PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 8: EXCHANGE AND TRANSPORT IN ANIMALS (PACK 1)

SCORE	PERCENTAGE
/60	%

STEMUP

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Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
	An explanation linking: • to release energy (1) • for metabolic processes / chemical reactions (1)	 accept named metabolic process e.g. movement	**(2)** AO1 1

Q2.

Question number	Answer	Additional guidance	Mark
	An explanation that links **two** of the following: • there is increased blood flow to the muscles (1) • to allow for { respiration/ release of energy} (in the muscles) (1)	accept heart for muscle accept there is a {reduced /restricted} blood flow through the digestive system accept to supply oxygen/glucose to the muscles/remove carbon dioxide	**(2)** AO 2 1

Q3.

Question number	Answer	Mark
*	**AO2 (6 marks)** **Fick's law** • rate of diffusion is proportional to surface area and concentration difference • and inversely proportional to the thickness of the membrane **Surface area** • as surface area increases the rate of diffusion also increases • as there are more places for diffusion to happen faster **Concentration difference** • the larger the difference in concentration inside the cell to outside the cell • the faster the rate of diffusion **Thickness of the membrane** • the thicker the membrane • the slower the rate of diffusion as the diffusion distance is greater	**(6)** AO2 1

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear
Level 2	3–4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question • Line of reasoning mostly supported through the application of relevant evidence
Level 3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question • Line of reasoning are supported by sustained application of relevant evidence

Q4.

Question number	Answer	Additional guidance	Mark
	An answer linking two of the following: • veins contain valves (1) • which prevent the backflow of blood (1) OR • veins have a large lumen (1) • to maximise blood flow (1)	accept keep blood flowing in one direction accept to carry a lot of blood	**(2)** **AO1 1**

Q5.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking: • the structure shows many chambers/circles/alveoli (1) • which increase the surface area (of the alveoli) (1) • to maximise diffusion (from the alveoli into the capillaries) (1)	 accept air sacs accept surface area to volume ratio accept more efficient gas exchange accept have thin walls / membranes (1) so short diffusion distance (1)	**(3)** AO2 1

Question number	Answer	Mark
(ii)	C by diffusion **A.** *is not correct because osmosis is the passive movement of water* ***B*** *is not correct because oxygen does not need active transport to travel from high to low concentrations* ***C*** **The only correct answer is C** ***D*** *is not correct because respiration uses respiration but it is not the method of movement*	**(1)** AO2 1

Q6.

Question Number	Answer	Additional guidance	Mark
	An explanation linking **three** from: • water will move into the erythrocyte (1) • by osmosis (1) • down a concentration gradient (1) • causing the erythrocyte to {burst/lyse} (1)	 accept red blood cell for erythrocyte accept from high water concentration to low water concentration	**(3)** **AO2 1**

Q7.

Question number	Answer	Additional guidance	Mark
	An answer linking the following: • person A had a lower stroke volume (1) • pumps less blood out per beat (1) • so needed to have a higher heart rate to get a similar cardiac output (1) • in order to exercise at the same intensity (1) • to supply oxygen/glucose to the muscles (1)	 accept the heart is not used to exercise	**(3)** **AO3.2ab**

Q8.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking: • germinating peas **produce** carbon dioxide (1) • because germinating peas were respiring (aerobically) (1)	accept dried peas **did not produce** carbon dioxide accept because dried peas **do not** respire	**(2)** AO3 1ab

Question number	Answer	Mark
(ii)	**B when glucose is broken down in the presence of oxygen** **A.** *is not correct because photosynthesis uses carbon dioxide* ***B*** **The only correct answer is B** ***C*** *is not correct because in germinating peas glucose is broken down in the presence of oxygen* ***D*** *is not correct because the reaction is between glucose and oxygen*	**(1)** AO1 1

Q9.

Question Number	Answer	Acceptable answers	Mark
(i)	3 / x3 / three (times thicker) Accept any number between 2.5 and 3 (times thicker).		**(1)**

Question Number	Answer	Acceptable answers	Mark
(ii)	An explanation including two of the following: wall of {left ventricle / chamber B} is {more muscular / stronger / applies more force / more powerful} (1) blood from left ventricle / chamber B is under higher pressure (than blood from right ventricle) (1) (as) blood needs to be {pushed / pumped / forced} through {more capillaries / whole body} (1)	Accept reverse argument for right ventricle / chamber A. ignore left hand side pumps more blood than right hand side / pumps blood faster.	**(2)**

Q10.

