Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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The heart and double circulation

Time allowed: 1 hour 25 minutes

Subject code **0610**

Biology

Questions from Paper 3, Paper 4 and Paper 6

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.

Total marks

/ 85

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.

Information

- This paper has 9 questions worth 85 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 Fig. 3.1 shows an external view of the heart.

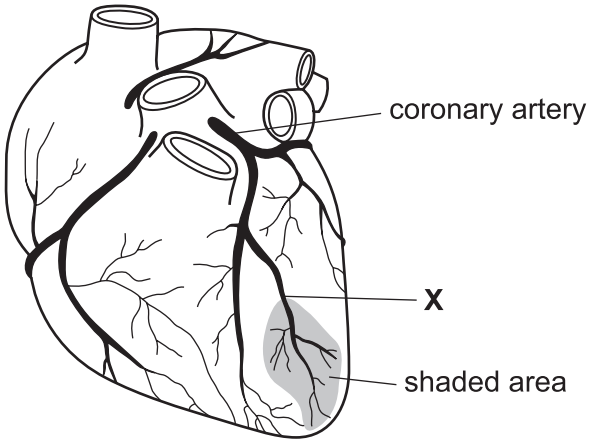


Fig. 3.1

(a) A blood clot is stuck at **X**. Explain what will happen to the heart muscle cells in the shaded area on Fig. 3.1.

.....

.....

.....

.....

.....

..... [3]

(b) List **three** actions people can take to reduce the risk of having a blood clot in the coronary arteries.

1 .....

.....

2 .....

.....

3 .....

..... [3]

[Total: 6]

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2 Plan an investigation to determine the effect of exercise intensity on heart rate in humans.

.....

.....

.....

.....

.....

.....

.....

.....

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.....

.....

..... [6]

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3 Fig. 2.1 shows an external view of a human heart seen from the front.

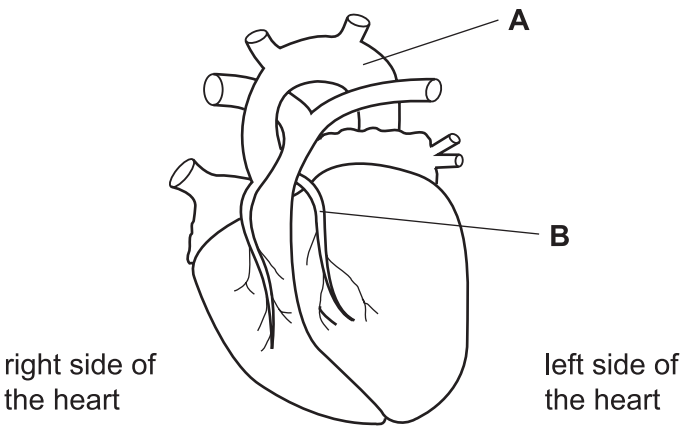


Fig. 2.1

(a) (i) Name blood vessel **A**.

.....

[1]

(ii) Blood vessel **B** supplies blood to the muscle of the heart wall.

Name blood vessel **B**.

.....

[1]

(iii) State what happens if blood vessel **B** becomes blocked.

.....

.....

[1]

(iv) Describe **and** explain how the structure of the left ventricle differs from the structure of the right ventricle.

.....

.....

.....

.....

.....

[2]

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(b) Exercise affects pulse rate.

Describe how you would measure a person's pulse rate.

.....

.....

.....

.....

..... [2]

[Total: 7]

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4 The heart pumps blood around the body.

(a) Explain why the heart is an organ.

.....

.....

..... [1]

(b) Complete the sentences:

The ..... system includes the heart and blood vessels. Deoxygenated blood from the body is transported to the heart in the ..... .

During a heart beat the ventricles contract. The right ventricle pumps deoxygenated blood to the lungs. The right ventricle has a ..... muscular wall than the left ventricle.

Gas exchange in the lungs occurs by ..... . Oxygenated blood travels back to the heart where it enters the ..... of the heart.

The two sides of the heart are separated by the ..... . This structure prevents the mixing of oxygenated and deoxygenated blood. Oxygenated blood is then delivered to the rest of the body. Blood is supplied to the muscle of the heart in the ..... .

[7]

(c) Many people monitor their heart rate by counting their pulse.

State **one** other method of monitoring heart rate.

..... [1]

[Total: 9]

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5 Fig. 2.1 shows some of the external features of the human heart.

