

3ai	Amylase.	1	Accept “salivary or pancreatic amylase”.
ii	Maltose.	1	
bi	As time increases, the concentration of disaccharide increases. The rate of production decreases with time.	1 1	
ii	Initially all the active sites of the enzyme are filled by the substrate. The initial high rate of reaction is because enzymes are fully saturated. As the substrate concentration decreases the number of effective collisions decreases and therefore the reaction rate decreases.	1 1 1	Accept answers that refer to collisions with enzymes.
iii	Time.	1	
c	Add Benedict’s solution to a reducing sugar solution. Put in water bath to heat. Blue solution turns into a brick red precipitate.	$\frac{1}{2}$ 1 $\frac{1}{2}$	
Total		10	
4a	The heartbeat rate will increase until it reaches a plateau and stops increasing.	1 1	
bi	Red blood cells are rich in haemoglobin. The red blood cells have a biconcave shape. OR Red blood cells do not have a nucleus.	1 1	Any two.
ii	At high altitudes, a breath delivers less oxygen to the muscles. The body makes more red blood cells to deliver oxygen. Back at ground level the body will have more red blood cells to carry oxygen. So, more oxygen is carried to the muscles.	1 1 1	
c	The circulatory system is a double loop with blood moving from the heart to the lungs and back and to the body and back.	1 1	
Total		9	
5ai	Less organisms may be trapped in large waste or eating waste e.g. plastics instead of food. Less leaching of toxic matter into the water. Less bioaccumulation of toxic organic matter in organisms.	1 1	Any two.
ii	Less noise pollution decreases disturbance to organisms in ecosystems.	1	

bi	Increase in organic waste resulting in an increase in production of methane. OR Increase in inorganic waste resulting in the filling in of landfills more quickly.	2	Any one.
ii	Increase in air, land and water pollution. Increase in energy consumption. Decrease in natural resources.	1 1	Any two.
	Total	7	
6a	Enzymes involved in the process of germination, are sensitive to pH and are denatured at an incorrect pH environment.	1 1	
b	Nitrates are a source of nitrogen which is used for the production of amino acids used to form proteins – the building blocks for growth. Magnesium is necessary for the synthesis of chlorophyll.	1 1	
c	Male – stamens. Female – carpel.	1 1	Accept “anthers”. Accept “ovary”. Do not accept stigma, style and filament.
di	Light OR smooth OR small.	1	Any one.
ii	Grow ragweed in soil of any pH values other than 6.	1	
	Total	8	
7a	Identical cells with diploid number of chromosomes.	½ ½	
b	Gametes have a haploid number of chromosomes. The diploid number is restored on fertilisation.	1 1	
c	Mother can be $X^I X^i$ or $X^I X^i$. Father must be $X^i Y$. Mother must be $X^I X^i$ as one son is normal. Mother gives X^i to this son while the father gives Y. For the other son mother gives X^I while the father gives Y. For the daughter mother gives X^I while the father gives X^i . So, Mother is $X^I X^i$ and father is $X^i Y$.	1 1 ½ ½ ½ ½ 1	No marks are rewarded if the Y chromosome carries the allele for the disorder (Y^i).
	Total	8	

Section B			
1a	Title and axes. Legend/key. Plotting of graphs.	1 1 3	Do not award marks if axes are inverted.

