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

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Transport in animals

Time allowed: 1 hour 35 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

/ 96

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 10 questions worth 96 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. 2.1 shows an external view of a human heart seen from the front.

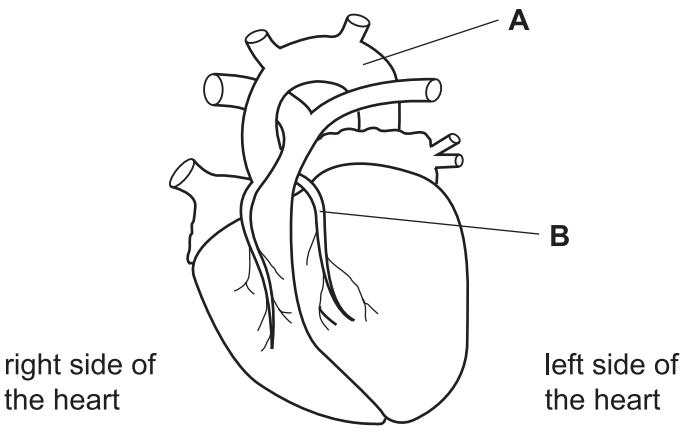


Fig. 2.1

(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]

Heart and circulation Click for more variations

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2 **(a)** Arteries are a type of blood vessel.

State **two** structural features of arteries.

1 .....

2 .....

[2]

(b) Capillaries are another type of blood vessel.

State **one** function of capillaries.

.....

..... [1]

(c) State the name of the structures in veins that ensure the one-way flow of blood.

..... [1]

(d) Fig. 1.1 is a diagram of part of the human circulatory system.

The arrows show the direction of blood flow.

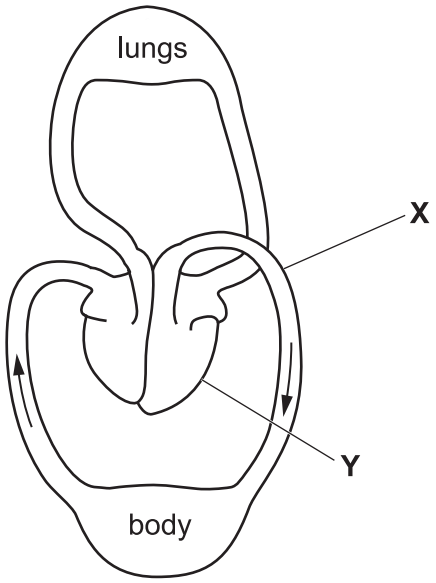


Fig. 1.1

(i) **On Fig. 1.1**, draw arrows to show the direction of blood flow to and from the lungs. [1]

(ii) State the names of blood vessel **X** and organ **Y** in Fig. 1.1.

blood vessel **X** .....

organ **Y** .....

[2]

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(e) State the name of the blood vessel that transports oxygenated blood to the kidney.

..... [1]

[Total: 8]

Blood vessels Click for more variations

3 **(a)** Fig. 7.1 is a diagram of the circulatory system.

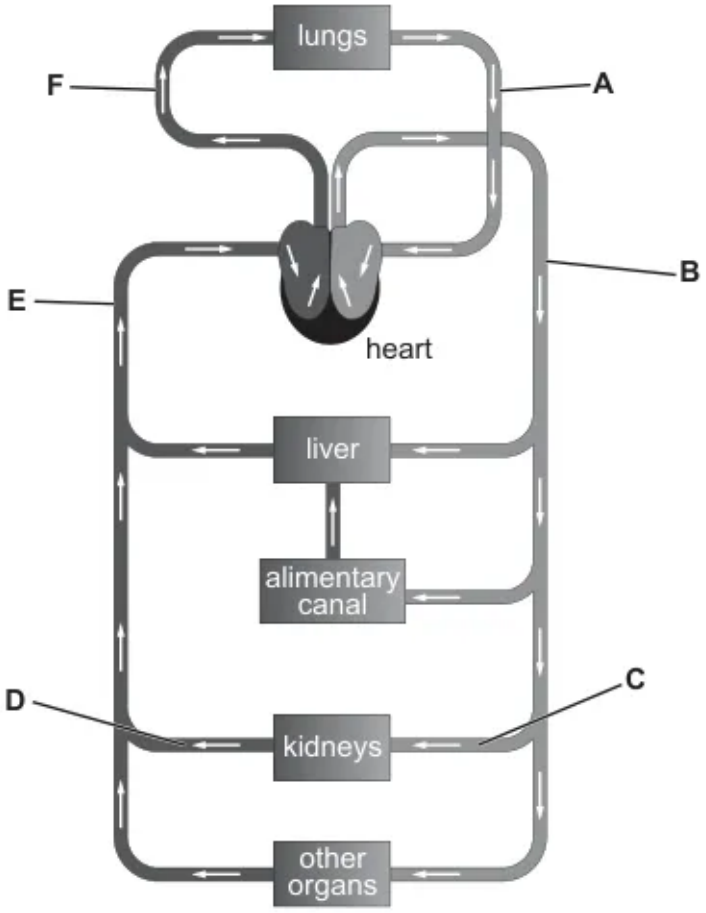


Fig. 7.1

(i) State the names of the blood vessels labelled **A**, **C** and **E** in Fig. 7.1.

