

MARINA INTERNATIONAL SCHOOL

COMBINED SCIENCE SCHEME OF WORK

FORM 5 - TERM 1

WEEK	TOPIC	TOPIC DETAILS
1.1	Asexual and sexual reproduction	<ol style="list-style-type: none"> 1. Define asexual reproduction as a process resulting in the production of genetically identical offspring from one parent 2. Identify examples of asexual reproduction from information provided
1.2	Sexual reproduction in plants	<ol style="list-style-type: none"> 3. Define sexual reproduction as a process involving the fusion of the nuclei of two gametes (sex cells) to form a zygote and the production of offspring that are genetically different from each other 4. Identify and draw, using a hand lens if necessary, the sepals, petals, stamens, filaments and anthers, carpels, style, stigma, ovary and ovules, of an insect-pollinated flower 5. Use a hand lens to identify and describe the anthers and stigmas of a wind-pollinated flower 6. State the functions of the sepals, petals, anthers, stigmas and ovaries
1.3	Sexual reproduction in plants	<ol style="list-style-type: none"> 7. Distinguish between the pollen grains of insect pollinated and wind-pollinated flowers 8. Define pollination as the transfer of pollen grains from the anther to the stigma 9. Name state that fertilisation occurs when a pollen nucleus fuses with a nucleus in an ovule the agents of pollination 10. Describe the structural adaptations of insect pollinated and wind-pollinated flowers 11. Investigate and state the environmental conditions that affect germination of seeds: limited to the requirement for water, oxygen and a suitable temperature
2.1	Sexual reproduction in humans	<ol style="list-style-type: none"> 1. Identify and name on diagrams of the male reproductive system: the testes, scrotum, sperm ducts, prostate gland, urethra and penis 2. State the function of the parts of the male reproductive system limited to: <ul style="list-style-type: none"> <input type="checkbox"/> testes – production of male gametes (sperm) <input type="checkbox"/> scrotum – sac that holds the testes outside the body <input type="checkbox"/> sperm ducts – transfer sperm to the urethra <input type="checkbox"/> prostate gland – secrete fluids for sperm to swim in forming semen <input type="checkbox"/> urethra – carries urine and semen out of the body <input type="checkbox"/> penis – transfers semen to vagina during sexual intercourse 3. Identify and name on diagrams of the female reproductive system: the ovaries, oviducts, uterus, cervix and vagina

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2.2	Sexual reproduction in humans	<p>4. State the function of the parts of the female reproductive system limited to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> ovaries – release of female gametes (eggs) <input type="checkbox"/> oviducts – transfers egg to uterus and the site of fertilisation <input type="checkbox"/> uterus – where the fetus develops <input type="checkbox"/> cervix – ring of muscle at the opening of the uterus <input type="checkbox"/> vagina – receives penis during sexual intercourse <p>5. Describe fertilisation as the fusion of the nuclei from a male gamete (sperm) and a female gamete (egg cell/ovum)</p> <p>6. Compare male and female gametes in terms of size, structure, motility and numbers</p> <p>7. State the adaptive features of sperm, limited to flagellum and the presence of enzymes</p> <p>8. State the adaptive features of egg cells, limited to energy stores and a jelly coating that changes after fertilisation</p>
3.1	Sexual reproduction in humans continue	<p>1. Describe the menstrual cycle in terms of changes in the ovaries and in the lining of the uterus (knowledge of sex hormones not required)</p> <p>10. State that in early development, the zygote forms an embryo which is a ball of cells that implants into the wall of the uterus</p> <p>11. State the functions of the umbilical cord, placenta, amniotic sac and amniotic fluid</p> <p>12. Describe the function of the placenta and umbilical cord in relation to exchange of dissolved nutrients, gases and excretory products and providing a barrier to toxins (structural details are not required)</p> <p>13. State that human immunodeficiency virus (HIV) infection may lead to acquired immune deficiency syndrome (AIDS)</p> <p>14. Describe the methods of transmission of HIV</p> <p>15. Explain how the spread of sexually transmitted infections (STIs) is controlled</p>
4.1	Acids, bases and salts	<p>1. The characteristic properties of acids and bases</p> <p>2. Describe neutrality and relative acidity and alkalinity in terms of pH (whole numbers only) measured using Universal Indicator</p> <p>3. Describe the characteristic properties of acids (exemplified by dilute hydrochloric acid and dilute sulfuric acid) including their effect on litmus paper and their reactions with metals, bases and carbonates</p> <p>4. Describe and explain the importance of controlling acidity in soil</p>
4.2	Acids, bases and salts	<p>5. Describe the preparation, separation and purification of salts</p> <p>6. Suggest a method of making a given salt from suitable starting material, given appropriate information</p>

