

YEAR 11 SCIENCE STANDARDS

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Reproduction, inheritance and survival US 18971

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Specific Learning Outcomes	Specific Learning Outcomes
<p>Candidates should be able to:</p> <p style="text-align: center;">Cells</p> <ul style="list-style-type: none"> • Describe the main parts of typical cells and their functions. • Identify the nucleus in diagram of cells. • Describe different cells including sperm, ova and pollen. <p style="text-align: center;">Reproduction</p> <ul style="list-style-type: none"> • Distinguish between sexual and asexual reproduction. • Label a diagram of the reproductive structures of animals and plants. • Recall that sexual reproduction involves gamete transfer, fusion and development. • Outline these processes in flowering plants and humans. • Outline the main stages of the human life cycle: birth, infancy, childhood, adolescence, adulthood, old age, and death. • Describe the physical and emotional changes from childhood to adulthood. • Explain the effect of abuse of substances on a foetus. <p style="text-align: center;">Variation in humans</p> <ul style="list-style-type: none"> • Recognise that individuals in a species are different from each other. • Outline the way in which characteristics are inherited from the parents via DNA, the chromosomes and genes. • Predict the outcome of simple genetic crosses. • Describe how gender is inherited. • Relate variation and selection to survival of a species. • Describe the reasons why some plants and animals have become endangered and others become pests in New Zealand. 	<p>Candidates should be able to:</p> <p style="text-align: center;">Cells</p> <ul style="list-style-type: none"> • Describe the main parts of typical cells and their functions. • Identify the nucleus in diagram of cells. • Describe different cells including sperm, ova and pollen. <p style="text-align: center;">Reproduction</p> <ul style="list-style-type: none"> • Distinguish between sexual and asexual reproduction. • Label a diagram of the reproductive structures of animals and plants. • Recall that sexual reproduction involves gamete transfer, fusion and development. • Outline these processes in flowering plants and humans. • Outline the main stages of human life cycle: birth, infancy, childhood, adolescence, adulthood, old age, and death. • Describe the physical and emotional changes from childhood to adulthood. • Explain the effect of abuse of substances on a foetus. <p style="text-align: center;">Variations in humans</p> <ul style="list-style-type: none"> • Recognise that individuals in a species are different from each other. <p style="text-align: center;">Outline the way in which characteristics are inherited from the parents via DNA, the chromosomes and genes.</p> <ul style="list-style-type: none"> • Predict the outcome of simple genetic crosses. • Describe how gender is inherited. • Relate variation and selection to survival of a species. • Describe the reasons why some plants and animals have become endangered and others become pests in New Zealand.

YEAR 11 SCIENCE STANDARDS

Topic: Biotechnology US 18978

Specific Learning Outcomes
<p>Candidates should be able to:</p> <p>Define biotechnology as the use of living things or their products to improve quality of life.</p> <p style="text-align: center;">Microbes</p> <ul style="list-style-type: none"> Define microbes as microscopic living organisms. Classify microbes as fungi, bacteria or viruses. Recognise the basic structure of fungi, bacteria and viruses. Understand lab safety rules for culturing microbes. Culture samples and identify groups as being bacteria or fungi. <p style="text-align: center;">Working Microbes</p> <ul style="list-style-type: none"> Recognise that microbes can be useful. Investigate fermentation in yeast and it's importance in baking, brewing and/or winemaking. Describe some of the roles of bacteria in biotech. <p style="text-align: center;">Enzymes</p> <ul style="list-style-type: none"> Describe the role that enzymes play in controlling biological reactions in organisms. Investigate how temperature and pH affect enzyme activity. Outline some uses of enzymes in biotech. <p style="text-align: center;">Genetic Engineering</p> <ul style="list-style-type: none"> Define genetic engineering as finding (identifying) and altering genes in living organisms including transferring between genes between species. Revise the role of DNA and genes in inheritance. Demonstrate knowledge of some applications of genetic engineering, eg gene splicing, cloning, DNA finger printing, genetically modified food.