A .....

C .....

E .....

[3]

(ii) State the letter in Fig. 7.1 that identifies the blood vessel that contains the highest oxygen concentration.

..... [1]

(b) Describe **three** ways the structure of arteries differs from the structure of veins.

1 .....

.....

2 .....

.....

3.....

.....

[3]

(c) White blood cells are one of the components of blood.

(i) State **two** functions of white blood cells.

1 .....

2 .....

[2]

(ii) State **two other** main components of blood.

1 .....

2 .....

[2]

[Total: 11]

Blood vessels Click for more variations

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4 **(a)** Fig. 1.1 is a diagram of part of the human circulatory system.

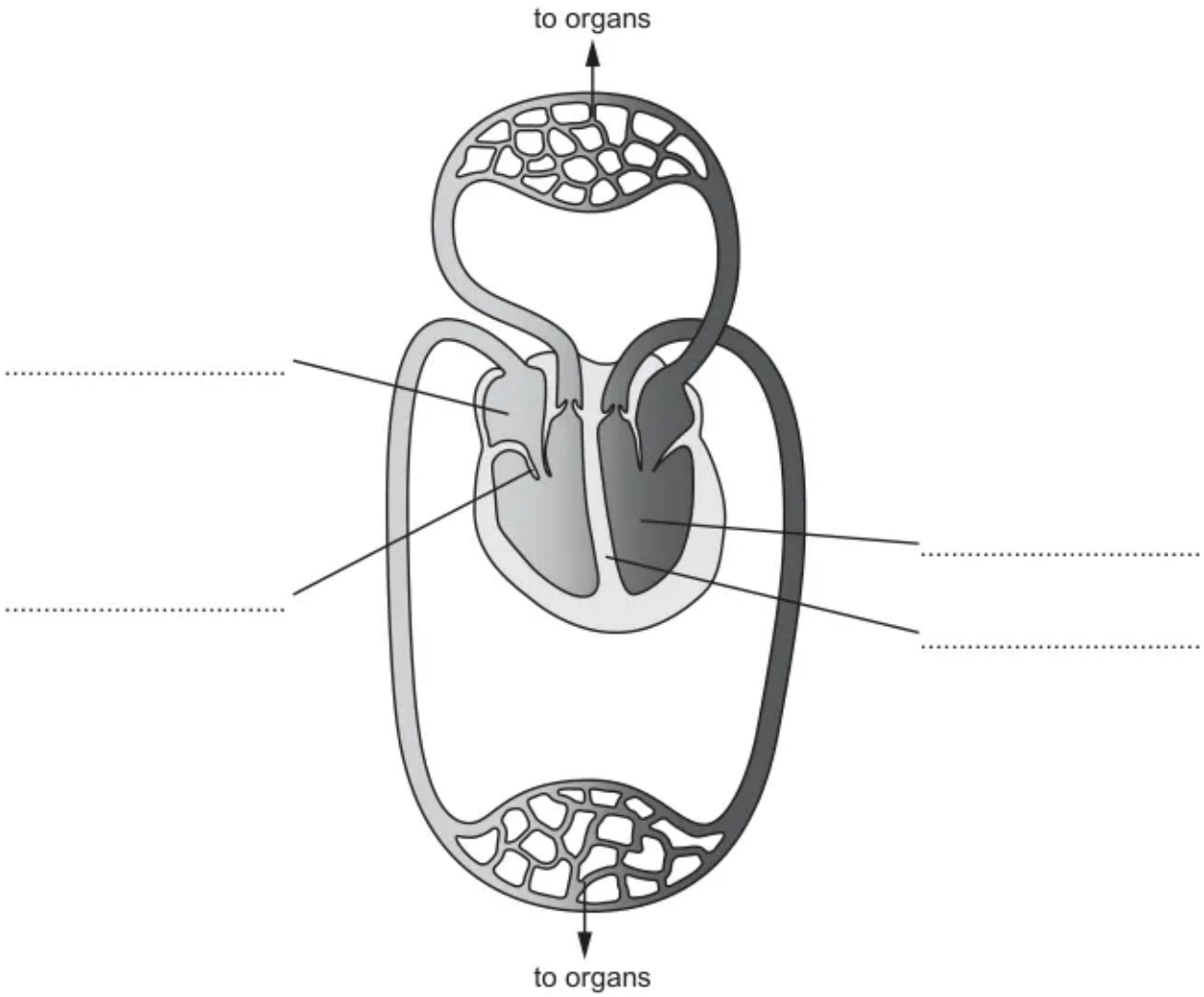


Fig. 1.1

(i) Identify and label on Fig. 1.1 in the spaces provided:

