

PRELIMINARY EXAMINATION 2020 BIOLOGY 6093							
Paper 1							
1	A	11	D	21	C	31	D
2	A	12	C	22	C	32	C
3	C	13	B	23	A	33	C
4	B	14	B	24	B	34	A
5	C	15	A	25	B	35	A
6	B	16	B	26	A	36	A
7	B	17	C	27	C	37	B
8	A	18	D	28	B	38	D
9	B	19	C	29	C	39	D
10	A	20	D	30	C	40	C
Paper 2							
1	(a)	Golgi apparatus- chemically modifies, store and packages substances made by the endoplasmic reticulum into vesicles for secretion out of cell					[1]
		mitochondria - site for aerobic respiration to <u>release energy</u>					[1]
	(b)	P –ANY mesophyll cell Reason: P has high number of chloroplast					[1]
		Q- root hair cell (R: epidermal cell as mitochondria number is high) (accept companion cell)					[1]
		Reason -Q has <u>no chloroplast and has a high number of mitochondria</u> (both reasons to award marks)					
	(c)	Exceptionally high levels of Golgi apparatus and rER No chloroplast High levels of mitochondria (lower than golgi and rER) Smooth endoplasmic (lower than RER)					[1]
		Label the bar (accept legend at side)					[1]
2	(a)	M- cuticle N- xylem					[1]
		Both must be correct					
		Marker's report					
		Many were able to identify M correctly. A few identified M as epidermis or epidermal layer. The common incorrect answer given for N is phloem.					

	(b)	Both sunken stomata and tiny hairs <u>trap water vapour</u> within the area; [accept either one]	[1]	
		Thus increasing humidity within the area/ decreasing the water vapour concentration gradient to reduce <u>diffusion of water vapour</u> out of the stomata; / rate of transpiration will decrease	[1]	
	(c)	Carbon dioxide concentration higher in atmosphere than in leaf , carbon dioxide <u>diffuses</u> into leaf/ intercellular air spaces; Carbon dioxide <u>dissolves in thin film of moisture</u> around mesophyll cell and <u>diffuses</u> into the cell;	[1] [1]	
3	(a)	As concentration of NaCl, increases from 0.0 to 0.2 %, percentage of cells remaining is constant at 0% [1] As concentration of NaCl increases from 0.2 to 0.9%, the percentage of cells remaining increases from 0 to about 100% at a constant rate [1] As concentration of NaCl increases from 0.9 to 1.5%, the percentage of cells remaining is constant at 100%. [1] (values must be given, description of line)	[3]	
	(b)	The water potential of the red blood cells is lower than the water potential of the NaCl solution [1] Water enters the red blood cells by <u>osmosis</u> causing the cells to expand and eventually <u>burst</u> [1] Hence percentage of red blood cells is 0.	[2]	
4	(a)	(i) Similar position of centromere/ same length of chromosome/ genes have same gene loci / same shape/ same size [any 1]	[1]	
		(ii) Alleles <u>may</u> be different/ one chromosome from mother (maternal) and the other from father (paternal) [1] R: alleles are different	[1]	
	(b)	Prophase 1	[1]	
	(c)	Exchange of genetic materials during <u>crossing over</u> which increases variation during the formation of gametes [1] Increased variation increases chance of survivability of the organisms during changes in environment [1]	[2]	

5	(a)	The <u>fusion of haploid nucleus of the sperm</u> (male gamete) and the haploid nucleus of the <u>ovum</u> (female gamete) forming a <u>diploid zygote</u> .	[1]
	(b)	(i) 27	
		(ii) 54 (both must be correct to award 1 mark)	[1]
	(c)	Asexual reproduction [1] There is no fusion of nucleus from male and female gametes [1] only one parent The diploid nucleus from the body cell is being inserted into the egg cell forming a diploid cell which contains the identical chromosomes as the sheep J [1]	[2]
6	(a)	Blood passes through the heart/ blood pumped by heart goes to other capillaries/ both contains heart [1]	[1]
	(b)	Prevents mixing of oxygenated and deoxygenated blood [1] so the amount of oxygen carried by blood will not be reduced;/ efficient transport of oxygen [1]	[2]
	(c)	(i) Left ventricle [1] Blood pressure is higher which can be generated as muscles of ventricles contract and as needed to pump blood to the rest of body/ oxygen concentration is high as it receives blood indirectly from lungs [1]	[2]
		(ii) Pulmonary capillaries; / lung blood capillaries Oxygen concentration is increasing showing that oxygen diffused from lungs into the blood and / blood pressure is low as blood is flowing in the capillaries [1]	[2]
		(iii) Liver; As urea concentration increases due to deamination of <u>excess</u> amino acids;	[2]
7	(a)	Glucose and galactose;	[1]
	(b)	Condition is recessive; Let allele for digest lactose be R Parental phenotypes can digest lactose x can digest lactose Parental genotype Rr Rr ;	[4]