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Topic: Biotechnology US18978

Specific Learning Outcomes
<p>Candidates should be able to:</p> <p>Define biotechnology as the use of living things or their products to improve quality of life.</p> <p style="text-align: center;">Microbes</p> <ul style="list-style-type: none"> Define microbes as microscopic living organisms. Classify microbes as fungi, bacteria or viruses. Recognise the basic structure of fungi, bacteria and viruses. Understand lab safety rules for culturing microbes. Culture samples and identify groups as bacteria or fungi. <p style="text-align: center;">Working Microbes</p> <ul style="list-style-type: none"> Recognise that microbes can be useful. Investigate fermentation in yeast and it's importance in baking and or/winemaking. Describe some of the roles of bacteria in biotech. <p style="text-align: center;">Enzymes</p> <ul style="list-style-type: none"> Describe the role that enzymes play in controlling biological reactions in organisms. Investigate how temperature and pH affect enzyme activity. Outline some uses of enzymes in biotech. <p style="text-align: center;">Genetic Engineering</p> <ul style="list-style-type: none"> Define genetic engineering as finding (identifying) and altering genes in living organisms including transferring between genes between species. Revise the role of DNA and genes in inheritance. <p>Demonstrate knowledge of some applications of genetic engineering, eg gene splicing, cloning, DNA finger printing, genetically modified food.</p>

YEAR 11 SCIENCE STANDARDS

Topic: Chemical Patterns US 18973

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Topic: Chemical Patterns US18973

Specific Learning Outcomes	Specific Learning Outcomes
<p>Candidates should be able to:</p> <p>Elements, compounds and mixtures</p> <ul style="list-style-type: none"> • Define <ul style="list-style-type: none"> - An element as a substance which cannot be separated into simpler substances. - A compound as a substance made of elements, which has different properties to those elements and which cannot be separated into them by physical means. - A mixture as made from substances mixed together which can be separated by physical means into the substances which formed it. - Describe and use some methods of separating mixtures (e.g. filtering, sieving, evaporating, distilling (simple), sometimes by magnetic means, chromatography, electrolysis. <p style="text-align: center;">Atoms</p> <ul style="list-style-type: none"> • Recall that an element consists of very small particles called atoms. • Describe an atom in terms of protons, neutrons and electrons <p style="text-align: center;">Metals and non-metals</p> <ul style="list-style-type: none"> • Define <ul style="list-style-type: none"> - Metals as solid, shiny, hard, conduct heat and electricity - Non-metals as having varied properties; most do not conduct heat or electricity, and a number are gases. • Classify some substances as metals and non-metals from their given or investigated properties (e.g. iron, copper, sulphur, carbon, oxygen, helium, neon) <p style="text-align: center;">Patterns of elements</p> <ul style="list-style-type: none"> • Recall that the elements can be arranged in a table. • Locate 'blocks' of metals and non-metals on an outline of the periodic table. 	<p>Candidates should be able to:</p> <p>Elements, compounds and mixtures</p> <ul style="list-style-type: none"> • Define <ul style="list-style-type: none"> - An element as a substance which cannot be separated into simpler substances. - A compound as a substance made of elements, which has different properties to those elements and which cannot be separated into them by physical means. - A mixture as made from substances mixed together which can be separated by physical means into the substances which formed it. - Describe and use some methods of separating mixtures (e.g. filtering, sieving, evaporating, distilling (simple), sometimes by magnetic means, chromatography, electrolysis. <p style="text-align: center;">Atoms</p> <ul style="list-style-type: none"> • Recall that an element consists of very small particles called atoms. • Describe an atom in terms of protons, neutrons and electrons <p style="text-align: center;">Metals and non-metals</p> <ul style="list-style-type: none"> • Define <ul style="list-style-type: none"> - Metals as solid, shiny, hard, conduct heat and electricity - Non-metals as having varied properties; most do not conduct heat or electricity, and a number are gases. • Classify some substances as metals and non-metals from their given or investigated properties (e.g. iron, copper, sulphur, carbon, oxygen, helium, neon) <p style="text-align: center;">Patterns of elements</p> <ul style="list-style-type: none"> • Recall that the elements can be arranged in a table. • Locate 'blocks' of metals and non-metals on an outline of the periodic table.

