Transport in animals Multiple Choice

Model Answers 1

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Exchange and transport
Topic	Transport in animals
Booklet	Model Answers 1

Time allowed: **18 minutes**

Score: **/13**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

Question 1

The aquatic crustacean *Daphnia magna* has a heart that pumps a blood-like liquid called haemolymph around the body cavity.

Which of the statements, **A** to **D**, describes the circulatory system of *Daphnia magna*? **[1]**

A single closed

B single open

C double open

D double closed

The clue is that the fluid flows into a cavity. If it stays inside blood vessels it's a closed system so this is an open system. It only flows through t he heart once so it's also a single system

Question 2

Carbon dioxide release during respiration can affect the % oxygen saturation of haemoglobin.

The tertiary structure of haemoglobin is affected when carbon dioxide reacts with water to form carbonic acid. This reaction releases hydrogen ions.

Which of the statements, **A** to **D**, explains this change? **[1]**

A. The release of hydrogen ions causes the pH to rise, which reduces haemoglobin's affinity for oxygen.

B. The release of hydrogen ions causes the pH to rise, which increases haemoglobin's affinity for oxygen.

C. The release of hydrogen ions causes the pH to fall, which increases haemoglobin's affinity for oxygen.

D. The release of hydrogen ions causes the pH to fall, which reduces haemoglobin's affinity for oxygen.

As carbon dioxide levels rise it dissolves in water to form carbonic acid so the pH falls.

The affinity of Hb for oxygen drops so it unloads more readily. This is the Bohr effect.

Question 3

Which of the statements, **A** to **D**, explains why diastole follows systole in the mammalian heart?

A. Cardiac muscle is myogenic.

B. Cardiac muscle takes a short time to repolarise after being stimulated.

C. The aorta is capable of maintaining the pressure generated by the left ventricle.

D. The SAN receives impulses from the AVN. **[1]**

Cardiac muscle behaves in a similar way to action potentials in neurones. In order to contract again (systole), the potassium ions that flooded into the muscle cells (depolarisation) must be pumped back out again (repolarisation)

Question 4

The drug metoprolol prevents stimulation of post-synaptic receptors in the sympathetic nervous system.

Which of the following conditions could this drug be used to treat?

1 Muscle fatigue
2 Tachycardia
3 High blood pressure

A 1, 2 and 3

B. Only 1 and 2

C. Only 2 and 3

D Only 1 **[1]**

If post-synaptic receptors are stimulated less then muscle contraction will be reduced so tachycardia (fast heart rate) will slow down.

High blood pressure is reduced when the smooth muscle in the walls of the arteries relax and the lumen widens

Question 5

Which of the options, **A** to **D**, is a correct statement about tissue fluid?

A. Tissue fluid carries carbon dioxide to muscle cells.

B. Oncotic pressure in the capillary causes tissue fluid formation from plasma.

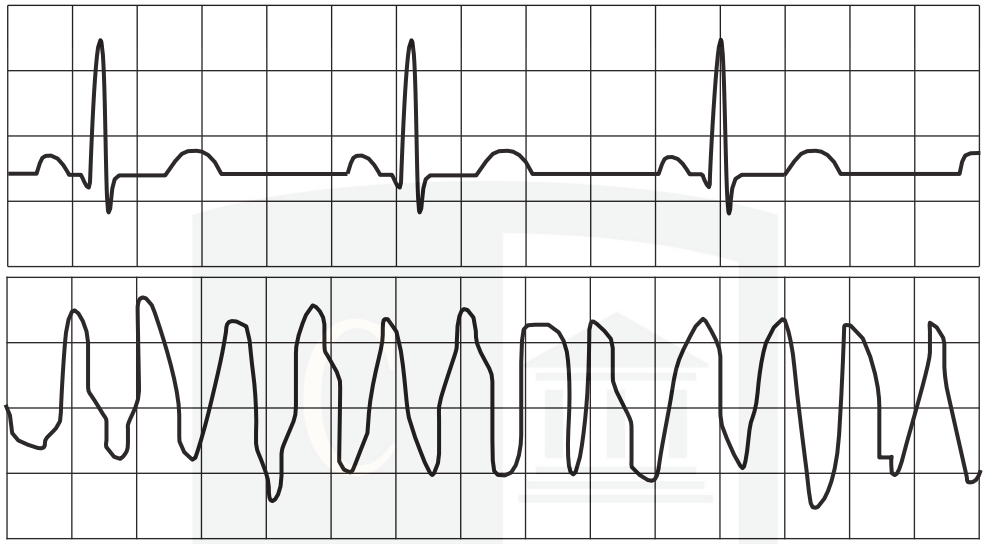
C. Hydrostatic pressure in the capillary causes tissue fluid formation from plasma.

D. Tissue fluid is reabsorbed into the capillary by active transport. **[1]**

Tissue fluid is forced out of capillaries by the hydrostatic pressure of the blood. It is reabsorbed back into the blood stream by the oncotic pressure caused by plasma proteins, remaining in the bloodstream. They create a type of osmotic potential called oncotic potential, which is unique the proteins

Question 6

In the graph below, the top electrocardiogram (ECG) trace shows normal heart activity and the ECG trace below shows abnormal heart activity.



What is the heart condition represented by the bottom ECG trace?

A. fibrillation

B. tachycardia

C. ectopic heartbeat

D. bradycardia **[1]**

Fibrillation takes place when the AV node fails to transmit impulses from the atria to the ventricles. The impulses circulate around the atria making them contract vigorously whilst the ventricles fail to contract

Question 7

A student studied the structure of a blood vessel and found:

- an outer layer of collagen fibres,
- a thick middle layer of smooth muscle and elastic tissue,
- an innermost layer of endothelial cells.

