Paper 1 [40 marks]

Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	D	**11**	D	**21**	C	**31**	A
2	A	**12**	D	**22**	B	**32**	D
3	A	**13**	B	**23**	D	**33**	D
4	D	**14**	C	**24**	B	**34**	B
5	B	**15**	B	**25**	C	**35**	D
6	B	**16**	B	**26**	B	**36**	A
7	B	**17**	C	**27**	C	**37**	A
8	C	**18**	B	**28**	B	**38**	C
9	C	**19**	D	**29**	C	**39**	D
10	B	**20**	D	**30**	A	**40**	B

Abbreviations used in the Mark Scheme:

;	separates marking points
/	alternatives
I	ignore
R	reject
A	accept (for answers correctly cued by the question, or guidance for examiners)
AW	alternative wording
AVP	any valid point
ecf	credit a correct statement / calculation that follows a previous wrong response
ora	or reverse argument
( )	the word / phrase in brackets is not required, but sets the context
underline	actual words given must be used by the candidate (or grammatical variants of them)

Paper 2 Section A [70 marks]

		Answer	Remarks	Marks
1	**(a)**	1 testosterone 2 sperm	1 mark each R semen R hormone	2
	(b)	X: Sperm Duct		1
		Explanation: - Man is infertile / cannot reproduce - Sperms cannot travel to the urethra and out of the body		1 1

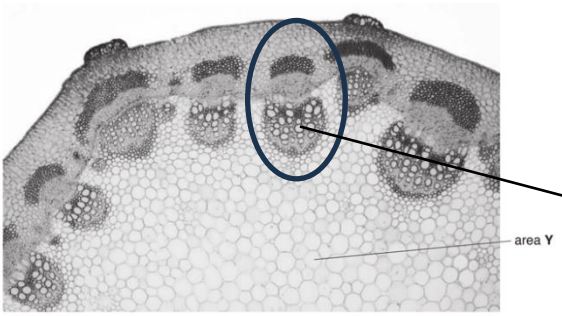
	(c)	[1] When the valves malfunction/not working, backflow of blood occurs / blood flow backwards. [2] Blood vessels swell up and blood accumulates. [3] Accumulation of blood raises the temperature of the area/cells/tissues surrounding the testes. [4] The high temperatures causes lower sperm production and poor quality of sperms.	4
Total			9

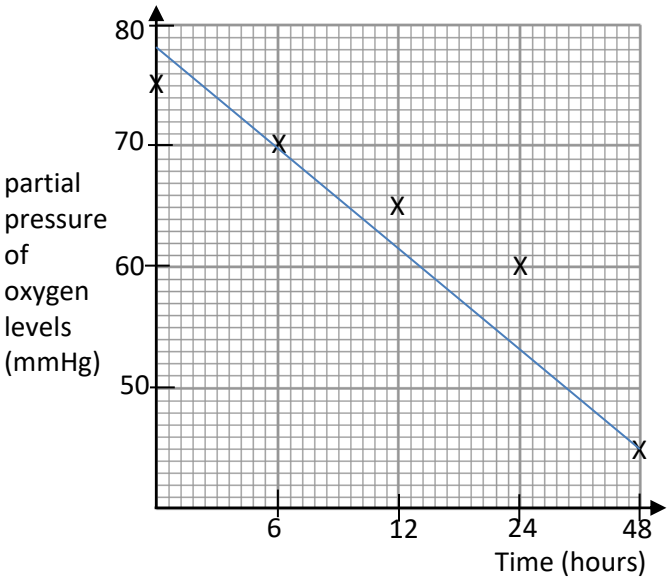
		Answer	**Remarks**	**Marks**
2	**(a)**	[1] Cells in the trachea / bronchial tubes secretes mucus. [2] Mucus traps bacteria / germs / pathogens. [3] Cilia sweep the mucus containing bacteria / germs / pathogens upwards and out of the body / prevent it from entering lungs.		3
	(b)	[1] Vaccine contains an agent that resembles a pathogen. [2] Which stimulate white blood cells to produce antibodies. [3] These antibodies kill pathogens that cause infectious diseases.		3
	(c)	[1] Virus does not have cellular structures that antibiotic target. [2] Antibiotic acts on bacterial cell walls but viruses do not have cell walls. [3] Antibiotic break up cell membranes but viruses do not have cell membranes. [4] Antibiotic act on ribosomes inhibiting protein synthesis and growth but viruses do not have ribosomes and they do not grow.	Any two points	2
Total				8

