OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B5.1 HOW DO SUBSTANCES GET INTO, OUT OF AND AROUND OUR BODIES? (HIGHER)

SCORE	PERCENTAGE
/36	%

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1. Sarah is feeling unwell so she goes to her doctor. Her doctor thinks she may have Chronic Fatigue Syndrome (CFS).

CFS is difficult to diagnose. Before diagnosis doctors rule out a condition called anaemia by carrying out a blood test.

A blood test checks the number of blood cells in Sarah's blood.

(i) What is the role of the **red** blood cell?

---

[1]

(ii) Extreme tiredness is one symptom of CFS.
The table shows the results of Sarah's blood test.

	Red blood cell (per mm^3)	White blood cell (per mm^3)	Platelets (per mm^3)
Normal level	3 800 000	8 500	250 000
Sarah	2 700 000	9 000	245 000

Explain how the results in the table show the possible cause of Sarah's tiredness.

---

[3]

(iii) The table below below shows some information about red blood cells and cheek cells taken from a human.

	Red blood cell	Cheek cell
Surface area (μm^2)	136	7854
Volume (μm^3)	90	65 450
Surface area: volume ratio		0.12 : 1

Calculate the surface area to volume ratio of the red blood cell.

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Show your working.

Give your answer to **two** significant figures.

Surface area : volume ratio =

---------- [1]

(iv) Red blood cells have a greater surface area : volume ratio than cheek cells.

Explain how this allows red blood cells to carry out their function.

---[1]

(v) The doctor will check to see if Sarah has an underactive thyroid gland as this could also make her feel tired.

The thyroid gland produces a hormone.

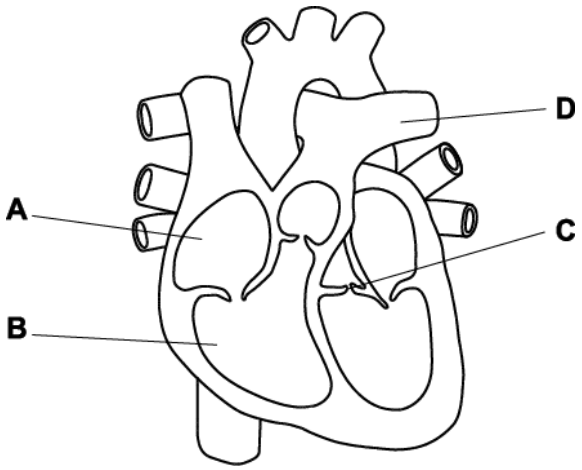
What is the role of a hormone?

---[1]

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2. Look at the diagram of the heart.



(i) Which letter on the diagram, **A**, **B**, **C** or **D**, shows how the backflow of blood is prevented?

Place a tick (✓) in the correct box.

A	☐
B	☐
C	☐
D	☐

[1]

(ii) The blood vessels in the circulatory system are adapted to their function.

The table shows features of the three different blood vessels, **X**, **Y** and **Z**.

Vessel	Smooth inner lining	Valves	Muscular tissue	Elastic tissue
X	Yes	Yes	Yes	Yes
Y	Yes	No	Yes	Yes
Z	Yes	No	No	No

Using the table, identify the **type** of blood vessel for **X**, **Y** and **Z**.

Blood vessel X _____

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Blood vessel Y _____

Blood vessel Z _____

[3]

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3(a). The function of the heart is to pump blood round the circulatory system.

The coronary arteries provide the cardiac muscle of the heart with a blood supply although the heart is full of blood.

Explain why coronary arteries are still needed.

---

[2]

(b).

(i) Jon carries out a heart dissection of a heart from a lamb.

He discovers that the wall of the left ventricle of the heart is made from thicker cardiac muscle than the walls of the right ventricle.

Explain the difference in thickness of the two ventricle walls.

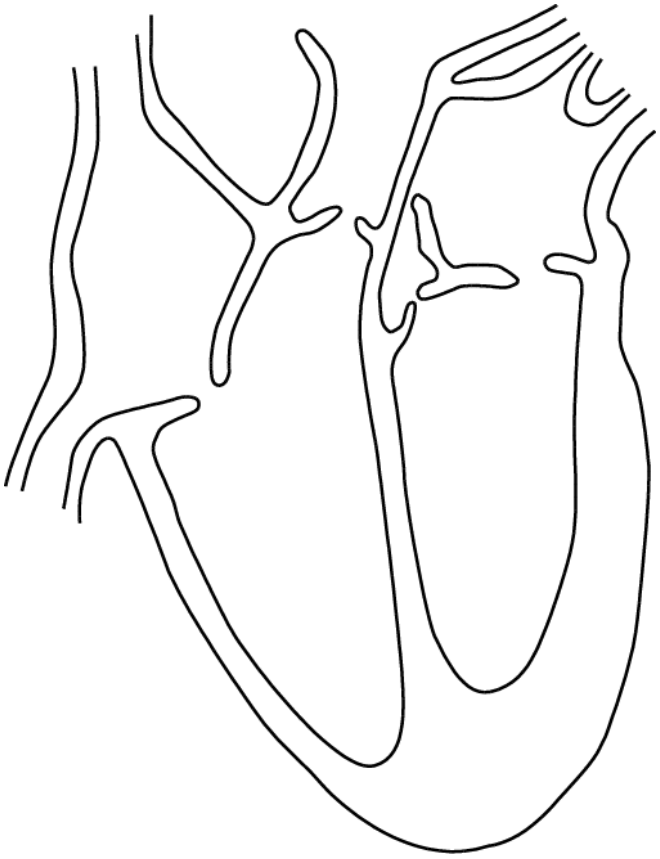
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[2]

The diagram below shows a line drawing that Jon does of his dissection.

