

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	C	A	B	B	C	C	B	D	C

11	12	13	14	15	16	17	18	19	20
B	A	C	D	B	B	C	A	D	D

21	22	23	24	25	26	27	28	29	30
C	A	B	B	B	C	B	D	B	A

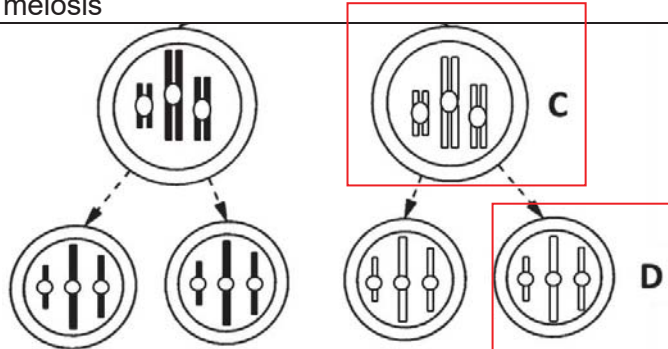
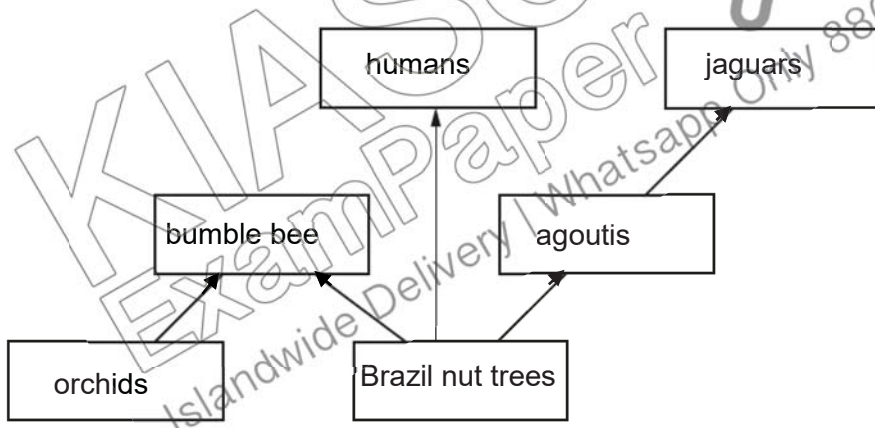
31	32	33	34	35	36	37	38	39	40
C	C	C	B	D	B	A	A	C	D

Marking Scheme

Qn no	suggested marking points		marks				
Section A							
1(a)	X: mitochondrion Y: nucleus		1 1				
1(b)	The mitochondrion releases energy + for active transport/ aerobic respiration; of the glucose and amino acids; (from the lumen of the proximal convoluted tubule back into the bloodstream;) Common errors: - not reading 'ORGANELLES' as requested in qn stem; - plural VS singular		1 1				
1(c)	- The brush border increases the surface area to volume ratio of the cell; - to increase rate of selective reabsorption/ diffusion of useful substances;		1 1				
1(d)	The liver can regenerate itself/ the other portion is still functioning Common errors: - not using ideas/ keywords close enough to 'regeneration' i.e. (biology) the process of growing again; - using "grow again quickly" + "grow again slowly". The rate of regeneration is relative, so why mention the speed? It actually takes about 30 days + this is relatively fast. - R: answers related to patients e.g. the donated portion of the liver can still carry out the functions. Qn is on donor.		1				
			7				
2(a)	<table><tr><td>blood to or from lungs</td><td>blood to or from body tissues</td></tr><tr><td>B, C, F</td><td>A, D, E</td></tr></table> 1 m for each correct side. No 0.5m Common errors: not practicing careful reading – the blood can be TO or FROM, not necessarily oxygenated or deoxygenated only	blood to or from lungs	blood to or from body tissues	B, C, F	A, D, E		2 m
blood to or from lungs	blood to or from body tissues						
B, C, F	A, D, E						
(b)	higher to body tissues; OR lower to lungs		1				
(c)	left ventricle; [correct identification of side] has thicker muscular walls ; greater + contraction / force (applied to blood) AW ; Common errors: - the thicker muscular ventricular walls GENERATE higher blood pressure, not simply withstand - exert ≠generate high blood pressure *BUT* muscular contraction of thicker left ventricular walls exerts higher pressure on the blood → sentence phrasing/ C+E		1 1 1				

