Study to Succeed

KNOW MORE DO MORE REMEMBER MORE

Boldon School

INNOVATE: FOCUS: ACHIEVE

Half term 3

Subject:Science

Variation

Differences in characteristics are called **variation**.

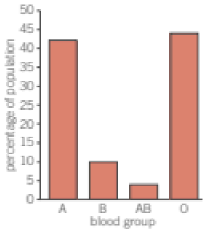
Inherited variation – **Characteristics are passed on from parents to offspring**: *genetic diseases*, *eye colour*, *blood group*

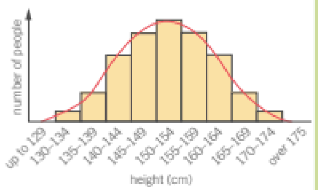
Environmental variation – **Surroundings affects your characteristics**: *dyed hair*, *tattoos*, *accent*

Many characteristics, such as height, are affected by both inherited and environmental variation.

Continuous variation
can only result in certain values (e.g., *blood group or eye colour*)

Discontinuous variation
can take any value within a range (e.g., *height or hair length*)





Discontinuous variation should be plotted on a bar chart, and continuous variation should be plotted on a histogram.

Inheritance

Characteristics

Characteristics are inherited from your parents through genetic material stored in the nucleus of cells.

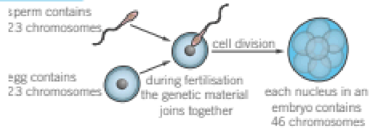
We inherit half of our DNA (deoxyribonucleic acid) from our mother and half from our father.

DNA

- contains all the information needed to make an organism
- is arranged into long strands called **chromosomes**.
- each chromosome is divided into sections of DNA
- sections of DNA that contain the information to produce a characteristic are called **genes**

Scientists Watson, Crick, Franklin, and Wilkins, worked together to produce a model of the structure of DNA.

Inheritance of genetic material:



Natural selection

Organisms in a species show variation caused by differences in their genes.

↓

Organisms with the most useful characteristics survive and reproduce.

↓

This is called 'survival of the fittest'.

↓

Successful genes are passed on to the offspring. → This is repeated many times and over a long time can lead to a new species.

Process of natural selection

- All living organisms have **evolved** from a common ancestor, through the process of natural selection.
- Organisms change slowly over time.
- Those better adapted to their environment are more likely to survive.

Adaptation and change

Adaptation	Competition
• Adaptations are characteristics that help an organism to survive and reproduce. *For example, the cheetah is the fastest land animal. This speed makes it a very successful predator.*	Animals compete for: food, water space (for shelter and to hunt), and mates (to reproduce). Plants compete for: light, water, space, and minerals (plants produce their own food through photosynthesis).
Environmental changes	**Competition and adaption**
• Plants and animals adapt to changes in their environments. • Habitats can change through fire, climate change, or disease causing reduced food supplies. *For example, deciduous trees look different in each season, and bears hibernate somewhere warm in the winter.*	• Predator and prey species are **interdependent**. • This occurs when a change in the population of one animal directly affects the population of the other. *For example, the number of Canadian lynx and its prey the snowshoe hare.*

Extinction

If a species is not well-adapted to its environment it will not survive, and the organisms will die before reproducing. A species becomes **extinct** when there are no more individuals of that species left anywhere in the world. The **fossil record** shows that many species that once lived have become extinct.

Factors leading to extinction:

- changes to the organism's environment
- destruction of their habitat
- new diseases
- new predators
- increased competition.

Scientists are trying to prevent **endangered** species (at risk of extinction) from becoming extinct.

For example, by using gene banks to store genetic samples from different species.

In the future these can be used for research, or to produce new individuals.

Key terms Make sure you can write definitions for these key terms.

adaptation *competition* *chromosome* *continuous* *characteristic* *discontinuous* *DNA* *inherited variation* *environmental variation* *evolution* *extinct* *fossil record* *gene* *gene bank* *interdependent* *natural selection* *species* *variation*

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What are mixtures?

Mixtures are different substances found together, but not chemically bonded. This means the different substances can be **separated** from each other.

In a **compound**, different substances are chemically bonded together, while in a mixture they are not.

The substances that make up a mixture keep their own properties and are easy to separate.

You can change the amounts of the substances in a mixture.

You can tell the difference between a **pure substance** and an **impure substance** – a pure substance has a single, sharp melting point, while an impure substance (a mixture) has a range of temperatures for its melting point.

Solutions

Solutions are a type of mixture made of two parts:

1 **Solvent**: the liquid that makes up most of the solution.

2 **Solute**: the substance that is added to the solvent and **dissolves** into it.

The solute usually starts as a solid, and its particles break away from each other and move into the solvent.

Solubility

The **solubility** of a solute means how much solute can dissolve in a certain volume of solvent.

- Different solutes have different solubilities in different solvents.
- Increasing the temperature often increases the solubility.
- Soluble substances can dissolve, **insoluble** substances cannot.

Saturated: when so much solute has been added to the solvent that no more can dissolve, we say the mixture is saturated.

How can we separate mixtures?

Filtration

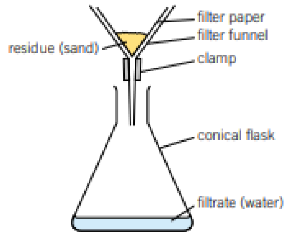
A method to separate a mixture of an undissolved solid and a liquid.

1 **Filter paper** has extremely small holes in it.

2 Particles in a liquid or solution are so tiny that they can fit through the holes.

3 Larger particles of the solid are too big to fit through the holes and are held back by the paper.

- **Residue**: solids left behind in the filter paper.
- **Filtrate**: the liquid that passes through the filter paper.

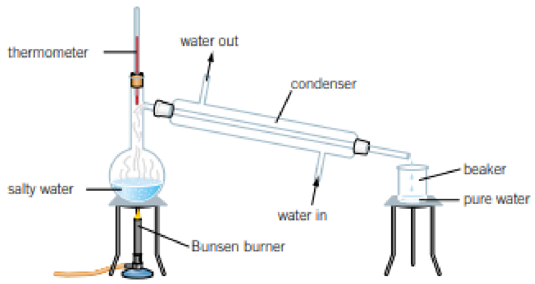


Distillation

A method that separates a solute and a solvent while keeping the solvent.

1 The solution is boiled so the solvent turns in to a gas.

2 The gas is then cooled down in a **condenser**, where it turns back into a liquid and can be collected.

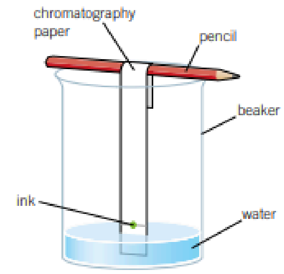


Chromatography

A method used to separate mixtures that are soluble in the same solvent.

1 A mixture like ink is placed on a piece of paper, which is placed in a solvent.

2 As the solvent moves up the paper it separates all the different constituents (parts) of the ink, producing a **chromatogram**.

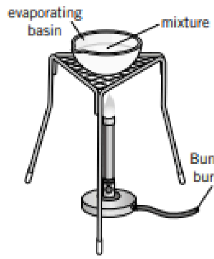


Evaporation

A method to separate a solute and a solvent, keeping the solute.

1 The solution is heated then left in an evaporating basin until all the solvent evaporates.

2 The solute is left behind as a solid.



Key terms Make sure you can write definitions for these key terms.

chromatography chromatogram compound condenser dissolve distillation evaporation filtrate filtration filter paper impure substance insoluble mixture pure substance residue saturated separate solvent solute soluble solubility solution