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Biology BIOL1

(Specification 2410)

Unit 1: Biology and Disease

Final

Mark Scheme

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Question	Marking Guidance	Mark	Comments
1(a)	(Plasma / cell) membrane;	1	Reject: nuclear membrane
1(b)	Nucleus / nuclear envelope / nuclear membrane / nucleolus; Mitochondrion; (Smooth / rough) ER; Lysosome; Microvillus / brush border; Golgi; Linear / non-circular DNA / chromosome; 80S / denser / heavier / larger ribosomes;	2 max	Accept: membrane-bound organelles only if an example has not been given Neutral: villi Neutral: DNA strands Neutral: ribosomes
1(c)(i)	Higher resolution / higher (maximum) magnification / higher detail (of image); ***OR*** Allows internal details / structures within (cells) to be seen / cross section to be taken;	1	Accept: 'better' instead of 'higher' Neutral: shorter wavelength Reject: longer wavelength Reject: can be used on living specimens **Q** Do not accept 'clearer' image
1(c)(ii)	Thin sections do not need to be prepared / shows surface of specimen / can have 3-D images;	1	Accept: can be used on thick(er) specimens Reject: can be used on living specimens Neutral: refs. to staining / preparation / artefacts / colour

1(d)	Two marks for correct answer of 0.42 – 0.46;; One mark for incorrect answers in which candidate clearly divides measured width by magnification;	2	Correct answer = 2 marks outright Accept: 0.4 or 0.5 only if working is correct for 2 marks Do not award a mark for 0.4 or 0.5 if there is no working out Ignore rounding up
1(e)	As height increases, the number of deaths decrease / inversely proportional / negative correlation; Correct reference to increase / decrease at 14-30m;	2	Accept: converse statement Must give a trend and not simply give individual points Do not penalise for 'more likely to get cholera'

Question	Marking Guidance	Mark	Comments
2(a)(i)	Active site / enzyme not <u>complementary</u>; Active site changes (shape) / is flexible; (Change in enzyme allows) substrate to fit / E-S complex to form;	2 max	Active site becomes complementary / wraps around substrate = 2 marks For mark point 2. allow 'binding site' but not 'enzyme' For mark point 2. can only have enzyme changes (shape) if active site has been mentioned earlier Final mark point must have context Reject: active site on substrate for second marking point only Accept: diagrams only if suitably labelled or annotated
2(a)(ii)	<u>Active site</u> does not change (shape) / is fixed (shape) / is rigid / does not wrap around substrate / (already) fits the substrate / is complementary (before binding);	1	Assume that 'it' refers to lock and key

2(b)	Similar structure / shape (to PABA) / both complementary; Competes for / binds to active site / competitive inhibitor; Less PABA binds / less E-S complexes; ***OR*** Specific reference to different structure / shape (to PABA) using the diagram; Binds to position other than active site / binds to allosteric site / binds to inhibitor site / non-competitive inhibitor; Changes the active site so substrate cannot bind / less PABA binds / less E-S complexes;	3 max	**Q** Reject: same structure / shape Note: competitive inhibitor binds to active site = 1 mark (same mark point) Assume that 'it' refers to sulfanilamide Accept: PABA / substrate cannot bind Neutral: less product produced as in question stem Neutral: different structure / shape to PABA Reject: active site on substrate for second marking point only

Question	Marking Guidance	Mark	Comments
3(a)(i)	**G**;	1	Neutral: name of blood vessel
3(a)(ii)	**E**;	1	Neutral: name of blood vessel
3(b)	Pressure is greater below valve / in ventricle than (artery);	1	Must be comparative Reject: pressure is greater in ventricle than atrium Neutral: pressure in ventricle increases Accept: **E** / **F** / named artery Accept: converse argument
3(c)	Allow atria to empty / contract / ventricles to fill; Before ventricles contract; ***OR*** Delays contraction of ventricles; Until after atria have contracted / ventricles have filled;	2	Neutral: 'to pump blood'
3(d)(i)	Two marks for correct answer of 91 / 90.9;; One mark for incorrect answers which clearly show understanding of the relationship between SV = CO/HR;	2	Correct answer = 2 marks outright 5000 divided by 70, 55 or 15 = 1 mark for principle

3(d)(ii)	Increase in size or volume of heart / ventricles / increased heart muscle / increased strength of contraction / hypertrophy; Cardiac output is the same (before and after training); Increase in stroke volume / more blood leaves heart in each beat;	2 max	Accept: increased strength of heart muscle Neutral: heart muscle contracts more **Q** Do not allow 'heart is stronger' Neutral*:* more blood leaves the heart If the term 'stroke volume' is not used, it must be defined

Question	Marking Guidance	Mark	Comments
4(a)	Double bond(s); (Bonds) between carbon;	2	C=C bond(s) = 2 marks 'No' C=C bond(s) disqualifies 1 mark only Accept: does not contain maximum number of H for 1 mark Neutral: contains C=O bonds
4(b)	Graph shows negative correlation / description given; Correlation does not mean causation / prevention / shows lower risk not prevention; May be due to another factor / example given;	3	Neutral: refs. to methodology e.g. sample size / line of best fit **Q**: Do not allow 'casual' relationship
4(c)(i)	Glycosidic;	1	Accept: if phonetically correct Reject: ester bond
4(c)(ii)	Contains glycerol / three fatty acids / forms three ester bonds;	1	Neutral: contains less fatty acids Answers must refer to a triglyceride Ignore refs. to incorrect bond names Neutral: olestra has eight fatty acids / R groups Reject: contains three glycerols
4(c)(iii)	9;	1	

