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BIOLOGY

ORGANISMS EXCHANGE SUBSTANCES

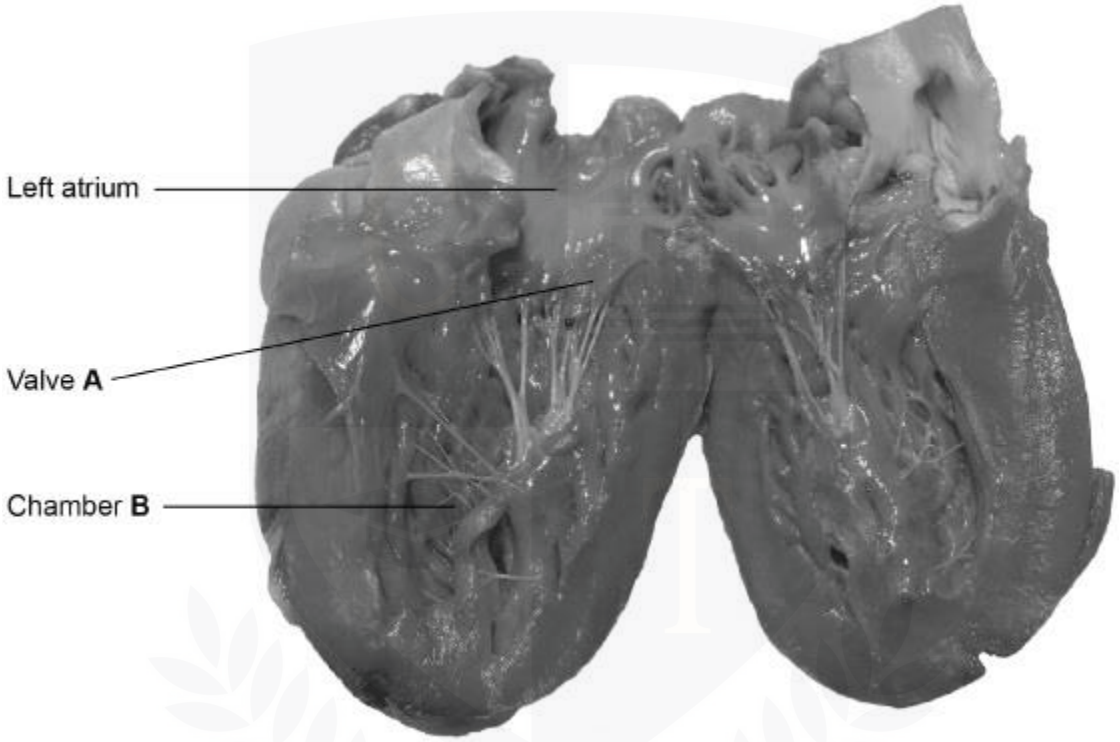
Level & Board	AQA (A-LEVEL)
TOPIC:	MASS TRANSPORT IN ANIMALS
PAPER TYPE:	QUESTION PAPER - 2
TOTAL QUESTIONS	5
TOTAL MARKS	28

Mass Transport in Animal - 2

1.

Figure 1 is a picture of a heart that has been dissected.

Figure 1



(a) Give chamber B and valve A names. **(1)**

I am Sorry !!!!!

(b) Describe two safety measures that need to be taken when a heart is being dissected. **(1)**

(c) Describe how valve A in Figure 1 keeps the blood flowing only in one direction. **(2)**

A research expert looked into how caffeine affected volunteer subjects' heart rates.

Three groups of volunteers were formed by the scientist. The fluid volume was the same for all the groups.

