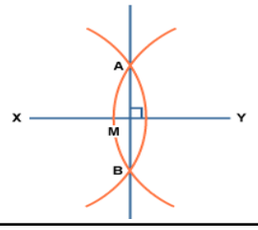
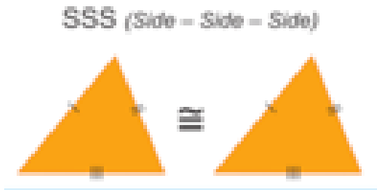
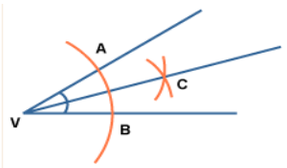
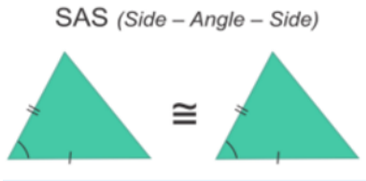
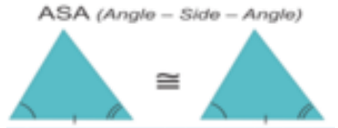
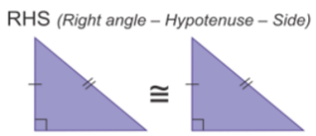
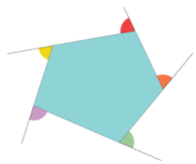
# Year 9 – Spring 1 - Maths - Geometry

| | | | | | |
|---|---|---|---|---|---|
| 1 | Equidistant | At equal distances | 13 | Similar shapes | Identical in shape, angles are the same<br>but different in size , the ratio between sides is the same |
| 2 | Perpendicular | At right angles to | 14 | Congruent shapes | Identical in shape and size |
| 3 | Bisector | Cuts in half | 15 | Congruency rules | SSS SAS ASA RHS |
| 4 |  | Perpendicular bisector | 16 |  | SSS<br>3 sides are equal |
| 5 |  | Angle bisector | 17 |  | SAS<br>Side, Angle ,Side |
| 6 | Possible triangles | The sum of the two shorter sides must be greater than the longest side | 18 |  | ASA<br>Angle, Side, Angle |
| 7 | Equilateral triangle | Equal angles (60 degrees), equal sides | 19 |  | RHS<br>Right angle , Hypotenuse, Side |
| 8 | Isosceles triangle | 2 equal sides and 2 equal angles | 20 | Polygon<br>Regular polygon | Any 2D shape formed with straight lines<br>A 2D shape formed with equal straight lines and equal interior angles |
| 9 | Scalene triangle | No sides and no angles are the same | 21 | Interior angles | The angles inside a shape |
| 10 | Right angled triangle | A triangle with a right angle | 22 | Sum of interior angles | (Number of sides – 2) x 180 |
| 11 | Enlargement | Changes the size of the shape by a scale factor f rom a centre point | 23 | Exterior angles |  |
| 12 | Scale factor | What all the sides are multiplied by to get the enlargement | 24 | Exterior angles | Sum to 360 degrees |

## 1. Energy stores and systems

| | |
|---|---|
| What is a system? | An object or group of objects |
| What happens when a system changes? | The way energy is stored changes |
| System | Change in energy storage |
| An object projected upwards | Kinetic energy to gravitational potential energy |
| A moving object hitting a vehicle | Kinetic energy transferred to thermal and sound |
| An object accelerated by constant force | Increase in kinetic energy |
| A vehicle slowing down | Decrease in kinetic energy |
| Bringing water to boil in an electric kettle | Electrical energy being transferred to thermal energy (and sound) |

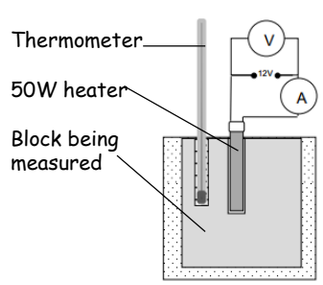
## 2. Changes in Energy

| Energy | Definition | Word equation | Symbol equation | Units |
|---|---|---|---|---|
| Kinetic energy, $E_k$ | Energy associated with moving objects | Kinetic energy = 0.5 x mass x (speed)$^2$ | $E_k = \frac{1}{2}mv^2$ | $E_k$ – J<br>m – kg<br>v – m/s |
| Elastic potential energy, $E_e$ | Energy associated with a compressed spring | Elastic potential energy = 0.5 x spring constant x(extension)$^2$ | $E_e = \frac{1}{2}ke^2$ | $E_e$ – J<br>k – N/m<br>e – m |
| Gravitational potential energy, $E_g$ | Energy associated with objects raised above ground level | Gravitational potential energy = mass x gravitational field strength x height | $E_g$=mgh | $E_g$ – J<br>M – kg<br>g – N/kg<br>h – m |
| Work done, W | Another way of saying "energy transferred" | Work done = force x distance | W = Fd | W – J<br>F – N<br>d - m |

## 3. Specific Heat Capacity

| Energy change | Word equation | Symbol equation | Units |
|---|---|---|---|
| Amount of energy stored or released in a system as its temperature changes | Change in thermal energy = mass x specific heat capacity x temperature change | $\Delta E = mc\Delta\Theta$ | E – J<br>m – kg<br>c – J/kg°C<br>Θ - °C |

**Specific heat capacity:**
Amount of energy required to raise the temperature of 1kg of a substance by 1°C

| | |
|---|---|
| What is the setup for measuring the specific heat capacity of a metal block? |  |

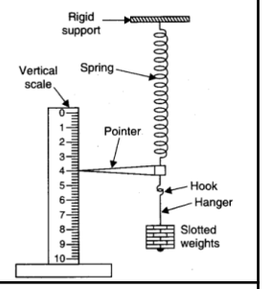
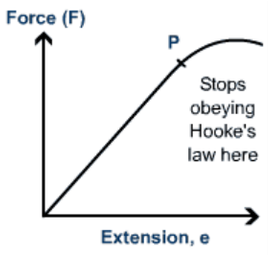
## 4. Power

| Definition | Word equation | Symbol equation | Units |
|---|---|---|---|
| Rate at which energy is transferred | Power = energy transferred / time | $P = \frac{E}{t}$ | P - W<br>E – J<br>t – s |
| Rate at which work is done | Power = work done / time | $P = \frac{W}{t}$ | P - W<br>W – J<br>t – s |
| A power of one Watt is an energy transfer of one Joule per second | | | |

## 5. Efficiency

| | | |
|---|---|---|
| **Efficiency** | In term of energy transfer | = Useful output energy transfer / Total input energy transfer |
| | In terms of power | = Useful power output / Total power input |
| Measures how much energy or power is usefully transferred.<br>It is value between 0 and 1.<br>0 → no input energy or power is usefully transferred<br>1 → all the input energy or power is usefully transferred | | |

## 6. Hooke's Law

| | |
|---|---|
| What needs to be applied for an object to change shape? | A force |
| What is elastic deformation? | Once the force is removed from an object, it returns to its original shape |
| What is inelastic deformation? | Once the force is removed from an object, it does not return to its original shape |
| What is Hooke's Law? | The extension of a spring is directly proportional to the force applied to it |
| Does Hooke's Law hold for all applied forces? | No, after a large enough force, the spring will not be able to stretch anymore. |
| What s the experimental setup for testing Hooke's Law? |  |
| What does a graph of force applied against extension of spring look like>? |  |

## 7. Energy Conservation and Dissipation

| | |
|---|---|
| What is a closed system? | A system with no external forces acting on it and no mass is transferred in or out of it. There is no net change to the total energy |
| What is an open system? | A system with external forces acting on it and mass can be transferred in or out of it |
| How is energy stored in a system? | Energy can be stored usefully and some energy is dissipated (wasted) |
| **Example**: energy stores in a hair dryer | Useful energy: thermal<br>Dissipated/wasted: sound |
| **Example**: energy stores in a TV | Useful energy: light and sound<br>Dissipated/wasted: thermal |

## 8. Thermal Conductivity and Insulation

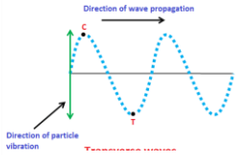
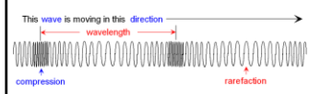
| | |
|---|---|
| What is thermal conductivity? | A measure of how quickly energy can be transferred by conduction through a material |
| What does it mean if a material has high thermal conductivity? | Energy is transferred by conduction very quickly |
| What two factors affect how quickly a building cools down? | - Thickness of its walls<br>- Thermal conductivity of its walls |
| How do these factors affect how quickly a building cools down? | If we slow the rate of conduction, the building will cool down slower. We need:<br>- Thick walls→it takes for energy to be transferred by conduction<br>- Walls made of material with low thermal conductivity→the longer it takes for energy to be transferred by conduction |