		Gametes	R	r	R	r;	
		Offspring genotype	RR	Rr	Rr	rr	
		Offspring phenotype	can digest:	can digest:	can digest:	cannot digest;	
	(c)	(i)	Similarity The enzyme activity for both free lactase and immobilized lactase increases as temperature increases from 20 °C to 35 °C ; Difference The enzyme activity is higher in free lactase than immobilized lactase at all temperatures between 20 °C to 40 °C; The enzyme activity of free lactase starts to decrease as temperature goes above 35 °C whereas the activity of enzyme continues to increase after 35 °C; (must include the similarity)				[2]
		(ii)	As temperature increases, substrate molecules gain more energy hence increasing the rate of collisions of substrate to enzymes ; This will increase the rate of formation of enzyme-substrate complex ; therefore enzyme activity increases.				[2]
8	(a)	(i)	Alveoli Walls are <u>one cell thick</u> to reduce diffusion distance thus increasing rate of gaseous exchange; Surrounded by blood capillaries to maintain the concentration gradient of gases in blood; R: lining of moisture/ many alveoli				[2]
		(ii)	Red blood cell <u>Flexible</u> to squeeze through tiny capillaries ; R: no nucleus/ biconcave				[1]
			Marker's report Common mistakes include stating features that are not seen in diagram.				
	(c)	(i)	Irritants in cigarette smoke may be trapped in trachea/ air passageway causing <u>inflammation of airways/ bronchitis</u> ;				[2]

		Or tar in cigarette smoke paralyses cilia thus unable to sweep trapped dirt and dust out <u>causing inflammation/ bronchitis</u> ; (any 1) Cause <u>violent coughing</u> to remove the irritants/ trapped dirt and dust which will break the walls down;	
	(ii)	Tobacco smoke contains Tar- carcinogenic many cause <u>lung cancer/</u> paralyse cilia hence causing inflammation leading to <u>bronchitis</u> Nicotine – high blood pressure Carbon monoxide – reduce ability of blood to transport oxygen Irritants- inflammation leading to <u>bronchitis or emphysema</u>	[2]
9	(a)	Axes; Scaling; Line; Plots;	[4]
	(b)	0.125% ± 0.05 (based on graph, must be shown)	[1]
	(c)	100% - 600 ml 12% - 72 ml $72/ 5000 \times 100\% = 1.44\%$ (no unit- 1m)	[2]
	(d)	No [1] Highly intoxicated, <u>reduce brain function/ slower reaction/ increased reaction time, may lead to accidents [1]</u> Note: Need to show the serious effect	[1]
	(e)	Lower chances of fertilization [1] Fertility decreased [1]	
	(f)	Produce bile to emulsify fats to increase fat digestion by lipase/ Deamination of excess amino acids into urea/ Converts excess glucose to glycogen in presence of insulin/ Breaking down of haemoglobin to form iron for storage R: general statements	[1]

10	(a)	Kidney 1 belongs to kangaroo rat [1] Kidney 2 belongs to brown rat [1] Kidney 3 belongs to coypu rat [1] As brown rat is not able to obtain water easily, blood water potential will be very low [1] In kidney 2, the <u>nephron tubules are longest</u>. This can provide more time for absorption of water from the collecting ducts thus ensuring that the water potential in blood remains constant at normal levels [1] As coypu rat stays in area where there is abundant water supply, there is no need for collecting duct to absorb more water as the rat can obtain water easily. <u>In kidney 3, the nephron tubules are the shortest</u> [1] Any 4		[4]
	(b)	As the water potential in blood in kangaroo rat is low, more <u>anti-diuretic hormone</u> is released by <u>the pituitary gland</u>; This increases the permeability of the collecting duct to water; More water is absorbed into the blood capillaries increasing the water potential of blood; Urine will contain lower volume of water hence becomes <u>more concentrated</u>;		[4]
11	(a)	Similarity Both help to coordinate the activities of the body; Both are activated by stimulus; Both exerts effects on target organs; [any 2] Difference Hormonal system involves hormones while nervous system involves nerve impulses; Hormones are transported by blood but nerve impulses are transmitted by neurons; Hormonal system is usually a slow response while nervous system is usually a quick response. Hormonal system is always involuntary but nervous system can be voluntary or involuntary; Hormonal system affects more than one organ but nervous system effect is usually localized; [any 3]		[5]

	(b) Insulin enters the mouth and into the <u>trachea</u>, <u>bronchi</u>, <u>bronchioles</u> and eventually reaching <u>alveoli</u>; Insulin <u>diffuses</u> through the alveolar walls and into the blood capillaries; Insulin transported by blood and enters the <u>left atrium</u> of the heart via the <u>pulmonary vein</u>; Insulin in blood then flows from the left atrium into <u>the left ventricle</u> through the bicuspid valve and out of the heart via the <u>aorta</u>; Insulin in blood will then travel to the liver via the <u>hepatic artery</u>;	[5]
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