

Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Q1.

- (a) Blood is made up of four main components.

Red blood cells and white blood cells are two of these components.

Describe the functions of the **two** other components of blood.

(2)

- (b) The heart is often described as a **double pump**.

Describe why.

(1)

- (c) In coronary heart disease (CHD) layers of fatty material build up inside the coronary arteries.
This can cause a heart attack.

Statins and stents can be used to reduce the risk of a heart attack in people with CHD.

Evaluate the use of statins and stents in people with CHD.

Remember to include a justified conclusion.

(6)
(Total 9 marks)

Q2.

The circulatory system contains arteries and veins.

- (a) (i) Describe how the structure of an artery is different from the structure of a vein.

(2)

- (ii) A comparison is made between blood taken from an artery in the leg and blood taken from a vein in the leg.

Give **two** differences in the composition of the blood.

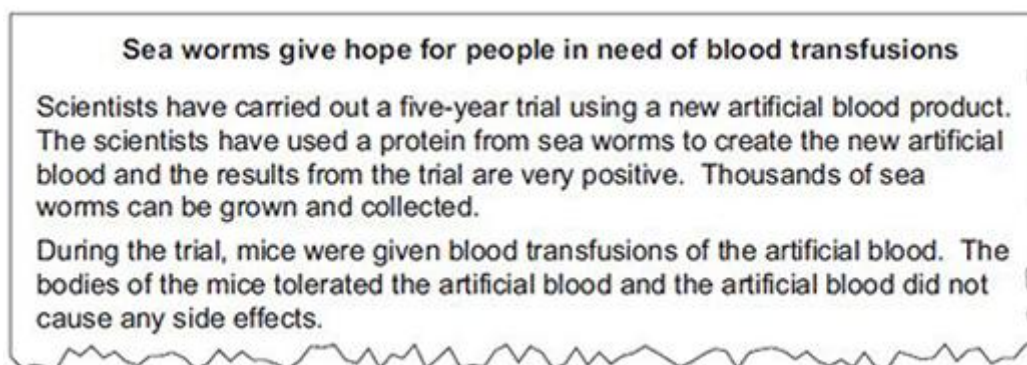
1. _____

2. _____

(2)

- (b) During operations patients can lose a lot of blood. Patients often need blood transfusions to keep them alive.

The text shows information about a new artificial blood product.



Suggest **two** possible advantages of using the new artificial blood, instead of using human blood for a transfusion in humans.

1. _____

2. _____

(2)

(Total 6 marks)

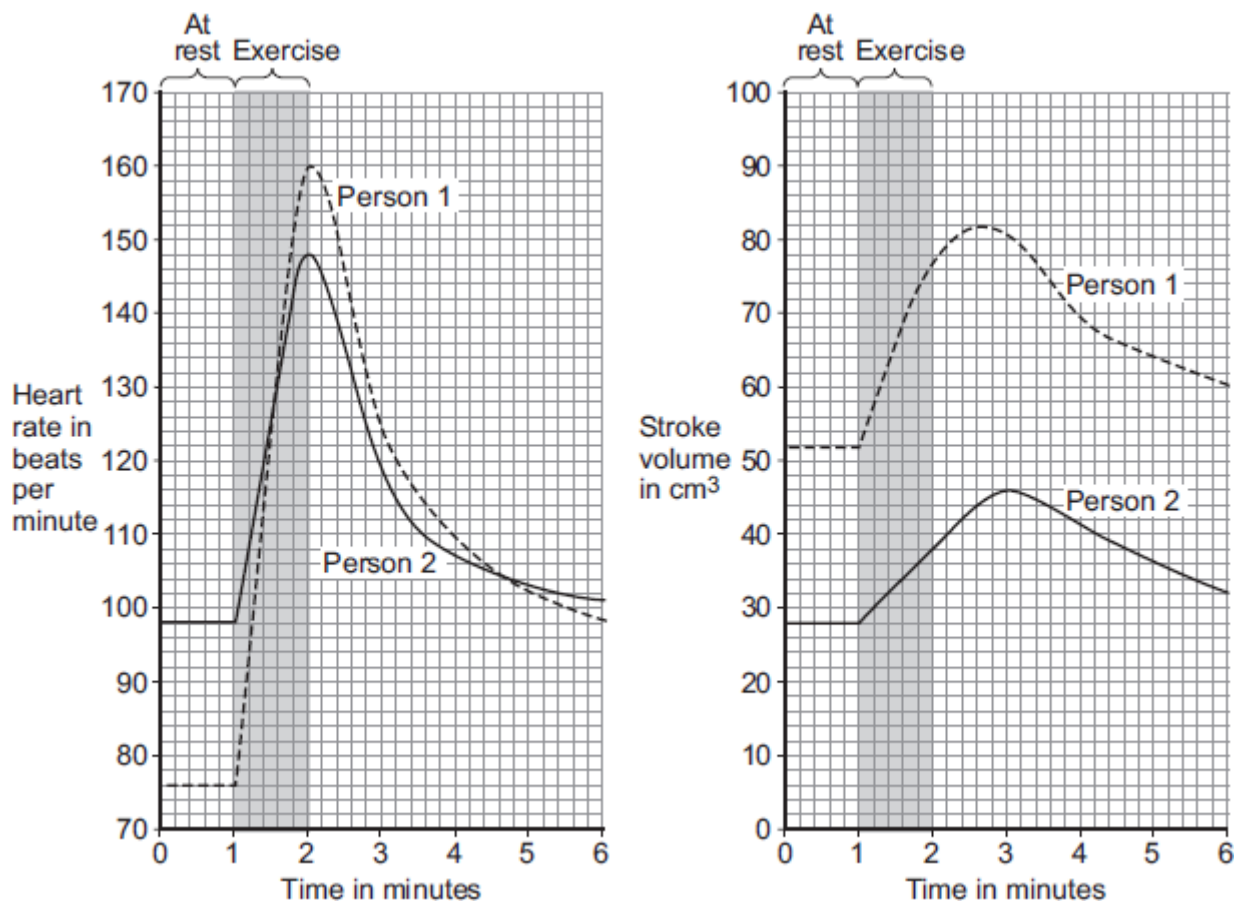
Q3.

During exercise, the heart beats faster and with greater force.

The 'heart rate' is the number of times the heart beats each minute. The volume of blood that travels out of the heart each time the heart beats is called the 'stroke volume'.

In an investigation, **Person 1** and **Person 2** ran as fast as they could for 1 minute. Scientists measured the heart rates and stroke volumes of **Person 1** and **Person 2** at rest, during the exercise and after the exercise.

The graph below shows the scientists' results.



- (a) The 'cardiac output' is the volume of blood sent from the heart to the muscles each minute.

$$\text{Cardiac output} = \text{Heart rate} \times \text{Stroke volume}$$

At the end of the exercise, **Person 1**'s cardiac output = $160 \times 77 = 12\,320 \text{ cm}^3$ per minute.

Use information from the figure above to complete the following calculation of **Person 2**'s cardiac output at the end of the exercise.

At the end of the exercise:

Person 2's heart rate = _____ beats per minute

Person 2's stroke volume = _____ cm^3

Person 2's cardiac output = _____ cm^3 per minute

(3)

- (b) **Person 2** had a much lower cardiac output than **Person 1**.

- (i) Use information from the figure above to suggest the **main** reason for the lower cardiac output of **Person 2**.

(1)

- (ii) **Person 1** was able to run much faster than **Person 2**.

Use information from the figure above and your own knowledge to explain why.

(5)

(Total 9 marks)