



Topic Overview

Variation & Inheritance



KNOW IT

- [I know about the discovery of DNA.](#)
- [I know about the structure of DNA.](#)
- [I know what variation is and can categorise differences as environmental, genetic or both.](#)
- [I know the difference between continuous and categorical data and know which graph to use to display each.](#)
- [I know the role of the egg and the sperm in inheritance.](#)
- [I know what happens during fertilisation.](#)
- [I know what chromosomes are.](#)
- [I know how sex is inherited.](#)
- [I can use a punnet square to make predictions about expected ratios.](#)



LINK IT

This topic links with the unit 4.6 Inheritance, variation & evolution topic that you will cover in KS4.



PROVE IT

- DIRT task
- End of unit test



SAY IT

VOCABULARY	DEFINITION
DNA	A molecule found in the nucleus of cells. It is normally arranged in chromosomes and it determines an individuals characteristics.
CHROMOSOMES	Humans have 46 (23p) of these inside of the nucleus of our cells. Eggs and sperm cells on have 23.
GENE	The part of the DNA molecule that is different between individuals.
VARIATION	The differences between individuals.
ENVIRONMENTAL	Differences between individuals which are caused by our surroundings or lifestyle choices.
INHERITED	Differences between individuals which are caused by DNA.
CONTINUOUS	Data that can be represented by any numerical value and is normally displayed as a line graph.
DISCONTINUOUS	Data that has a label, name or defined group and is normally displayed as a bar graph.

18. Variation



Species: A group of living things that have more in common with each other than with other groups and can breed to produce a fertile offspring.

Variation: The differences within and between species.

Continuous variation: Where differences between living things can have any numerical value.

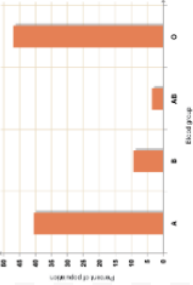
Discontinuous variation: Where differences between living things can only be grouped into categories.



- There is variation between individuals of the same species.
- Some variation is inherited, for example;
 - eye colour,
 - hair colour,
 - skin colour,
 - lobed or lobeless ears.
- Some variation is caused by the environment, for example;
 - your accent,
 - your weight,
 - scars,
 - piercings,
 - tattoos.
- Some variation is a combination of both environmental and inherited factors, for example;
 - your weight,
 - height.

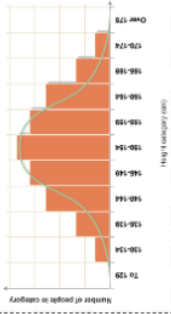


Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment.



Human blood groups are an example of **discontinuous variation**. There are only 4 types of blood group. There are no other possibilities and there are no values in between. So this is discontinuous variation.

- Here are some other examples:
- gender (male or female)
 - blood group (A, B, AB or O)
 - eye colour



Human height is an example of **continuous variation**. Height ranges from that of the shortest person in the world to that of the tallest person. Any height is possible between these values. So it is continuous variation.

- Here are some other examples:
- height
 - weight
 - foot length.

Securing
To be securing in this topic you need to be able to:

- Explain whether characteristics are inherited, environmental or both.
- Plot bar charts or line graphs to show discontinuous or continuous variation data.
- Explain how variation helps a particular species in a changing environment.
- Explain how characteristics of a species are adapted to particular environmental conditions.

Mastering
To be mastering in this topic you need to be able to:

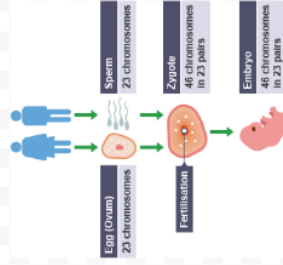
- Predict implications of a change in the environment on a population.
- Use the ideas of variation to explain why one species may adapt better than another to environmental change. Critique a claim that a particular characteristic is inherited or environmental.

Fertilisation is the joining or fusion of a male gamete and a female gamete.

When fertilisation happens, a single body cell with new pairs of chromosomes is formed.

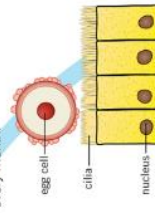
The new cell then divides over and over again forming a bundle of cells, after approximately two weeks the bundle of cells forms an embryo.

At eight weeks the developing baby is called a foetus.



Fertilisation

An egg is released every month.



The egg cell is moved along the oviduct towards the uterus by cilia.

If a sperm meets the egg **fertilisation** will happen.

The fertilised egg may then **implant** in the uterus lining and form an **embryo** (ball of cells)

Sperm cells are produced in the **testicles/ testes**.

Sperm are mixed with nutrients and fluid from the glands to form **semen**.

During sexual intercourse a man will release semen into the vagina (**ejaculation**).

Variation

Differences in characteristics are called **variation**.

Inherited variation

Characteristics are passed on from parents to offspring

- genetic diseases
- eye colour
- blood group

Surroundings affects your characteristics

- dyed hair
- tattoos
- accent

Environmental variation

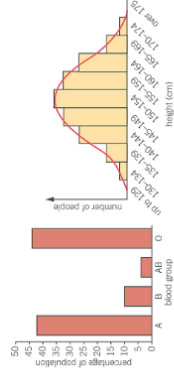
Many characteristics, such as height, are affected by both inherited and environmental variation.

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)



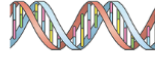
Discontinuous variation should be plotted on a bar chart, and continuous variation should be plotted on a histogram.

Inheritance

Characteristics

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

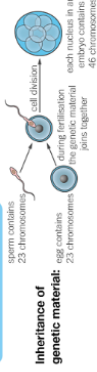
We inherit half of our DNA (deoxyribonucleic acid) from our mother and half from our father.



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