1 Blood clots can form if the lining of an artery becomes damaged.

(a) For each of the statements below, put a cross ☒ in the box that corresponds to the correct statement about the blood clotting process.

(i) A platelet

(1)

☒ **A** is a protein that forms an insoluble mesh to trap red blood cells

☒ **B** is an enzyme that converts prothrombin into thrombin

☒ **C** is a cell fragment that releases thromboplastin

☒ **D** is a cell fragment that releases fibrinogen

(ii) Thrombin is

(1)

☒ **A** an enzyme that changes fibrinogen into fibrin

☒ **B** an enzyme that changes fibrin into fibrinogen

☒ **C** an insoluble protein that forms a mesh to trap red blood cells

☒ **D** a protein that sticks to collagen in damaged walls of arteries

(iii) Fibrinogen is

(1)

☒ **A** an insoluble protein that forms a mesh to trap red blood cells

☒ **B** a soluble plasma protein

☒ **C** an enzyme that converts prothrombin into thrombin

☒ **D** a clotting factor released by platelets

(b) A stroke can be caused by cardiovascular disease (CVD) affecting arteries leading to the brain. Callum's family has a history of strokes.

(i) Explain why a blood clot in an artery leading to the brain could cause a stroke.

(3)

(ii) Suggest **two** lifestyle changes Callum could make to reduce his risk of suffering a stroke in later life.

(2)

1 .....

2 .....

(Total for Question 1 = 8 marks)

2 Read through the following passage on the cardiac cycle, then write on the dotted lines the most appropriate word or words to complete the passage.

The cardiac cycle consists of three stages: atrial systole, ventricular systole and

..... .

During atrial systole, the ..... contract and the

..... are relaxed. The ..... valves are open.

During ventricular systole, the ..... open as oxygenated blood is

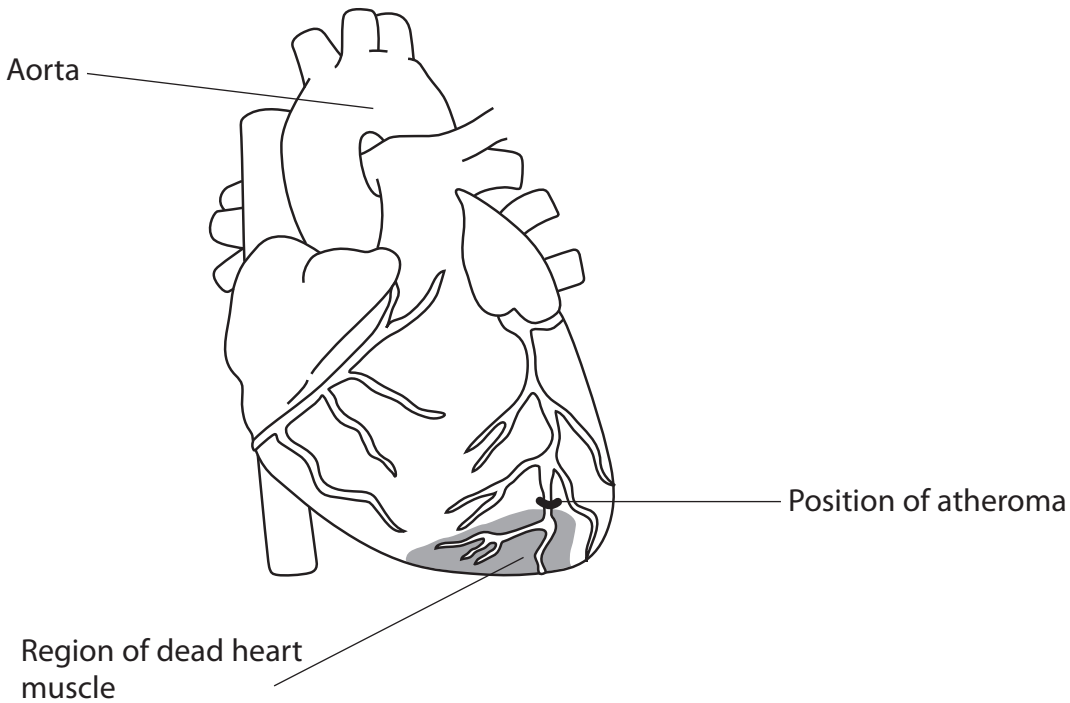
forced out of the heart through the aorta to the body and through the pulmonary

..... to the lungs.

