Transport in animals – 2021/20 GCE Biology A Component 01

1. Nov/2021/Paper_H420/1/No.6

The table describes adaptations of three types of specialised cell.

	Erythrocytes	Neutrophils	Palisade cells
A	biconcave shape with flattened nucleus to allow them to squeeze through narrow capillaries	a large, spherical nucleus and cytoplasm that contains many lysosomes	thick cell walls to maintain turgor
B	biconcave shape with no nucleus and flexible to allow them to squeeze through narrow capillaries	a multi-lobed nucleus that makes it easier to squeeze through small gaps	thin cell walls allowing rapid diffusion of carbon dioxide
C	biconcave shape with no nucleus and flexible to allow them to squeeze through narrow capillaries	a large, spherical nucleus and cytoplasm that contains many lysosomes	thick cell walls maintain turgor
D	biconcave shape with flattened nucleus to allow them to squeeze through narrow capillaries	a multi-lobed nucleus that makes it easier to squeeze through small gaps	thin cell walls allowing rapid diffusion of carbon dioxide

Which of the rows, **A** to **D**, is a correct description of the three cells?

Your answer ☐ **[1]**

2. Nov/2021/Paper_H420/1/No.16(c)

Fig. 16.1 shows a drawing of a dissected human heart.

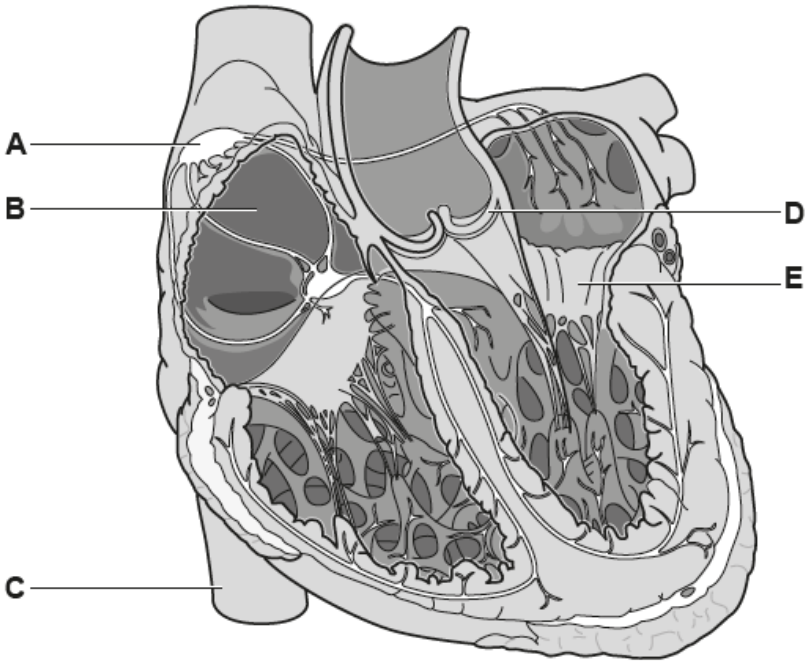


Fig. 16.1

(a) (i) Identify the structures labelled **A** to **E** on **Fig. 16.1**.

A .....

B .....

C .....

D .....

E .....

[5]

(ii) State which subdivision of the peripheral nervous system supplies structure **A** on **Fig. 16.1**.

..... **[1]**

3. Nov/2020/Paper_H420/1/No.5

Large multicellular animals need a transport system for oxygen and carbon dioxide.

Large multicellular plants do not need a transport system for oxygen and carbon dioxide.

Which of the following statements, **A** to **D**, correctly explains these observations?

A Large plants have a low surface area to volume ratio.

B Plant cells have a low metabolic rate.

C Plants generate ATP during photosynthesis, so they do not need to respire.

D Plants generate oxygen during photosynthesis.

Your answer ☐ **[1]**

4. Nov/2020/Paper_H420/03/No.2

(a) Valves control the flow of blood through the heart.