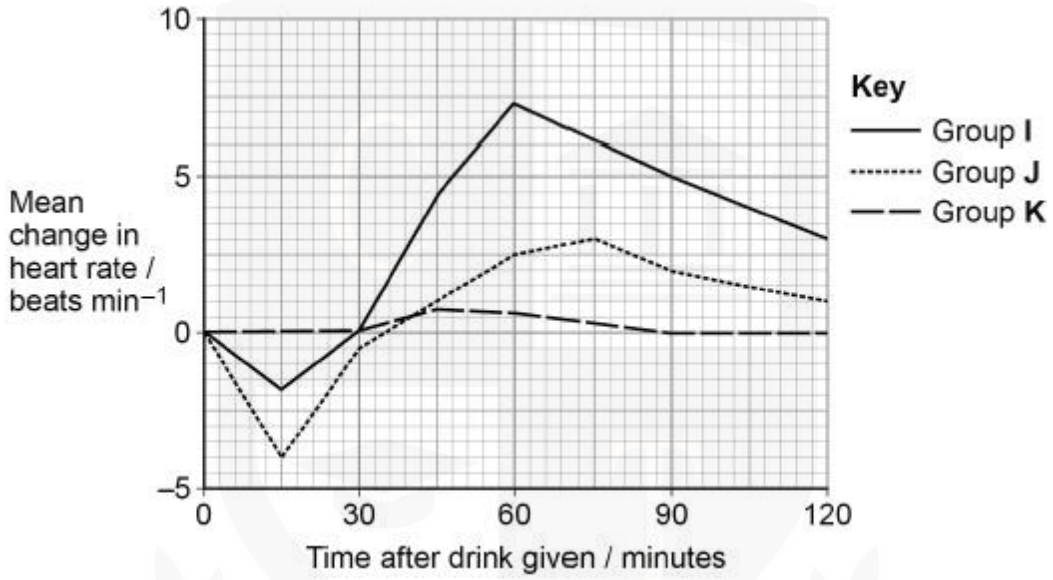
• A sugar-and caffeine-containing sports drink was supplied to each member of Group I.

• Group J participants received a caffeinated sports drink without added sugar, while Group K participants received water.

Before the drink was given to the volunteers and for 120 minutes later, the scientist took their heart rates.

Figure 2 shows the results of her work.

Figure 2



(d) There is an autonomic nervous system effect of caffeine.

Explain how coffee might have affected Group I's results in Figure 2 at the 60-minute mark. **(2)**

I am Sorry !!!!!

(e) Group J mean heart rate prior to consuming the beverage was 68 beats per minute.

After fifteen minutes of consumption, Group J hearts were pumping 4700 cm^3 of blood per minute on average.

Answer = _____ cm^3

(f) The combination of sugar and caffeine may be the cause of the rise observed in Group I.

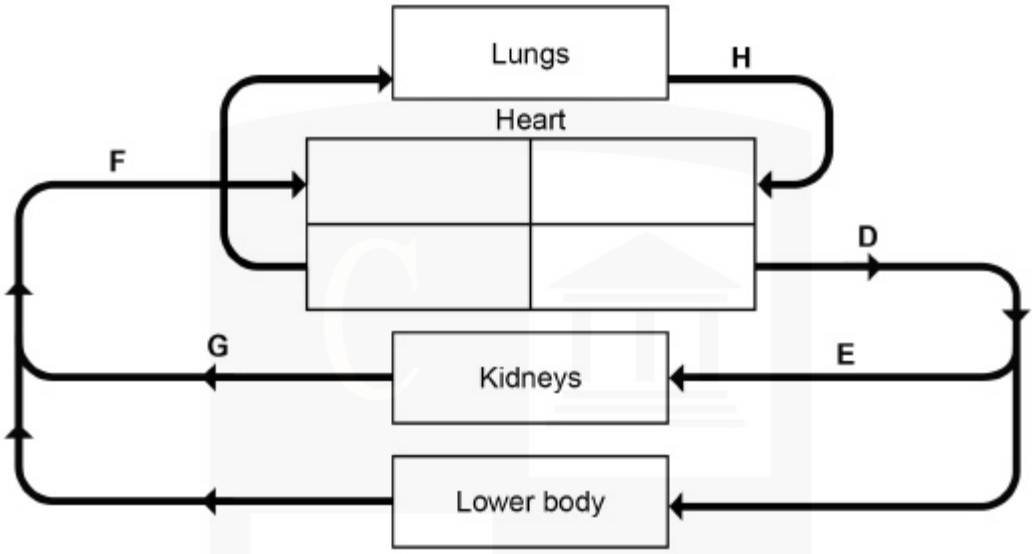
Suggest giving one drink to a second group that needs further investigation to see if this is accurate.

Give a rationale for your response. **(2)**

2.

(a) A portion of a mammal's blood circulation is depicted in **Figure 1.**

Figure 1



Determine which letter corresponds to each of these blood arteries using **Figure 1**. **(3)**

Aorta

Renal vein

Vena cava

(b) Identify the blood arteries that supply the heart muscle with blood. **(1)**

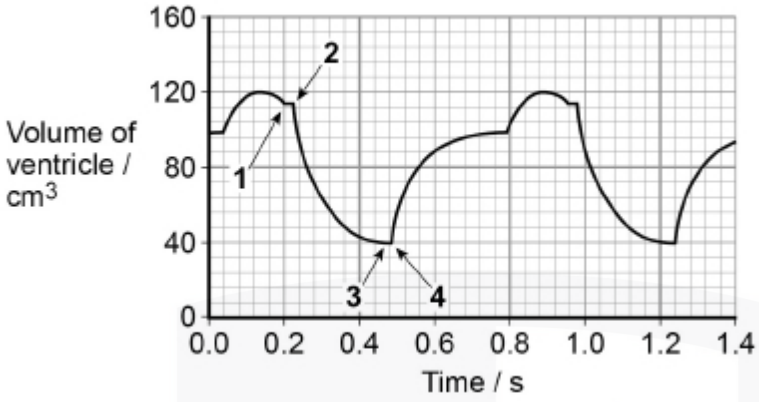
3.

