

Science – Combined Biology: Genetics (CB3) Autumn Term
Section A: Vocabulary
Tier 3 Vocabulary

asexual reproduction	Producing new organisms from one parent only. These organisms are genetically identical to the parent.
sexual reproduction	Reproduction that needs a male and a female parent.
chromosome	A structure found in the nuclei of cells. Each chromosome contains one enormously long DNA molecule packed up with proteins.
diploid	A cell or nucleus that has two sets of chromosomes. In humans, almost all cells except the sperm and egg cells are diploid.
DNA	Deoxyribonucleic acid. A polymer made of sugar and phosphate groups joined to bases. One molecule of DNA is found in each chromosome.
gamete	A haploid cell used for sexual reproduction.
gene	Section of the long strand of DNA found in a chromosome, which often contains instructions for a protein.
genome	All the DNA in an organism. Each body cell contains a copy of the genome.
haploid	A cell or nucleus that has one set of chromosomes. Gametes are haploid.

Section B: DNA and Replication
Sexual and Asexual Reproduction

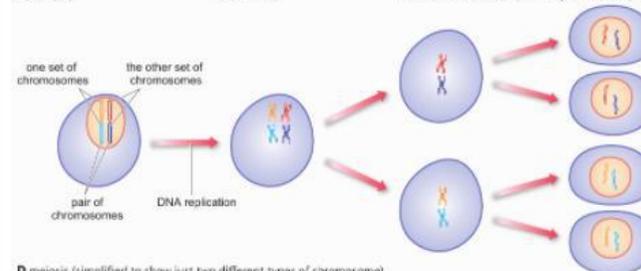
Most animals and plants reproduce by **sexual reproduction**, involving **fertilisation** of a female sex cell by a male sex cell. Some organisms can reproduce without fertilisation, which is known as **asexual reproduction**. This produces **clones** (offspring that are genetically identical to the parent).



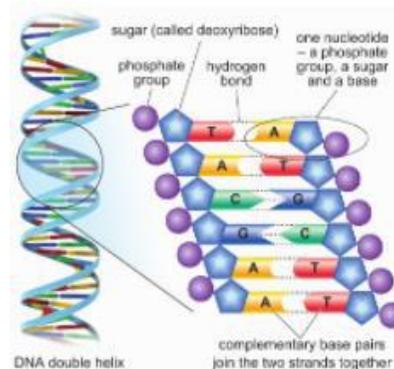
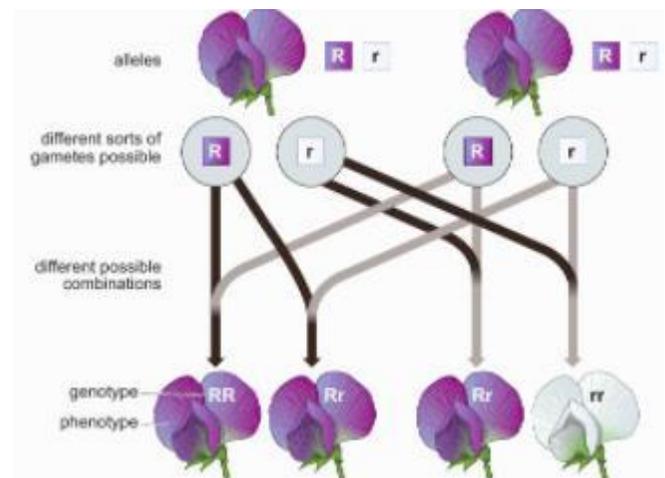
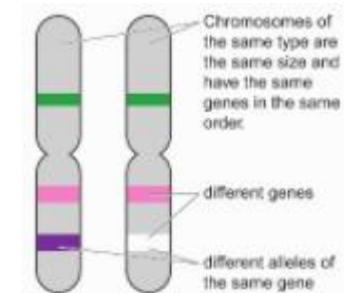
B In the summer, an adult female aphid can produce up to five young a day without the need for a mate.