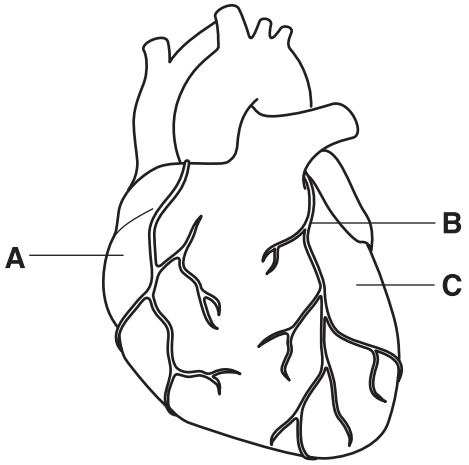


Fig. 2.1

(a) (i) State the function of the heart.

.....[1]

(ii) Name the tissue that makes up most of the heart wall labelled **C** on Fig. 2.1.

.....[1]

(iii) State **two** ways that the activity of the heart can be monitored.

1 .....

2 .....

[2]

(b) (i) Identify blood vessel **B** on Fig. 2.1.

Draw a circle around your answer.

aorta **coronary artery** **pulmonary artery**

pulmonary vein **vena cava**

[1]

(ii) Blockage of this blood vessel can cause serious damage to the heart.

Describe **one** factor that can increase the risk of developing a blockage in this blood vessel.

.....[1]

(iii) Name the type of blood vessel that carries blood

away from the heart .....

towards the heart .....

[1]

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(c) **(i)** Deoxygenated blood from the body enters the part of the heart labelled **A** on Fig. 2.1.

State the name of part **A** .....[1]

(ii) The inside of the heart contains a number of valves.

State the function of these valves.

.....

.....[1]

(iii) State the name of the structure which separates the two sides of the heart.

.....[1]

[Total: 10]

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6 Fig. 1.1 is a diagram of the human heart. The diagram shows the phase during the heart beat when the atria contract. The blood vessels that carry blood to and from the heart are labelled **A** to **F**.

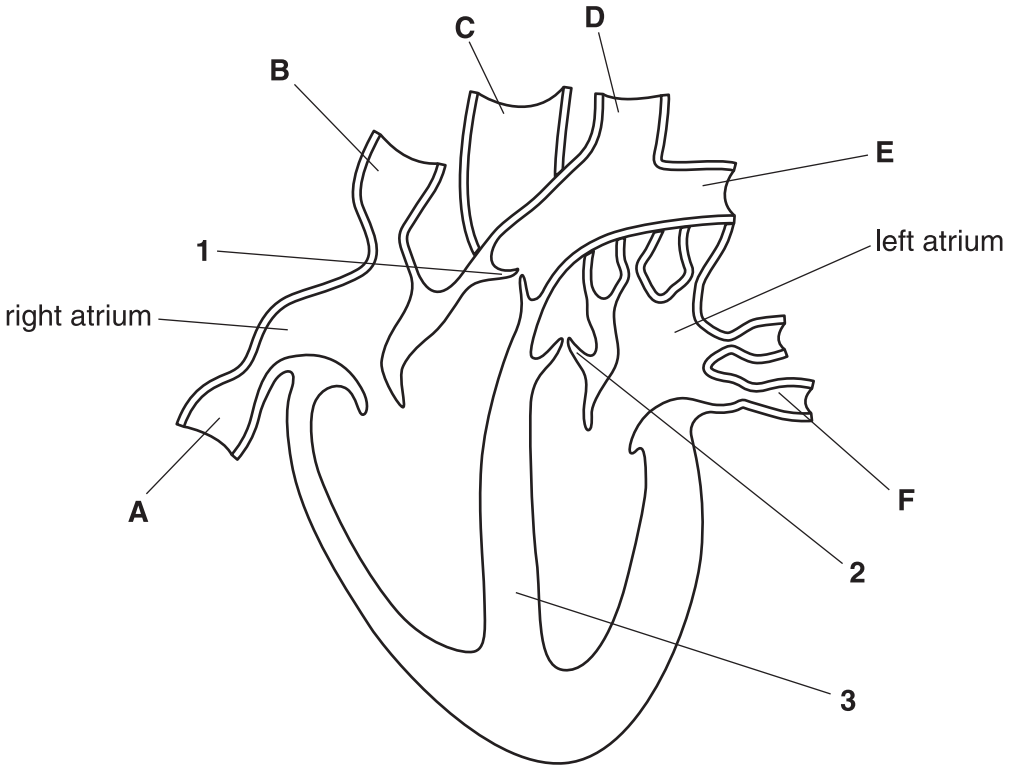


Fig. 1.1

(a) (i) Draw **one** arrow on Fig. 1.1 to show the pathway taken by blood from a vein into the **right ventricle**. [1]