## 9. Renewable and Non-Renewable Energy sources

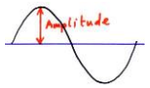
| Energy source | Uses | Advantages | Disadvantages |
|---|---|---|---|
| Coal | Electricity generation, heating | Found in many places<br>Easy to transport to power stations<br>Cheap | Non-renewable→will run out in 100 years<br>Produces $CO_2$ → global warming<br>Produces $SO_2$→ acid rain<br>Miners get various lung-related illnesses |
| Oil and natural gas | Electricity generation, heating, transport | Found in many places<br>Easy to transport | Non-renewable<br>Produces $CO_2$ → global warming<br>Produces $SO_2$→ acid rain<br>Risk of environmental damage when oil spills |
| Nuclear fuel | Electricity generation | No greenhouse gas emissions<br>Very little needed to generate lots of energy | Non-renewable– uranium supplies will run out<br>Waste is radioactive and harmful<br>Risk of terrorist attack |
| Biofuel | Electricity generation, heating, transport | Renewable<br>Cheap<br>Uses things that would otherwise be thrown away | Greenhouse gas emissions<br>Biofuel crops are grown in place of food<br>May run out of space |
| Wind | Electricity generation | Renewable<br>No greenhouse gas emissions<br>Wind is free→main cost in building wind turbine | Can only be used in areas with lots of wind<br>Amount of wind varies daily<br>Need many turbines to generate sufficient electricity<br>Eye-sore |
| Hydro-electric | Electricity generation | Renewable<br>No greenhouse gas emissions<br>Water is free | Expensive to build dam (large wall in water)<br>Building a dam requires flooding→affects local wildlife<br>If insufficientrainfall→not enough water to turn turbines |
| Geother mal | Heating | Renewable<br>Free<br>No greenhouse has emissions | Limited number of places where power stations can be built<br>Harmful gases and minerals can come up from ground |
| Tidal | Electricity generation | Renewable<br>Tides are free→main cost in building power station<br>No greenhouse gas emissions<br>Know when tides happen→know when electricity will be generated | Need to build a dam→destroys habitats for plants and animals<br>Tides happen twice a day→limited time for electricity generation |
| Solar | Electricity generation, heating | Renewable<br>Energy from sun is free | Power stations are expensive to build<br>If cloudy or dark→not enough light to generate electricity<br>Eye-sore |
| Water waves | Electricity generation | Renewable<br>No greenhouse gas emissions<br>Waves is free→main cost is in building power station | Size of waves vary→electricity cannot always be generated<br>Need to transport electricity from sea to land<br>Technology is new→equipment is expensive |

# 10. Waves in Air, Fluids and Solids

## 10a. Transverse and Longitudinal Waves

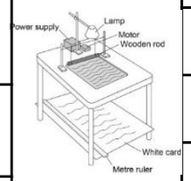
| | | |
|---|---|---|
| What is a wave? | Waves carry energy from one place to another. | |
| What else can a wave carry? | Information | |
| Are waves natural or man made? | Waves are common in natural and manmade systems | |
| | **Transverse** | **Longitudinal** |
| Diagram |   |   |
| How do the oscillations relate to the direction of energy transfer? | Oscillations are perpendicular (right angles) to the direction of energy transfer | Oscillations are parallel to the direction of energy transfer |
| Can this type of wave travel through solids? | Yes | Yes |
| Can this type of wave travel through liquids? | Yes | Yes |
| Can this type of wave travel through air? | Yes | Yes |
| Can this type of wave travel through a vacuum? | Yes | No |
| Examples | Water waves, electromagnetic waves | Sound waves |

## 10b. Properties of Waves

| Property | Definition | How to work it out | | Units |
|---|---|---|---|---|
| Amplitude | Maximum displacement of a point on a wave away from its undisturbed (equilibrium) position |   | | m |
| Wavelength λ | Distance from a point on one wave to the equivalent point on an adjacent wave |   | | m |
| Frequency F | Number of waves passing a point each second. | $\frac{1}{\text{Period}}$ | $\frac{1}{T}$ | Hz (or /s) |
| Period T | Time to complete one wavelength (one complete wave) | $\frac{1}{\text{Frequency}}$ | $\frac{1}{f}$ | S |
| Wave speed v | Speed at which energy is transferred (or wave moves) through the medium. The equation for wave speed is called the wave equation. | Frequency x wavelength | f x λ | m/s |
| | | $\frac{\text{Wavelength}}{\text{period}}$ | $\frac{\lambda}{T}$ | |

## 10d. RP: Measuring the Speed of Water Waves

| Stage | Method |
|---|---|
| 1) Find the wavelength | Use a ruler to measure as many waves as possible (dark lines show the peaks). Divide the number of waves by the total length of all the waves. |
| 2) Find the frequency | Count the number of waves passing a fixed point for a given period of time (e.g. 10s). Divide the number of waves counted by the time. |
| 3) Calculate the speed | speed = frequency x wavelength |




## 10c. Measuring the Speed of Sound in Air

| Method | How it works |
|---|---|
| Balloon and stop watch | - Person1 holds balloon and pin<br>- Person2 stands fixed distance away with stopwatch<br>- Person1 pops balloon<br>- As soon as Person2 **sees** balloon pop → start stopwatch<br>- As soon as person2 **hears** the balloon pop→stop stopwatch<br>- Use speed = distance/time<br>- Repeats for different distances and take the mean |
| Clap-echo method | - Stand a long distance from a wall<br>- Clap at same time as starting timer<br>- Stop timer when you hear echo<br>- Distance travelled is double distance to wall<br>- Use speed = distance/time |
| Microphone and data logger | - Set up two microphones a known distance apart<br>- Connect to data logger<br>- Ring a bell<br>- Data logger records time taken to reach each microphone<br>- Speed = distance between microphones/time on computer |

# 11. Electromagnetic Waves

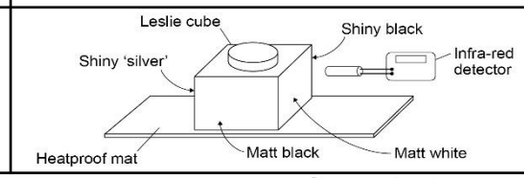
## 11a. Types of Electromagnetic Wave

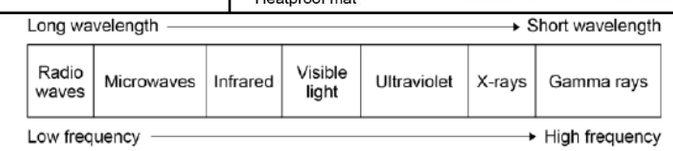
| | |
|---|---|
| What are electromagnetic waves? | Transverse waves that transfer energy from the source of the waves to an absorber.<br>They all travel at the same velocity through a vacuum and through air. |
| What is unique about electromagnetic waves compared to other transverse waves? | They can travel through a vacuum.<br>They all travel at the same velocity through a vacuum and through air. |
| How many types of electromagnet waves are there? | 7 |
| How do we group the electromagnetic waves? | In terms of their wavelength and frequency |
| What are the 7 groups? | Radio<br>Microwaves<br>Infra-red<br>Light<br>Ultra-violet<br>X-rays<br>Gamma rays |
| Which is the only electromagnetic wave that humans can detect/see? | Visible light |

## 11b. Applications of Electromagnetic Waves

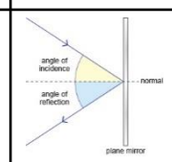
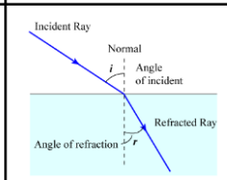
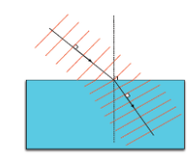
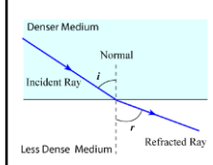
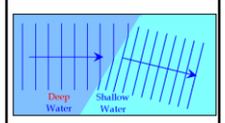
| EM Wave | Use | Additional Information |
|---|---|---|
| Radio | Television<br>Radio | -produced by oscillations in electrical circuits<br>- when absorbed they create an alternating current with same frequency as itself |
| Microwave | Satellite communications<br>Cooking food | Wavelength is approximately 1cm |
| Infrared | Electrical heaters<br>Cooking food<br>Infrared cameras | All hot things emit infrared (including humans!) |
| Light | Fibre optic communications | The only electromagnetic wave detectable by human eye |
| Ultraviolet | Energy efficienct lamps<br>Sun tanning | -Can cause skin to age prematurely<br>-Increases risk of skin cancer |
| X-rays<br>Gamma rays | Medical Imaging<br>Medical treatments | -emitted from unstable nuclei<br>-Ionising radiation→causes mutation of genes and cancer |

## 11c. RP – Absorption and Emission of Infrared

| | |
|---|---|
| What apparatus do you need? | - Leslie cube<br>- Infrared detector<br>- Heatproof mat<br>- kettle |
| What is a leslie cube? | A hollow cube with four different surfaces on each side |
| What are the four surfaces of a ledlie cube? | - Matt white<br>- Shiny black<br>- Matte black<br>- Shiny 'silver' (metal) |
| What is the method> | - Boil the kettle<br>- Pour water into the leslie cube and put stopper in<br>- Measure the temperature emitted from each surface using the infrared detector<br>- Ensure you always measure from the same distance away from a side |
| What does a high temperature mean? | Lots of infrared is being emitted from that surface (therefore the surface material does not absorb infrared radiation) |
| What does a low temperature reading mean> | Very little infrared is being emitted (therefore the infrared is being strongly absorbed by the surface material) |
| Draw a diagram of the apparatus |   |



