THE KNOWLEDGE Year 8 B2.3

Adaptation and Inheritance

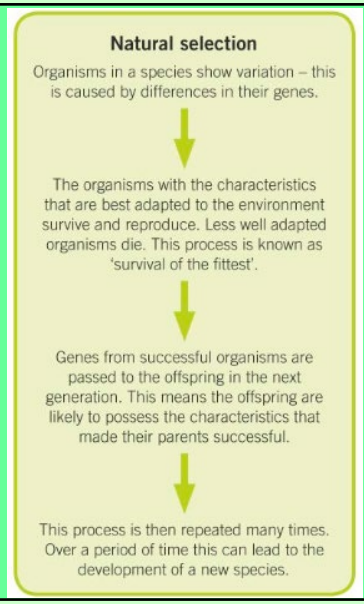
Sentence starters:
All living things compete for…
All living things show variation, this can be ……. or …….
Each cell has 46 chromosomes, which are……..

Evolution and Extinction

Evolution happens by a process called **natural selection**. Organisms change slowly over time as they adapt to their environment. This change can take many, sometimes millions of years.

Species that do not adapt sufficiently to their environment become **extinct**. This means all individuals of that species have died.

One way of finding out about extinct species from the past is to look at **fossils**.

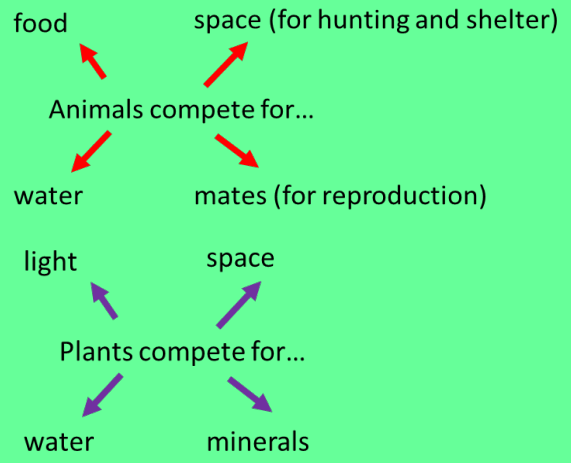


Glossary

Competition
Adaptation
Interdependence
Inherited variation
Environmental variation
Continuous variation
Discontinuous variation
DNA, Chromosome, Gene
Evolution
Natural selection
Extinction

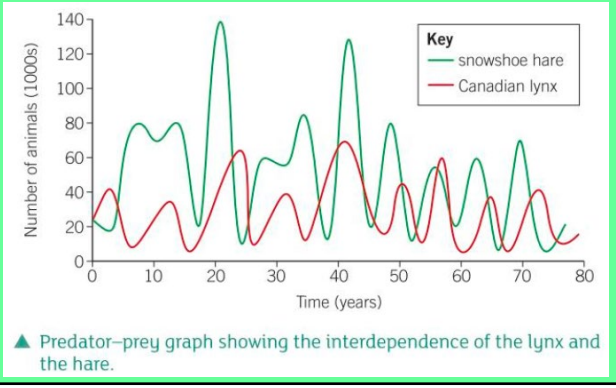
Competition and interdependence

All living things compete for resources.



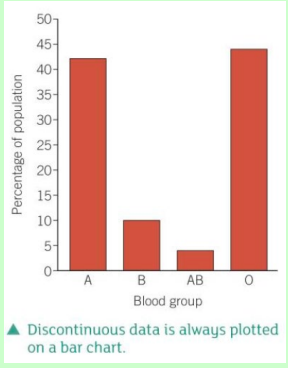
The best competitors will be the organisms that are best **adapted** to their environment.