Which of the options, **A** to **D**, identifies the type of blood vessel the student studied?

A. artery

B. capillary

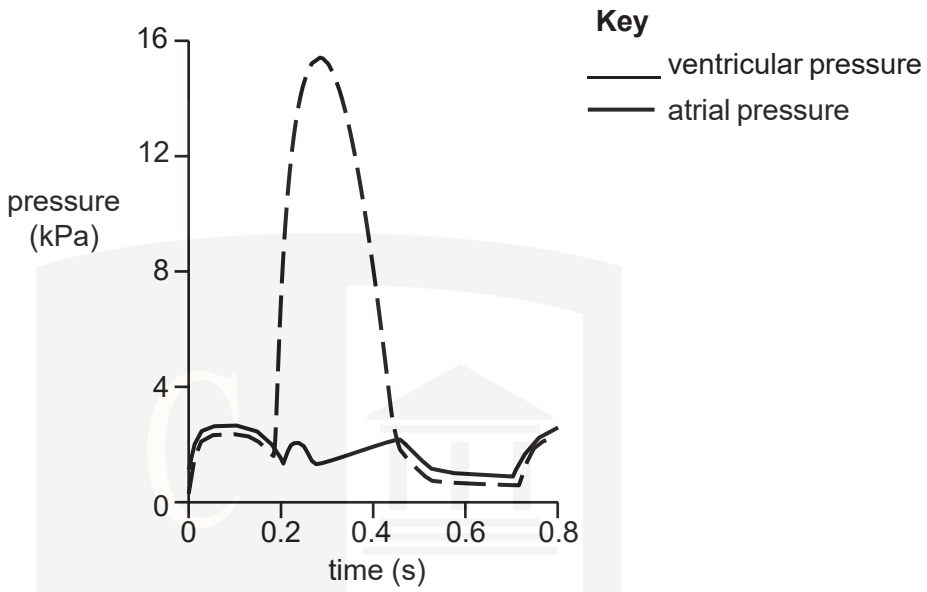
C. venule

D. vein **[1]**

To withstand the high pressure of blood, arteries have a thick wall consisting of a thick layer of collagen to prevent overstretching, elastic tissue to stretch and recoil and smooth muscle to control the diameter of the lumen

Question 8

The pressure changes in one mammalian cardiac cycle are shown in the graph below.



Which of the following time periods, **A** to **D**, shows ventricular systole?

A 0.0 to 0.1s

B 0.2 to 0.3s

C 0.4 to 0.5s

D 0.6 to 0.8s **[1]**

Ventricular systole is when the ventricles contract, it lasts for 0.1s as the graph falls they are relaxing (diastole)

Question 9

Pressure varies in different parts of the mammalian circulatory system.

	Blood in aorta	Tissue fluid	Lymph	Blood in vena cava
Pressure				

Which of the following options, **A** to **D**, correctly completes the table above?

A high high low low

B high low high low

C high low low low

D high low low high

[1]

If you think about it, the electron transport chain, chemiosmosis, photophosphorylation all take place in membranes. They do not provide any support as they are too thin.

Question 10

When you listen to a human heartbeat through a stethoscope you can hear a two stage 'lub–dub' sound.

Which of the following causes the first 'lub' component?

A. closing of the atrioventricular valves

B. sound of blood rushing into the atria

C. sound of blood rushing into the ventricles

D. closing of semilunar valves **[1]**

The lub sound is the first sound in the human heartbeat and the atrioventricular valves are the first valves to close in the journey of the blood through the heart.

Question 11

The following events occur when carbon dioxide enters an erythrocyte in a capillary.

1. Hydrogencarbonate ions diffuse into the plasma from the erythrocyte.
2. Dissociation of carbonic acid.
3. Carbon dioxide reacts with water forming carbonic acid.
4. Chloride ions diffuse into erythrocyte from plasma.

In which sequence do they occur?

	First step →			Final step
A	2	4	1	3
B	3	2	1	4
C	3	1	4	2
D	2	3	4	1

[1]

Carbon dioxide combines with water to form carbonic acid, this dissociates and the hydrogen carbonate ions produced diffuse out into the plasma, these are placed by the influx of chloride ions or the chloride shift.

Question 12

Which of the following statements correctly describes the mechanism behind water movement between plasma and tissue fluid at the venule end of a capillary?

A The hydrostatic pressure is greater than the oncotic pressure so water moves out of the capillary.

B The hydrostatic pressure is greater than the oncotic pressure so water moves into the capillary.

C The oncotic pressure is greater than the hydrostatic pressure so water moves out of the capillary.

D The oncotic pressure is greater than the hydrostatic pressure so water moves into the capillary.

[1]

At the venule end the hydrostatic pressure has dropped below the oncotic pressure which is drawing water back into the capillary

Question 13

Blood vessels are adapted for their function.

Which of the following statements is/are true?

Statement 1: The walls of arteries near the heart contain a lot of elastic fibres so that they can stretch and recoil to maintain blood pressure.

Statement 2: The walls of the venules contain little muscle.

Statement 3: The walls of arteries contain a lot of muscle fibres to contract and generate pressure in the blood.

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1 **[1]**

Statement 3 is very nearly correct. However, when the muscles in the walls of the arteries contract they narrow the lumen to increase blood pressure, they do not **generate** pressure