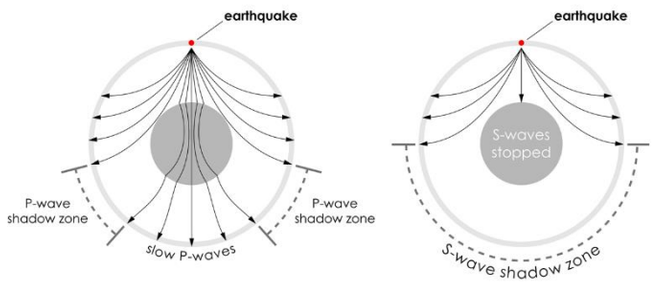

## 11d. Refraction – Ray Diagrams and Wave Fronts

| Property | What happens to the electromagnetic wave? | Ray diagram | Using wave fronts |
|---|---|---|---|
| Reflection | Angle of incidence = angle of reflection<br>$\theta_i = \theta_r$ |   | N/A |
| Refraction →Change in direction of a wave at a boundary due to a change in velocity when entering a different material | **Less dense to more dense**<br>→ waves slows down<br>→ angle of refraction is smaller then angle of incidence<br>→ bend towards the normal |   |  |
| | **More dense to less dense**<br>→ wave speeds up<br>→ angle of refraction is larger than angle of incidence<br>→ bend away from normal |   |   |

## 12. Waves for detection and exploration

| Ultrasound | |
|---|---|
| Why are ultrasound waves? | Sounds waves with a frequency higher than the upper limit of hearing for humans (>29kHz) |
| What happens when an ultrasound wave meets a boundary between two media? | They are partially reflected (some is reflected and some is transmitted) |
| How do you find out how far away a boundary is? | The time taken for the reflections to reach a detector is recorded. Knowing the speed of wave in the media means the distance can be found from:<br>Distance = speed / time |
| What are ultrasound waves used for? | Medical and industrial imaging |

| Seismic waves | |
|---|---|
| Why are seismic waves? | Waves produced by earthquakes |
| What are the two types of seismic wave? | S and P |
| What are S waves? | Transverse seismic waves |
| What are P waves? | Longitudinal seismic waves |
| Can S waves travel through solids? | Yes |
| Can S waves travel through liquids? | No |
| Can P waves travel through liquids? | Yes |
| Can P waves travel through solids | Yes |
| What have P and S waves to used to as evidence for? | The size and structure of the Earth<br>- S waves can not travel through core<br>- P waves travel different speeds through core and mantel |




| Echo Sounding | |
|---|---|
| What is echo sounding? | Using high frequency sound waves to detect objects in deep water and to measure the depth of water |
| How does echo sounding work? | 1. Ultrasound pulse is sent into water<br>2. Pulse will reflect back when it hits a surface boundary<br>3. The time between pulse being sent and reflection being detected is recorded.<br>4. Speed of ultrasound in water is known.<br>5. Use distance = speed x time.<br>6. Divide this number by two because the pulse travelled there and back (twice the actual distance of object) |

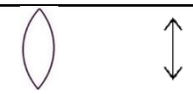
## 13. Visible Light

| | |
|---|---|
| What colours make up visible light? | Red, orange, yellow, green, blue, indigo, violet |
| What is specular reflection? | When light reflects from a smooth surface such that all the light is reflected in a single direction |
| What is diffuse reflection>? | When light reflects from a rough surface, light is scattered (reflected in lots of different directions) |
| How do colour filters work? | By absorbing certain wavelengths (i.e. certain colours) and transmitting other wavelengths |
| What does transparent mean? | All light is can pass through it (is transmitted) and is not scattered |
| What does translucent mean? | Light can pass through but is scattered in different directions so object behind cannot be seen clearly |
| What does opaque mean? | Light cannot travel through the object |
| Why are opaque objects different colours? | The colour is determined by which wavelengths (and therefore colours) of light are more strongly reflected. |
| What happens to wavelengths that are not reflected from an opaque object? | They are absorbed by the object |
| What colour is an opaque object if all colours are reflected equally? | White |
| What colour is an opaque object if all colours are absorbed? | Black |

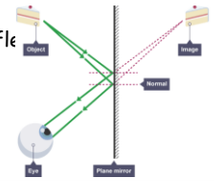
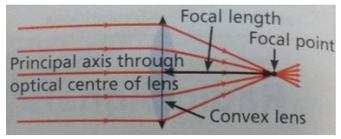
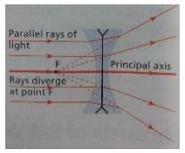
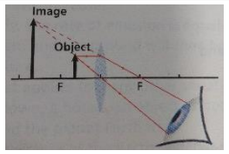
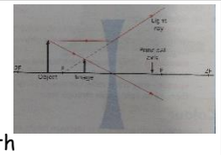
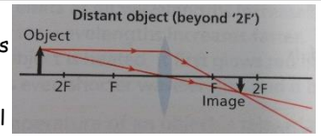
## 14. Sound waves

| | |
|---|---|
| How do sound wave travel through a solid? | By causing particles in the solid to vibrate. These vibrations cause neighbouring particles to also vibrate. |
| How do humans hear? | Sounds wave cause the ear drum and other parts to vibrate, causing the sensation of sound |
| Why are their restrictions on human hearing? | The conversion of sound waves to vibrations in solids works over a limited frequency range |
| What is the range of normal human hearing? | 20Hz – 20kHz |

## 15. Lenses

| | |
|---|---|
| How does a lens form an image? | By refracting light |
| What are the two types of lens? | Convex and concave |
| Draw a convex lens |  |
| Draw a concave lens |  |
| What two types of image can be formed by a lens? | Real and Virtual |
| What is a real image? | Image formed where light rays are focussed (meet at a focal point) |
| What is a virtual image? | Light rays appear to come from the image but don't actually (e.g. a mirror) |
| What type of image can be formed by a convex lens? | Real or virtual |
| What type of image can be formed by a concave lens? | Always virtual |

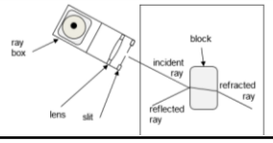
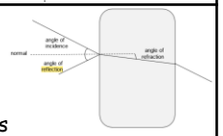
## 16. Ray diagrams

| What is a ray diagram? | Diagram that traces the path that light takes |
|---|---|
| What are the rules for constructing a ray diagram? | 1. A mirror is drawn as a straight line with hatches on one side<br>2. A concave lens is drawn as<br>3. Light rays (path of light) are drawn as solid straight lines with arrows on to show the direction the light is travelling<br>4. Light rays that appear to come from behind the mirror are drawn as dashed lines |
| Ray diagram For object refle in mirror  | Ray diagram for parallel rays incident on convex lens  |
| Ray diagram for parallel rays incident on concave lens  | Ray diagram for convex lens for object between lens and focal length  |
| Ray diagram for concave lens for object between focal length and twice focal length  | Ray diagram for convex lens for object further than twice the focal length  |

## 17. Magnification

| | |
|---|---|
| What is the magnification? | How large the image is compared to the object |
| What is the equation for magnification? | Magnification = $\frac{\text{image height}}{\text{object height}}$ |
| What are the units for magnification? | No units |
| What do we measure image height and object height in? | Either cm or mm (both must be measured in the same units!) |
| If magnification is larger than 1 what does this mean? | Image is bigger than object |
| If magnification is smaller tan 1 what does this mean? | Image is smaller than object |

## 18. RP – Reflection and Refraction

| | |
|---|---|
| What apparatus do you need? | - Ray box and power supply<br>- Collimating slit and lens<br>- Rectangualr transparaent blocks<br>- 30 cm ruler<br>- Protractor<br>- Plain A3 paper |
| Draw the experimental setup |  |
| What will you draw on the A3 paper and what you can measure from it? | -Shape and position of glass block<br>-Path that the light has taken: incident, refracted and reflected rays  |
| What will happen to the angle of refraction as you change the type of material that block is made of? | The angle of refraction will change because the light will be slowed down a different amount by different materials. |

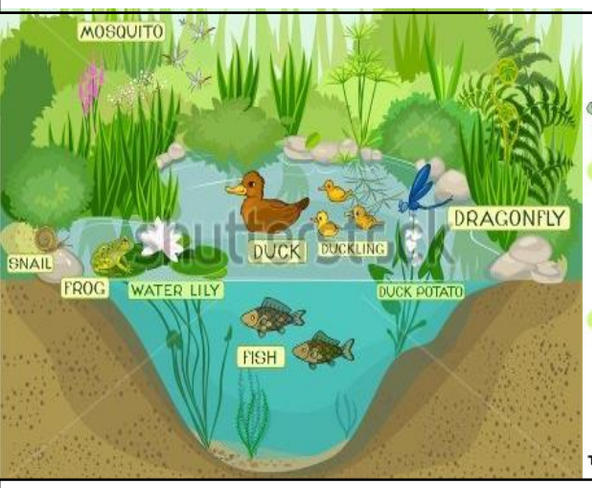
An ECOSYSTEM is a natural system made up of plants, animals and the environment. There are many complex interrelationships (links) between the living (plants & animal) and non-living (atmosphere) components. Ecosystems can be as small as a hedgerow or pond. Larger ecosystems, on a global scale, are known as biomes, such as tropical rainforest or the desert.

