

Qn	Answers	Remarks
1a	A: Starch B: Amylase C: Maltose	Common mistake: Did not state precise names of the substances A, B and C.
Bi	Temperature	
li	pH	
c	A blockage in bile duct will prevent delivery of bile to duodenum. Emulsification of fats cannot occur. Surface area for lipase to act on fats decrease. Hence, blockage in bile duct will result in decrease in fats digestion.	Common mistakes: Candidates did not state the application of consequence of a bile duct. Candidates need to state clearly the understanding of differences between physical and chemical digestion. Important for candidate to state that fat digestion is slowed down as compared to completely stopped.
2a	Sexual reproduction involves the fusion of male and female gamete to produce a zygote. Gametes are products of the process of meiosis. During fertilisation, fusion of haploid gametes are at random and zygote formed is diploid. Offspring from sexual reproduction are genetically dissimilar to parents.	Good responses includes production of genetically dissimilar offspring and references to meiosis were made.

2b	The pollen grain is spherical in shape and has a rough surface with spikes evenly distributed that enable the pollen grain to cling on the body of animals when they brush pass the flowers. These pollen grains can then be transferred from the anther of a flower to a stigma of another flower when the animals brush past another flower.	
2ci	Pollen tube	
2cii	After pollination, pollen grain germinates in response to sugary fluid secreted by mature stigma. A pollen tube grows out from the pollen grain. Growth of pollen tube is controlled by the pollen tube nucleus. The cytoplasm and the two nuclei pass into the pollen tube. The pollen tube secretes enzymes to digest the surrounding tissue of stigma and style. Pollen tube enters the ovule through the micropyle. The generative nucleus divides into two male gametes, while the pollen tube nucleus disintegrates. When the pollen tube reaches the ovule, its tip absorbs sap and bursts, releasing the two male gametes. One male gamete fuses with the ovum to form the zygote (fertilisation). The other male gamete fuses with the definitive nucleus to form the endosperm nucleus. Zygote divides and develops into the embryo, and the endosperm nucleus will give rise to an endosperm (food storage tissue)	Need to give a detailed description of how the pollen tube reach the female nucleus
3a	$40-16 = 24^{\circ}\text{C}$	

B	1. There was a rise in body temperature of the insect when the air temperature increases. 2. The insect was not able to maintain a constant body temperature.	Common mistake Was not able to give a second conclusion
3c	Constant body temperature at 37°C	Common mistake Not able to show the body temperature at 37°C in the graph
3d	When body temperature increases, the hypothalamus detects the change. Sweat glands become more active to increase production of sweat. Latent heat of vapourisation is lost when sweat evaporates to reduce body temperature and bring the body temperature back to normal. When body temperature decreases, the hypothalamus detects the change and sweat glands becomes less active to decrease production of sweat.	Candidates need to understand how sweating cools the body.
4a	A: Aorta B: Pulmonary vein	
4b	The semi lunar valve in the aorta prevents the backflow of blood from the aorta to the left ventricle, when the ventricle relax to ensure that blood flows in one direction from the ventricle to the aorta to the rest of the body.	Common mistake Lack of precision in exact location of the valve
4c	Deoxygenated blood is brought back to the heart via the superior and inferior vena cava. Contraction of the right atrium forces the blood to the right ventricle. The right atrium relax and the right ventricle then contract to bring the blood to the lungs via the pulmonary artery. Tricuspid valve closes to prevent the backflow of blood back to the right atrium from the right ventricle. When the right ventricle relax, the semilunar valve in the pulmonary artery closes to prevent the	Candidates need to do both description and explanation to gain the full marks. Candidates should show understanding of the processes involved.

	backflow of blood from the artery to the right ventricles.	
5a	Change in concentration of insulin decrease by 90 arbitrary units.	Common mistake Lacking precision in response to the question
5b	During fasting, there is no intake of carbohydrates, causing the blood glucose concentration to decrease below normal. Islet of Langerhans is stimulated to increase production of glucagon which stimulates the liver and muscle cells to convert glycogen to glucose. This will increase blood glucose concentration. Concentration of blood glucose concentration increases and blood glucose level returns back to normal. Feedback is sent to the islets of Langerhans to reduce the production of glucagon. Blood glucose concentration is maintained at normal concentrations by negative feedback. The initial increase in insulin after a meal to decrease blood glucose level causes the concentration of blood glucose level to decrease, resulting in negative feedback, and hence, there is a reduction in level of insulin when the person start fasting to prevent further decrease in blood glucose level.	Good level of details is needed. Correct descriptions also made references to negative feedback Common mistake Candidates need not include unnecessary detail that did not answer to the question at the start of the answers Precise answers with references to the blood rather than the body in general
5c	Adrenaline helps to convert stored glycogen to glucose. Glucose is needed for respiration during exercise to release more energy when oxidized. Adrenaline also increases heart rate and blood flow to ensure that oxygen and glucose are transported to the respiring muscles faster.	Common mistake Production of energy instead of release of energy
6ai	I ^A I ^o	
6aii	I ^B I ^o	