	- Students who explained double circulation are not awarded marks as NATQ + IRR. - Ventricles cannot contract; ventricular walls contract	
(d)	hepatic portal vein/ renal portal vein	1
		7
3 (a)	light energy carbon dioxide + water → glucose + oxygen + water chlorophyll 1m for all conditions 1m for all correct reactants + products Common errors: - Missing out water as product - Using 'sunlight' instead of 'light energy'	2
(b)	- photosynthesis occurs - oxygen gas released via intercellular spaces - diffuses through opening/ spaces/ stomata/ lenticels	1 1 1
(c)	- increases oxygen concentration in water via photosynthesis - Oxygen is required for respiration - reduce competition for oxygen - use plants/ leaves of plants for food/ - use plants/ leaves of plants for home/ shelter from predators Common errors: - Benefit to the water plants; qn requested benefits to other aquatic organisms	max 3
		8
4(a)	C: style D: petal E: anthers Common errors: not observing closely – E is anther, not stigma. Compare with the other anther structures. If F is fruit, thus C is the style, the stigma is found above C. E would be anthers, above the filament. NB marking points are strictly followed as this was a previous O level qn with the exact same diagram.	1 1 1
(b)	glucose + oxygen (gas A) → carbon dioxide (gas B) + water + large amount of energy $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy/ ATP/ 38 ATP}$	
(c)	- wind dispersal OR - hooks onto insects Common errors: R: dispersed by animals → how so?; water – assumption there's a body of water in the tropical rainforests	1
(d)	- alkaline: to neutralise HCl - anti-bacteria: to kill/ destroy bacteria in stomach/ reduce chance of infections Common errors: - Not answering the quality of 'anti-bacterial properties' - R: "extracts remove/ eliminate the bacteria" → remove/ eliminate, how?	1 1

5(a)	SS 4EXP BIO (6093) 2018 Prelim P2 LYT	7
	1. Scale 2. Points 3. Line for hormone A 4. Line for BGC 5. Axes – blood glucose and hormone A; both must be the same scale due to relationship between the 2 smooth curve, not straight line + differentiated/ different plot symbols simply labelling won't suffice as there is a cross/ overlap of lines Common errors: straight line – relationship between hormone concentration in blood + time is usually a curve Use “SPLAT” as a reminder – even if the markers’ points are different, these SPLAT points would help you cover all grounds! Write it down as a reminder to yourself.	1 1 1 1 1
(b)	Adrenalin. The increase in hormone causes increase in BGC + with no prior decrease. A: Although glucagon increases in blood glucose level, there is no trigger/stimulus eg drop in blood glucose level which causes release of glucagon/ sudden increase in concentration of hormone A which usually happens when a person faces/ suffers from a shock. Common errors: not differentiation why it is caused by adrenaline as opposed to glucagon.	1 1

		7
6(a)	meiosis	1
(b)	 *A: student drawing for the circle closes to letter C and D.	1
(c)	1. The Bt-toxin gene is cut from the DNA of the soil bacterium, Bacillus thuringiensis using restriction enzymes. Using the same restriction enzyme, bacterial plasmid is cut. 2. Bt-toxin gene is inserted into plasmid to form a recombinant plasmid using ligase. 3. Recombinant plasmid then introduced into bacterial cells using heat / electric shock. Bacterial cells are cloned. 4. Cabbage plant cells infected with bacteria, thus introducing the recombinant plasmid into the cabbage plant cells. Common errors: poorly done – not using keywords or understanding process.	max 4
7(a)	 3 m: all 6 correct boxes, 2m: 4 correct boxes, 1m: 2 correct boxes// no 0.5 m awarded 1m: all correct arrow heads. Common errors: not understanding the sequence. the fruit, the flower, belongs to the same brazil nut tree → we do not differentiate them into different trophic level. It is one trophic level i.e. brazil nut tree.	4
(b)	1 less nectar ; 2 male bees + lack scent ; 3 female bees + not attracted ; 4 less reproduction of bees ; 5 less pollination + of trees ;	any 3