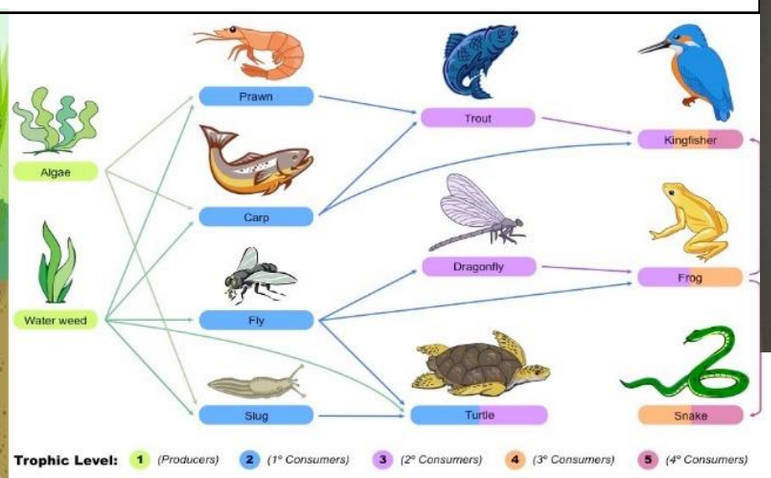
| | |
|---|---|
| Producer | Organisms that get their food from the natural environment (e.g. by photosynthesis) |
| Consumer | Organisms that feed on the producers or each other. They are made up of:<br>• herbivores (only eats plants),<br>• carnivores (eat only animals)<br>• omnivores (eats animals and plants) |
| Decomposer | Fungi and bacteria feed on dead and waste material. They break down dead material and recycle the nutrients back to the soil. |
| Food Chain | A food chain and web shows what eats what. A food chain is a single line of linkages between producers and consumers. |
| Food Web | A food chain and web shows what eats what. A food web shows all the linkages between the producers and consumers in an ecosystem. |
| Nutrient Cycle | The movement of nutrients around an ecosystem. *e.g. when dead material is decomposed, nutrients are released into the soil. The nutrients are then taken up from the soil by plants. The nutrients are then passed to consumers when they eat the plants. When the consumers die, decomposers return the nutrients to the soil. This is the nutrient cycle.* |

A freshwater pond ecosystem is an example of a small scale ecosystem in the UK. It provides a variety of habitats for plants and animals, due to changes in oxygen, water and light.

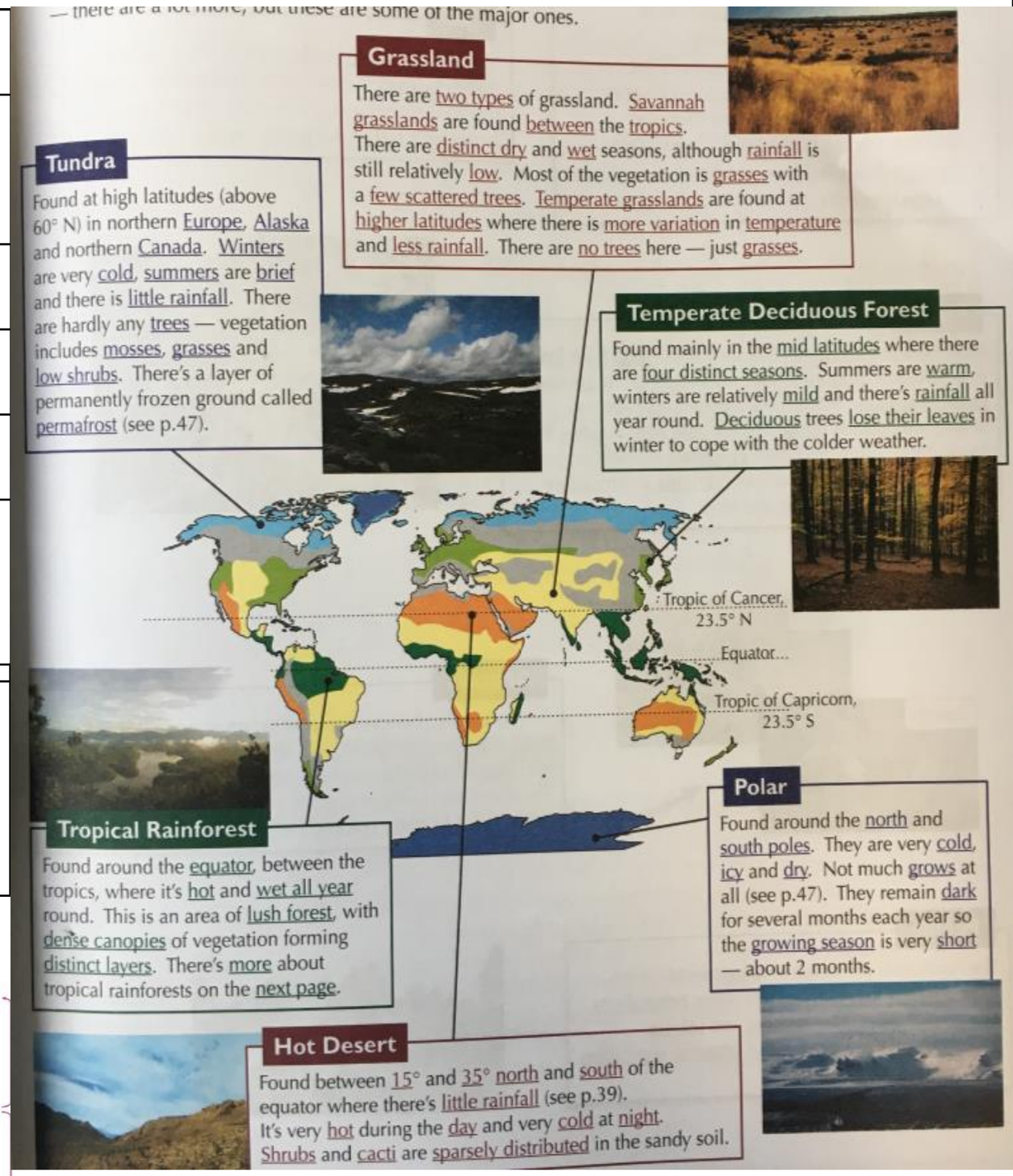
It is made up of the plants, fish, birds and other organisms that live within it, as well as the water, sunlight, temperature in the area.

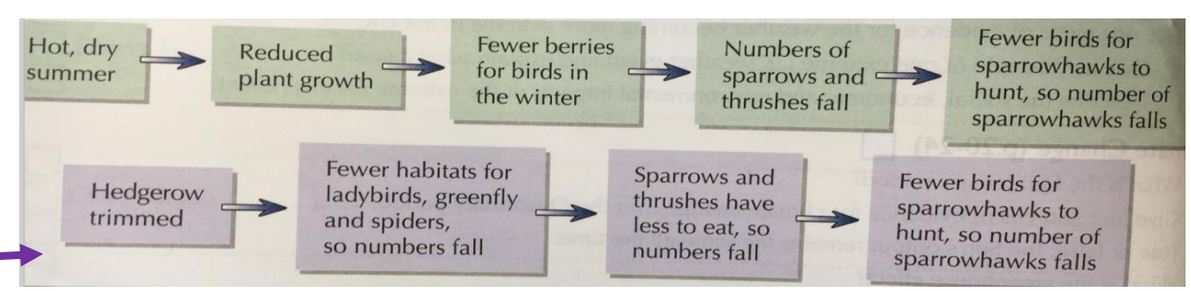
- Producers: algae, marsh marigold, waterlily
- Consumers: frog, heron, fish (e.g. perch), duck, waterworms, rat tailed maggot



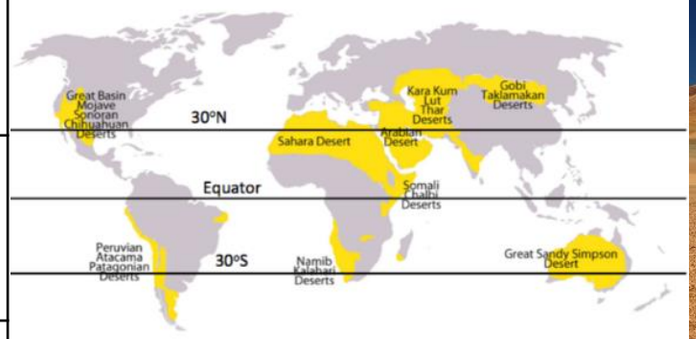




A change in one part of an ecosystem has an impact on other parts of the ecosystem. Some parts of an ecosystem depend on the others (e.g. consumers depend on producers for a source of food) and some depend on them for a habitat. So if one part changes it affects all the other parts that depend on it. Two examples can be seen to the right.