YEAR 11 SCIENCE STANDARDS

Topic: Chemical reactions US 18974

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Topic: Chemical reactions US 18974

Specific Learning Outcomes	Specific Learning Outcomes
<p>Candidates should be able to:</p> <p style="text-align: center;">What is a chemical change?</p> <ul style="list-style-type: none"> • Change various materials by chemical reactions into new and useful substances with different properties. • Describe some everyday examples of chemical changes: <ul style="list-style-type: none"> - burning wood and role of oxygen (test for carbon dioxide and water). - rusting of iron (involves oxygen and water) and it's prevention. (grease, oil, paint) • Investigate and describe the conditions necessary for rusting. • Investigate and describe the formation of a precipitate by blowing (carbon dioxide) into lime water. • Use a flow chart to identify precipitates. • Define chemical reactions as causing permanent changes. • Outline the differences between chemical and physical changes. <p style="text-align: center;">Neutralisation</p> <ul style="list-style-type: none"> • Classify solutions as acidic, basic or neutral and give examples. • Recall that acids react with bases to form salts and water in a process called neutralisation; indicators can be used to monitor this change. • Investigate and describe some everyday neutralisation reactions. <p style="text-align: center;">Reaction rates</p> <ul style="list-style-type: none"> • List some metals in the order of how well/easily they react (their reactivity) e.g. with water, or with dilute acid. • Relate the rate of a chemical reaction to temperature change. • Plan an investigation into the effect of heat on a reaction 	<p>Candidates should be able to:</p> <p style="text-align: center;">What is a chemical change?</p> <ul style="list-style-type: none"> • Change various materials by chemical reactions into new and useful substances with different properties. • Describe some everyday examples of chemical changes: <ul style="list-style-type: none"> - burning wood and role of oxygen (test for carbon dioxide and water). - rusting of iron (involves oxygen and water) and it's prevention. (grease, oil, paint) • Investigate and describe the conditions necessary for rusting. • Investigate and describe the formation of a precipitate by blowing (carbon dioxide) into lime water. • Use a flow chart to identify precipitates. • Define chemical reactions as causing permanent changes. • Outline the differences between chemical and physical changes. <p style="text-align: center;">Neutralisation</p> <ul style="list-style-type: none"> • Classify solutions as acidic, basic or neutral and give examples. • Recall that acids react with bases to form salts and water in a process called neutralisation; indicators can be used to monitor this change. • Investigate and describe some everyday neutralisation reactions. <p style="text-align: center;">Reaction rates</p> <ul style="list-style-type: none"> • List some metals in the order of how well/easily they react (their reactivity) e.g. with water, or with dilute acid. • Relate the rate of a chemical reaction to temperature change. • Plan an investigation into the effect of heat on a reaction

YEAR 11 SCIENCE STANDARDS

Topic: Electricity US 18977

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Topic: Electricity US 18977

Specific Learning Outcomes	Specific Learning Outcomes
<p>Candidates should be able to:</p> <p style="text-align: center;">What is electricity</p> <ul style="list-style-type: none"> • Recognise what electric charge is and how it can move. • Explain that moving charge is electric current and some materials allow electric charge to pass through and other do not (conductors and insulators). • Measure current, voltage and resistance using multimeters. <p style="text-align: center;">At home and work</p> <ul style="list-style-type: none"> • Differentiate between AC and DC. • Recognise which appliances at home are AC or DC. • Explain how we get electricity. • Describe how transformers are used to convert voltages. • Explain what a diode does as a current control. • Differentiate between parallel and series circuits. • Consider the requirements for wiring up a house. <p style="text-align: center;">Safety Aspects</p> <ul style="list-style-type: none"> • Relate the use of safety precautions such as correct wiring, correct fuses and earthing of appliances to the dangers of mains electricity. • Explain why fuses are used in circuits and analyse their effects. • Explain why isolating transformers are used. • Explain why some rooms in a house (e.g. the bathroom) should not have power outlets close to the floor. <p style="text-align: center;">Costs of Electricity</p> <ul style="list-style-type: none"> • Recall that the labels on electrical appliances normally show the power in Watts (W) or Kilowatts (Kw) and voltage. • Relate the electricity used by an electrical appliance in a given time to it's power rating. • Recognise that electricity is charged in kilowatt hours (KWh) • Compare the costs of electricity for using different appliances. 	<p>Candidates should be able to:</p> <p style="text-align: center;">What is electricity</p> <ul style="list-style-type: none"> • Recognise what electric charge is and how it can move. • Explain that moving charge is electric current and some materials allow electric charge to pass through and other do not (conductors and insulators). • Measure current, voltage and resistance using multimeters. <p style="text-align: center;">At home and work</p> <ul style="list-style-type: none"> • Differentiate between AC and DC. • Recognise which appliances at home are AC or DC. • Explain how we get electricity. • Describe how transformers are used to convert voltages. • Explain what a diode does as a current control. • Differentiate between parallel and series circuits. • Consider the requirements for wiring up a house. <p style="text-align: center;">Safety Aspects</p> <ul style="list-style-type: none"> • Relate the use of safety precautions such as correct wiring, correct fuses and earthing of appliances to the dangers of mains electricity. • Explain why fuses are used in circuits and analyse their effects. • Explain why isolating transformers are used. • Explain why some rooms in a house (e.g. the bathroom) should not have power outlets close to the floor. <p style="text-align: center;">Costs of Electricity</p> <ul style="list-style-type: none"> • Recall that the labels on electrical appliances normally show the power in Watts (W) or Kilowatts (Kw) and voltage. • Relate the electricity used by an electrical appliance in a given time to it's power rating. • Recognise that electricity is charged in kilowatt hours (KWh) • Compare the costs of electricity for using different appliances.