(Total for Question 2 = 6 marks)

3 Atherosclerosis is responsible for many deaths that result from cardiovascular disease (CVD).

The diagram below shows an external view of a human heart.
The position of an atheroma (plaque) is shown and a region of dead heart muscle is shaded.



(a) (i) Explain how the structure of the aorta relates to its function.

(3)

(ii) Describe **two** differences between the structure of a capillary and the structure of a vein.

(2)

1 .....

.....

.....

2 .....

.....

.....

(b) (i) Suggest how the location of the atheroma results in the position and size of this region of dead heart muscle.

(3)

.....

.....

.....

.....

.....

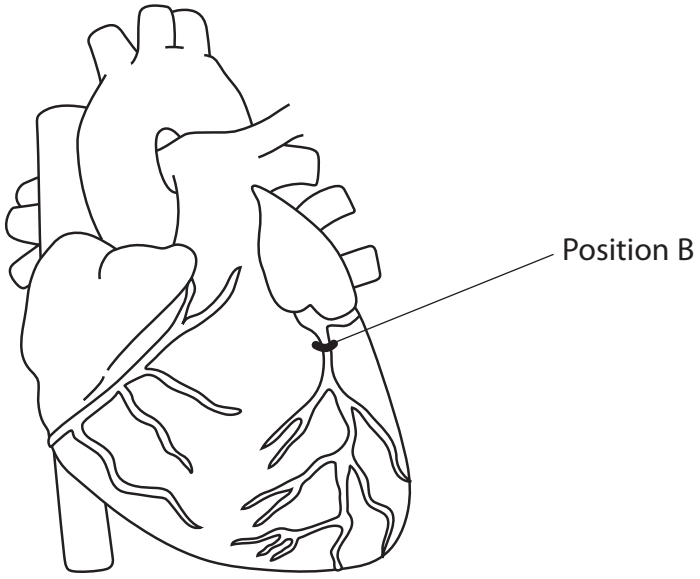
.....

.....

.....

(ii) On the diagram below, shade an area to show the position and size of dead heart muscle, if the atheroma occurred at position B.

(2)



(Total for Question 3 = 10 marks)

4 Many animals, such as mammals, have a heart and circulation. This helps them to meet their requirements by overcoming the limitations of diffusion.

*(a) Describe the structure of the mammalian heart.

(5)

(b) Giraffes are very tall mammals found roaming the plains of Africa.
Two giraffes are shown in the photograph below.

Using the information in the photograph and your own knowledge, explain the importance of the heart and circulation to the giraffe.

(4)

(Total for Question 4 = 9 marks)

5 Cardiovascular disease (CVD) is responsible for many deaths.

*(a) One cause of CVD is atherosclerosis. Describe how atherosclerosis develops.

(4)

(b) A number of factors have been identified that increase the risk of CVD. One of these factors is genetic.

The genotype of some individuals causes them to be more at risk of developing CVD. One gene that influences this risk is the *KIF6* gene. Carriers of the 719 Arg allele of this gene are more at risk of CVD.

(i) Explain the meaning of the term **genotype**.

(1)

(ii) Explain the meaning of the term **allele**.

(1)

(c) Give **two** factors, other than genetic factors, that increase the risk of developing CVD.

(1)

1 .....

2 .....

(d) Trials have shown that plant statin therapy is more effective in 719 Arg carriers than in non-carriers of this allele.

Describe the risks of using plant statins to treat CVD.

(2)

.....

.....

.....

.....

.....

.....

(Total for Question 5 = 9 marks)