| | |
|---|---|
| Location | Deserts are located along the Tropic of Cancer & Tropic Capricorn (23.5° – 30° north and south of the equator latitude),<br>Examples: Sahara Desert: Africa (Algeria, Egypt), Mojave desert: USA |
| Climate | Hot and dry: arid.<br>2 seasons (summer and winter).<br>Temperature range: over 40°C in the day – less than 0°C at night<br>Precipitation range: less than 250mm per year |
| Vegetation | Very sparse & sporadic (giant saguaro cactus, Joshua tree, desert daisy) |
| Animals | Very few (lizards, scorpion, camel, wolf spider, kangaroo) |
| Soil | Not very fertile as there is hardly any decaying plants to add nutrients to the soil.<br>It is shallow, dry and has a coarse, gravelly texture. |
| People | Indigenous people in the desert are usually nomadic farmers who travel with their herd (goats and sheep) in search of food, water.<br>New groups have started to live in the desert to use their natural resources (e.g. oil, farming, tourism, renewable energy) |




DESERTS HAVE LOW BIODIVERSITY. Biodiversity is the variety of organisms living in a particular area (plants and animals)

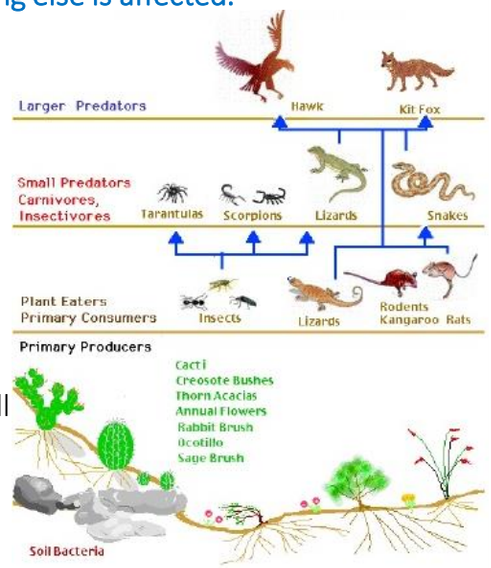
Small areas of the desert that are near water (rivers, ponds) have the highest diversity of plants, animals and humans.

Treats to the desert and surrounding area:

- Humans are causing desertification in the desert and surrounding savannah. This is causing the desert to get larger and the soils to become drier = erosion.
- Climate change = more extreme weather (e.g. droughts) = plants and animals are unable to survive the even hotter and drier weather = loss of biodiversity.

All parts of the desert ecosystem are linked together (climate, soil, water, animals, plants and people). If one of them changes, everything else is affected.

- Plants get their nutrients from the soils. Animals get their nutrients from the plants.
- Animals spread seeds in their dung (poo), helping new plants to grow.
- Hot and dry climate = water is very quickly evaporated = leave salts behind = salinity/salty soils.
- Very few nutrients are recycled as there is so little vegetation = very litter decay.
- Sparse vegetation = lack of food = low density of animals
- Water supplies in the desert are caused due to low rainfall and quick evaporation. As a result humans use irrigation to water their crops using deep wells = less water available for plants and animals.




VEGETATION ADAPTATIONS

Cactus:

- Some have deep roots to reach water deep under the ground
- Some have a very shallow horizontal root system, just below the surface, so that it can soak up water before it evaporates.
- Succulent: store water in the stems.
- Thick, waxy skin to reduce water loss from transpiration
- Spines reduce water loss and protect the cacti from predators.

Joshua Tree:

- Deep roots to reach water deep under the ground
- Small needle like leaves to reduce water loss.
- Leaves are covered in a waxy resin to avoid water loss.

ANIMAL ADAPTATIONS

Camel:

- Large, flat feet to spread their weight on the sand.
- Two rows of eye lashes to keep sand out.
- Their colour helps them camouflage (blend in)
- Store fats in their hump, which can be used for energy. They can also break this down into water when needed.

Lizard:

- Burrow during the hot days and emerge at night to feed.
- Their colour helps them camouflage (blend in)
- Nocturnal – only come out at night when cooler.

**Other adaptations:**

- Some animals sit very still in the shade during the hottest part of the day (e.g. fennec foxes).

| People use the Sahara Desert in a number of ways. These are known as economic opportunities. | |
|---|---|
| **Mining for Oil and Gas** | **What**: digging under the desert for oil and gas.<br>**Where**: Hassi Messaoud oilfield in Algeria, Sahara Desert, Northern Africa<br>***Good***: *½ the money Algeria earns comes from oil and gas, Hassi Messaoud employs 40,000 people*<br>***Bad***: *must fly 40,000 workers to the remote oilfield, fly out water and food reserves, difficult to drill hundreds of metres beneath desert and hard to construct pipelines 100s of kilometres across the desert to the coastline.* |
| **Solar Panels** | **What**: solar panels are built to make use of the 12+ hours of bright sunshine in the desert<br>**Where**: Algeria and Tunisia, Northern Africa<br>***Good***: *money for development from sold energy, it is clean renewable energy.*<br>***Bad***: *sandstorms destroy solar panels & dusty conditions mean they need cleaning. This requires 10,300 gallons of water per day.* |
| **Agriculture** | **What**: using the River Nile to irrigate land and grow crops (dates, figs and fruit) to feed increasing population (20 to 79 million in last 25 years).<br>**Where**: Next to the River Nile, Egypt, Northern Africa.<br>***Good***: *accounts for 13% of Egypt's income, employs 32% of labour force.*<br>***Bad***: *rapid evaporation of irrigation water, leaves salt crystals = salinity.* |
| **Tourism** | **What**: visit world's largest desert, Egyptian culture, pyramids, camel treks.<br>**Where:** Egypt, Northern Africa<br>***Good***: *income for development, employment, development of transport and infrastructure.*<br>***Bad***: *pollution from development, overuse of water, cultures are used as entertainment rather than tourists learning about their tradition.* |

**Development in the Sahara Desert is challenging due to:**

Extreme Temperatures
- Daily temperatures can reach over 40°C
- Evening temperatures can go below freezing
- The hot temperatures can cause illness, death and can be too hot for tourists = less come.

Inaccessibility
- The Sahara is HUGE = people often have to travel long distances, usually by plane which is expensive.
- It is difficult to provide services across such a large area
- It is difficult to transport products from oil or energy fields, as extensive pipelines have to be built.

Water Supply
- There is very low rainfall in the Sahara Desert (less than 70mm in some places). As a result providing water to workers, tourists, industries or for irrigation is very hard.

**DESERTIFICATION is the process where land gradually turns into a desert. It becomes drier, less fertile and is vulnerable to erosion.**

Causes of desertification

| | |
|---|---|
| OVER-GRAZING<br>Too many cattle and sheep eat the vegetation = the soil is no longer held together by the plants = vulnerable to soil erosion.<br>Cattle and sheep also trample on the soil. | OVER-CULTIVATION<br>Population growth = more demand for food.<br>As a result land is being over-cultivated. This uses up all the nutrients in the soil, leaving it dry and exposed to erosion. |
| DEFORESTATION<br>Population growth = increased demand for fuel wood = increased deforestation. The roots therefore no longer bind the soil together and the nutrient cycle is stopped = soil becomes dry and exposed to erosion. | CLIMATE CHANGE<br>Climate change results in extreme weather, such as droughts.<br>Lack of rainfall = not enough rain for the soils to have moisture and stay healthy.<br>High temperatures = any water is immediately evaporated leaving behind salts = salty, dry soil that is vulnerable to erosion. |