One of the things animals have to adapt to is changes in their food supply. When a predator feeds on only one type of prey there is an **interdependence** between the predator and prey populations. This can be shown on a graph:



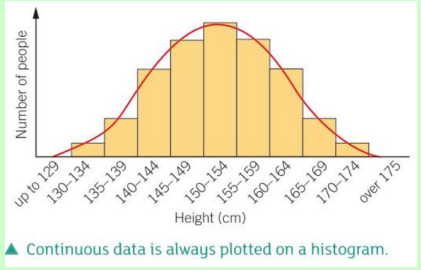
▲ Predator–prey graph showing the interdependence of the lynx and the hare.

Variation: All living things, even if they are the same species, show variation. This means they have different characteristics.
Some of the variation in people comes from differences inherited from your parents – e.g. eye colour. This is called **inherited variation**. Other differences are caused by people having different environments – e.g. Diet or lifestyle. This is called **environmental variation**. Variation in characteristics can either be continuous or discontinuous:

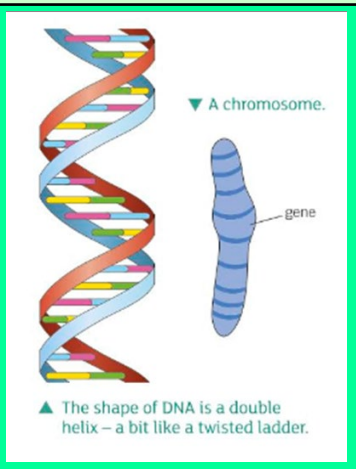


▲ Discontinuous data is always plotted on a bar chart.

Discontinuous variation: characteristics are one of a few different values/types. **Continuous variation**: when any value within a range is possible



▲ Continuous data is always plotted on a histogram.



▲ The shape of DNA is a double helix – a bit like a twisted ladder.

Inheritance: Inherited characteristics are passed on through DNA, which make up genes. Genes are stored on chromosomes. Each body cell has 46 chromosomes – 23 pairs.

THE KNOWLEDGE Year 8 C2.3

Metals and acids

Sentence starters:
When metals react with acids …
The reactivity series describes how …
In a displacement reaction …
Polymers are substances which …

Acids and metals:

- Metals react with acids to make a solution of a **salt and hydrogen gas:**
  - zinc + hydrochloric acid → zinc chloride + hydrogen
  - iron + hydrochloric acid → iron chloride + hydrogen
- We can tell that the gas given off is hydrogen by carrying out the **squeaky pop test.**
- Some **unreactive metals** (e.g. gold, silver, copper) do not react with acids.

Glossary:

carbon fibre	natural polymer
ceramic	polymer
composite	reactive
displace	reactivity series
displacement reaction	synthetic polymer
metal	thermite reaction
ore	

Metals and oxygen:

- Some metals will burn in air. They react with oxygen, producing a **metal oxide.**
  e.g. magnesium + oxygen → magnesium oxide
  zinc + oxygen → zinc oxide
- Unreactive metals, such as gold, will not burn.
- More reactive metals burn more vigorously than less reactive ones.

Metals and water:

- Group 1 metals react vigorously with water, making soluble **hydroxides and hydrogen gas.** e.g.

potassium + water → potassium hydroxide + hydrogen

- **Less reactive metals** (e.g. magnesium) will not react with cold water, but do **react with steam.**
- Copper and gold **will not react** at all with water, because they are so unreactive.
- The **reactivity series** lists the metals in order of how reactive they are.

Metal displacement reactions:

- More reactive metals will **displace** a less reactive ones from their compounds.
  e.g. iron + copper sulphate → iron sulphate + copper
  aluminium + iron oxide → aluminium oxide + iron
- Copper will not react with iron oxide because copper is **less reactive** than iron.

