1.2 Organisation: Test Pack

AQA 8461 · Calculator allowed · about 55 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Complete the sentence. Cells with the same structure and function are grouped together to form a _____.

(Total for Question 1 is 1 mark)

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2 Explain how root hair cells are adapted to absorb water and minerals from the soil. Give two clear points.

(a) Point 1 **(2)**

(b) Point 2 **(2)**

(Total for Question 2 is 4 marks)

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3 The digestive system includes specialised tissues and organs. Match each structure with its main function.

(a) State which number matches function A. **(1)**

- ☐ 1
- ☐ 2
- ☐ 3

(b) State which number matches function B. **(1)**

- ☐ 1
- ☐ 2
- ☐ 3

(c) State which number matches function C. **(1)**

- ☐ 1
- ☐ 2
- ☐ 3

(Total for Question 3 is 3 marks)

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4 During respiration cells use glucose and oxygen to release energy. Write a balanced symbol equation for aerobic respiration using glucose and oxygen to make carbon dioxide and water.

(a) Write the balanced symbol equation. **(4)**

(Total for Question 4 is 4 marks)

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5 Blood is made up of plasma, red blood cells, white blood cells and platelets.

(a) State the function of platelets. **(1)**

(b) State one way in which red blood cells are adapted to carry oxygen. **(1)**

(c) State the function of white blood cells. **(1)**

(d) A person has 5 000 000 red blood cells per mm^3 of blood, and a total blood volume of 5 litres. Calculate the total number of red blood cells in their body. (1 litre = 1 000 000 mm^3) **(2)**

(Total for Question 5 is 5 marks)

6 The human digestive system contains several organs, each with a specific role.

(a) Name the organ, other than the salivary glands, that produces amylase to digest starch. **(1)**

(b) Name the organ where most water is absorbed from undigested food. **(1)**

(c) Name the organ that produces hydrochloric acid, which kills bacteria and provides the optimum pH for protease enzymes to work. **(1)**

(d) State the role of the liver in the digestive system. **(1)**

(e) Name the organ where most digested food molecules are absorbed into the blood. **(1)**

(Total for Question 6 is 5 marks)

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7 In a standard resting adult, cardiac output is about 5.0 litres per minute and heart rate is 70 beats per minute. Calculate the stroke volume in cm^3 per beat. Remember 1 litre = 1000 cm^3.

(a) Calculate the stroke volume in cm^3 per beat. Show working and give answer to 3 significant figures. **(4)**

(Total for Question 7 is 4 marks)

8 Blood is transported in arteries, veins and capillaries which have different structural features.

(a) Give one structural feature of an artery. **(1)**

(b) Explain how the feature you gave helps the artery to do its job. **(2)**

(Total for Question 8 is 3 marks)

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9 Arteries, veins and capillaries are the three types of blood vessel in the human circulatory system.

(a) State one structural feature of arteries that relates to the high pressure of the blood flowing through them. **(1)**

(b) State one structural feature of veins that helps blood, which is at low pressure, return to the heart. **(1)**

(c) Explain why capillary walls are only one cell thick. **(2)**

(d) State one other feature of capillaries that adapts them for the efficient exchange of substances. **(1)**

(Total for Question 9 is 5 marks)

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10 The human heart contains valves that ensure one-way flow. A patient has a leaky valve causing backflow and reduced cardiac output. Explain how a leaky valve could reduce the amount of oxygenated blood reaching tissues.

(a) Explain the physiological sequence by which a leaky valve reduces oxygen delivery to tissues. Assume heart rate and blood oxygen concentration remain unchanged. **(4)**

(Total for Question 10 is 4 marks)

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11 Cancer is caused by changes in cells that lead to uncontrolled growth and division.

(a) State two differences between a benign tumour and a malignant tumour. **(2)**

(b) Give two risk factors that increase a person's chance of developing cancer. **(2)**

(Total for Question 11 is 4 marks)

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Mark scheme · 1.2 Organisation: Test Pack

Question 1

tissue cao **B1**

Answer: tissue

Question 2

(a) identifies an adaptation such as large surface area due to root hairs **M1**

(a) explains how this increases the rate of absorption by providing more area for water and mineral uptake, oe **A1**

(a) Answer: They have many root hairs giving a large surface area so more water and minerals can be absorbed.

(b) identifies another adaptation such as thin cell walls or lots of mitochondria for active transport **M1**

(b) explains how this helps uptake (thin wall shortens diffusion distance or mitochondria provide energy for active uptake of minerals), oe **A1**

(b) Answer: They have thin cell walls for short diffusion distance or many mitochondria to provide energy for active transport of minerals into the cell.

Question 3

(a) 3 (pancreas) cao **B1**

(a) Answer: 3

(b) 2 (stomach) cao **B1**

(b) Answer: 2

(c) 1 (small intestine) cao **B1**

(c) Answer: 1

Question 4

(a) correct reactant formulae on the left: $C_6H_{12}O_6 + O_2$ **M1**

(a) correct product formulae on the right: $CO_2 + H_2O$ **A1**

(a) balances carbon and hydrogen using $6CO_2$ and $6H_2O$ for one $C_6H_{12}O_6$; accept equivalent multiples **A1**

(a) balances oxygen using $6O_2$ for one $C_6H_{12}O_6$, completing $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$; accept equivalent multiples; no energy statement or state symbols required **A1**

(a) Answer: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Question 5

(a) help blood clot at a wound (oe) **B1**

(a) Answer: They help blood to clot at the site of a wound.