**Responding to desertification: how can we reduce the risk of desertification?**

| | |
|---|---|
| **Afforestation** (planting trees) | The roots also help to hold the soil together and prevent erosion.<br>When the plants/leaves die, their nutrients are giving back to their soil.<br>They act as windbreakers and therefore reduce wind erosion. |
| **Crop Rotation**<br>**Grazing Rotation** | When farmers allow a field to rest between farming. This allows the soil time to repair and get their nutrients back. This prevents over-cultivation.<br>Move the animals from place to place to reduce the amount of vegetation eaten or reduce the number of farm animals. This prevents over-grazing. |
| **Water Managemen t** | Grow crops that don't need a lot of water (e.g. millet or olives)<br>Use irrigation techniques that use very little water (e.g. drip irrigation) |
| **Appropriate Technologies** | Use cheap, sustainable and easily available materials<br>Earth Dams: collect and store water in the wet season. The stored water is then used to irrigate crops in the dry season.<br>Using Manure: animal manure is used to fertilise the soil by adding nutrients. |

| | | | | | |
|---|---|---|---|---|---|
| 1 | The dates of the Modern period. | 1900 - 2018 | 11 | Crime and punishment changed due to immigration. ( political changes) | People from places like, the Caribbean, Africa and India were invited to Britain. |
| 2 | The two centuries that made up the Modern Period | 20th century and 21st century | 12 | The law made paying people differently because of their gender illegal. | The **Equal Pay Act 1971**- social change- sexism is not acceptable. |
| | **Continuity and change in modern crime 1900-2018** | | 13 | The law that classified illegal drugs. | The Misuse of Drugs Act 1970 classified different illegal drugs |
| 3 | **Crime types** | **Examples of that type of crime** | 14 | Ways smuggling is similar to the 18th century | Because of taxes, alcohol and tobacco are still smuggled in large amounts. People are now smuggled |
| 4 | Crime against property | Crime that directly affects possessions e.g. Burglary, Car theft | 15 | In 1991, the law in Britain changed | Rape in marriage became recognised as a crime. ( social change) |
| | Crime against the person. | Crime that directly affects someone physically or mentally e.g. racism, people trafficking.. Assault – physically harming a person | 16 | Examples of cybercrime: ( crime against property and person) ( new technology) | Hackers can steal data such as credit card numbers. |
| 5 | Crime against society | Crime that affects whole communities e.g vandalism. Terrorism the use of violence for political goal. For example bombs in public places. | 17 | Examples of cybercrime: (Crime against society) ( | Social media can be used to spread extremist content. |
| 6 | Law that made racist discrimination illegal | 1968 Race Relations Act ( factor- Social and political change as it is no longer acceptable to be racist and there is a more multicultural society) | 18 | Examples of cybercrime (Crime against society) | Foreign governments like Russia can try to influence voters- which is illegal |
| | | | | **Changes in law enforcement 1900-2018** | |
| 7 | Technology – invention of cars. | Car theft, speeding, drunk driving | 19 | Scientific developments that helped police catch criminals | Fingerprinting and DNA |
| 8 | Political changes ( factor) | Terrorism- property or person or authority (Factor- political change) | 20 | Fingerprinting – technology that improved detection | 1902 |
| 9 | Examples or terrorism in 2005. | The 7 July 2005 London bombings – Muslim terrorists. | 21 | Police cars – able to get to criminals faster | 1913 |
| | Example of terrorism from 1970s to 2001. | The Irish Republican Army (IRA). | 22 | First police radio – can respond to events | 1933 |
| 10 | Hate crime | A crime motivated by a hatred of an individual's race, gender or sexual orientation. | 23 | CCTV- prevent crime and catch offenders | 1970s |
| | | | 24 | DNA evidence/ Forensic | 1988 |

# Year 9 – Spring 1 - History - Crime and Punishment- 4. Modern England

| | | | | | |
|---|---|---|---|---|---|
| 1 | New technology that helped police catch criminals in the modern period. | Police cars, CCTV, mobile phones, radios and computer databases are examples of technology that helped police catch criminals. | 11 | A Liberal and more educated and progressive society | Open to new ideas: People in the 20th century questioned whether the death penalty was right. |
| 2 | Police organisation has changed in the Modern Period | 1.Police cars, CCTV, mobile phones, radios and computer databases are examples of technology that helped police catch criminals. | 12 | Derek Bentley was executed in 1953 | Derek Bentley had a learning disability so he should not have been allowed to plead guilty. |
| | | 2. Specialised departments and groups: armed response units, dog handling The Special Branch works specifically to prevent terrorism. | 13 | Timothy Evans executed In 1950 ( factor – key individuals cause sympathy) | He was executed for murdering his wife and baby. Later evidence showed he was innocent. |
| | **Continuity and change in modern punishment 1900-2018** | | 14 | Ruth Ellis's ( factor- key individuals caused sympathy) | Only a few murderers were hung and so it was unfair she was picked out to be hung. |
| 3 | A Punishment developed for petty criminals. | Community Service | 15 | The year the death penalty abolished for most crimes in England | 1965 |
| 4 | 1933 aim to prepare prisoners who are not a danger to society to be ready for their release | Open prison: Prisoners allowed freedoms to proved they can be trusted – such as leaving the prison to go out to work | 16 | Year the Death Penalty abolished for all crimes in England | 1998 |
| 5 | Houses prisoners considered to have severe mental problems. | Psychiatric Hospitals | 17 | Dates of World War I | 1914 to 1918 ( 16,000 men refuse to fight) |
| 6 | 1902 – aim to keep boys away from older convicts | Young Offenders institutions ( borstal) | 18 | Dates of World War II | 1939 to 1945 ( 60,000 men and women refuse to fight) |
| 7 | Punishment that was developed to enforce people being in a certain place. | 1999: Electronic Tagging: enforces curfews for people who are released from prison on condition that they are at home during certain hours. | 19 | Conscientious objector . | Anyone who had a genuine objection to fighting for moral, religious or political reasons. They were put in prison |
| 8 | Punishment developed to keep criminals away from certain areas. | 1998: ASBO stands for anti-social behaviour order | 20 | Absolutists | In WW1 most absolutists – people who refused to take any part in the war effort – were imprisoned, in WW2 very few were imprisoned. |
| 9 | Neighbourhood Watch | 1982 it was set up- communities encouraged to work together: eg to report suspicions of crime | | | |
| 10 | Changes in attitude to the death penalty | Social changes/ individual cases of misjustice | 21 | Alternativists | These people say they will perform some sort of useful military service. |

# Year 9 – Spring 1 – French – Life at school

| | | | | | |
|---|---|---|---|---|---|
| 1 | la matière | subject | 21 | le trimestre | term |
| 2 | l'instituteur [m] | primary school teacher[male] | 22 | la récré(ation) | break |
| 3 | l'institutrice [f] | primary school teacher[female] | 23 | la rentrée | return to school |
| 4 | le professeur | teacher | 24 | scolaire | school [adj] |
| 5 | la langue | language | 25 | en seconde | in year 11 |
| 6 | le français | French | 26 | l'élève | pupil |
| 7 | la chimie | chemistry | 27 | l'étudiant [m] | student |
| 8 | le dessin | art | 28 | le directeur | headmaster |
| 9 | l'EPS [f] | PE; physical education | 29 | la directrice | headmistress |
| 10 | l'informatique [f] | IT; information technology | 30 | la salle de classe | classroom |
| 11 | la physique | physics | 31 | le terrain de sport | sports ground |
| 12 | la religion | religious studies | 32 | le tableau | board |
| 13 | l'école [f] | school | 33 | l'école secondaire [f] | secondary school |
| 14 | l'école primaire [f] | primary school | 34 | apprendre | to learn |
| 15 | le collège | secondary school | 35 | demander | to ask |
| 16 | le cours | lesson | 36 | discuter | to discuss |
| 17 | l'emploi du temps[m] | timetable | 37 | lire | to read |

# Year 9 – Spring 1 – French – Life at school

| | | | | | |
|---|---|---|---|---|---|
| 35 | penser | to think | 52 | réussir un examen | to pass an e |
| 36 | savoir | to know | 53 | répéter | to repeat |
| 37 | trouver | to find | 54 | le règlement | school rules |
| 38 | comprendre | to understand | 55 | la règle | rule |
| 39 | faire attention | to pay attention | 56 | le droit | the right |
| 40 | les études [f] | study | 57 | la difficulté | difficulty |
| 41 | les devoirs [m] | homework | 58 | le maquillage | make up |
| 42 | la lecture | reading | 59 | permettre | to allow; to permit |
| 43 | la leçon | lesson | 60 | porter | to wear |
| 44 | la pause | break; pause | 61 | oublier | to forget |
| 45 | la réponse | reply | 62 | | |
| 46 | la calculette | calculator | 63 | | |
| 47 | l'examen [m] | examination | 64 | | |
| 48 | la pression | pressure | 65 | | |
| 49 | la note | mark | 66 | | |
| 50 | le résultat | result | 67 | | |
| 51 | passer un examen | to sit an exam | 68 | | |

# Year 9 – Spring 1 – Spanish – Life at school

| | | | | | |
|---|---|---|---|---|---|
| 1 | la asignatura | school subject | 21 | el idioma | language |
| 2 | el taller | workshop | 22 | las ciencias | science |
| 3 | el director | head teacher; principal | 23 | la química | chemistry |
| 4 | la lengua | language | 24 | la biología | biology |
| 5 | la nota | mark | 25 | la informática | IT |
| 6 | la tarea | task; homework | 26 | las ciencias económicas | economics |
| 7 | trabajador | hard working | 27 | el comercio | business studies |
| 8 | sacar buenas notas | to get good marks | 28 | la cocina | food technology |
| 9 | sacar malas notas | to get bad marks | 29 | la gimnasia | gymnastics |
| 10 | enseñar | to teach | 30 | la escuela | school |
| 11 | el español | Spanish | 31 | el colegio | school |
| 12 | el francés | French | 32 | el instituto | secondary school |
| 13 | el alemán | German | 33 | la lección | lesson |
| 14 | el Inglés | English | 34 | el alumno | pupil |
| 15 | el arte dramático | drama | 35 | los deberes | homework |
| 16 | el dibujo | drawing; art | 36 | el intercambio | exchange |
| 17 | | | 37 | | |

