



Mark Scheme (1st draft)

SAM

Pearson Edexcel International GCSE
in Human Biology (4HB1)
Paper 02

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Notes	Marks
1 (a) (i)	to increase reliability/to obtain a mean/to exclude anomalous results (1)		1
(ii)	<ul style="list-style-type: none"> decreases (reaction time)/increases how quickly the student responds(1) reference to 30 ms faster (1) 		2
(b)	A statement X only (1)		1
(c)	paracetamol/aspirin/other valid named painkiller (1)		1

(Total for Question 1 = 5 marks)

Question number	Answer	Notes	Marks
2 (a)	double helix (1)		1
(b) (i)	C A-T and C-G (1)		1
(ii)	(weak) hydrogen (bonds) (1)		1
(c) (i)	<ul style="list-style-type: none"> the fourth base has changed (1) T/thymine has changed to C/cytosine (1) 		2
(ii)	mutation (1)		1
(iii)	<ul style="list-style-type: none"> 3 (1) amino acid (1) protein (1) 		3

(Total for Question 2 = 9 marks)

Question number	Answer	Notes	Marks
3 (a) (i)	A makes proteins	Full marks for correct final answer	1
(ii)	C prevents the cell from bursting		1
(iii)	6cm = 60000 μ m 60000 \div 12 000 5 (μ m)		3
(iv)	risk of infection/disease		1
(v)	wear gloves/mask/ wash hands after handling/reference to disposing of slide in the correct manner		1
(b)	<ul style="list-style-type: none"> place the microscope slide on the stage turn the coarse/fine focussing knob 		2

(Total for Question 3 = 9 marks)

Question number	Answer	Notes	Marks								
4 (a) (i)	D enzyme P is pepsin and enzyme Q is trypsin (1)		1								
(ii)	stomach (1)		1								
(b) (i)	<ul style="list-style-type: none">column headings temp and time (1)units added to column headings, °C and s/mins (1)temperature values added in order (1) <table><tr><th>Temperature in °C</th><th>Time in s/mins</th></tr><tr><td>35</td><td></td></tr><tr><td>40</td><td></td></tr><tr><td>55</td><td></td></tr></table>	Temperature in °C	Time in s/mins	35		40		55			3
Temperature in °C	Time in s/mins										
35											
40											
55											
(ii)	iodine solution (1)	Do not accept iodine on its own	1								
(iii)	B temperature (1)		1								
(iv)	<ul style="list-style-type: none">compare results to results from other students (1)if they are similar they are reproducible (1)		2								
(v)	<ul style="list-style-type: none">reference to solutions not being warmed separately to correct temperature (1)reaction will be slower at room temperature / idea that the reaction will start at an incorrect temperature (1) <p>OR</p> <ul style="list-style-type: none">judging when the reaction finishes(1)reference to time being either too short or long / idea that the change in colour is gradual (1) <p>OR</p> <ul style="list-style-type: none">Incorrect volumes of solutions measured(1)greater volume of amylase/starch solution will increase rate of reaction as more particles available to react (1)	One step plus linked explanation for two marks	2								
		Allow reverse argument for lower volumes									

(Total for Question 4 = 11 marks)

Question number	Answer	Notes	Marks
5 (a) (i)	X = scapula (1) Y = radius (1) Z = ulna (1)	Allow shoulder blade	3
(ii)	<ul style="list-style-type: none"> tendon attaches muscle to bone (1) ligaments hold bones together (1) 		2
(iii)	<ul style="list-style-type: none"> triceps contract (1) biceps relax (1) 		2
(b)	<ul style="list-style-type: none"> (ball and socket joint) allows 360° movement /movement in all planes (1) (intervertebral joint) all forward and twisting only (1) 		2

(Total for Question 5 = 9 marks)