(ii) Identify the letter of the blood vessel that carries blood at the highest pressure and state its name.

letter .....

name of the blood vessel .....
[1]

(b) (i) Suggest what causes the valves at **1** and **2** to close during a heart beat.

.....

.....[1]

(ii) State the function of valves **1** and **2** in the heart.

.....[1]

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(c) Fig. 1.1 shows the phase of the heartbeat when the ventricles are filling with blood.

Using Fig. 1.1, describe **and** explain how the blood travels from the right ventricle to the lungs.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

(d) State the name of the part of the heart labelled **3** and state its role in the mammalian circulation.

name .....

role .....

.....

[2]

[Total: 10]

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7 Fig. 2.1 shows a section through the human heart.

Chamber **A** collects deoxygenated blood from the body.

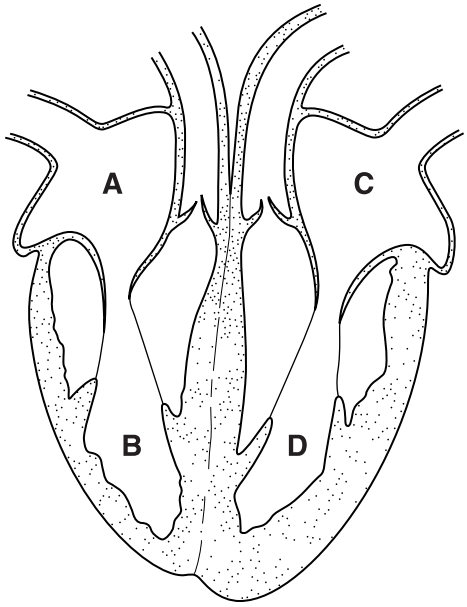


Fig. 2.1

(a) (i) State the name of chamber **B**.

.....[1]

(ii) State which organ the blood goes to after it leaves chamber **B**.

.....[1]

(iii) Blood can contain different concentrations of carbon dioxide and oxygen.

Tick (✓) the boxes that describe the blood found in chamber **C**.

high concentration of carbon dioxide	☐
low concentration of carbon dioxide	☐
high concentration of oxygen	☐
low concentration of oxygen	☐

[1]

(iv) Name the tissue that makes up the wall of chamber **D**.

.....[1]

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(b) The heart contains a number of valves.

(i) Draw a line on Fig. 2.1 to identify **one** of the valves.
Label this line with a **V**. [1]

(ii) State the function of the valves in the heart.

.....

.....

.....[1]

(c) **(i)** Suggest **two** ways in which the heartbeat changes when a person exercises.

1 .....

.....

2 .....

.....
[2]

(ii) The coronary artery supplies blood to the heart tissue. People with coronary heart disease (CHD) are unable to do much exercise.

State a cause of CHD and explain why people with this disorder are unable to do much exercise.

cause .....

.....

explanation .....

.....

.....

.....
[3]

[Total: 11]

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8 **(a)** Fig. 5.1 is a diagram of a human heart.

