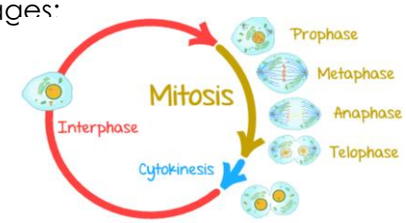
Year 9 Science: Term 4
Genetics and Using Resources

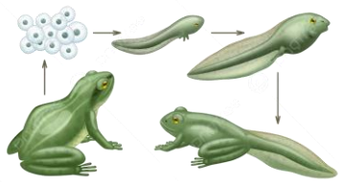
Week 1

All living cells undergo the cell cycle. This allows for the growth of organisms and the replacement of damaged or old cells. For some organisms, this process is also their method of reproduction. During the cell cycle, genetically identical copies of cells are made.

There are three main stages:
Stage 1 - **Interphase**
Stage 2- **Mitosis**
Stage 3 - **Cytokinesis**



Mitosis involves the replication of DNA and then splitting the DNA between two new cells which are identical to the original cell. **Meiosis** is the cell division to make sex cells (gametes) and produces cells with half a set of DNA.



Week 2

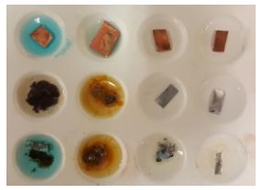
Sexual reproduction occurs in most eukaryotic organisms and involves exchanging DNA with two parents. Asexual reproduction occurs in fungi, bacteria and some plants and involves replicating the DNA to create a clone of the parent.

	Asexual	**Sexual**
Commonly used by	Bacteria, fungi, some plants	Plants and animals
No. of parent cells involved	One	Two
Genetic variability	All cells genetically identical (clones)	All cells genetically different
Involves gametes	No	Yes
Type of cell division involved	Mitosis (Binary fission in bacteria)	Meiosis (for production of gametes) Mitosis (for growth of the zygote)

Week 3

Organisms have two copies of most genes. One from the mother and one from the father. Sometimes an individual inherits two **different versions** of the gene, sometimes an individual inherits two of the **same version**.
Different versions of genes are called **alleles**.
The set of alleles present is called the **genotype.**
When an organism has two different alleles for one gene, we describe the **genotype** as **heterozygous.**
When the two alleles are the same, we describe the genotype as **homozygous.**
A dominant allele is always **expressed** in the **phenotype** when present, even when only one copy is present.
A recessive allele is only **expressed** in the **phenotype** when there are two copies of it (no dominant allele).

Reuse
Reduce
Recycle



Week 4

What do you get when you cross a purple pea plant with a white pea plant?

Phenotype: Purple flowers White flowers
Genotype: FF ff
Gametes: F F f f
Cross:

	F	F
f	Ff	Ff
f	Ff	Ff

Ratio: 4 purple: 0 white

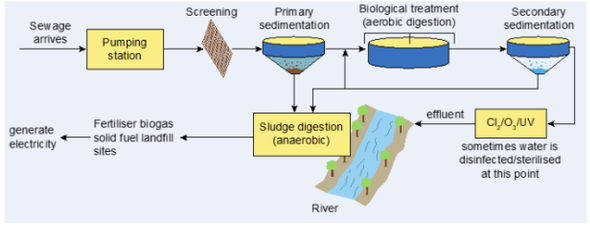
Percentage: 100% purple flowers (Ff - heterozygous)

The possible genotypes and phenotypes of the offspring can be determined using a Punnett square, a grid that shows the possible combinations of alleles that can result at fertilisation. Dominant alleles are represented as a CAPITAL letter and recessive a small letter. The phenotype is the expression of the genes – what they will look like.

Week 5 & 6

The reactivity series is a list of metals from most reactive to least reactive. A **more reactive** metal will take the place of a **less reactive** metal in a compound. This type of reaction is called a **displacement reaction**.

Sewage treatment can be broken into 4 main stages:



Key words:

Chromosome - A section of DNA that contains many genes.

Gene - A section of a chromosomes that codes for a particular protein.

Mutation - A change in the genetic material of an organism.

Dominant allele – it will always be expressed if present

Recessive allele – it will only be expressed if two copies are present

Biodegradable - When a substance can be decomposed or broken down by microorganisms.

Semi Permeable Membrane - A type of membrane that allows some molecules to pass through it but not others

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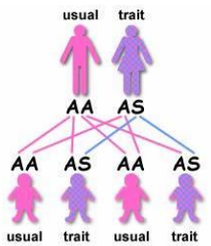
Week 1

Questions	Answers
State the number of chromosomes present in a human body cell.	46 chromosomes (23 pairs)
Outline the two uses of mitosis in living organisms.	In the process of asexual reproduction (for some organisms) During growth and repair of organisms (eukaryotic only)
State the purpose of meiosis.	Meiosis occurs to produce gametes that are used in sexual reproduction
After fertilisation, state the process that causes cells to divide.	Mitosis

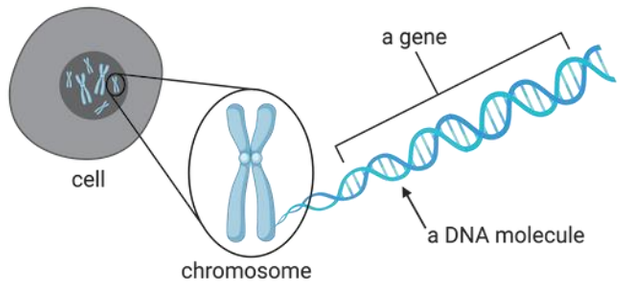


Week 2

Questions	Answers
State why complex organisms have 2 copies of every chromosome.	One copy comes from the mother and one from the father during sexual reproduction
Define homozygous genotype.	When the allele is the same
Define heterozygous genotype.	When the alleles are different
What is asexual reproduction?	No transfer of DNA, only involves one parent and produces clones
What is sexual reproduction?	DNA is transferred between two parents and produces offspring which is genetically different

Week 3

Questions	Answers
What is the difference between the terms 'genotype' and 'phenotype'?	The genotype is the combination of alleles. The phenotype is the expressed characteristic.
When would a recessive allele be expressed?	Only when there are 2 recessive alleles in the genotype
What does it mean for an allele to be dominant?	The allele is always expressed in the phenotype
Define a gene.	A section of DNA that contains a code for a specific protein



Week 4

Questions	Answers
What is an allele?	Different forms of the same gene
Polydactyly is caused by a _____ allele	Dominant
Cystic fibrosis is caused by a _____allele	Recessive
What is polydactyl?	Polydactyly is an inherited disorder which results in the sufferer having extra fingers or toes .
What is a genetic disorder?	A disorder that is a passed from parents to offspring in the DNA

Week 5 & 6

Questions	Answers
What does a reactivity series show?	The order of how reactive different metals are
What happens in a displacement reaction?	A more reactive metal takes the place of a less reactive metal in a compound
What two substances are needed for rusting?	Oxygen and water
Explain what is meant by sewage.	Any wastewater, such as from toilets, showers, washing machines or from industry
State the stages involved in treating sewage.	Screening and grit removal, primary sedimentation, biological treatment, secondary sedimentation

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