KS3 SCIENCE · BIOLOGY

Genetics and evolution revision sheet

Name _____

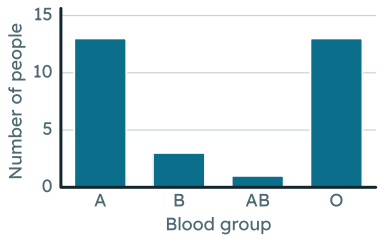


1. Variation

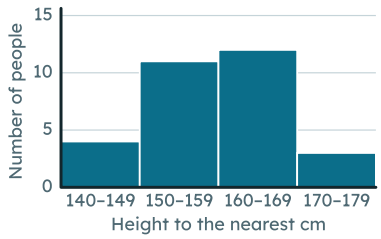
- **Variation** is the differences between living things. There is variation between species and within a species.
- A **species** is a group of living things that can breed together to produce fertile offspring.

INHERITED	ENVIRONMENTAL	BOTH
Passed on from parents in their genes: blood group, natural eye colour	Caused by surroundings and way of life: a scar, the language you speak	Height, body mass, skin colour

2. Continuous or discontinuous?

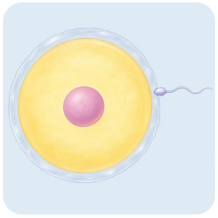


Discontinuous: a bar chart with gaps



Continuous: a histogram, where the bars touch

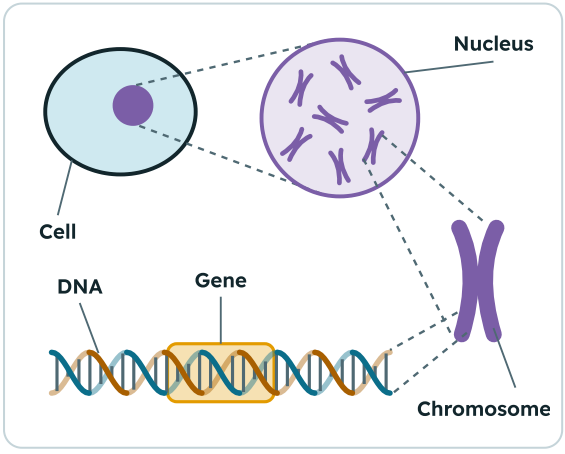
- **Discontinuous variation** falls into separate groups, with nothing in between: blood group, the colour of a pea flower.
- **Continuous variation** can take any value in a range: height, body mass, hand span, the length of a leaf. Put the values into groups to draw the histogram. A line graph works too.



3. Heredity

- **Heredity** is the passing of genetic information from one generation to the next.
- An egg carries half the mother's number of chromosomes. A sperm carries half the father's. At fertilisation they join to make a full set. In humans that is 23 + 23 = 46.
- Every egg and every sperm carries a different mix of the parent's genes. That is why brothers and sisters look alike but not identical. Identical twins grow from one fertilised egg, so they have the same genes.

4. Chromosomes, genes and DNA



- **Chromosomes** are in the nucleus. A human body cell has 46 of them, in 23 pairs: one of each pair from the mother and one from the father.
- A chromosome is made of **DNA**: a very long thread of it, coiled up tightly. It looks like an X when it has been copied, just before the cell divides.
- A **gene** is a short section of DNA. Genes control inherited features. One chromosome carries many genes.
- A gene can come in different versions. That is why people have different blood groups.
- From biggest to smallest: cell, nucleus, chromosome, gene.



5. The DNA story

SCIENTIST	WHAT THEY DID
Rosalind Franklin	Took X-ray pictures of DNA. Photo 51 (1952), from her laboratory, showed that DNA is a helix.
Maurice Wilkins	Began the X-ray work on DNA in London. He showed Photo 51 to Watson.
James Watson and Francis Crick	Used the X-ray results to build a model of DNA in 1953: the **double helix**, two strands twisted together.

Watson, Crick and Wilkins shared the Nobel Prize in 1962. Franklin had died in 1958.



6. Natural selection

1. The individuals in a species **vary**, and some of the differences are inherited.
2. Some have features that suit their surroundings better.
3. These individuals are more likely to **survive and breed**.
4. Their offspring **inherit** the genes for those features.
5. Over many generations the features become more common. This is **evolution**.

Peppered moths: soot turned tree bark dark. Birds then found the light moths more easily, so more dark moths survived and bred. No moth changed colour. The mix in the population changed.



7. Extinction

- A species is **extinct** when no individuals of it are left alive.
- **Causes:** a change in climate, a new predator, a new disease, a new competitor, the loss of its habitat, hunting by humans.
- The dodo died out after sailors hunted it and the rats and pigs from their ships ate its eggs.
- **Variation protects a species.** When the environment changes, a few individuals may have features that suit the new conditions. They survive and breed.



8. Biodiversity and gene banks

- **Biodiversity** is the variety of living things. To measure it, count the species in a place.
- Species depend on each other for food, shelter and pollination. Where there are many species, there are resources for other populations, including humans.
- A **gene bank** stores seeds, eggs, sperm or tissue, dried or frozen. It keeps genes safe: a species or crop variety that dies out may be grown or bred again.

Key words

Variation: the differences between living things

Species: a group of living things that can breed together to produce fertile offspring

Inherited variation: differences passed on from parents in their genes

Environmental variation: differences caused by surroundings and way of life

Continuous variation: can take any value in a range, such as height

Discontinuous variation: falls into separate groups, such as blood group

Heredity: the passing of genetic information from one generation to the next

Gamete: a sex cell: an egg or a sperm

Chromosome: a thread of tightly coiled DNA that carries many genes

DNA: the chemical that holds genetic information

Gene: a section of DNA that controls an inherited feature

Double helix: the shape of DNA: two strands twisted together

Mutation: a change in the DNA

Natural selection: the best-suited individuals survive, breed and pass on their genes

Evolution: the change in a species over many generations

Extinct: no individuals of the species are left alive

Biodiversity: the variety of living things in a place

Gene bank: a store of seeds, cells or other genetic material

Pictures are illustrations made for this sheet, not real photographs.