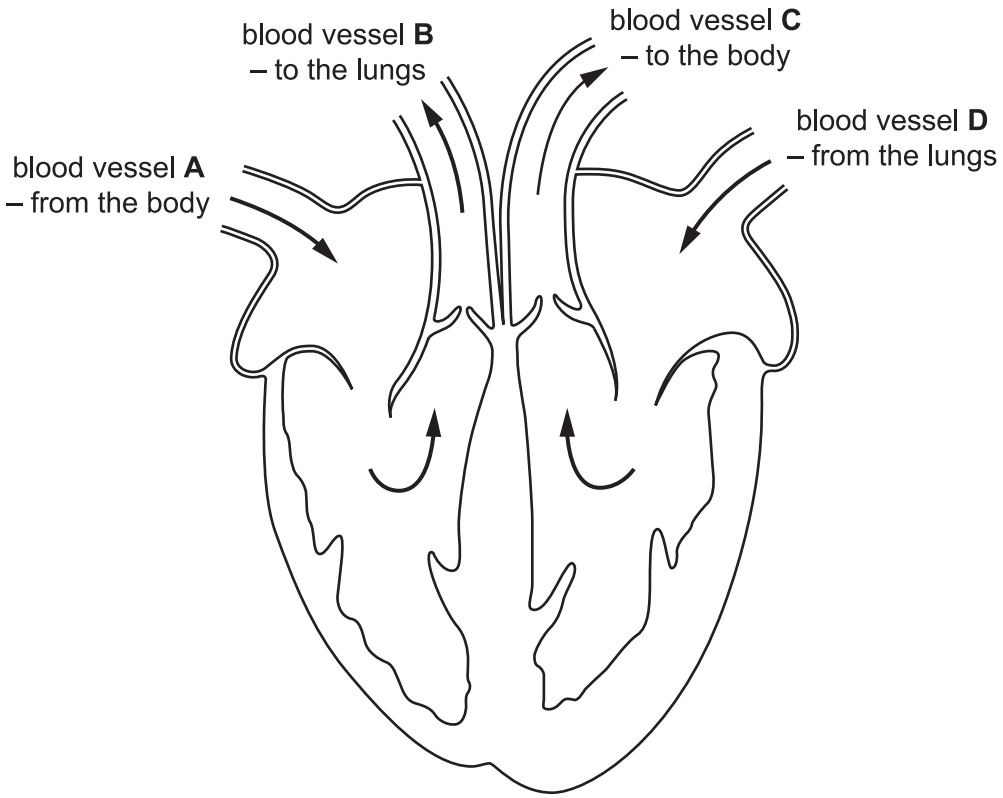


Fig. 5.1

(i) Use label lines and labels to identify these structures on Fig. 5.1:

- **atrium**
- **septum**
- **ventricle**
- **valve**

[4]

(ii) Identify the letter or letters of all the blood vessels from Fig. 5.1, that:

are arteries .....

is the pulmonary vein ..... .

[2]

(b) The activity of the heart can be monitored by measuring the pulse rate.

State **two other** ways of monitoring the activity of the heart.

1 .....

2 .....

[2]

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(c) Coronary heart disease (CHD) is caused by a blockage of blood vessels in the heart.

(i) State the name of the blood vessels that become blocked.

..... [1]

(ii) State **three** risk factors for developing CHD.

1 .....

2 .....

3 .....

[3]

[Total: 12]

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9 Fig. 4.1 shows a section through a human heart and the main blood vessels.