(a) When one oxygen molecule binds to hemoglobin, it facilitates the binding of another oxygen molecule.

Describe your reasoning. **(2)**

4.

The graph displays the variations in left ventricular volume over the course of two cardiac cycles in a human heart. Heart valve opening and closing timings are represented by the digits 1, 2, 3, and 4.



(**a)** Fill in portion (a) of the table using the data from the graph. Put one, two, three, or four numbers in the corresponding box. **(2)**

	Valve opens	Valve closes
Semi-lunar valve		
Atrioventricular valve		

(b) Determine how much blood the left ventricle pumps out in a minute using the given diagram. **(2)**

Answer = _____ $cm^3\ min^{-1}$

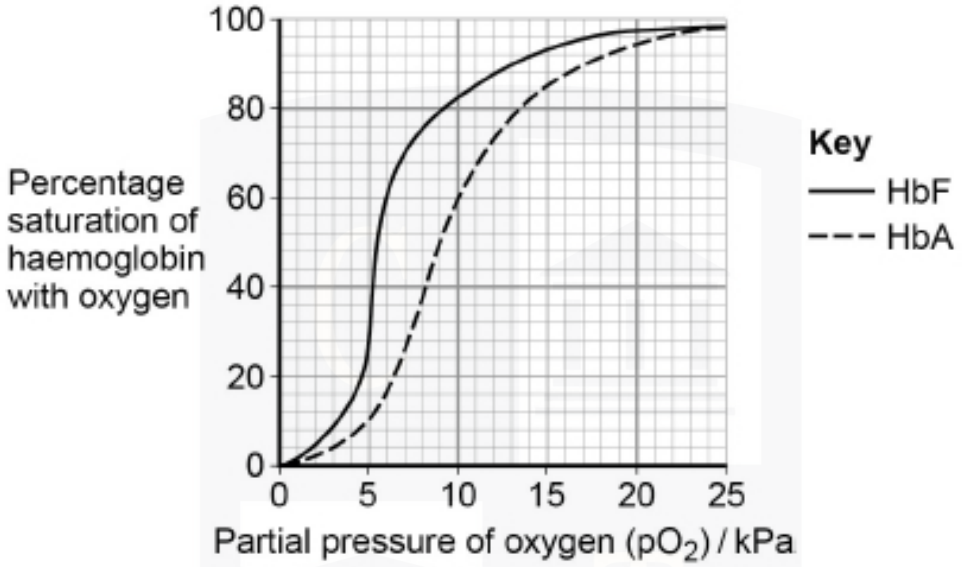
(c) Describe how the heart contributes to the creation of tissue fluid. **(2)**

(d) Leg swelling known as lymphoedema may result from a lymphatic system obstruction.

Explain how lymphoedema could be brought on by a blockage in the lymphatic system. **(1)**

5.

The oxyhemoglobin dissociation curves for adult hemoglobin (HbA) and fetal hemoglobin (HbF) are displayed on the graph.



(a) Describe how the S-shaped (sigmoid) oxyhemoglobin dissociation curve for HbA is the result of variations in the shape of hemoglobin. **(2)**

(b) 98% of hemoglobin is HbF at birth. By the time a newborn is six months old, HbF has typically entirely vanished from their blood and been replaced by HbA.

Explain why the baby will benefit from this change using the graph above.

(2)

(c) The genesis of sickle cell disease (SCD) is defective HbA production. This lowers the capacity of the body to provide oxygen to tissues. Researchers looked into the use of hydroxyurea as a treatment for SCD in infants. The blood's HbF content is altered by hydroxyurea.

122 newborns with SCD participated in research conducted by the scientists.

For forty-one months, hydroxyurea was given to each baby. The mean change in the HbF concentration in the newborns' blood was then discovered by the investigators. **(3)**

Their outcomes are displayed in the table.

The researchers came to the conclusion that administering hydroxyurea to infants with sickle cell disease would raise the oxygen content of their blood.

Explain how the preceding data and graph support this conclusion.

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