Meiosis

The gamete-making cell has two sets of chromosomes. It is diploid (2n). The chromosomes replicate (and the copies stay stuck to one another). The cell divides into two and then into two again. Each of the final four daughter cells has a copy of one chromosome from each pair. They are haploid (1n).

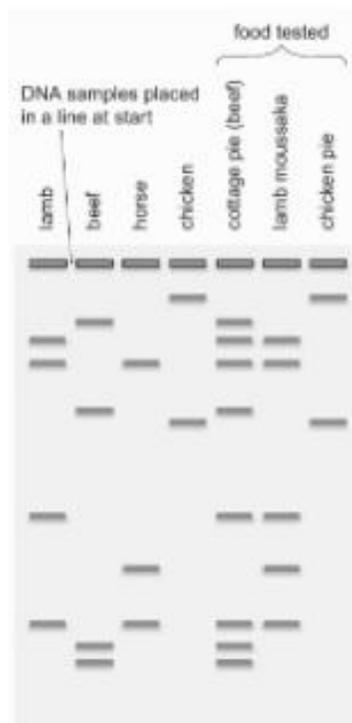


D meiosis (simplified to show just two different types of chromosome)

DNA

Section C: Genetic Variation & Inheritance
Alleles


meiosis	A form of cell division in which one parent cell produces four haploid daughter cells.
mitosis	A form of cell division in which one parent cell produces two diploid daughter cells.
zygote	Another term for 'fertilised egg cell'.
base (in DNA)	Four substances that help make up DNA, often shown by the letters A, C, G and T. Pairs of bases form 'links' between two 'spines' formed of phosphate groups and a type of sugar.
allele	Most genes come in different versions called alleles. So a gene for eye colour may have one version (allele) that can cause dark eyes, and another allele that can cause pale eyes.
phenotype	The characteristics that a certain set of alleles display.
dominant	Allele that will always affect the phenotype (as opposed to a recessive allele, whose effect will not be seen if a dominant allele is present).

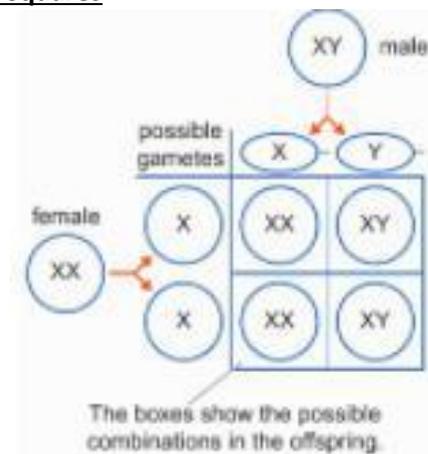
DNA Extraction



DNA is often analysed by chopping it up into small pieces. Where the cuts occur in the DNA is due to the order of the bases. The sizes of the pieces produced are different for different organisms. A form of chromatography is then used to separate the pieces of DNA, with smaller pieces travelling further than larger pieces. The results can then be examined. Diagram C shows the results of one of these tests on the meat in three pre-packed foods.

- State what substance would be added to the DNA samples to chop them into smaller pieces. (1 mark)
- Explain which meat produced the smallest size pieces of DNA. (2 marks)
- Explain which food(s) contain(s) only the meat they should. (2 marks)
- Identify the meats in the illegal food(s). (2 marks)

Punnett Squares



Mutation

Mutations happen when there is a mistake in copying DNA during cell division. For example, one base in a DNA sequence might be replaced with another, rather like typing the wrong letter in a word. This can happen naturally, but is more likely to happen if there is damage to the DNA caused by radiation or certain substances.

Human Genome Project

Mapping a person's genome can indicate their risk of developing diseases that are caused by different alleles of genes. It can also help identify which medicines might be best to treat a person's illness, because the alleles we have can affect how medicines work in the body.