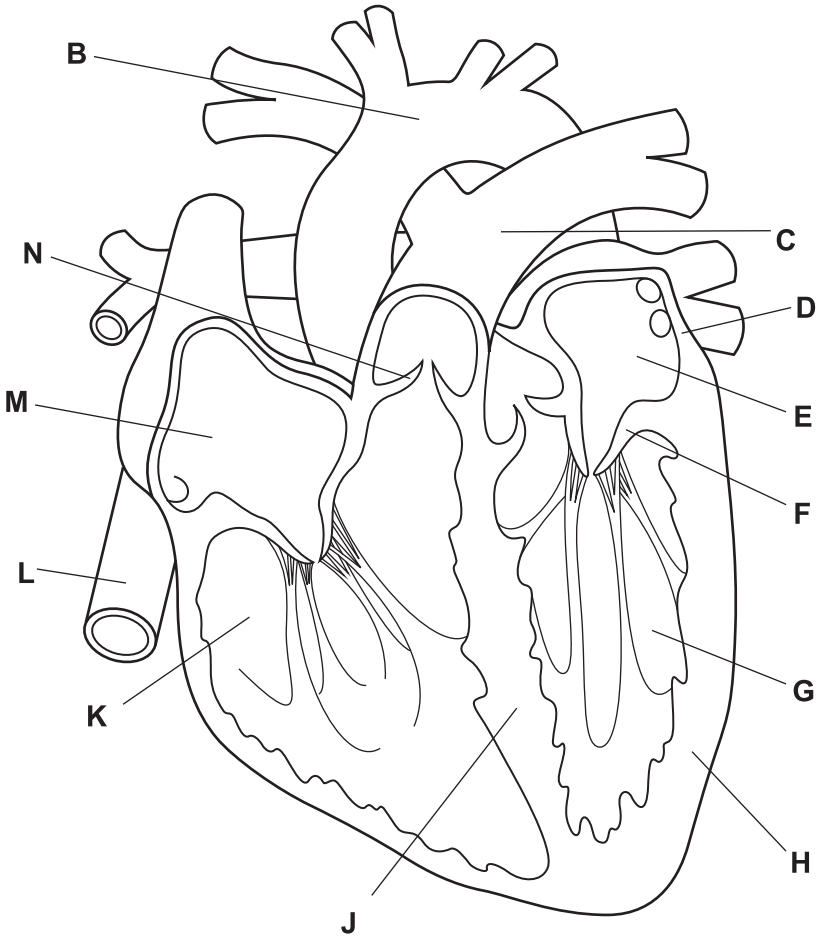


Fig. 4.1

(a) (i) State the letter in Fig. 4.1 that identifies:

the structure that separates oxygenated and deoxygenated blood .....

an atrioventricular valve. .....

[2]

(ii) Explain why the heart wall at **H** is thicker than the heart wall at **D** in Fig. 4.1.

.....

.....

.....

.....

..... [2]

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(iii) Table 4.1 contains eight descriptions of parts of the pathway a red blood cell takes as it moves from the vena cava to the aorta.

Using Fig. 4.1, complete Table 4.1 by numbering the descriptions to show the correct sequence.

Two have been done for you.

Table 4.1

description	sequence
blood enters **C**	
blood enters **E** and then **E** contracts	
blood enters **M** and then **M** contracts	1
blood travels to lungs	
blood moves into **G**	
blood moves into **B**	8
N opens	
blood moves into **K**	

[2]

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(b) Fig. 4.2 shows the effect of exercise on heart rate.

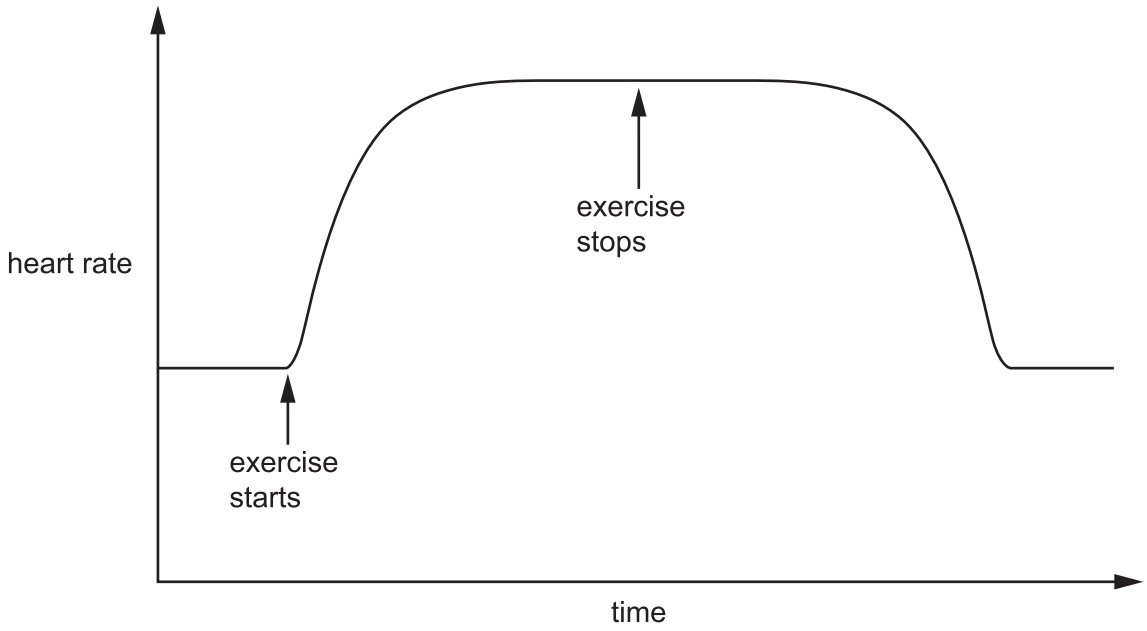


Fig. 4.2

(i) Explain the effect of exercise on heart rate shown in Fig. 4.2.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

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(ii) A lack of exercise can increase the risk of coronary heart disease.

State **three** other factors that can increase the risk of coronary heart disease.

1 .....

2 .....

3 .....

[3]

[Total: 14]

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