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5.1	Acids, bases and salts	<p>□ Identification of ions and gases</p> <p>7. Describe and use the following tests to identify:</p> <p>□ aqueous cations: ammonium, calcium, copper(II), iron(II), iron(III) and zinc, by means of aqueous sodium hydroxide and aqueous ammonia as appropriate (formulae of complex ions are not required).</p> <p>□ cations: flame tests to identify lithium, sodium, potassium and copper(II)</p> <p>□ anions: carbonate (by reaction with dilute acid and then limewater), chloride (by reaction under acidic conditions with aqueous silver nitrate), nitrate (by reduction with aluminium) and sulfate (by reaction under acidic conditions with aqueous barium ions)</p>
5.2	Acids, bases and salts	<p>□ gases: ammonia (using damp red litmus paper), carbon dioxide (using limewater), chlorine (using damp litmus paper), hydrogen (using a lighted splint), oxygen (using a glowing splint)</p>
6.1	Properties of metals	<p>1. Describe the general physical properties of metals as solids with high melting and boiling points, malleable and good conductors of heat and electricity</p> <p>2. Describe alloys, such as brass, as mixtures of a metal with other elements</p> <p>3. Explain in terms of their properties why alloys are used instead of pure metals</p> <p>4. Identify representations of alloys from diagrams of structure</p> <p>5. Place in order of reactivity: potassium, sodium, calcium, magnesium, aluminium, (carbon), zinc, iron, (hydrogen) and copper, by reference to the reactions, if any, of the elements with:</p> <ul style="list-style-type: none"> - water or steam - dilute hydrochloric acid - reduction of their oxides with carbon
6.2	Reactivity series	<p>6. Describe the reactivity series in terms of the tendency of a metal to form its positive ion, illustrated by its reaction, if any, with the aqueous ions of other listed metals</p> <p>7. Deduce an order of reactivity from a given set of experimental results</p>

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7.1	Extraction of metals from their ores	<p>8. Describe the use of carbon in the extraction of copper from copper oxide</p> <p>9. Describe and explain the essential reactions in the extraction of iron from hematite in the blast furnace</p> $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ $\text{C} + \text{CO}_2 \rightarrow 2\text{CO}$ $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$ <p>10. Know that aluminium is extracted from the ore bauxite by electrolysis</p> <p>11. Relate the method of extraction of a metal from its ore to its position in the reactivity series and for other metals, given information</p> <p>12. Describe metal ores as a finite resource and hence the need to recycle metals</p>
8.1	Sound	<p>1. Describe the production of sound by vibrating Sources</p> <p>2. Describe the longitudinal nature of sound waves</p> <p>3. Describe the transmission of sound waves in air in terms of compressions and rarefactions</p> <p>4. State that the approximate range of audible frequencies for a healthy human ear is 20 Hz to 20 000 Hz</p> <p>5. Show an understanding that a medium is needed to transmit sound waves</p>
8.2	Sound	<p>6. Describe and interpret an experiment to determine the speed of sound in air, including calculation</p> <p>7. Recognise that sound travels faster in liquids than gases and faster in solids than in liquids</p> <p>8. Relate the loudness and pitch of sound waves to amplitude and frequency</p> <p>9. Describe how the reflection of sound may produce an echo</p>
9.1	Electric charge	<p>1. State that there are positive and negative charges</p> <p>2. State that unlike charges attract and that like charges repel</p> <p>3. Describe and interpret simple experiments to show the production and detection of electrostatic charges by friction</p> <p>4. State that charging a body involves the addition or removal of electrons</p> <p>5. Distinguish between electrical conductors and insulators and give typical examples</p>
9.2	Current, potential difference and electromotive force (e.m.f.)	<p>6. Demonstrate understanding of current, potential difference, e.m.f. and resistance.</p> <p>7. State that current is related to the flow of Charge</p> <p>8. Know and use the formula $Q = It$</p> <p>9. Show understanding that a current is a rate of flow of charge and recall and use the equation $I = Q / t$</p> <p>10. State that current in metals is due to a flow of electrons</p> <p>11. State that the potential difference (p.d.) across a circuit component is measured in volts</p> <p>12. Use and describe the use of an ammeter and a voltmeter, both analogue and digital</p> <p>13. State that the electromotive force (e.m.f) of an electrical source of energy is measured in volts</p>

