

Temasek Secondary School

6093 Biology Prelim 2024 Answers

PAPER 1 (40 marks)

No	Answer	No	Answer
1	C	21	D
2	A	22	C
3	B	23	B
4	D	24	C
5	B	25	D
6	C	26	A
7	B	27	B
8	B	28	C
9	A	29	B
10	B	30	D
11	C	31	C
12	C	32	B
13	C	33	D
14	D	34	C
15	B	35	B
16	D	36	B
17	A	37	B
18	A	38	C
19	D	39	A
20	C	40	C

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Paper 2 Answers

Qn	Answer	Remarks
1a	Insect pollination; Large petals REJECT: colourful petals / scent / nectar guides / compact stigma	Both for 1 m
bi	A sepal / calyx B petal / corolla C fruit / ovary D style	Any error deducts 0.5 m
bii	E produces the pollen	
biii	Circle and name the stigma. [1] (structure tip of style) Both are female parts that receive the male gametes or pollen which contain male gametes. [1]	OWTTE
2a	Smoking. Cigarette smoke contains tar that can cause uncontrolled cell division	Both points 1 m
b	- Tumor / lumps of cells blocks the alveolar wall / alveolar space / alveoli / bronchiole space / makes the alveolar wall less elastic / less able to inflate/ deflate / reduces surface area of alveoli [1] - This reduces the volume in the lungs [0.5] and increases pressure in the lungs. [0.5] / Decreases the surface area for gaseous exchange / diffusion hence lower rate of diffusion of gaseous [1] - During inhalation, less air can be forced into the lungs / during exhalation less air can flow out of the lungs / there will be breathing difficulty [1]	
c	Patient has a slower rate of fat digestion by lipase [1] due to less / little bile released into gall bladder hence duodenum. [0.5] Lesser / no emulsification of fats can occur. SA:V of fat droplets / globules remain low. [0.5]	

Qn	Answer	Remarks
d	Non-infectious as it cannot be spread from person to person <u>and</u> not caused by pathogens	
3a	Voluntary as the action is controlled consciously / by choice / initiated by her	
b	Nerve impulse initiated in her brain [0.5] Transmitted via the relay neurone [0.5] from the brain to the spinal cord [0.5] In the spinal cord the nerve impulse is transmitted across a synapse to the motor neurone [0.5] The motor neurone transmits the nerve impulse to the bicep muscles [0.5] Bicep muscles contract to move her arm to lift the tool [0.5]	
c	Any one: <u>Water pollution</u>: There will not be any insecticides / fertiliser in the nearby water bodies reducing / no / less water pollution / cleaner water [0.5] • So no bioaccumulation and biomagnification [0.5] of <u>non-biodegradable</u> substances up the food chain, [0.5] top consumers are not harmed [0.5] • No eutrophication / algal bloom / growth of algae will occur [0.5] so no death/decomposition of water plants by bacteria, no increase in bacterial growth [0.5] thus no oxygen depletion in water / water continues to have high oxygen [0.5] <u>Biodiversity</u>: Insects in the ecosystem/ habitat not killed by insecticides [0.5] • There will be an increase in biodiversity / no loss of biodiversity [0.5] Insect pollinators of the crops / plants can continue pollination [0.5]	

Qn	Answer	Remarks
	greater variety of plant species can be pollinated [0.5]	
4a	Movement increases rate of respiration which releases more heat [1] thus would increase his body temperature / increase in sweating	
b	The internal body temperature near the brain decreases from 37.4 °C to 37.06 °C. [1] Blood in the capillaries (at the mouth / stomach) is cooled by the ice-cold drink. [0.5] The cooled blood flows to the brain [0.5]	
c	Thermoreceptors in the brain [1]	
d	The rate of sweating decreases from 3.6 to 0.9 arbitrary units.[1] Less water evaporates from the skin surface [0.5], reducing heat loss in the form of latent heat [0.5]	
5a	Water content <u>decreases steeply</u> from 76 % to 74% initially and decreases further to 73.8% / when crabs first moved / from day 0 to day 4.5 [0.5] before <u>increasing gradually</u> to 75% at day 15. [0.5] Sea water has a <u>lower water potential</u> than cytoplasm of crab's muscle cells, [0.5] water moves out of the crab's muscle cell via osmosis [0.5] As the amino acid content in the muscle cells increases, the water potential of the muscle cell cytoplasm <u>decreases to be / becomes lower than that of sea water</u> [0.5] Water moves into the cells via osmosis [0.5]	
b	Amino acids lowers the water potential of the crabs cells to <u>prevent dehydration</u> when in sea water	

