

UNIT 4: ELECTRICITY AND ELECTRICITY PRODUCTION



CONTENT

Students will learn and be tested on this content.

Big idea 1: Energy cannot be created or destroyed, only transformed or transferred

- **Describe** what Energy is - recap.
- **Understand** the Law of Conservation of Energy - recap.
- **Focus** is on electrical energy

Big idea 2: Electrical energy is very useful and can be produced and stored in a variety of ways

- **Describe** what electricity is and how useful it is in our everyday lives.
- **Understand** the different ways electrical energy can be produced using renewable and non-renewable sources of energy, and how electrical energy can be stored for later use.
- **Know** the basic difference between a motor and a generator.
- **Describe** different ways electrical energy can be stored – fuel cells and batteries.

Big idea 3: General equipment used in the classroom to investigate electricity and protecting ourselves from the dangers of electricity.

- **Identify** the circuit symbols of commonly used components and **draw** simple circuit diagram.
- **Build** a simple series circuit and **know** where the voltmeter and ammeter placed,
- **Define** current (I) and voltage (V) (potential difference) and these are measured (equipment and units).
- **Explain** what resistance (R) is and how it can be increased / decreased in a circuit.
- **Know** the difference between an insulator and a conductor and relate this to the Resistance of the material
- **Explain** basic electrical safety considerations added to systems to avoid electrical emergencies eg fuses, Earth wires etc.

UNIT 5: CARBON FUELS AND THE ENVIRONMENT



CONTENT

Students will learn and be tested on this content.

Big idea 1: Carbon is an essential element for life of Earth

- **Describe** what the element Carbon is and why it is an essential element for life on Earth.
- **Understand, describe and explain** how the Carbon cycle works, and why it is important for life on Earth.

Big idea 2: Fossil fuels are non-renewable sources of energy.

- **Describe** what a fossil fuel is, how it was made millions of years ago, how it is extracted and refined.
- **Explain** why fossil fuels are a non-renewable source of energy (not sustainable).
- **Understand and explain** the difference between complete and incomplete combustion of fossil fuels and their effect on planet Earth.
- **Know** the dangers of incomplete and complete combustion products.

Big idea 3: The increasing levels of greenhouse gases in the atmosphere is resulting in the Greenhouse Effect where the globe is warming up, resulting in climate change across the planet.

- **Describe** what the greenhouse gases are and how they have been produced.
- **Explain** why it is so hard to reduce the amount of greenhouse gases in our atmosphere.
- **Explain** how the greenhouse gases have a direct impact on the temperature of the Earth due to the Greenhouse Effect and therefore, global warming.
- **Understand** the overall result of the Earth getting warmer ie Climate Change and its direct impact on the planet.
- **Understand** the possible effects of Global Warming on New Zealand.
- **Explain** how we can try and solve this problem of Climate Change in an effort to save our planet eg decreasing our carbon footprint, reducing fuel miles, recyclable packaging, limit livestock numbers to lower methane cycles etc.

UNIT 6: SEXUAL REPRODUCTION AND GENETICS



CONTENT

Students will learn and be tested on this content.

Big idea 1: All organisms reproduce in order to perpetuate the species

- **Describe** the male and female reproductive organs
- **Understand** how the male and female reproductive systems work
- **Understand and describe** the process of fertilization where a male's sperm and female's egg fuse to make a zygote – fertilized egg. The end result is the production of offspring with a variety of traits.
- **Understand and explain** why sexual reproduction is important in terms of variation and perpetuating the human species

Big idea 2: All human characteristics are carried and passed down via in the genes

- **Describe** what the study of genetics is
- **Describe** the structure and function of DNA
- **Understand** that DNA is the building block of genetic material found in the nucleus of every cell and the genes code for various characteristics.
- **Know** that a section of the chromosome that codes for a trait is called a gene, and different forms of the gene are called alleles. Each allele is inherited from each parent.
- **Know** what variation within a species means.
- **Know** the difference between continuous and discontinuous variation.
- **Know** that different species have different karyotypes – humans have 23 pairs of chromosomes.
- **Understand** the difference between genotype and phenotype
- **Know** how to complete Punnett squares and be able to predict inheritance based on the genotypes of the parents and/or doing a "test cross".

Big idea 3: Changes in the genetic material lead to changes in the characteristics of the species, which eventually leads to evolution of the species. Either done by natural selection (survival of the fittest) or artificial selection (selective breeding).

- **Describe** what a mutation is and what causes it.
- **Understand** that a change in the genetic code due to a mutation will lead to a change in the gene and therefore, the trait of the organism.
- **Know** what artificial selection (selective breeding) is compared with natural selection. Compare and contrast.
- **Explain** how evolution is a very slow process and occurs because of mutations and natural selection.