Question	Marking Guidance	Mark	Comments
5(a)	Water will affect the mass / only want to measure water taken up or lost; Amount of water on cylinders varies / ensures same amount of water on outside;	2	Neutral: removes water Accept: '(sodium chloride) solution' for water Do not accept 'sodium chloride' Neutral: refs. to fair testing
5(b)	$4cm^3$ (of 1.0 mol dm^{-3} sodium chloride solution) and $16cm^3$ (of distilled water);	1	Reject: factors and multiples of these figures e.g. $2cm^3$ and $8cm^3$, as final volume should be $20cm^3$
5(c)	Allows comparison / shows proportional change; Idea that cylinders have different starting masses / weights;	2	Reject: if comparison is in context of the start and final mass of the same cylinder Neutral: different masses Neutral: different starting sizes
5(d)	(Allows) anomalies to be identified / ignored / effect of anomalies to be reduced / effect of variation in data to be minimised; Makes the average / mean / line of best fit more reliable / allows concordant results;	2	Accept: 'outliers' instead of anomalies **Q** Reject: abnormalities Reject: idea of not recording anomalies / preventing anomalies from occurring Accept: 'cancels out anomalies' as bottom line response **Q** Reject: makes the average / mean more accurate Neutral: makes the average / mean more valid Neutral: makes 'it' / results / conclusion more reliable

5(e)	0.35 (mol dm^{-3})	1	

Question	Marking Guidance	Mark	Comments
6(a)	Girls are not sexually active / not likely to carry HPV / vaccine may not work if already infected / few girls sexually active (at this age);	1	Neutral: girls are not sexually mature Neutral: to provide better protection Accept: provides immunity before sexually active Neutral: girls are less likely to have '**it**' as could mean the vaccine from the question stem
6(b)	Other (HPV) types have different antigens; No memory cells for other types / memory cells not activated; Antibodies cannot attach to antigen / correct antibodies not produced / antibodies are not complementary;	2 max	Accept: refs. to antigenic variability Accept: B cells for memory cells Accept: memory cells cannot recognise antigen for 'not activated' Accept: examples of memory cell activation
6(c)	More antigen; More memory cells; So more antibodies produced / antibodies produced quicker (if infected);	2 max	Accept: 'many' / 'enough' instead of 'more' Neutral: primary / secondary response Accept: T cells / B cells / plasma cells instead of 'antibodies' Reject: the idea that vaccines contain antibodies **Q** Reject: antibodies 'fight' / 'antibiotics'

6(d)	Cancer takes years to develop / develops later in life; Takes time for females to become sexually active / females must become sexually active to obtain data; Few people / only teenagers vaccinated;	2 max	Neutral: will take time to vaccinate 80% of young girls Accept: do not develop cancer instantly
6(e)	(Cervical cancer) can be caused by other types of HPV / other factors / example given; ***OR*** (Some) women may have been infected (with HPV) before receiving the vaccine; ***OR*** (As a precaution) in case vaccine does not work / a way of monitoring if the vaccine has worked ;	1	Accept: 'caused by other types of HPV' in the context of mutation Neutral: to check for abnormal cells / that they are immune to the virus
6(f)	Virus cannot replicate / is destroyed / is not carried (in vaccinated people); Non-vaccinated people more likely to contact vaccinated people;	2	Neutral: 'do not spread virus' as in question stem Must be in context of the individual and not the population as in question stem **Q** Do not allow 'disease is destroyed' Neutral: 'herd effect' as given in the question stem

Question	Marking Guidance	Mark	Comments
7(a)	1 (Bacteria transmitted in) droplets / aerosol; 2 (Bacteria) engulfed / ingested by phagocytes / macrophages; 3 (Bacteria) encased in named structure e.g. wall / tubercle / granuloma / nodule; 4 (Bacteria) are dormant / not active / not replicating; 5 If immunosuppressed, bacteria activate / replicate / released; 6 Bacteria destroy alveoli / capillary / epithelial cells; 7 (Leads to) fibrosis / scar tissue / cavities /calcification; 8 (Damage) leads to less diffusion /less <u>surface area</u> / increases diffusion distance; 9 (Activation / damage allows bacteria) to enter blood / spreads (to other organs);	5 max	1 Accept: TB / 'it' / the disease / air droplets 1 Neutral: spread through the air / coughs / sneezes 1 Reject: virus 2 Neutral: 'destroyed by'; 2 Accept: white blood cells 3 Neutral: bacteria contained 5 Accept: reference to HIV / old age / stress 7 Accept: fibrous tissue 8 Neutral: reduced gas exchange 8 Accept: reduced SA:VOL

7(b)	1	Alveoli break down / collapse / rupture / <u>walls</u> thicken;	5 max	1	Neutral: alveoli damaged
	2	Less <u>surface area</u> / increases diffusion distance / less diffusion;		2	Accept: references to a lack of alpha-1-antitrypsin
	3	Loss of elastin / elastic tissue / elastase involved;		3	This mark is for a structure. Accept: elastin permanently stretched
	4	(Alveoli / lungs) cannot recoil / spring back / have reduced elasticity / more difficult to expel air;		4	This mark is for a mechanism. Do **not** award reduced elasticity for 3.
	5	Reduced diffusion gradient / air not replenished / less air leaves lungs;		4	Neutral: more difficult to inhale air
	6	Less oxygen enters blood / tissues;		5	This mark is for a consequence
	7	Less respiration / less energy released / less ATP produced;			Accept: reduced concentration gradient;
					Neutral: less air enters lungs
				7	**Q** Reject: 'less energy produced' / <u>anaerobic</u> respiration
				7	Accept: 'less energy produced in the form of ATP' / less oxygen for respiration