Question Number	Answer	Additional Guidance	Mark
	An explanation linking: • because of lactic acid (1) • from **anaerobic** respiration (1)		**(2)** **AO2**

Q11.

Question Number	Answer	Additional guidance	Mark
(i)	87 – 15 = 72 (1) 72% of 4.7 (1) 3.4/3.38 (litres) OR 87% = 4.1 (1) 15% = 0.7 (1) 4.1 – 0.7 = 3.4 (litres)	award full marks for correct numerical answer without working accept other methods of calculating the volume increase	(3)

Question Number	Answer	Mark
(ii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (3 marks): • more glucose and oxygen needs to be delivered to the working muscles (1) • more waste products / carbon dioxide removed (1) • to increase aerobic respiration (1) • releasing more energy to the working muscles (1)	(4)

Q12.

Question number	Answer	Mark
	B left ventricle **1. The only correct answer is B** ***A*** *is not correct because the left atrium receives blood from the pulmonary vein* ***C*** *is not correct because The right atrium receives blood from the vena cava* ***D*** *is not correct because the right ventricle has deoxygenated blood*	**(1)** AO 1 1

Q13.

Question number	Answer	Mark
(i)	C platelets The only correct answer is C platelets A is incorrect because erythrocytes are red blood cells which carry oxygen B is incorrect because lymphocytes are white blood cells which are part of the immune system D is incorrect because antibodies are part of the immune response	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	to stop blood loss / prevent bacteria entering /stops bleeding (1)	Accept microorganisms/pathogen/virus for bacteria	**(1)** **AO2 1**

Q14.

Question Number	Answer	Mark
(i)	D sludgeworm **The only correct answer is D** ***A*** *is not correct because fertiliser is not an indicator species* ***B*** *is not correct because lichen is an air pollution indicator* ***C*** *is not correct because stonefly are clean water indicators*	**(1)** **AO1 1**

Question Number	Answer	Additional Guidance	Mark
(ii)	haemoglobin binds oxygen / increases the rate of diffusion / polluted water is low in oxygen	accept allows them to get more oxygen	**(1)** **AO2 1**

Question Number	Answer	Additional Guidance	Mark
(iii)	Any **two** from: • concentration **gradient** (1) • diffusion distance (1) • surface area (1)	 accept thickness of membrane accept temperature (1)	**(2)** **AO1 1**

Q15.

	Answer	**Acceptable answers**	**Mark**
	Any three from the following: • (concentration of lactic acid) decreases (1) • lactic acid broken down(1) • using oxygen / oxidised(1)	 Accept amount Accept if written in a word or formula equation for MP3 and MP4	**(3)**

	• into carbon dioxide and water (1) • ref to oxygen debt / EPOC (1)		

Q16.

Question number	Answer	Additional guidance	Mark
(i)	An answer that combines **three** of the following points to provide a method: • measure the length of the tissue (1) • add masses / mass (1) • remove the mass and measure length of the tissue (1) • repeat until the tissue no longer returns to its original length (1)	 accept remove the mass and see if the tissue returns to its original size	**(3)** AO 3 3a

Question number	Answer	Additional guidance	Mark
(ii)	Any one from: • wash hands (1) • wear gloves (1) • sterilise the apparatus after use / disinfect working area (1)	ignore standard lab rules accept cover open wounds	**(1)** AO 2 2

Q17.

Question Number	Answer	Acceptable answers	Mark
(i)	**D** a tissue		**(1)**

Question Number	Answer	Acceptable answers	Mark
(ii)	A suggestion including two from: more haemoglobin can be carried (1) {increase in surface area (to volume ratio) / biconcave shape} (1) can carry more / absorb more oxygen (1) idea that RBCs are only carriers / does not need to carry out processes like protein synthesis (1)	more only needs to be stated once eg more haemoglobin to carry oxygen = 2 marks	**(2)**

Q18.