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(ii) Label the left ventricle with a straight line.

[1]

(iii) Place arrows on the drawing to show the direction of blood flow out of the heart through the left **and** right sides of the heart.

[2]

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4(a). Human blood contains four main components.

One of these is red blood cells.

Name and explain the functions of the other **three** main components.

1

2

3

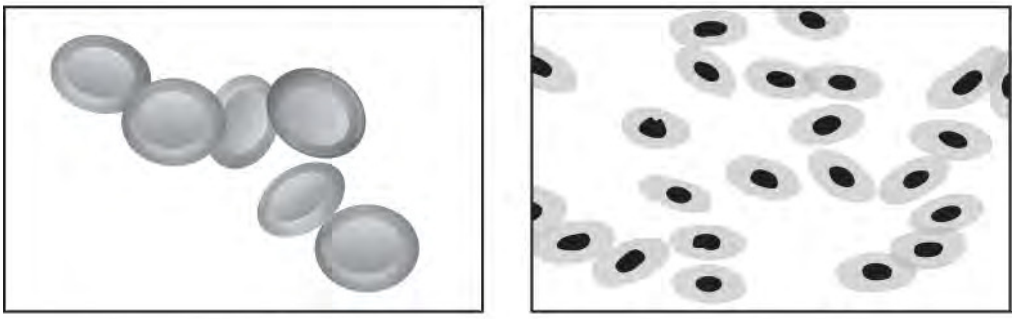
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[3]

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(b). Look at the diagrams.

show human red blood cells and frog red blood cells.



Human red blood cells

Frog red blood cells

Human red blood cells are better adapted to the job that they do than frog red blood cells.

Use the diagrams to suggest how.

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[2]

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5. Helene is a deep sea diver.

She reads these two articles in a magazine.



The deeper you dive, the greater the pressure of the water.

The longer you stay under water, the more air dissolves in your blood.

Air bubbles in the blood can block blood flow to organs causing pain and damage.

Fizzy drinks



Fizzy drinks get their fizz from a gas that is dissolved in the drink under great pressure.

When the bottle is opened the pressure is released and bubbles of gas appear in the drink.

If the bottle is opened slowly fewer bubbles appear in the drink.

Helene plans to dive with a supply of air.

Predict what might happen in Helene's body as she returns to the surface.
Explain any possible problems and how she might avoid them.

Use information from the articles in your answer.

The quality of written communication will be assessed in your answer.

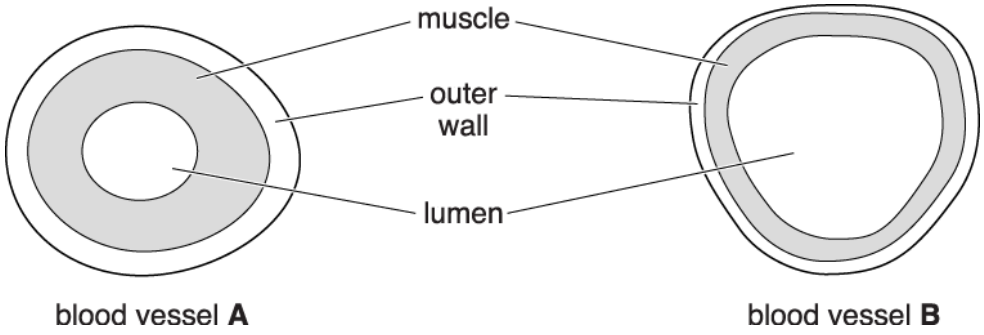
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--- [6]

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6. Blood vessels are tubes that carry blood.

The diagram shows cross-sections through blood vessels **A** and **B**.



not to scale

(i) The diameter of the lumen of blood vessel **A** is 1 cm in real-life.

Calculate the cross-sectional area of the **lumen** of blood vessel **A**.

Use the formula, area = πr^2 (where π is 3.14).

Show your working. Give your answer to two decimal places.

cross-sectional area of **A** = _____ cm^2 **[2]**

(ii) The cross-sectional area of the lumen of blood vessel **B** is approximately 1.40 cm^2

Explain the reason for the difference between the cross-sectional area of the lumens of the two blood vessels.

_____

_____

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[2]

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7. Blood consists of many different components.

The table shows the normal level of three different blood components.
It also shows the level in three different people, **A**, **B** and **C**.

	Red blood cell haemoglobin g per 100 cm^3	White blood cells per mm^3	Platelets per mm^3
normal level	15	8500	250 000
person **A**	15	3000	255 000
person **B**	9	9000	245 000
person **C**	15	8000	130 000

What is the consequence of this data for the health of each person?

Explain your answer.

person **A** _____

person **B** _____

person **C** _____

[3]

END OF QUESTION PAPER

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