	6 less trees ; 7 less nut / fruit production ; 8 loss of jobs (for humans) / negative economic impact AW ; 9 less food for agoutis ; 10 death / reduced population + of agoutis OR agoutis seek other food ; 11 less food for jaguars ; 12 death / reduced population + of jaguars OR jaguars seek other food ; Common errors: hyperbolic assumptions reduced/ decreased $\neq$ 0 less $\neq$ lesser decreased rate $\neq$ cannot	
		7
Section B		
8a	- Nucleotides: 1 deoxyribose sugar + phosphate group + nitrogenous base - 4 bases: adenine, thymine, guanine, cytosine - 2 strands of DNA joined together by complementary base pairing; double helix + complementary base pairing - Anti-parallel strands	1 1 1 1
8b	- This is possible as the mother is a carrier of the recessive gene, and the father is a healthy male.	1
	Handwritten genetic cross diagram for hemophilia. It shows a cross between a healthy carrier mother (X^H x X^h) and a healthy father (X^H Y). The diagram includes parental phenotypes and genotypes, random segregation of alleles into gametes (X^H, X^h, X^H, Y), the resulting F₁ genotypes (X^H X^H, X^H X^h, X^H Y, X^h Y), and their corresponding phenotypes (healthy daughter, healthy son, carrier daughter, haemophiliac son). It concludes with the probability of a haemophiliac son being 25%.	5
		10
9(a)	exchange of substances at the placenta; oxygen and nutrients diffuse from maternal blood space into fetal blood; waste products e.g urea and carbon dioxide diffuse out of fetal blood into maternal blood space; umbilical cord transports the dissolved substances in the blood to and fro fetus and mother; oxygen and glucose are used for cellular respiration to release energy for cell growth; amino acids and fatty acids used for building new protoplasm, new cells for the fetus;	1 1 1 1 1 1

9(b)	water transported via osmosis in xylem vessels from roots to stem to the transport tissues in the developing fruit; water move up through transpiration pull; glucose produced in the leaves are converted to sucrose; transported as sucrose in the phloem to the developing fruit;	1 1 1 1
		10
Either 10(a)	diffusion + describing the process; diffusion example; osmosis + describing the process; osmosis example; active transport + describing the process; active transport example; R: any explanation wrt plant cells	1 1 1 1 1 1
10(b)	- Circular muscles relax + Longitudinal muscles contract - Widening the lumen, allowing entrance/ to pass through - Circular muscles contract + longitudinal muscles relax - Constricting the lumen behind the bolus, pushing it through	1 1 1 1
		10
Or 10(a)	- Pollen grain germinates / pollen tube develops upon stimulation by sugary sticky fluid + secreted by the stigma - Growth of pollen tube by secreting enzymes to digest tissues of style - transports the male gamete - The tip of pollen tube enters the ovule via the micropyle - The tip of pollen tube absorbs sap and swell/burst - Releasing the male gamete into the ovule + fertilise/ fuse with the female gamete	1 1 1 1 1 1
10(b)	Advantages of cross pollination to self-pollination: - Greater genetic variation in the offspring compared to the parents + more adapted to changes in the environment - Beneficial genes/traits of both parents may be passed to the offspring / less possibility for recessive alleles to offspring R: if answers stop at "greater genetic variation" – so what? How does this benefit the offspring? Disadvantages of cross pollination to self-pollination: - Dependent on external agent of pollination + may not always be available - requires two parents + they may not be always available - More abundant pollen grains need to be produced compared to self pollination process as there is greater risk of loss during the transfer between two plants / more energy loss/ - Not all beneficial traits / genes of a plant may be passed down to the offspring	1 1 1 1
		10