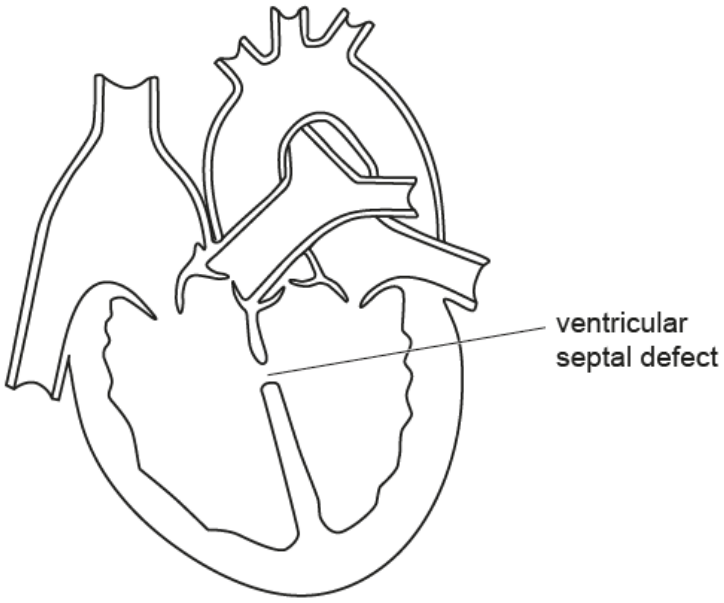
Complete the table below to show the roles of two valves in the heart.

Source of blood	Valve that controls blood flow	Destination of blood
....	right semilunar valve	....
left atrium	....	left ventricle

[2]

(b) A ventricular septal defect (VSD) is a hole in the septum of the heart.

The diagram below shows a heart with VSD.



Describe and explain why people with VSD can easily become tired.

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..... **[4]**

(c) Creatine kinase (CK) is an enzyme that catalyses reactions in heart muscle. High levels of CK in the blood indicate that a person may have had a heart attack.

Suggest why high levels of CK in the blood indicate that a person may have had a heart attack.

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..... **[1]**

(d) Mice are often used in laboratory studies to research treatments for heart conditions.

These mice are often clones.

Suggest one reason why clones are used in these studies.

.....

..... **[1]**

5. Nov/2020/Paper_H420/03/No.6(a_ c)

(a) The oxygen dissociation curves for adult haemoglobin and fetal haemoglobin are shown in Fig. 6.1.