		Answer	Remarks	Marks
3	**(a)**	[1] Blood flow remains constant <u>and</u> then increases. [2] Blood flow remains at 4/5 %. [3] Increase in blood flow from 25-27°C [4] to a maximum / 100% at 41°C.	AW Any three points	3
	(b)	[1] Rise in <u>temperature detected by receptor in skin and generate nerve impulses.</u> [2] Nerve impulses generated travelled to the <u>brain</u> via the <u>sensory neurone</u>. [3] Impulses from the brain travelled to the <u>muscles</u> in the arterioles / shunt vessels via <u>motor neurone</u>. [4] <u>Arterioles dilate</u> / vasodilation OR <u>shunt vessels constrict</u> to <u>increase more blood flow</u> into capillaries / near the surface of the skin	Any three points	3
	(c)	46%		1
	(d)	[1] Higher concentration of capsaicin on the skin surface (than in the cells) [2] Capsaicin diffuse through the cells / passes through / across cell membranes to the cells by [3] diffusion.	A down a concentration gradient A from high to low concentration	3
	(e)	[1] Hormones is by chemical means while nerve co-ordination involves nerve impulses. [2] Hormones are transported in the blood / circulatory system while nerve co-ordination are transported by the neurones. [3] The (effects) by hormones are slower than nerves. [4] The (effects) by hormones are longer-lasting than nerves.	Any two points	2
Total				12

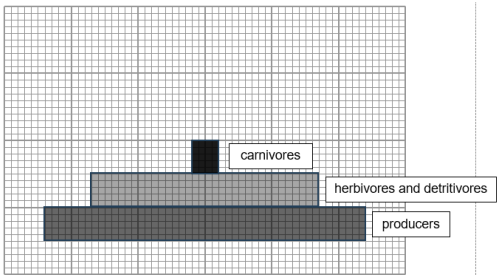
		Answer	Remarks	Marks
4	**(a)(i)**	Mutation is spontaneous / random change in the structure of the gene or the number of chromosome.		1
	(a)(ii)	formaldehyde; radiation; x-ray; tar		1
	(a)(iii)	Parent without MSUD has a child who has MSUD; Parent 1 and 2 without MSUD have child 5 with MSUD; Parent 7 and 8 without MSUD have child 12 with MSUD.		1
	(a)(iv)	Correct genotype of parents and gametes: N + n and N + n Correct genotypes of offspring: NN / Nn / Nn / nn Correct phenotypes of offspring. Probability that the child will have MSUD: 0.25 / ¼ / 25%	 R ratio	4
	(b)(i)	liver		1
	(b)(ii)	[1] Toxic substance P passes through the (glomerulus) in the **kidney**. [2] Not all of the toxic substance P is reabsorbed back into the blood capillaries and end up in the urine. [3] Only some of the toxic substance P is reabsorbed into the blood capillaries.	Any two points	2
	b(iii)	[1] proteins are broken down into amino acids / proteins are made up of / contain amino acids. [2] must keep amino acids in low amount / amino acids do not build up / less amino acids produced. [3] so that toxic substance P does not build up in the body <u>and</u> cause damage to cells / tissues / organs.	 AW AW	3
Total				13

		Answer	Remarks	Marks
5	**(a)(i)**	AAC-ACG-UCC-CAG		1
	(a)(ii)	asparagine – threonine – serine – glutamine		1
	(b)(i)	B		1
		Explanation: Amino acids is absorbed by the blood capillaries in the villi.		1
	b(ii)	[1] (Pancreatic enzymes) Protease active site is <u>complementary</u> to the shape of the proteins. [2] Only proteins can bind / fit to the protease (enzyme) / other molecules cannot bind / fit to the enzyme active site. [3] Lesser proteins is broken down (digested) into amino acids <u>and</u> lesser <u>absorption of amino acids into the blood stream.</u> [4] lesser amino acids results in stunted growth and poor muscle development. [5] amino acids are building blocks needed for muscle and tissue repairs / growth of new cells.	Any four points	4
Total				8