Question Number	Answer	Acceptable answers	Mark
(i)	(oxygen + glucose →) water + carbon dioxide	both water and carbon dioxide are required in either order. Accept H_2O + CO_2 Ignore: energy reject wrong symbols eg H2O or H^2O	**(1)**

Question Number	Answer	Acceptable answers	Mark
(ii)	an explanation linking two of the following: muscles **contract** more / faster (1) more (aerobic) respiration (1) (so) more energy (is needed from aerobic respiration) (1)	'More' only has to be stated once for MP 2 and 3 more respiration for energy is carried out = 2 marks. Reject produce / make energy	**(2)**

Question Number	Answer	Acceptable answers	Mark
(iii)	**B** statement 2 only		**(1)**

Q19.

Question Number	Answer	Acceptable answers	Mark
(i)	24 ÷ 0.12 (1) = 200 (beats per minute)	two marks for correct bald answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
(ii)	more blood per minute / faster blood flow (1) more oxygen / glucose (transported to muscle cells) (1)	'more' only has to be stated once blood flows faster carrying oxygen /glucose = 2 marks.	**(2)**

Q20.

Question Number	Answer	Acceptable answers	Mark
	A comparison including two of the following: both increase (1) oxygen uptake increases more when running / less when walking (from 6 to 10 km per hr) (1) from 6 to 8 km per hour running has a higher oxygen uptake (1) at 8 km per hour both running and walking have the same oxygen uptake (1) from 8 to 10 km walking has a higher oxygen uptake (1)	 accept from 6 to 10 km per hour running increase by 13 ± 1 and walking increase by 22± 1 accept quoted figures ± 1 eg at 6 running uses 2 (cm^3/kg/min) more than walking accept any speed between 6 and 7.9 (km per hr) ignore lines cross at 8 accept quoted figures ± 1 eg at 9 running uses 6 (cm^3/kg/min) less than walking accept any speed between 8.1 and 10	**(3)**

Q21.

Question number	Answer	Additional guidance	Mark
	Any two from: • weight (1) • height (1) • fitness (1) • other medical conditions (1) • drug intake / medication (1)	 accept other valid factors when selecting the people	**(2)**

Q22.

Question number	Answer	Additional guidance	Mark
(i)	Any **two** from: • same concentration of indicator (1) • same mass of organisms (1) • same volume of indicator (1) • same temperature (1) • same volume/size of test tube(1) • repeat the experiment (1) • use a control (1)	accept weight for mass accept mass/weight ignore references to time as this is in the stem of the question	**(2)** AO3 3b

Question number	Answer	Additional guidance	Mark
(ii)	A description including: • same test tube, gauze and bung with (hydrogencarbonate) indicator (1) • without any (live) organisms / with a mass of inert object e.g.stones/dead peas/glass beads(1)	accept set up the same {apparatus/equipment}	**(2)** AO2 2

Q23.

Question Number	Answer	Additional guidance	Mark
(i)	An explanation linking: • artery has {thicker / more muscular} wall (1) • because of the (blood) pressure (higher in artery than in vein) (1)	accept prevent the artery bursting / maintain blood pressure	**(2)** **AO2 1**

Question Number	Answer	Mark
(ii)	valve / valves	**(1)** **AO1 1**

Q24.

Question Number	Answer	Additional Guidance	Mark
(i)	multiply the number of beats (in 10 seconds) by 6	accept times by six	**(1)** **AO2**

Question Number	Answer	Additional Guidance	Mark
(ii)	Any **two** from: • use a heart rate monitor / electronic device (to measure HR) (1) • take readings more frequently than 5 minutes (1) • record the pulse for longer than 10 seconds (1) • take repeat readings / calculate a mean (1)	ignore use a stopwatch accept repeat it	**(2)** **AO3b**

Question Number	Answer	Additional Guidance	Mark
(iii)	An answer linking **three** from: • heart rate {remains relatively constant / fluctuates slightly} when walking (1) • heart rate increases when running (1) • heart rate levels off {at 15 minutes / at 180 b.p.m.} when running (1)	accept heart rate stays at 90 b.p.m.to 96 b.p.m. when walking accept heart rate is higher when running / data illustrating the difference	**(3)** **AO3**