# Year 9 – Spring 1 – Spanish – Life at school

| | | | | | |
|---|---|---|---|---|---|
| 35 | el trimestre | (school) term | 52 | el estuche | pencil ca |
| 36 | privado | private | 53 | los lápices de colores | coloured pencils |
| 37 | el recreo | break; playtime | 54 | el libro | book |
| 38 | la reunión | meeting | 55 | la pizarra interactiva | smart board |
| 39 | la rutina | routine | 56 | la regla | rule; ruler |
| 40 | la falta | absence | 57 | la agenda | diary |
| 41 | ausente | absent | 58 | la mochila | rucksack; school bag |
| 42 | faltar | to be absent | 59 | el trabajo | work |
| 43 | terminar | to finish | 60 | preguntar | to ask a question |
| 44 | la sala de profesores | staffroom | 61 | charlar | to chat |
| 45 | el salón de actos | hall; assembly hall | 62 | dibujar | to draw |
| 46 | el aula | schoolroom | 63 | diseñar | to design |
| 47 | el campo de deportes | sports field | 64 | entender | to understand |
| 48 | el gimnasio | gymnasium | 65 | mirar | to look |
| 49 | los vestuarios | changing rooms | 66 | el examen | examination |
| 50 | los apuntes | notes | 67 | el bachillerato | school leaving exam ; baccalaureate |
| 51 | [illegible] | [illegible] | 68 | [illegible] | to approve |

## Year 9 – Spring Term - PE – Principles and Methods of training / Components of fitness / Effects of exercise on the body

| | | | | | |
|---|---|---|---|---|---|
| 1 | Warm up | Prepares the body for physical work. | 8 | Progression | This principle involves gradually increasing the amount of exercise you do. |
| 2 | Cool down | Returns the body to a resting state **gradually**. | 9 | Overload | fitness can only be improved by training more than you normally do. You must work hard. |
| 3 | Warm up stages | 1. Pulse raiser e.g. jogging.<br>2. Static stretches e.g. stretch quadriceps.<br>3. Dynamic stretches e.g. lunges.<br>4. Skill rehearsal e.g. follow pass in football. | 10 | Reversibility | Reversibility is the process of an athletes body losing fitness levels. This can occur if training has stopped due to illness or injury. |
| 4 | Cool down stages | 1. Low intensity exercise e.g. jogging.<br>2. Static stretching of all major muscle groups. | 11 | Principles of training | The best training programmes are built on SPOR principles. (no.7-10). |
| 5 | Purpose of a warm up | 1. Injury prevention<br>2. Increase muscle temperature<br>3. Mental preparation<br>**4. Gradually** increases Heart Rate.<br>5. Increases flexibility of muscles.<br>6. Increased speed of muscular contractions. | 12 | FITT Principle | For training to improve an individuals fitness they must following the FITT principle (in order to see Progression from the SPOR principle). |
| 6 | Purpose of a cool down | **1. Gradually** lowers Heart Rate back to a resting level.<br>**2. Gradually** lowers muscle temperature.<br>3. Removes waste products e.g. lactic acid.<br>4. Prevents DOMS (Delayed Onset Muscle Soreness). | 13 | Frequency<br><br>Intensity<br><br>Time<br><br>Type | How often we train (number of training sessions per week)<br><br>How hard we train.<br><br>How long we train per session.<br><br>What type of training is used. |
| 7 | Specificity | Your training should be geared specifically towards your chosen sport or activity. | | | |

| | | | | | |
|---|---|---|---|---|---|
| 14 | Methods of training | Different types of training are used when working on different components of fitness (no.15-20) | 21 | Components of fitness | Every sport requires different components of fitness depending on the demands of that event. (no.22-31) |
| 15 | Continuous training | This type of training involves a steady pace at a moderate intensity which should last for at least 30 minutes e.g. running. | 22 | Cardiovascular endurance / Stamina | The ability of the heart and circulatory system to meet the demands of the body for a long period of time. Test = 'Bleep' test or Coopers 12 minute run. |
| 16 | Fartlek training | It is a combination of different intensities. Involves both aerobic and anaerobic fitness due to the varying intensity e.g. 1 lap at 50% of max, 1 lap at 80% of max. | 23 | Muscular endurance | Means that the muscles keep working for a long time without getting tired. Test = 1 minute sit up or press up test. |
| 17 | Interval training | This training involves periods of work followed by periods of rest e.g. 20M sprint then walk back to start. | 24 | Speed | Time taken to cover a set distance. Test = 30M Sprint test |
| 18 | Circuit training | Circuit training is a series of exercises completed one after another. It is a very good way of developing strength, muscular endurance and power. | 25 | Strength | The ability to exert a large amount of force in a single maximum effort. Test = 1 rep max or grip dynamometer. |
| 19 | Weight training | Weight training is a form of training that uses progressive resistance against a muscle group. E.g. free weights – dumbbell curl. | 26 | Power | It is a combination of strength and speed. Test = Vertical Jump or Standing Long Jump test. |
| 20 | Plyometrics | A type of strength training that can be used to improve power or muscular strength. E.g. jumping and bounding activities. | 27 | Flexibility | The range of movement at a joint. Test = sit and reach test. |

| | | | | | |
|---|---|---|---|---|---|
| 28 | Agility | The ability to change direction with speed. Test = Illinois Agility Run test. | 35 | Muscles (short term) | 1. Increase in muscle temperature<br>2. Increase in muscular contractions.<br>3. Lactic acid produced.<br>4. More Oxygen to working muscles. |
| 29 | Balance | The ability of the performer to retain their centre of mass over their base of support without falling. Test = Stork Stand Test | 36 | Blood flow (short term) | 1. Blood flow increases to working Muscles (vasodilation of blood vessels).<br>2. Decreases to digestive system (vasoconstriction of blood vessels).<br>3. Vascular shunt mechanism. |
| 30 | Coordination | The ability to move two or more body parts at the same time. Test = Wall throw test. | 37 | Long Term effects of exercise | The effects of exercise after 8-10 weeks of training (no.38-41) |
| 31 | Reaction time | The time between the presentation of a stimulus and movement. Test = Ruler drop test. | 38 | Lungs (long term) | 1. Increase in strength of intercostal muscles.<br>2. Increased tidal volume during exercise.<br>3. Increased minute ventilation during exercise.<br>4. Increased aerobic capacity.<br>5. Increased strength of diaphragm. |
| 32 | Short Term effects of exercise | The immediate effects when you start exercising (no.33-36) | 39 | Heart (long term) | 1. Cardiac hypertrophy (heart gets bigger).<br>2. Lower resting heart rate (due to stronger cardiac muscle).<br>3. Higher stroke volume.<br>4. Higher cardiac output. |
| 33 | Lungs (short term) | 1. Increased respiratory rate (breaths per minute)<br>2. Increased tidal volume (air breathed in and out per breath)<br>3. Increased minute Ventilation (air breathed in and out per min) | 40 | Muscles and bones (long term) | 1. Increased bone density.<br>2. Muscular hypertrophy (muscles get bigger).<br>3. Increase in muscular strength.<br>4. Increase in muscular endurance.<br>5. Muscles fatigue more slowly (less Build up of lactic acid). |
| 34 | Heart (short term) | 1. Increased Heart Rate (Beat per minute).<br>2. Increased Stroke Volume (Volume of blood pumped from left ventricle per beat).<br>3. Increased Cardiac Output (Volume of blood pumped from left ventricle per minute). | 41 | Blood Vessels (long term) | 1. Capilliarisation (more capillaries are made).<br>2. Increase in number of red blood cells.<br>3. Increase in blood volume. |

**Concerto** = when there is a solo instrument playing with an orchestra

## The *Baroque* Period 1600-1750 – Bach

| | | |
|---|---|---|
| | **INSTRUMENTATION** | |
| 1 | **Typical Solo instruments** | Recorder, oboe, trumpet, violin, harpsichord<br>The String section is the most important |
| 2 | **Size of Orchestra** | Small. Always. |
| | **MELODY** | |
| 3 | **Balanced phrases** | Melody lines are equal in length – usually 4 or 8 bars. |
| 4 | **TEXTURE** | |
| 5 | **Polyphonic (or contrapuntal)** | Many lines of music (melodies) are interweaving in and out of each other |

