

Mark Scheme (Results)

November 2023

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)	<table><tr><th>Description</th><th>Part</th></tr><tr><td>contains light sensitive cells</td><td>retina;</td></tr><tr><td>vibrates when receives sound waves</td><td>ear drum;</td></tr><tr><td>helps the body balance</td><td>semi-circular canals;</td></tr><tr><td>controls the amount of light entering the eye</td><td>pupil;</td></tr><tr><td>transfers vibrations across the middle ear</td><td>ossicles;</td></tr><tr><td>turns vibrations into nerve impulses</td><td>cochlea;</td></tr><tr><td>refracts light entering the eye</td><td>cornea;</td></tr></table>		7
(b)	• stereoscopic/3D vision; • each eye gives a slightly different image/view; • allows better distance/speed judgement/wider field of view;	Allow better judgement of depth for 3D vision	3

Total 7 marks

Question number	Answer	Notes	Marks
2 (a)	• irregular shaped cell; • nucleus labelled; • cytoplasm labelled; • cell/plasma membrane labelled;		4
(b) (i)	• similar cells/cells with similar characteristics/shape; • grouped/work together; • to carry out a particular function;		3
(ii)	squamous epithelium;		1
(iii)	any two from • nervous; • ciliated epithelium • blood; • bone; • (smooth/cardiac/skeletal) muscle; • connective; • skin	reject 'a' bone' reject 'a' muscle'	2

Total 10 marks

Question number	Answer	Notes	Marks
3 (a)	pathogens;		1
(b) (i)	1.2 years;		1
(ii)	• active; • artificial;		2
(iii)	Any two from • weakened/dead/attenuated organisms; • toxins; • antigens; • RNA;	Allow named bacterium/virus Ignore genetic material	2
(c)	Any two from • passed from mother; • during breastfeeding/from breast milk; • across placenta;	Ignore umbilical cord	2
(d)	Any five from • antibody level falls; • below safe level/to unsafe level; • greater risk of disease; • booster dose increases antibody levels/remains above unsafe level; • person immune/can't catch disease; • increased number of memory cells;	Allow faster response	5
(e)	Any two from • antibody level higher; • for longer period/decreases more slowly/remain for many years; • levels of antibody increase faster after booster;		2

Total 15 marks

Question number	Answer	Notes	Marks
4 (a)	• reduce fat/cholesterol intake; • increase exercise;		2
(b) (i)	Any four from • liver breaks down toxins/drugs; • (if not working properly) statins won't be broken down/will accumulate/reduced detoxification; • kidneys excrete waste (products)/named waste products; • (if not working) can't be removed/less waste/named waste filtered/removed; • increased risk of (further) liver/kidney damage;	Ignore references to deamination	4
(ii)	• statins could cross from mother to fetus; • through the placenta; • damage/affect growth/development of fetus/lead to low birth weight of fetus; • could be in mother's milk if breastfeeding;	Allow baby for mp's 1 and 3 Ignore affects fetus	3
(c) (i)	• (16.3 : 8) = 2.0;	Accept 2.0375 Accept 2/2.04	1
(ii)	Any four from • Double the number/more symptoms shown with patients taking statins than those taking no tablets • even on statins symptoms not high; • almost same with placebo/symptoms with placebo similar/just below those on statins; • symptoms still present when taking no statins; • statins not the cause/other causes of symptoms/named cause e.g. age/gender/fitness/lifestyle;		4 exp

Total 14 marks

Question number	Answer	Notes	Marks
5 (a)			2
(i)	• alternative form of gene; • only expressed in homozygote/when 2 recessive alleles are present/ when no dominant allele is present/not expressed in heterozygote/;		2
(b)	any two from • person 2; • person 4; • person 9;		
(ii)	Aa;		1
(c) (i)	parents Aa × Aa; gametes A a A a; F1 AA 2Aa aa; phenotype normal normal carrier sickle-cell;	2 marks max for unlabelled Punnett square (mp's 2 and 3)	4
(ii)	• chance of a boy = 0.5/50%; • chance of sickle cell anaemia = 0.25/25%; • chance of boy with condition = 0.5 × 0.25 OR $\frac{50 \times 25}{100}$; • = 0.125/12.5%;		4

Total 13 marks

Question number	Answer	Notes	Marks
6 (a) (i)	A = mitochondria; B = nucleus; C = acrosome;		3
(ii)	Any three from • releases enzymes; • digestion of outer part of ovum/jelly coat; • to allow nucleus of sperm to enter; • reference to fertilisation;	Ignore contains / produces enzymes Ignore cell membrane Ignore head	3
(iii)	• length on diagram is 122 (mm); • = 122 000(µm); • 122 000 ; • 50 • = 2440;	Allow a value between 120 and 122	4
(b)	• release energy/produce ATP; • by (aerobic) respiration; • allows swimming/movement of sperm (to ovum);		3

Total 13 marks

Question number	Answer	Notes	Marks
7 (a) (i)	• volume/concentration of enzyme/lipase; • volume/concentration of indicator; • volume/same type of olive oil; • volume/mass of bile saltes	Ignore amount for all mps	3
(ii)	40°C;		1
(iii)	no values given between 30°C and 40°C; no values given between 40°C and 50°C; optimum could be between temperature intervals given/below/above 40ºC/50ºC;		3
(b) (i)	• tube 3 = 11.5 hours and tube 8 = 24 hours; • 24 - 11.5 = 12.5 hours;	Ecf incorrect values in a subtraction calculation with a correct answer 1 mark	2
(ii)	• lipase digests/breaks down olive oil; • produces fatty acids; • these acids lower the pH;		3
(c)	• no bile salts so no emulsification of oil/oil not broken down to droplets; • less surface area (for lipase to work on); • lipase only working very slowly/not very active/takes longer to digest oil;		3

Total 15 marks

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