		Answer	Remarks	Marks
6	**(a)**		Circle any one of the vascular bundles. Label xylem.	2
	(b)	[1] cell vacuoles / cells have a higher water potential [2] cells absorbed water by <u>osmosis</u> / down a water potential gradient [3] causes cells to become <u>turgid</u> / have turgor pressure. [4] presence of cell wall which is inelastic and prevent the cells from bursting.	Any three points	3
	(c)	Describe: [1] Q has sucrose / ^{13}C in shoot <u>and</u> root [2] T has no sucrose / ^{13}C in shoot <u>and</u> root [3] R has sucrose / ^{13}C in root but not in shoot [4] S has sucrose / ^{13}C in shoot but not in root	Any two points	5
		Explain: [5] there is no transport of sucrose / ^{13}C where phloem is removed. [6] phloem transport sucrose / ^{13}C in both directions; upwards and downwards. [7] leaf carry out photosynthesis and produce glucose and convert to sucrose for transport. [8] sucrose is then transported to the roots and shoots.	Any three points	
Total				10

		Answer	Remarks	Marks
7	**(a)(i)**	Scale; Best-Fit line; Axis Titles; Plotting points  		4
	(a)(ii)	[1] As the time increases, the partial pressure of oxygen levels decreases from 75 mmHg to 55 mmHg / by 20 mmHg. [2] Every 6 hours, the partial pressure of oxygen levels decreases by 5 mmHg.	AW	2
	(b)	[1a] walls of alveolus has a thin film of moisture [1b] to allow gases to dissolve to diffuse into the blood capillary [2a] walls of alveolus is made up of one cell thick [2b] to allow faster diffusion of gases [3a] alveolus is surrounded by a dense network of blood capillaries. [3b] to transport gases quickly to maintain a steep concentration gradient of gases.	Any four points	4
Total				10

Paper 2 Section B [10 marks]

		Answer	Remarks	Marks
8	**(a)**		4 units; Correct size Label carnivores	2
	(b)	[1] eat mainly plants [2] feed at second trophic level as primary consumers [3] eaten by third trophic level / secondary consumers	(any 1 point)	1
	(c)	(480 – 220)/480 * 100% = 54%	Working 1 m Final 1 m	2
	(d)	[1] 90% of energy is lost from one trophic level to the next. [2] Only 10% of the energy is passed down from one trophic level to the next. [3] Not all of the organisms are eaten / digested / absorbed. [4] Energy is lost mainly as heat through respiration' [5] Insufficient energy to support more than four/five trophic levels.	Any two points	2
	(e)	[1] in a pyramid of numbers, one large individual is shown in the same way as one very tiny individual. [2] biomass indicates how much food there is / available / left [3] biomass is an indicator of the energy available [4] pyramid of biomass is pyramid shaped but a pyramid of numbers is not always. [5] a pyramid of numbers can be misleading because it only counts the number of organisms without considering their size or energy content.	Any three points	3
Total				10

		Answer	Remarks	Marks
9	**(a)**	Tricuspid valve		1
	(b)	[1] Deoxygenated blood from the right side of the heart will mix with the oxygenated blood from the left side of the heart or vice versa. [2] This reduced the (overall) pressure of the blood. [3] which results in lesser oxygenated blood flowing to the rest of the body. [4] Breathing rate and heart rate increases to pump more oxygenated blood to the rest of the body. [5] Cells receive lesser oxygen and nutrients resulting in reduced respiration rates and lesser energy released.	Any three points	3
	(c)	In the fetus, the main source of oxygen is from the mother through the placenta.		1
	(d)	Describe differences: [1] The survival rate for untreated CHD decreases progressively from 95% at 1 year to 80% at 5 years. [2] The survival rate for children who undergo surgical intervention remains higher throughout the period, starting at 99% at 1 year and slightly decreasing to 95% at 5 years. [3] Surgical intervention significantly improves the long-term survival rates for children with CHD compared to those who remain untreated. [4] Survival rate for untreated CHD decreases the most by 5% between the first and the third year / for the first 3 years.	Any two points	3
		Reason: [1] by repairing the defect, the blood flow will improve resulting in adequate oxygen supply and good nutrient absorption. [2] children will be able to engage in normal physical activities and have a better overall quality of life. [3] children will have better growth and development.	Any one point	
	(e)	[1] body / immune system will recognise the heart transplanted as foreign object. [2] white blood cells will attack the foreign object leading to rejection of the heart.		2
Total				10

End of Paper