(b) contain haemoglobin (which binds oxygen), OR biconcave disc shape (large surface area), OR no nucleus (more room for haemoglobin) (oe, any one) **B1**

(b) Answer: They contain haemoglobin, which binds to oxygen.

(c) defend the body against disease/pathogens, e.g. engulfing pathogens (phagocytes) or producing antibodies (lymphocytes) (oe) **B1**

(c) Answer: Defend the body against disease, e.g. by engulfing pathogens or producing antibodies.

(d) converts blood volume to mm^3: 5 x 1 000 000 = 5 000 000 mm^3, then multiplies by cell concentration (ft candidate's own correct method even if conversion figure differs) **M1**

(d) 2.5×10^{13} (accept 25 000 000 000 000 or 25×10^{12}, cao) **A1**

(d) Answer: 2.5×10^{13} red blood cells.

Question 6

(a) pancreas (accept small intestine: amylase is also produced there) **B1**

(a) Answer: The pancreas (the small intestine also produces amylase and is also correct).

(b) large intestine **B1**

(b) Answer: The large intestine.

(c) stomach **B1**

(c) Answer: The stomach.

(d) produces bile **B1**

(d) Answer: It produces bile.

(e) small intestine **B1**

(e) Answer: The small intestine.

Question 7

(a) converts cardiac output to cm^3: 5.0 L = 5000 cm^3 and divides by heart rate: 5000 / 70 **M1**

(a) 71.428... cm^3 **A1**

(a) gives final to 3 s.f.: 71.4 cm^3 cao **A1**

(a) units stated cm^3 per beat cao **B1**

(a) Answer: 71.4 cm^3 per beat

Question 8

(a) thick muscular wall or elastic fibres or small lumen **B1**

(a) Answer: Thick muscular wall with elastic fibres.

(b) links the chosen feature to its effect: thick muscular walls withstand high pressure or alter the lumen diameter; elastic fibres allow stretching and recoil; a small lumen helps maintain high blood pressure, oe **B1**

(b) develops the matching functional explanation: strong walls prevent bursting under pressure; changing diameter regulates blood flow to tissues; elastic recoil maintains flow between heartbeats; the pressure maintained by a small lumen helps drive blood from the heart towards tissues, oe **B1**

(b) Answer: Thick walls withstand high pressure, preventing arteries from bursting; muscle can also change the lumen diameter to regulate blood flow. Elastic fibres stretch and recoil, maintaining flow between heartbeats. Alternatively, a small lumen helps maintain arterial pressure, which drives blood towards tissues.

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Question 9

(a) thick, muscular and/or elastic walls (oe) **B1**

(a) Answer: Thick, muscular, elastic walls.

(b) valves (to prevent backflow of blood) (oe, wide lumen also accepted) **B1**

(b) Answer: Valves to prevent the backflow of blood.

(c) reduces the diffusion distance between the blood and body cells/tissues (oe) **B1**

(c) increases the rate of diffusion of substances (e.g. oxygen, glucose, carbon dioxide, waste products) between the blood and cells (oe) **B1**

(c) Answer: A thin wall reduces the diffusion distance, increasing the rate of exchange of substances between blood and cells.

(d) e.g. very narrow (lumen), permeable walls, or a large total number/surface area of capillaries (oe, any one) **B1**

(d) Answer: Very narrow lumen, or permeable walls, or a large total surface area.

Question 10

(a) the leaky valve allows blood to flow backwards instead of maintaining one-way flow **M1**

(a) backflow reduces net forward stroke volume, the volume of blood pumped forwards per beat **M1**

(a) at the same heart rate, reduced forward stroke volume reduces cardiac output, the volume pumped forwards per minute **A1**

(a) at the same blood oxygen concentration, less oxygenated blood reaching tissues per minute means less oxygen is delivered per minute, oe **A1**

(a) Answer: A leaky valve allows blood to flow backwards. This reduces net forward stroke volume, so less blood is pumped forwards per beat. With heart rate unchanged, cardiac output falls, so less blood reaches tissues per minute. With blood oxygen concentration unchanged, less oxygen is therefore delivered to tissues per minute.

Question 11

(a) a benign tumour grows in one place/is contained (often within a membrane) and does not spread to other parts of the body (oe) **B1**

(a) a malignant tumour invades neighbouring (healthy) tissue and can spread via the blood or lymph to other parts of the body, forming secondary tumours (metastasis) (oe) **B1**

(a) Answer: Benign tumours stay in one place and do not spread; malignant tumours invade other tissue and can spread around the body.

(b) e.g. smoking/tobacco use, OR exposure to UV/ionising radiation, OR obesity, OR exposure to carcinogens **B1**

(b) a second, different valid risk factor from the list above, or inherited (genetic) factors **B1**

(b) Answer: For example: smoking and prolonged exposure to UV radiation.

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