Topic: Wave, Sound and Light US 18980

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Specific Learning Outcomes	Specific Learning Outcomes
<p>Should be able to:</p> <p style="text-align: center;">Wave Types</p> <ul style="list-style-type: none"> Describe waves as carriers of energy. Classify waves as longitudinal and transverse. <p style="text-align: center;">Longitudinal Waves – Sound</p> <ul style="list-style-type: none"> Describe sound as a pressure wave, caused by something vibrating. Distinguish between amplitude and frequency. Demonstrate that sound needs a medium to travel through. Relate the loudness of sound to the distance from its source. Investigate the approximate value for the speed of sound in air. <p style="text-align: center;">The Ear</p> <ul style="list-style-type: none"> Describe how sounds are heard. Identify the eardrum and sound nerve on diagram/model of the ear. <p style="text-align: center;">Noise Pollution</p> <ul style="list-style-type: none"> Describe noise as unwanted sound which may permanently damage the ear if it is too loud or prolonged. Investigate methods of controlling noise by insulation: double glazing, ear protectors, carpets and curtains, soundproof tiles. <p style="text-align: center;">Transverse Waves</p> <ul style="list-style-type: none"> Give some examples of other waves and their uses: radio and tv waves, microwaves, infrared, visible, ultraviolet, X-rays. Identify the above as electromagnetic waves. <p style="text-align: center;">White Light</p> <ul style="list-style-type: none"> Relate how light comes from a variety of sources and travels in straight lines. Compare the speed of sound to the speed of light. Investigate a spectrum produced by passing white light through a prism showing that white light is made up of several colours. Light travels in straight lines. Describe how shadows are formed when light is stopped because the object is opaque not transparent. Describe how shadows change as the object is moved nearer to and further from a small light source. <p style="text-align: center;">The Pinhole Camera</p> <ul style="list-style-type: none"> Make and use a pinhole camera and describe the image produced. Investigate the effects on the image of changing the size and number of holes. Describe how plane mirrors (a) change the direction of light (b) produce images. Describe the features of images formed in plane mirrors. <p style="text-align: center;">Refraction of Light</p> <ul style="list-style-type: none"> Relate how light is refracted (bent) as it travels from one medium to another (provided that it is not traveling along the normal). <p style="text-align: center;">The Eye</p> <ul style="list-style-type: none"> Explain how see non-luminous objects because light travels from a source, reflects off the object and into our eyes. Describe how the eye “sees”. Draw an outline of an eye, including a lens and show how the direction of the rays are changed to form an image on the retina. 	<p>Should be able to:</p> <p style="text-align: center;">Wave Types</p> <ul style="list-style-type: none"> Describe waves as carriers of energy. Classify waves as longitudinal and transverse. <p style="text-align: center;">Longitudinal Waves – Sound</p> <ul style="list-style-type: none"> Describe sound as a pressure wave, caused by something vibrating. Distinguish between amplitude and frequency. Demonstrate that sound needs a medium to travel through. Relate the loudness of sound to the distance from its source. Investigate the approximate value for the speed of sound in air. <p style="text-align: center;">The Ear</p> <ul style="list-style-type: none"> Describe how sounds are heard. Identify the eardrum and sound nerve on diagram/model of the ear. <p style="text-align: center;">Noise Pollution</p> <ul style="list-style-type: none"> Describe noise as unwanted sound which may permanently damage the ear if it is too loud or prolonged. Investigate methods of controlling noise by insulation: double glazing, ear protectors, carpets and curtains, soundproof tiles. <p style="text-align: center;">Transverse Waves</p> <ul style="list-style-type: none"> Give some examples of other waves and their uses: radio and tv waves, microwaves, infrared, visible, ultraviolet, X-rays. Identify the above as electromagnetic waves. <p style="text-align: center;">White Light</p> <ul style="list-style-type: none"> Relate how light comes from a variety of sources and travels in straight lines. Compare the speed of sound to the speed of light. Investigate a spectrum produced by passing white light through a prism showing that white light is made up of several colours. Light travels in straight lines. Describe how shadows are formed when light is stopped because the object is opaque not transparent. Describe how shadows change as the object is moved nearer to and further from a small light source. <p style="text-align: center;">The Pinhole Camera</p> <ul style="list-style-type: none"> Make and use a pinhole camera and describe the image produced. Investigate the effects on the image of changing the size and number of holes. Describe how plane mirrors (a) change the direction of light (b) produce images. 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**Topic: Weather US 18981
Astronomy US 18989**