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9.3	Resistance	<p>14. State that resistance = p.d. / current and understand qualitatively how changes in p.d. or resistance affect current</p> <p>15. Recall and use the equation $R = V / I$</p> <p>16. Recall and use quantitatively the proportionality between resistance and length, and the inverse proportionality between resistance and cross-sectional area of a wire</p>
10.1	Circuit diagrams	<p>1. Draw and interpret circuit diagrams containing sources, switches, resistors (fixed and variable), lamps, ammeters, voltmeters and fuses (Symbols for other common circuit components will be provided in questions)</p> <p>2. Understand that the current at every point in a series circuit is the same</p>
10.2	Series and parallel circuits	<p>3. Calculate the combined resistance of two or more resistors in series</p> <p>4. Recall and use the fact that the sum of the p.d.s across the components in a series circuit is equal to the total p.d. across the supply</p> <p>5. State that, for a parallel circuit, the current from the source is larger than the current in each branch</p> <p>6. Recall and use the fact that the current from the source is the sum of the currents in the separate branches of a parallel circuit</p> <p>7. State that the combined resistance of two resistors in parallel is less than that of either resistor by itself</p> <p>8. Calculate the combined resistance of two resistors in parallel</p> <p>9. State the advantages of connecting lamps in parallel in a circuit</p>
10.3	Electrical Energy & Dangers of electricity	<p>10. Recall and use the equations $P = IV$ and $E = IVt$</p> <p>11. Identify electrical hazards including:</p> <ul style="list-style-type: none"> <input type="checkbox"/> damaged insulation <input type="checkbox"/> overheating of cables <input type="checkbox"/> damp conditions <p>12. State that a fuse protects a circuit</p> <p>13. Explain the use of fuses and choose appropriate fuse ratings</p>

WEEK	TOPIC	TOPIC DETAILS
11.1	Organisms and their environment	1. State that the Sun is the principal source of energy input to biological systems 2. Define the terms: <input type="checkbox"/> food chain as showing the transfer of energy from one organism to the next, beginning with a producer <input type="checkbox"/> food web as a network of interconnected food chains <input type="checkbox"/> producer as an organism that makes its own organic nutrients, usually using energy from sunlight, through photosynthesis <input type="checkbox"/> consumer as an organism that gets its energy by feeding on other organisms <input type="checkbox"/> herbivore as an animal that gets its energy by eating plants <input type="checkbox"/> carnivore as an animal that gets its energy by eating other animals <input type="checkbox"/> decomposer as an organism that gets its energy from dead or waste organic matter 3. Define the terms: <input type="checkbox"/> ecosystem as a unit containing all of the organisms and their environment, interacting together, in a given area, e.g. a lake <input type="checkbox"/> trophic level as the position of an organism in a food chain or food web
11.2	Organisms and their environment	4. Describe how energy is transferred between trophic levels 5. Explain why food chains usually have fewer than five trophic levels 6. Construct simple food chains 7. Interpret food chains and food webs in terms of identifying producers and consumers 8. State that consumers may be classed as primary, secondary and tertiary according to their position in a food chain 9. Identify producers, primary consumers, secondary consumers, tertiary consumers and quaternary consumers as the trophic levels in food webs and food chains
12.1	Air and water	1. Describe a chemical test for water using copper(II) sulfate and cobalt(II) chloride 2. Describe, in outline the treatment of the water supply in terms of filtration and chlorination 3. State the composition of clean air as being a mixture of 78% nitrogen, 21% oxygen and small quantities of noble gases, water vapour and carbon dioxide 4. Name the common pollutants in air as being carbon monoxide, sulfur dioxide and oxides of nitrogen 5. State the adverse effect of these common air pollutants on buildings and on health 6. State the conditions required for the rusting of iron (presence of oxygen and water)