- the left ventricle
- the right atrium
- the septum
- a valve

[4]

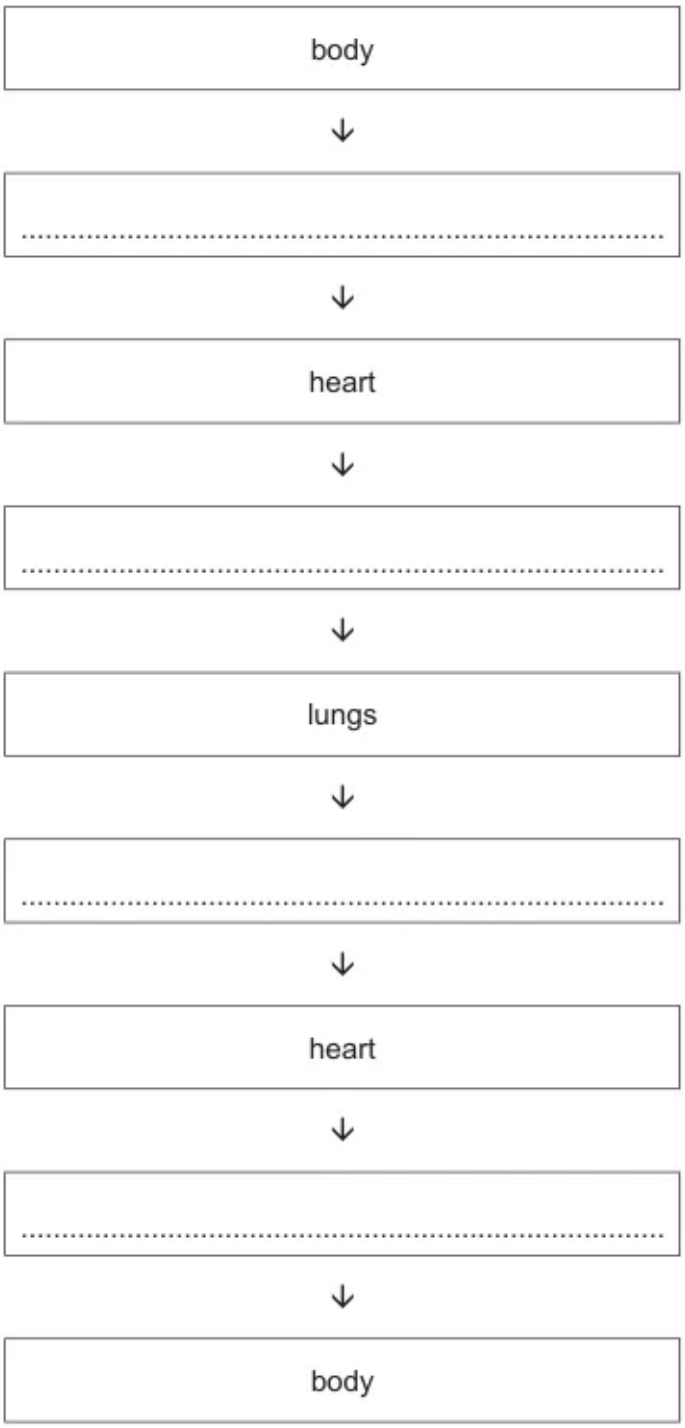
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(ii) Complete the flow chart of the circulatory system by writing the correct blood vessels from the list, in the spaces provided.

The arrows show the direction of blood flow.

Each word or phrase may be used once, more than once or not at all.

aorta	**pulmonary artery**	**pulmonary vein**
renal artery	**renal vein**	**vena cava**



[4]

(b) A healthy diet is recommended to reduce the risk of coronary heart disease (CHD).

State **three** other risk factors for CHD.

1 .....

2 .....

3 .....

[3]

[Total: 11]

Heart and circulation Click for more variations

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5 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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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**.