Qn	Answer	Remarks
c	concentration of amino acids in blood remains similar after a meal [0.5] the excess amino acids transported to liver are deaminated [0.5] in the liver into urea and glucose [0.5] blood leaving the liver via hepatic vein will not have excess amino acids [0.5]	
6a	Fast-twitch muscle fibres have low myoglobin content, thus low supply/ store of oxygen They rely on anaerobic respiration [0.5] to release additional energy to meet energy demand of vigorous exercise [0.5] by converting glucose to lactic acid. [0.5] Build up of lactic acid causes fatigue [0.5]	
c	Mitochondrion / Mitochondria. [1] (Slow-twitch muscle fibres has more myoglobin hence larger supply of oxygen.)	
d	Long-distance race requires slower and lower intensity muscular contraction over a longer period of time. [1] Since slow-twitching muscle fibres contract slowly over a longer period of time, they have lower overall energy demand and lower oxygen demand [1] Breathing rate and heart rate during the race are able to supply sufficient oxygen (and glucose) to slow-twitch muscle fibers during long-distance races to carry out aerobic respiration. [1]	
7a	Carbon dioxide is absorbed during photosynthesis and released during respiration. [1] Rate of photosynthesis of the pondweed equals to the rate of respiration of both pondweed and snail. [1]	Need to have idea of direction Rej: converted Idea of rate [0.5]

Qn	Answer	Remarks
		Both snails and pondweed respire [0.5]
b	Pondweed unable to photosynthesise due to absence of light. [1] Carbon dioxide is not absorbed, but continued to be released when snail and pondweed respire. [1]	Unable to photosynthesise [0.5] idea of absorbed [0.5], released [0.5]
c	From yellow to (red then) purple	Qn focus on over the next few hours Starting colour [0.5] final colour [0.5] Change must have "from" "to"
8a	The offsprings have similar beak depth to their parents	Not trend but must compare the actual beak depth of parent and offspring Scatterplot x and y reading should be similar
b	Both continuous and discontinuous variations. Size of ground finch is discontinuous as there are only 2 discrete/ distinct phenotypes, small and medium. [1] Beak depth is continuous variation as there are many values over a range, from 7 to 17 mm. [1]	
c	Finches on Isabela Island have a larger range of beak depth, between 10 to 16.5 mm, while finches on Daphne Island have a narrower range of beak depth between 8.5 to 11.5 mm. / Highest percentage of finches on Isabela Island has beak depth of 12 mm, while on Daphne Island is 10 mm. [1] 1. Idea of mutation leads to variation Ancestor/ coloniser finches on Daphne Island have a range of beak depth due to random <u>mutation</u> / different combination of alleles of one / several genes. [1]	Mark can be awarded if mentioned later on in answer Answer should focus on Daphne island

Qn	Answer	Remarks
	2. Selector on Daphne Island Daphne Island have smaller seeds than on Isabela Island [1] 3. Phenotype/ trait with advantage and effect of having advantage Finches with shallower beaks on Daphne Island are able to feed on the smaller seeds better, have sufficient food to survive and reproduce [1] They are able to pass on their genes to their offspring, increasing the population of finches with shallower beaks (8.5-11.5 mm) [1] making up the larger percentage of finches on the island.	Idea of survive and reproduce [0.5] Idea of pass on favourable genes [0.5] Idea of increasing the population of finches with selected trait [0.5]
9a	A condition whereby a person has <u>persistently higher than normal blood</u> glucose concentration [0.5] due to the body's (liver & muscle cells') resistance to insulin or insufficient production of insulin. [0.5] Liver cells and muscle cells are less permeable to glucose [0.5] Less glucose absorbed into liver and muscle cells [0.5] Liver not stimulated to convert excess glucose to glycogen for storage [0.5] Excess glucose remains in bloodstream [0.5]	Idea of liver not stimulated to convert Idea of remains / idea of high
b	One risk factor is old age / family history / blood lipid levels / obesity [1]	
c	Any one: Age/ height and mass/ proportion of males and females or group size /(same) severity of diabetes / (same) activity (during investigation) / (same) type of meal / dose of drug/ (similar)	Reject "lifestyle" to broad / generic for over 3-4 hour investigation