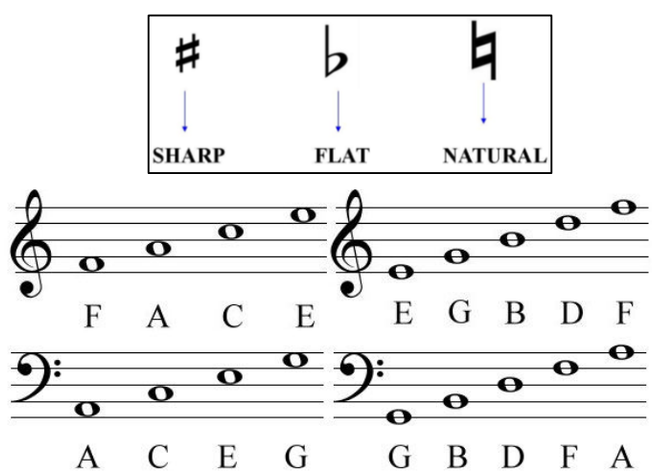
## Italian Musical Terms

| | | |
|---|---|---|
| | **ARTICULATION** | |
| 6 | **Legato** | Smooth |
| 7 | **Staccato** | Spiky |
| | **TEMPO** | |
| 8 | **Allegro** | Fast |
| 9 | **Lento** | Slow |
| | **DYNAMICS** | |
| 10 | **Crescendo** | Gradually getting louder |
| 11 | **Dynamics** | Gradually getting softer |
| 12 | **pp-ff** | pp = very quiet<br>P = quiet<br>Mp = quite quiet<br>Mf = quite loud<br>F = loud<br>Ff = very loud |

## The *Classical* Period 1750-1820 - Mozart

| | | |
|---|---|---|
| | **INSTRUMENTATION** | |
| 13 | **The Piano** | A new development in the Classical Period |
| 14 | **Size of Orchestra** | Larger in the Classical period than in the Baroque Period (but not by much) |
| 15 | **More woodwind / Brass instruments** | Clarinet, flute, trombone, French horn |
| | **MELODY** | |
| 16 | **Question and Answer** | A melody that is made up of short 'chunks' that seem to question and answer each other |
| 17 | **TEXTURE** | |
| 18 | **Homophonic** | Clear melody with a simple accompaniment (chords/sustained notes) underneath |

## The Stave



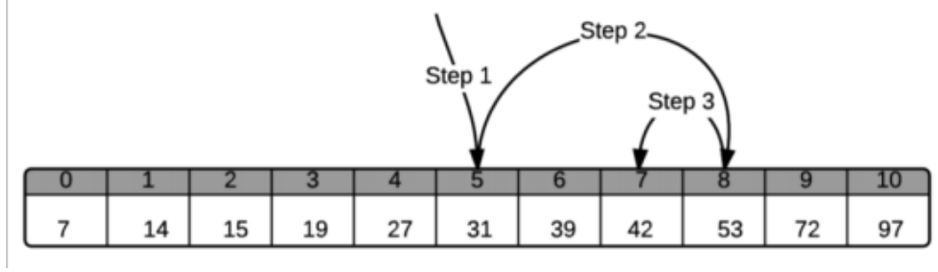

## The *Romantic* Period 1750-1820 – Brahms

| | | |
|---|---|---|
| | **INSTRUMENTATION** | |
| 19 | **New instruments** | Percussion (Timpani, cymbals, trinagle) – to add emotion<br>Piccolo flute, tuba |
| 20 | **Size of Orchestra** | HUGE! Dramatic! – to add emotion |
| | **MELODY** | |
| 21 | **Virtuosic** | The instruments (especially the soloists) have to p lay much harder music – faster, wider range, more dynamics |
| | **TEXTURE** | |
| 22 | **Homophonic** | Clear melody with a simple accompaniment (chords/sustained notes) underneath |

## The Sections of the Orchestra

| | | |
|---|---|---|
| 23 | **Strings** | Violin, Viola, Cello, Double Bass |
| 24 | **Percussion** | Timpani, Cymbals, Triangle |
| 25 | **Brass** | Trumpet, Trombone, French Horn, Tuba |
| 26 | **Woodwind** | Flute, Clarinet, Oboe |
| 27 | **Keyboard *Not always in orchestra** | Harpsichord (only in Baroque Period)<br>Piano (only in Classical and Romantic periods) |

# Year 9 – Spring Term – Computer Science - Algorithms

| | | | | | |
|---|---|---|---|---|---|
| 1 | Algorithm | A step by step set of rules or instructions. | 10 | Bubble Sort | Compares pairs of items. It is used to sort Unordered lists of items. |
| 2 | Abstraction | Picking out the important bits of information. | 11 | Merge Sort | Splits the list apart the merges it back together. |
| 3 | Decomposition | Breaking a problem down into smaller problems. | 12 | Insertion Sort | Orders the items as it goes. |
| 4 | Computational Thinking | Tackling a problem through decomposition, abstraction and algorithmic thinking. | 13 | Binary | A number system that only uses 1 and 0. |
| 5 | Pseudocode | A set of instructions in the style of a programming language but using plain English. | 14 | Algorithmic Thinking | Coming up with an algorithm to solve a problem. |
| 6 | Truth Table | A table listing all possible binary inputs through a logic circuit, with the corresponding outputs. | 15 | Boolean | A logical system using the operators OR, AND and NOT. The Boolean data can take one of two values, either TRUE or FALSE. |
| 7 | Syntax Error | An error in the code where the rules or grammar of the programming language have been broken. | | | |
| 8 | Binary Search | Looks/Searches for items in an ordered list. |   | | |
| 9 | Linear Search | Looks/Searches for items in an Unordered list, |   | | |

# Year 9 – Art - Term 3 + 4– Natural Form

| | | | | | |
|---|---|---|---|---|---|
| 1 | Different qualities of darkness and light. | Tone | 16 | The imagery contained within the work. | Content |
| 2 | The feel of a surface e.g. rough/ smooth. | Texture | 17 | Why and when the work was made. | Context |
| 3 | A mark made by a point moving on a surface. | Line | 18 | How the work makes you feel. | Mood |
| 4 | The three dimensional quality of an object. | Form | 19 | How the work was made. | Process |
| 5 | The outline of an object. | Shape | 20 | How and where the formal elements have been used. | Form |
| 6 | Different Hues caused by light refracting on a surface. | Colour | 21 | Your overall opinion of the work. | Evaluation |
| 7 | The space within a painting or sculpture that contains the important objects/ information. | Positive space | 22 | A way of breaking down and studying different parts of an artwork. | Critical Analysis |
| 8 | The space within a painting or sculpture that does not contain the important objects/ information. | Negative space | 23 | A famous British designer from the Victorian era. | William Morris |
| 9 | The arrangement of objects within an artwork. | Composition | 24 | An art, literature, fashion and design movement from the Victorian era. | The Aesthetic Movement |
| 10 | A popular print design made by the artist William Morris. | Strawberry Thief (1883) | 25 | A type of printing where detail is carved away from a surface to create a design. | Relief Printing |
| 11 | A soft plastic material used for lino cut relief printing. | Lino | 26 | A pattern that includes the same image printed more than two times. | Repeat Pattern |
| 12 | A tool used to apply a thin, evenly layer of ink onto a surface. | Roller | 27 | A sharp carving tool used for cutting and carving lino. | **Lino Cutter** |

# Year 9 – Art - Term 3 + 4– Natural Form

| | | | | | |
|---|---|---|---|---|---|
| 1 | Different qualities of darkness and light. | Tone | 16 | | Repeat Pattern |
| 2 | The feel of a surface e.g. rough/ smooth. | Texture | 17 | Key ideas and themes in William Morris' work | |
| 3 | A mark made by a point moving on a surface. | Line | 18 | Beauty | William Morris was obsessed with beauty and believed that all people should be able to decorate their homes with beautiful things. |
| 4 | The three dimensional quality of an object. | Form | 19 | Repetition | William Morris' works are almost all repeat patterns. This means they can be extended across huge areas like the walls of large houses. |
| 5 | The outline of an object. | Shape | 20 | Nature | William Morris and other artists of the aesthetic movement were concerned that people in Britain were becoming separate from nature because of the industrial revolution. |
| 6 | Different Hues caused by light refracting on a surface. | Colour | 21 | The Industrial Revolution | A period in Victorian Britain where new machines and technologies meant that goods and products could be manufactured in factories. This meant many people left the countryside and came to work in factories in the cities. |
| 7 | Any pattern where images contained within are repeated more than once. | Repeat Pattern | 22 | 'The Strawberry Thief' (1883) | A William Morris print that contains images of a bird and strawberry plants. It contains a wide range of contrasting colours. |
| 8 | The aesthetic movement was a late nineteenth century movement that championed pure beauty and 'art for art's sake' emphasising the visual and sensual qualities of art and design over practical, moral or narrative considerations | The aesthetic Movement | 23 | 'Honeysuckle' (1876) | A William Morris print that contains images of the Honeysuckle plant. This print contains a complimentary colour scheme of red and green. |
| 9 | An artist and designer from Walthamstow who was a key member of the Aesthetic movement. | William Morris | 24 | 'Anemone Wallpaper' (late 19th century) | A William Morris print that contains images of the Honeysuckle plant. This print contains cool colours. |
| 10 | A tool used to cut away lino in order to create a relief printing block. | Lino Cutter | 25 | Complimentary Colours | Colours that are opposites on the colour wheel. They can compliment each other well and contrast. |
| 11 | A soft plastic material used for lino cut relief printing. | Lino | 26 | Contrast | an obvious difference between two people or things |
| 12 | A tool used to apply a thin, evenly layer of ink onto a surface. | Roller | 27 | Embellishment | to make something more beautiful or interesting by adding something to it |