Extracting metals:

- An **ore** is rock from which you can extract a metal.
- Many ores contain metal oxides.
- There are two main stages in extracting a metal from its ore:
  - separate the metal oxides from the compounds it is mixed with.
  - use **chemical reactions** to extract the metal from its oxide.
- Metals which are below carbon in the reactivity series can be **displaced** from their oxides by carbon:
  e.g. carbon + copper oxide → copper + carbon dioxide
  carbon + lead oxide → lead + carbon dioxide

Ceramics:

- Ceramic materials are compounds including metal silicates, metal oxides, metal carbides and metal nitrides.
- **Ceramics are strong, brittle, stiff, solid, strong under pressure, electrical insulators.**
- Ceramics are used for:
  - building materials (e.g. bricks)
  - electrical power line insulators
  - jet-engine turbines
  - crockery

Polymers:

- A polymer is a substance with **very long molecules.**
- A polymer molecule **has identical groups of atoms**, repeated many times.
- **Natural polymers**, such as wool, cotton and rubber, are made by animals and plants.
- **Synthetic polymers** are made by chemical reactions.
- **Plastics**, including polythene and PVC are synthetic polymers.

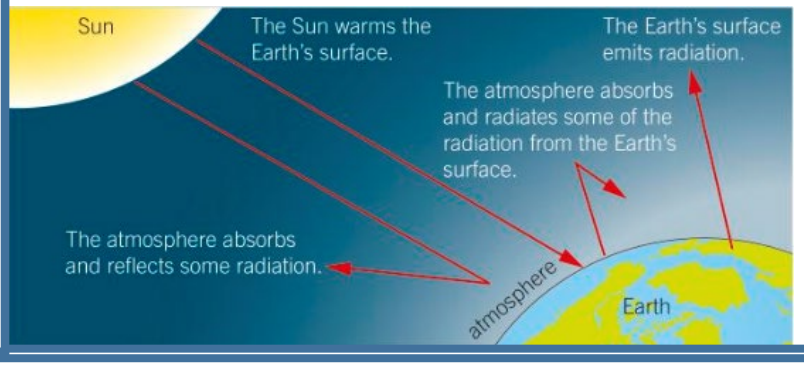
Composites:

- A **composite** is a mixture of materials.
- Each material has **different properties.**
- The properties of the composite are a **combination** of the properties of the materials it is made of.
- Composites can be used to make many products, including bicycle frames and aircraft.

THE KNOWLEDGE

Year 8 C2.4 The Earth and its atmosphere, rock and carbon cycle

- Sentence starters:
- The difference between sedimentary and igneous rocks is….
- Metamorphic rocks form when….
- The increasing concentration of atmospheric carbon causes….
- One of the many advantages or recycling is....
- Huge forces inside the Earth can…
- The importance of the Greenhouse effect is….
- Global warming means that…..

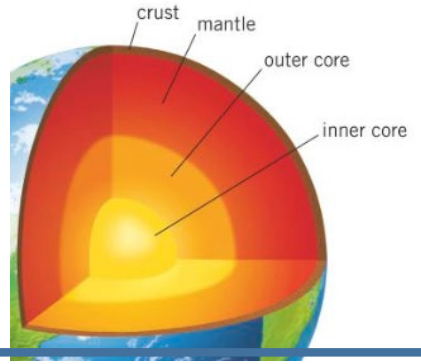


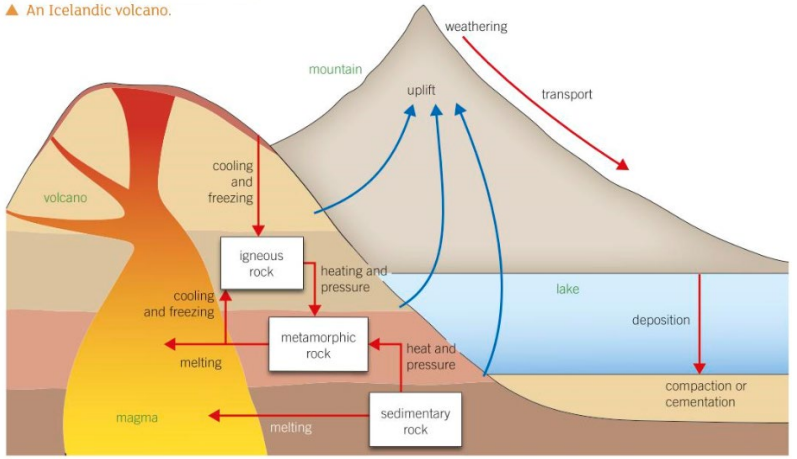
Greenhouse gases: (methane and carbon dioxide) in the atmosphere absorb some of the heat radiation from the surface of the Earth so it does not go back into space.