Qn	Answer	Remarks
	The ocean seabed buries/ stores a portion of the carbon compounds in the form of fossil fuel overtime. [1]	
c	Avoiding sunscreen ensures no harmful / toxic chemical harm corals [0.5] Avoiding purchasing living corals ensures live corals not extracted / removed from ecosystem for sale [0.5] Avoiding pollution coastline with trash prevents the trash e.g. non-biodegradable plastics from being washed away into the oceans, [0.5] and forming microplastics which harm corals / marine life / marine life mistook plastic/trash for food and die [0.5] All of the above guidelines prevent the damage/ destruction / harming of the corals which are habitats to about 25% / large variety of marine life [0.5] Hence coral reefs can continue to thrive, ensuring the algae in their tissue can continue to carry out photosynthesis [0.5] And support other marine life that live in corals, Preventing extinction of organisms hence loss of biodiversity of the marine life [0.5] this ensures the prey-predator relationship / transfer of energy along food chains/webs is/are not disrupted and maintaining the ecosystem. [0.5]	Effect of action in the guidelines on corals Mark for idea of death of organisms awarded once Effect of preserving corals in the reef Idea of marine life continue to have food/shelter/ and can live/will not migrate No marks for just restating maintain biodiversity and balanced ecosystem without elaborating how.
11a	The cilia lining the inner surface of the oviduct sweep the fertilised egg or zygote along the oviduct. / Peristaltic movements in the wall of the oviduct also help move the zygote to the uterus; [1] The zygote divides by mitosis to form a ball of cells called the embryo; [1] Eventually, the embryo implants or becomes embedded in the uterine lining; [1]	If embryo swept deduct [0.5] Idea of mitosis [0.5]

Qn	Answer	Remarks
	Embryonic villi begin to grow from the embryo into the uterine lining;[1]	
b	Must compare and identify point / criteria of comparison <u>Structure:</u> 1. Shape/ SA:V - Both embryonic villi and intestinal villi are finger-like projections to increase surface area for movement of substances / diffusion [1] 2. types of vessels - Both villi contain blood capillaries - but intestinal villi also has lacteal, which is absent in embryonic villi [1] <u>Function:</u> 3. Type of substances (nutrients / gases / wastes / antibodies) - Both allows movement of nutrients/water - But embryonic villi allows movement of waste materials, and antibodies 4. Process (diffusion / active transport) - Both move substances via diffusion, - But intestinal villi also move glucose and amino acids via active transport 5. Location substances move from/to (lumen vs blood /) - At embryonic villi, movement is between maternal and fetal blood - But at intestinal villi substances move from lumen into blood 6. Direction - At intestinal villi, movement of substances only in one direction (absorption) - But at embryonic villi, movement of substances occur in 2 directions (exchange)	Accept both villi one cell thick to decrease diffusion distance Reject both have microvilli Reject villi have many folds since villus is the fold

Qn	Answer	Remarks
12a	Any 5 points but must have at least 1 structure and 1 method to reduce transmission <u>Structure:</u> 1. Genetic material Both influenza virus and pneumococcus bacteria has genetic material, But bacteria also has plasmid/ influenza virus has RNA while pneumococcus bacteria has DNA [1] 2. Outer covering Influenza virus only has a protein coat with spike proteins and membrane envelope as outer covering while Pneumococcus bacteria has a cell wall, cell membrane, as outer covering 3. Other organelles Virus has no cytoplasm and organelles but bacteria has cytoplasm and ribosomes [1] 4. Form Influenza virus exists individually / not connected to other virus, but pneumococcus bacteria forms chains [1] <u>Methods to reduce transmission:</u> Both transmissions can be reduced by vaccination [1] Both can be reduced by Any of the daily preventive actions [1] But only for pneumococcus bacteria, transmission can be reduced by taking antibiotics to treat disease, [1] (while transmission of influenza virus is reduced by taking antiviral)	

Qn	Answer	Remarks
b	Antigens A or antigen B are found on red blood cells while antibodies a or antibodies b are found in plasma.[1] Complementary antibodies and antigens will bind to each other causing agglutination/ clumping of blood. [1] The donor's red blood cells cannot have antigens that are complementary to the antibodies in the recipient's plasma [1] Donors can donate blood to recipient of same blood group, with the exception of Blood group O, the universal donor since there are no antigens on the red blood cell [1] Recipients can only receive blood of from donors of the same blood group except for blood group AB, the universal recipient since there are no antibodies A or B in their plasma. [1]	Idea of what caused agglutination Principle in selecting blood for transfusion / criteria for compatibility Idea of universal donor Idea of universal recipient