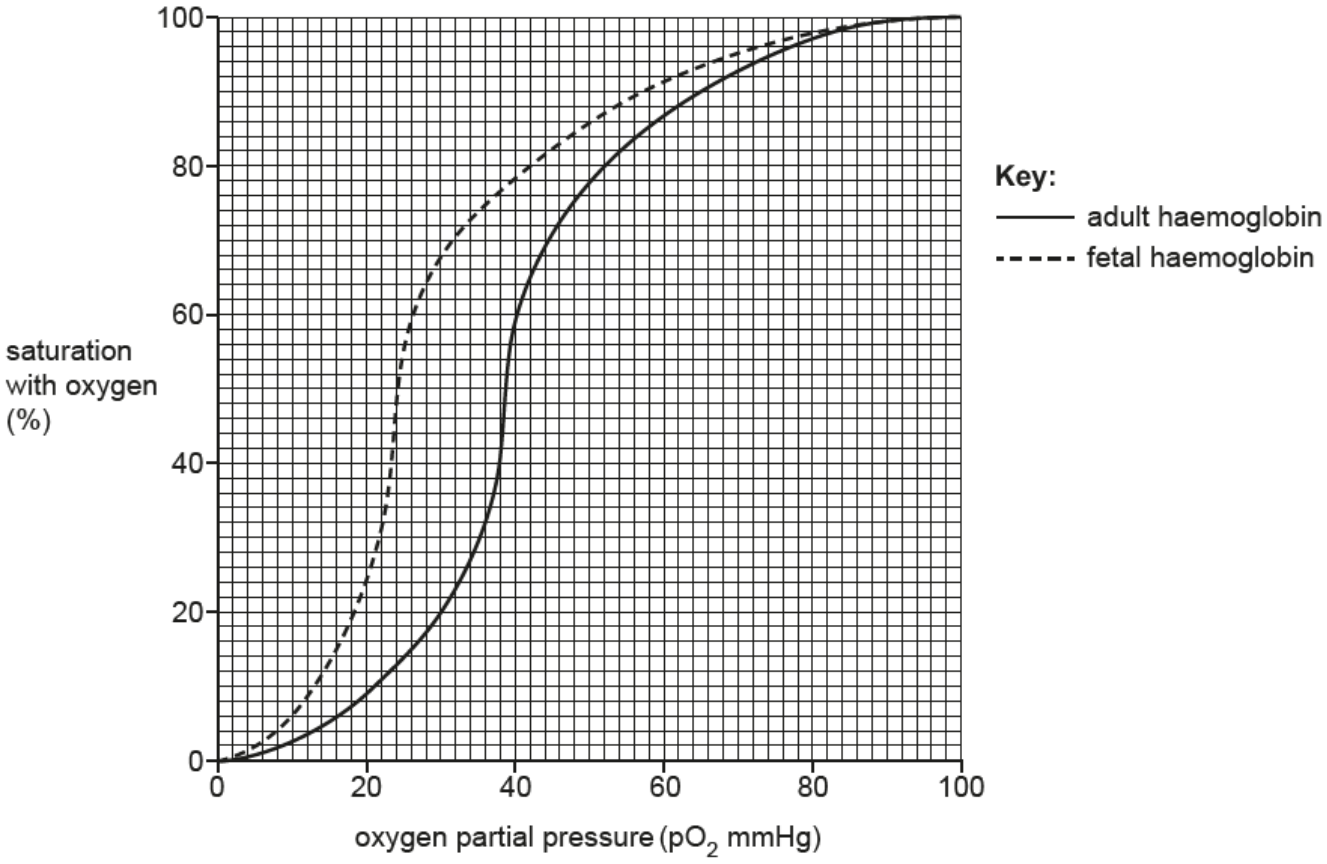

Fig. 6.1

(i) Outline why it is important that fetal haemoglobin has a higher oxygen affinity than adult haemoglobin.

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.....

.....

..... **[2]**

(ii) Myoglobin is a protein found in muscles. Oxygen binds to myoglobin.

A student described the oxygen dissociation curve for myoglobin as follows:

- When oxygen first becomes available, myoglobin saturation increases at a constant rate of 8% per mmHg of oxygen.
- When there is a slightly higher partial pressure of oxygen, the rate of oxygen binding slows gradually until the myoglobin is 100% saturated.
- The partial pressure at which myoglobin reaches 100% saturation is the partial pressure at which adult haemoglobin is 80% saturated.

Sketch an oxygen dissociation curve for myoglobin **on Fig. 6.1** based on the description provided above.

..... Answer **on Fig. 6.1** ..... **[2]**

(b) Haemocyanin is an oxygen-binding pigment that is found in many invertebrate animals, including lobsters.

Fig. 6.2 shows the oxygen dissociation curves for haemoglobin and haemocyanin.

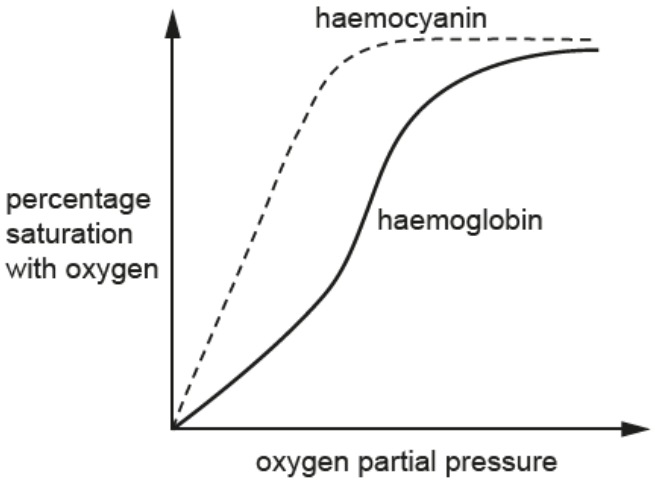

Fig. 6.2

What can you conclude about the habitat of a lobster?

.....

..... **[1]**

(c) When old red blood cells are broken down, each haem group is converted to a molecule called bilirubin. Bilirubin passes through the digestive system. Bilirubin gives faeces their characteristic colour.

Explain why bilirubin production and processing is an example of excretion.

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..... **[2]**