Glossary

crust, mantle, core, outer core, inner core, atmosphere, troposphere, sedimentary, igneous, metamorphic, porous, weathering, sediment, physical weathering, freeze-thaw, chemical weathering, biological weathering, erosion, transport, deposition, compaction, cementation, durable, magma, lava, rock cycle, uplift, respiration, combustion, photosynthesis, dissolving, carbon cycle, carbon store, climate change, deforestation, radiation, greenhouse effect, greenhouse gas, global warming, recycling.

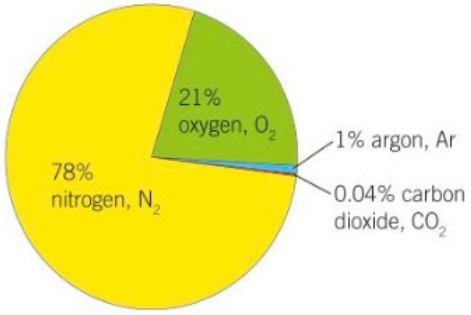
The Structure of the Earth

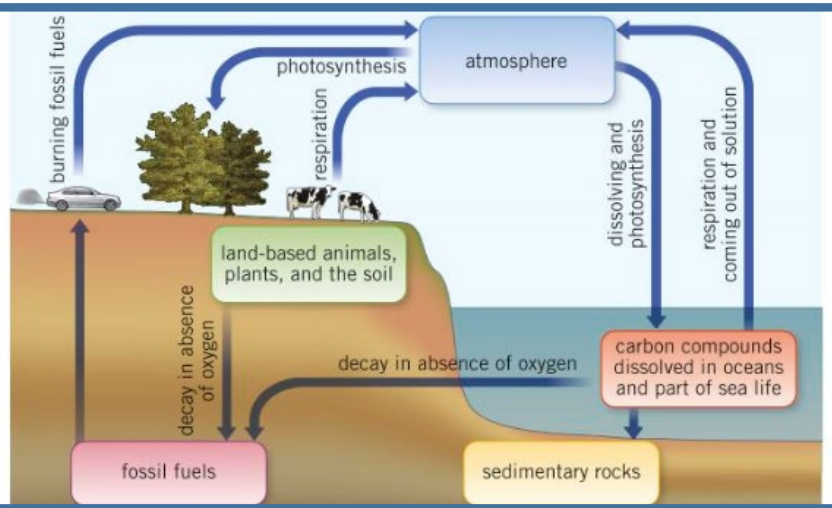




The rock cycle: Rocks are changing all the time. ***Weathering*** makes sediments, ***Transport*** moves them away from the original rock. When sediments are compacted and cemented they form new rock. Volcanoes erupt, and their lava freezes. Deep within the crust, heat and high pressure make metamorphic rocks.

Atmospheric components





The carbon cycle: carbon dioxide is constantly entering and leaving the atmosphere and other carbon stores:

- Oceans
- Soil and sedimentary rocks
- Plants and animals
- Fossil fuels

Since the industrial revolution carbon dioxide has been removed at a slower rate than it has entered the atmosphere. This process increases the Greenhouse effect.