	Good sized graphs.	1	
b	In both temperatures, the rate of photosynthesis increases as the distance from the lamp decreases.	2	
c	As the distance increases, the light intensity decreases.	1	Or vice versa.
	At high light intensity more light rays fall on chlorophyll pigments, increasing the rate of photosynthesis.	1	
d	At 30°C, the enzymic rate of reaction is higher than at 20°C.	1	
	Enzymes work faster and therefore the rate of photosynthesis also increases. OR Below optimum temperature, the rate of reaction increases with increase in temperature.	1	
e	As the distance is decreased the temperature of the water, in which the pondweed lies, might increase.	1	Any one.
	OR Some bubbles are too small to be counted OR remain stuck to leaves. OR Bubbles are of different volume.		
f	The total overall volume of gas will be measured.	2	
	Total	15	
2a	The messages are electrical impulses.	1	Accept “changes in concentration of specific ions across neuron membrane”.
bi	Receptor in the skin detects a stimulus such as change in pressure, temperature etc.	1	Reward marks for diagram with well explained annotations as in model answer.
	A sensory neurone sends electrical impulses to a relay neurone, which is located in the spinal cord of the CNS.	1	
	Relay neurons connect sensory neurons to motor neurons.	1	
	Motor neuron sends electrical impulses to an effector.	1	
	Effector produces a response such as a muscle contracting.	1	
ii	A reflex action is an automatic (involuntary) and rapid response to a stimulus.	1	
iii	Pain is felt because the transmission is along the sensory nerves found in dorsal root of the spinal cord.	1	
	No movement occurs because there is no transmission of an impulse due to some kind of damage	1	
	along the motor nerves found in the ventral root of the spinal cord.	1	
c	The blood transports the hormone to any site of the body including target organ/cells.	1	

di	Insulin.	1	
ii	Blood glucose is still taken up slowly by the cells for cellular respiration.	1	
iii	When the blood glucose level falls below the set level, negative feedback occurs where insulin is no longer secreted and glucagon is secreted.	1	
		1	
Total		15	
3a	Peptides are chains of amino acids held together by bonds called peptide bonds. Peptides form proteins/ made up of C, H, O and N.	1	
		1	
bi	<i>cinerea</i>	1	Deduct ½ mark if the first letter is in upper case and not underlined.
ii	A mould fungus has a network of hyphae that forms a mycelium. Sporangium/phore grows from the hyphae and releases spores.	1	
		1	
		1	
iii	Less light rays enter leaf. Therefore, rate of photosynthesis decreases.	1	
		1	
iv	Fungi may become resistant when a mutation occurs.	2	
v	A seed has a protective outer coat called a testa with a micropyle. The testa covers the embryo and the cotyledons.	1	
		1	
c	The pesticide has a dual action: Destroying the harmful fungus, Acting as an energy source. The pesticide is specific to the harmful agent and does not kill any other fungi.	1	
		1	
		1	
Total		15	
4a	A process of respiration without the presence of oxygen. Usually aided by micro-organisms such as yeast and bacteria.	1	
		1	
bi	Both are single celled organisms. Both have genetic material.	1	Accept "DNA".
		1	
ii	Substrate: glucose. Product: carbon dioxide.	1	
		1	
iii	Cellulose is a polysaccharide made of many glucose molecules.	1	
		1	
c	Enzymes are pH sensitive. Yeast enzymes are denatured at low pH and so fermentation stops.	1	Do not accept "enzymes are killed/die".
		1	

d	Alcohol can be produced in large quantities without destroying the environment. Alcohol produces less carbon dioxide than fossil fuels.	1 1	
ei	Large, brightly coloured petals. Scented. Nectar produced in flower. Abundant, large, sticky, heavy pollen. Small stamens and carpel inside flower. Sticky stigma.	1	Any one.
ii	Pollination is the movement of pollen from the stamens to the stigma of the same or other flower of the same species. Fertilisation is the fusion of male and female gametes.	1 1	
Total		15	
5a	Plant stems turn towards unilateral light. When unilateral light falls on a stem, auxin produced at the tip of the plant moves to the region of the stem away from the light source, stimulating growth in that region.	1 1 1 1	
b	During heavy rain, minerals leach from the surrounding soil into the water. These minerals are mainly nitrogen and magnesium that promote growth. These nutrients result in dense growth of algae in enclosed bodies of water. These deplete the oxygen supply thus resulting in death of organisms inhabiting the lake.	1 1 1	Any three sequential statements.
c	Contractile vacuoles form to expel water from the protist. The water enters as the pond water has a lower solute concentration than the cytoplasm of the protist. When the protist is put in seawater, the cytoplasm has the lower solute concentration and therefore water leaves the cytoplasm by osmosis.	1 1 1 1	
d	The development of insects is either through complete or incomplete metamorphosis. The egg stage and the adult stage is found in both types of metamorphosis. In complete metamorphosis the larva (second stage) undergoes complete body regeneration during the pupa stage. In incomplete metamorphosis the nymph is a small adult.	1 1 1 1	
Total		15	