction in which they are travelling



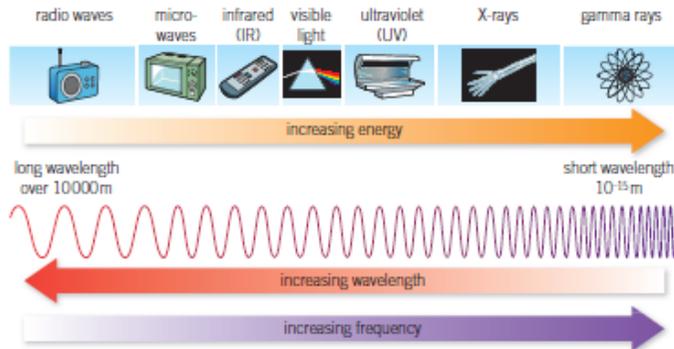
- When waves are put together they **superpose**, this means they will either add together or cancel each other out
- When the waves are in line with one another they add together, increasing the amplitude of the wave
- When the waves are not in line, they will cancel each other out, decreasing the amplitude of the wave



### Ultrasound

- Humans can hear sounds with a frequency between 20–20000Hz.
- ultrasound** is any sound with a frequency of higher than 20000Hz
- As ultrasound has a high frequency it causes the particles it interacts with to vibrate more quickly, this means that it can be used in:
  - Ultrasonic cleaning – dirt particles are 'shaken' off of objects
  - Physiotherapy – the ultrasound waves causes liquid particles in the body to move more quickly and hence get warmer

### Electromagnetic spectrum



### Uses of the electromagnetic spectrum

<b>Radio waves</b>	TV signals
<b>Microwaves</b>	Mobile phones
<b>Infrared</b>	Heating and cooking
<b>Visible light</b>	Photography
<b>Ultraviolet waves</b>	Detecting forgeries, sunbeds
<b>X-rays</b>	Imaging broken bones
<b>Gamma rays</b>	Killing cancer cells