Sedimentary rock *(Limestone)*

- Porous
- Soft
- Made up of pieces of older rocks

Igneous rock (Granite)

- Cooled magma
- Hard
- Durable
- Consists of crystals

Metamorphic rock *(Marble)*

Formed under high pressure and temperature

THE KNOWLEDGE

Year 8

P2.3 Motion and pressure

Sentence starters:
To calculate speed you need to …..
Gas pressure is due to the collisions of gas molecules …..
Objects are in equilibrium when ……

Speed

Speed is the distance travelled per unit time.
Instantaneous speed is the speed of an object at a given point in time, such as the one you see on a car's speedometer.
The average speed is found by dividing the total distance travelled by the total time taken to cover that distance.

Acceleration

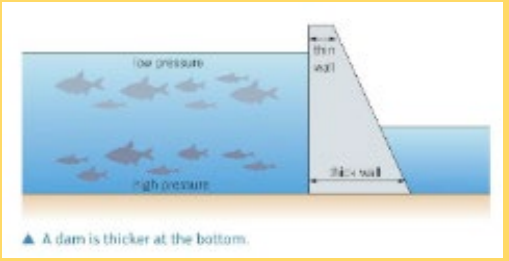
Acceleration tells us how quickly your speed is changing.

Glossary

speed
instantaneous speed
average speed
acceleration
pressure
compressible
Newton per metre squared
pivot
moment
law of moment
centre of mass

Liquid Pressure

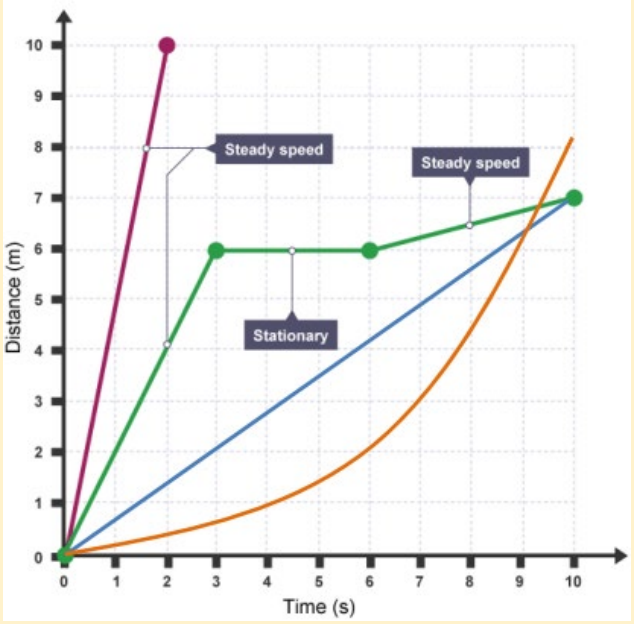
Liquid pressure acts in all directions.
The pressure at a particular depth in a liquid depends on the weight of water above it. Liquids are incompressible.



▲ A dam is thicker at the bottom.

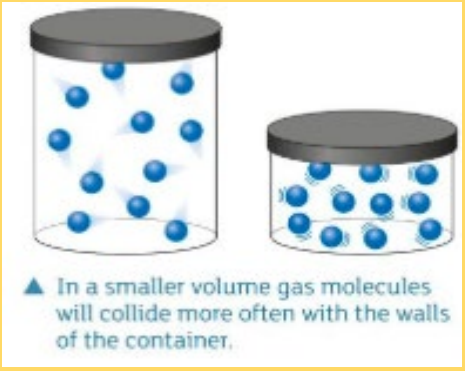
Distance –time graph

The slope of a distance-time graph is the speed.



Gas pressure

A gas exerts pressure on the walls of its container because the particles collide with the walls.
The hotter it is the higher the gas pressure.
If you squash a gas into a smaller volume, its pressure increases.


▲ In a smaller volume gas molecules will collide more often with the walls of the container.

Calculating Pressure

$$Pressure = \frac{Force}{Area}$$

Pressure is measured in newtons per metre squared (N/m^2)
Pressure is a measure of how much force is applied over an area.

Moment

A moment is the turning effect of a force. When a see saw is balanced the clockwise moment equals the anti-clockwise moment.

$$Moment = Force\ x\ distance$$