6aiii	Child 2: Blood group AB Child 4: Blood group O	Common mistake in stating the blood group of child 4
6b	Alleles I ^A and I ^B are co-dominant.	Common error Unclear if candidates were quoting genotype I ^A I ^B or identifying alleles separately. Blood group phenotype A and B stated were stated instead.
7ai	An organism that obtains its energy by feeding on other organisms.	Common mistake Repeating of term in definition without showing understanding of meaning of the term
7aii	Level of organism in a food chain	Common mistake Unable to define trophic level
7bi	Plankton → small fish → large fish → fishermen	Candidates should give the relevant names in their chains.
7bii	Bioaccumulation is the transfer and accumulation of certain chemicals that are toxic that cannot be broken down and are not excreted out of the bodies of organisms. The toxins are stored in the fatty tissues and accumulate in their bodies. The toxins are then passed along the food chain and become concentrated in the bodies of the final consumers. Mercury is non-biodegradable and not excreted. Plankton takes in the mercury compounds, hence, the storing the mercury in its cells. The small fish feeds on plankton and accumulates the mercury that cannot be excreted, causing the flesh of the small fish to have 100 times more mercury than the seawater.	Good responses shows understanding of impact on small fish. Common mistake Not reading question properly and commenting on the larger fish instead of showing understanding of the impact on the small fish

8a	Graph to include an anomaly, ensure that the label of axis follow strictly the heading of table provided	Common mistake Time of hour instead of time of day
8b	$0.04 - 0.014 = 0.026$	
8c	The carbon dioxide concentration decreases from a high of 0.04% per volume at 0400 to a low of 0.014% per volume at 1400. At 0400, there is no sunlight/ light intensity is low and it results in only respiration and carbon dioxide is released into the air, hence, a relatively higher concentration of carbon dioxide. As light intensity slowly increases from 0400 to 1400, rate of photosynthesis increases . This removes the carbon dioxide from the air until a maximum rate of photosynthesis at 1400 where there is highest light intensity to result in lowest carbon dioxide concentration in the air.	Students need to give their explanations in view of the impact of photosynthesis on concentration of carbon dioxide. Common mistakes: Changes in concentration not explained. Student need to not only describe but also give explanations for different trends at different key figures.
8d	Oxygen is a by-product of photosynthesis. As light intensity increases from 0600 to 1200, oxygen production increases and hence concentration of oxygen in the air increase.	
9a	Nicotine – It is addictive and makes one addicted to smoking. It also makes blood clot more easily, leading to higher risk of stroke and coronary heart diseases. Nicotine also causes the release of adrenaline, increasing heart rate and blood pressure, adding stress to the cardiovascular system. Carbon monoxide decreases the ability of red blood cells to transport oxygen. It binds better to haemoglobin to form carboxyhaemoglobin. Carbon monoxide also increases the rate at which fats are	

	deposited on the inner arterial walls, increasing the risk of arteriosclerosis. Tar is carcinogenic and increases the risk of lung cancer. It also paralyses the cilia lining in air passages, causing it to be unable to sweep and remove the mucus efficiently. This results in higher risk of chronic bronchitis and emphysema and a reduction in the efficiency of gaseous exchange.	
9b	An increase in 30 mg per 100cm³ of blood alcohol concentration increases reaction time by about 10 milliseconds while an increase in 70 mg per 100cm³ of blood alcohol concentration increases reaction time by about 30 milliseconds. This shows that increasing blood alcohol levels increases reaction time. Hence, people who drink and drive might have a longer reaction time and might lead to higher risk of accidents and possible loss of lives.	Common mistake Not being able to describe the relationship shown on the bar chart fully. Candidates need to draw the link between blood alcohol concentration and reaction time, hence how it affects driving.
10 either a	Both the xylem and the phloem serve as transport vessels in plants. They both transport substances in the form of solutions. Xylem transport water and mineral salts whereas the phloem transport manufactured food such as sucrose and amino acids. The xylem is long and hollow, allowing it to transport water and mineral salts from the roots to the leaves via transpiration pull. The phloem has companion cells and sieve plates allowing translocation to occur. Companion cells allow for active transport.	Good responses include being able to make references to both xylem and phloem and describing the tissues adequately, comparing the two. Common mistakes Showing irrelevant details of structures rather than the function

	Transport in xylem is only from roots to leaves whereas transport in phloem is from the leaves to all parts of the plants. Translocation can be in more than one direction as compared to transport in xylem. Xylem has lignified walls, allowing it to provide mechanical support for the plant unlike phloem which does not have lignified wall and hence unable to provide mechanical support.	
10 either b	Transpiration is the loss of water vapour from the aerial parts of the plants. The thin film of moisture from the intercellular air space evaporates and the water vapour diffuses out of the stomata. Increasing temperature increases rate of water evaporation and hence transpiration. Lower temperature decreases rate of evaporation and rate of transpiration. Lower humidity and higher wind movement increases concentration gradient of water vapour between the leaf and the external environment and hence increase rate of transpiration. Higher humidity and lower wind movement decreases the concentration gradient of water vapour between the leaf and the external environment and hence decrease rate of transpiration. Higher light intensity causes the stomata to be open wider and hence higher rate of transpiration whereas lower light intensity decreases the rate of transpiration.	Common mistake Lacking adequate details Candidates need to state clearly and explain the effect of a factor on the rate of transpiration. e.g. Increase temperature increase rate of transpiration instead of temperature increases rate of transpiration

10 OR a	Increasing light intensity is detected by the sensory receptors in the retina and impulses are sent through the optic nerve to the brain and through the motor neurone to the effector which are the muscles in the iris. The radial muscles relax while the circular muscles contract to reduce the pupil size and reduce the amount of light entering the eyes to prevent damage to the retina.	Good responses includes clear answers detailing the processes
10 OR b	Cornea allows light to pass through and refract through the lens which ensure that the image is focused on the retina and a clear image is formed. For distant objects, parallel rays of light passes through the cornea to the lens and the ciliary muscles contract. This allows the suspensory ligament to be taut, causing the lens to be less convex and light rays to focus on the retina. For near objects, divergent rays of light causes the ciliary muscles to relax and the suspensory ligament to be less taut, and the lens to become more convex, allowing the light rays to be focused on the retina.	Good responses Clear indication of standpoint of viewing of either a distant or close object