Question number	Answer	Notes	Marks
6 (a)	reference to pathogens/MRSA/bacteria not affected/killed / destroyed by antibiotics (1)		1
(b)	Any two from: <ul style="list-style-type: none"> less white blood cells/white blood cells less effective (1) reference to less antibodies produced/phagocytosis (1) more bacteria/MRSA survive to reproduce (1) 		2
(c)	<ul style="list-style-type: none"> reference to blood flow in the wrong direction / backflow of blood (1) less oxygenated blood (to cells) (1) 		2
(d)	$7700 - 1481 = 6219$ (1) $6219 \div 7700 (x100)$ (1) 81%;	Allow full marks for correct final answer Ecf – allow max 2 marks for marking points 2 and 3 only.	3
(e)	Any three from: <ul style="list-style-type: none"> heat inoculating loop in a Bunsen burner flame (1) pass neck of flask through Bunsen burner flame (1) reference to minimising exposure of agar gel to air/lift lid of petri dish at an angle (1) seal dish (before incubation) (1) 		3

(Total for Question 6 = 11 marks)

Question number	Answer	Notes	Marks
7 (a) (i)	$136 \div 259 \times 100$ (1) 52.5 (1) 53 (1)	Allow full marks for correct final answer	3
(ii)	Any three from: <ul style="list-style-type: none"> less eggs are retrieved as age increases (1) as less eggs available/mature (1) less embryos transferred to female patients (1) women less likely to be able to carry children as they get older (1) decrease in hormones / named reproductive hormone / reference to menopause (1) 		3
(b) (i)	<ul style="list-style-type: none"> condom (1) can split and release sperm in the vagina (1) 		2
(ii)	Any two from: <ul style="list-style-type: none"> eggs cannot pass blockage (1) no contact with sperm (1) no fertilisation (1) 		2
(iii)	Advantages sterilisation - <ul style="list-style-type: none"> permanent/provides lifelong protection against pregnancy (1) idea that there is no need to remember to take pills (1) birth control pills - <ul style="list-style-type: none"> can help to regulate menstrual cycle/reduce premenstrual symptoms (1) decrease risk of (ovarian) cancer/easy to use/effective against pregnancy if used correctly (1) Disadvantages sterilisation - <ul style="list-style-type: none"> risk of infection from surgery (1) cannot be reversed (1) birth control pills - <ul style="list-style-type: none"> need to remember to take everyday (1) can cause side effects/named side effect (1) 	At least one advantage and one disadvantage of each method for full marks.	4

(Total for Question 7 = 14 marks)

Question number	Answer	Notes	Marks
8 (a)	line drawn to pituitary gland (1)		1
(b)	Any six from: <ul style="list-style-type: none"> • reduced amount of FSH (1) • follicles not formed/less eggs matured (1) • reduction in oestrogen production (1) • wall of uterus not repaired (following menstruation) (1) • less chance of embryo implanting (1) • less progesterone production (1) • uterus lining not maintained (1) • reduced amount of LH released (1) • frequency of ovulation reduced (1) • less chance of fertilisation (1) 		6
(c)	<ul style="list-style-type: none"> • prolactinoma/ tumour puts pressure (1) • on optic nerves (1) • fewer impulses sent to the brain (1) 		3
(d)	<ul style="list-style-type: none"> • sweat glands (1) • muscles (1) 		2

(Total for Question 8 = 12 marks)

Question number	Answer	Notes	Marks
9 (a)	<p>Any three from:</p> <ul style="list-style-type: none"> foreign substances acts as antigens (1) phagocytes engulf (foreign substances) (1) (phagocytes) digest (foreign substances) using enzymes (1) lymphocytes release antibodies (1) foreign substances are agglutinated / stimulates phagocytosis (1) 		3
(b)	<p>Any four from:</p> <ul style="list-style-type: none"> villi destroyed (1) reduced surface area (1) less absorption of nutrients (1) reduction in amount of digestive enzymes / less efficient/slower digestion (1) nutrients not completely broken down (1) too large to pass through wall of small intestine (1) 		4
(c)	<p>Any three from:</p> <ul style="list-style-type: none"> less iron absorbed (1) into blood (1) iron needed for haemoglobin production (1) less haemoglobin so less oxygen carried (1) 		3

(Total for Question 9 = 10 marks)