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Astronomy US 18989**

Specific Learning Outcomes	Specific Learning Outcomes
<p>Candidates should be able to:</p> <p style="text-align: center;">The Earth</p> <ul style="list-style-type: none"> • Show that the earth’s atmosphere is principally made up of 80% Nitrogen and 20% oxygen with Carbon dioxide, water vapour and other gases. <p style="text-align: center;">Weather</p> <ul style="list-style-type: none"> • Draw a diagram of the water cycle and identify evaporation and condensation. • Make a device to measure an aspect of weather (rain gauge, anemometer etc) • Use collected weather data and relate to weather forecasts and maps. • Look for patterns associated with weather maps and outcomes. • Define air pressure and use the correct units – kilopascals • Locate and interpret H and L, cyclones, anti cyclones, warm, cold, and occluded fronts on weather maps. • Contrast weather patterns through the year. <p style="text-align: center;">Space</p> <ul style="list-style-type: none"> • Relate the terms day, year, solstice and equinox to the earth’s movement around the sun. • Identify the moon as earth’s natural satellite. • Use the moon to explain tidal movement. • Identify the sun as earth’s nearest star and list the stages in the life cycle of a typical star. • Identify at least 3 planets in the night sky. • Identify at least 2 constellations in the night sky and their passage through the sky over a period of time. • Collate information to demonstrate the key points about the solar system. 	<p>Candidates should be able to:</p> <p style="text-align: center;">The Earth</p> <ul style="list-style-type: none"> • Show that the earth’s atmosphere is principally made up of 80% Nitrogen and 20% oxygen with Carbon dioxide, water vapour and other gases. <p style="text-align: center;">Weather</p> <ul style="list-style-type: none"> • Draw a diagram of the water cycle and identify evaporation and condensation. • Make a device to measure an aspect of weather (rain gauge, anemometer etc) • Use collected weather data and relate to weather forecasts and maps. • Look for patterns associated with weather maps and outcomes. • Define air pressure and use the correct units – kilopascals • Locate and interpret H and L, cyclones, anti cyclones, warm, cold, and occluded fronts on weather maps. • Contrast weather patterns through the year. <p style="text-align: center;">Space</p> <ul style="list-style-type: none"> • Relate the terms day, year, solstice and equinox to the earth’s movement around the sun. • Identify the moon as earth’s natural satellite. • Use the moon to explain tidal movement. • Identify the sun as earth’s nearest star and list the stages in the life cycle of a typical star. • Identify at least 3 planets in the night sky. • Identify at least 2 constellations in the night sky and their passage through the sky over a period of time. • Collate information to demonstrate the key points about the solar system.