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12.2	Air and water	<p>7. Describe and explain barrier methods of rust prevention, including paint and other coatings</p> <p>8. State the formation of carbon dioxide:</p> <ul style="list-style-type: none"> - as a product of complete combustion of carbon-containing substances - as a product of respiration - as a product of the reaction between an acid and a carbonate - as a product of thermal decomposition of calcium carbonate <p>9. State that carbon dioxide and methane are greenhouse gases</p> <p>10. State that increased concentrations of greenhouse gases cause an enhanced greenhouse effect, which may contribute to climate change</p>
13.1	Human influences on ecosystems	<p>1. Describe the carbon cycle, limited to photosynthesis, respiration, feeding, decomposition, fossilisation and combustion</p> <p>2. Discuss the effects of the combustion of fossil fuels and the cutting down of forests on the oxygen and carbon dioxide concentrations in the atmosphere</p> <p>3. List the undesirable effects of deforestation as an example of habitat destruction, to include extinction, loss of soil, flooding and increase of carbon dioxide in the atmosphere</p> <p>4. Explain the process of eutrophication of water in terms of:</p> <ul style="list-style-type: none"> <input type="checkbox"/> increased availability of nitrate and other ions <input type="checkbox"/> increased growth of producers <input type="checkbox"/> increased decomposition after death of producers <input type="checkbox"/> increased aerobic respiration by decomposers <input type="checkbox"/> reduction in dissolved oxygen <input type="checkbox"/> death of organisms requiring dissolved oxygen in water

COMBINED SCIENCE SCHEME OF WORK

FORM 5 - TERM 2

WEEK	TOPIC	TOPIC DETAILS
1.1	ORGANIC CHEMISTRY-sources of hydrocarbons	<ol style="list-style-type: none">1. State that coal, natural gas and petroleum are fossil fuels that produce carbon dioxide on combustion2. Name methane as the main constituent of natural gas3. Describe petroleum as a mixture of hydrocarbons and its separation into useful fractions by fractional distillation4. Describe the properties of molecules within a Fraction5. Name the uses of the fractions as:<ul style="list-style-type: none"><input type="checkbox"/> refinery gas for bottled gas for heating and cooking<input type="checkbox"/> gasoline fraction for fuel (petrol) in cars<input type="checkbox"/> naphtha fraction as a feedstock for making chemicals<input type="checkbox"/> diesel oil/gas oil for fuel in diesel engines<input type="checkbox"/> bitumen for road surfaces
2.1	alkanes	<ol style="list-style-type: none">6. Describe the homologous series of alkanes and alkenes as families of compounds with the same general formula and similar chemical properties7. Describe alkanes as saturated hydrocarbons whose molecules contain only single covalent bonds8. Describe the properties of alkanes (exemplified by methane) as being generally unreactive, except in terms of burning9. Describe the complete combustion of hydrocarbons to give carbon dioxide and water
3.1	alkenes	<ol style="list-style-type: none">11. Describe alkenes as unsaturated hydrocarbons whose molecules contain one double covalent bond12. State that cracking is a reaction that produces13. Describe the formation of smaller alkanes, alkenes and hydrogen by the cracking of larger alkane molecules and state the conditions required for cracking
3.2	test for unsaturation	<ol style="list-style-type: none">14. Recognise saturated and unsaturated hydrocarbons:<ul style="list-style-type: none">- from molecular structures- by their reaction with aqueous bromine
4.1	polymerization	<ol style="list-style-type: none">15. Describe the formation of poly(ethene) as an example addition polymerisation of monomer units

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