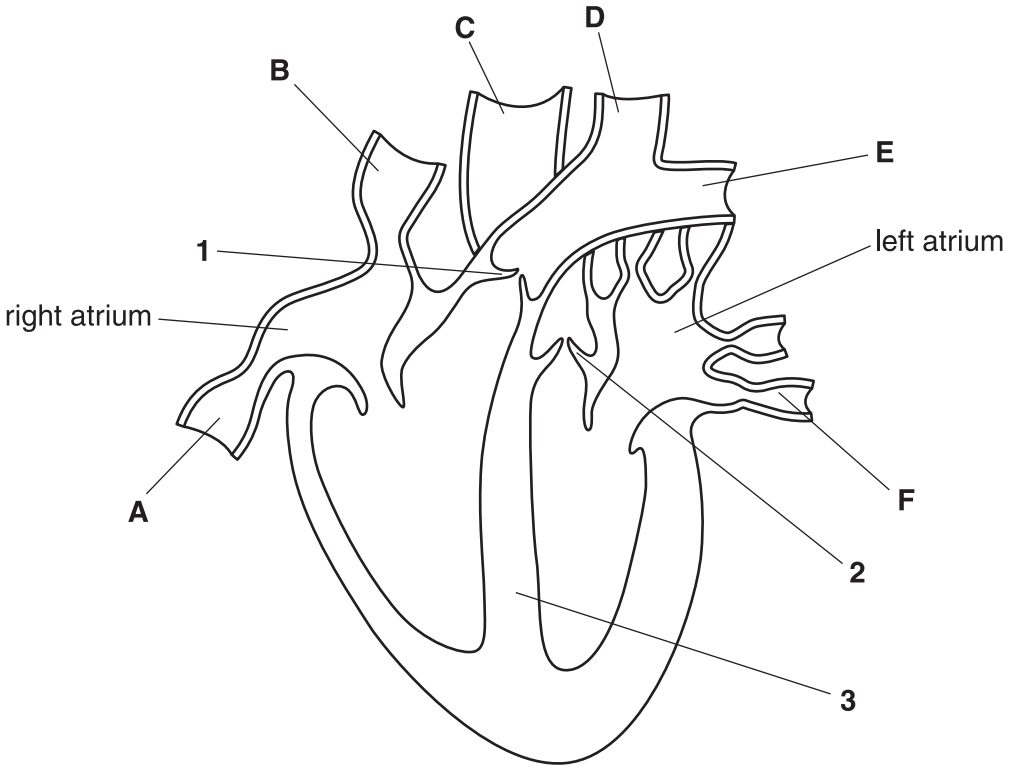


Fig. 1.1

(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]

Heart and circulation Click for more variations

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7 Fig. 4.1 shows a vertical section of a human heart.

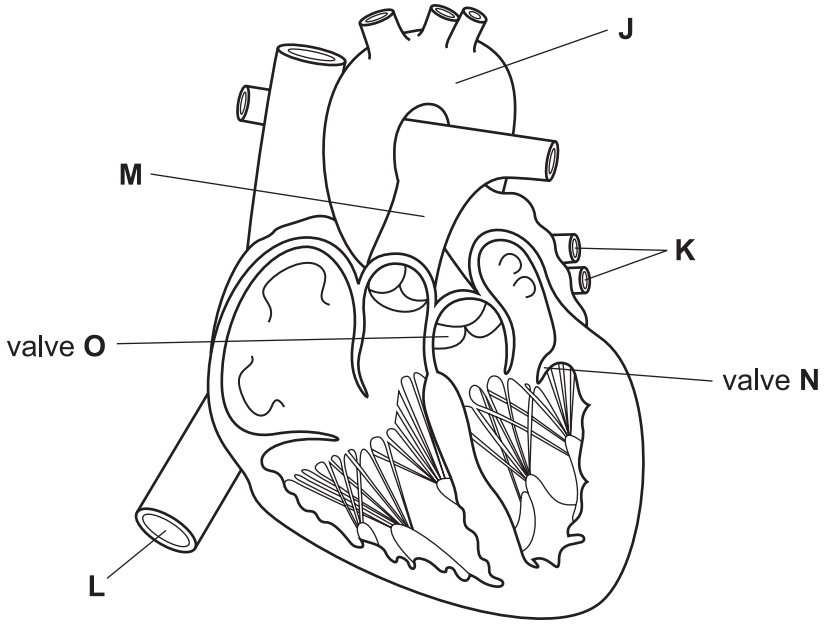


Fig. 4.1

(a) Identify the blood vessels labelled **J** to **M**.

J .....

K .....

L .....

M ..... [4]

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(b) Sensors that detect changes in blood pressure were placed into the blood vessels surrounding the heart. Recordings were taken at the times when the ventricles contracted and when they relaxed.

The blood pressures recorded are shown in Table 4.1.

Table 4.1

blood vessel	blood pressure / kPa	
	contraction of the ventricles	relaxation of the ventricles
J	16.0	10.0
K	0.3	0.3
L	0.3	0.3
M	2.0	0.5

(i) Explain why the pressure in blood vessel **J** is greater than the pressure in blood vessel **M**.

.....

.....

.....

.....

..... [2]

(ii) Explain why the pressure in blood vessels **K** and **L** is much less than the pressure in blood vessels **J** and **M**.

.....

.....

.....

..... [2]

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(c) Explain how the valves at **N** and **O** maintain one-way flow of blood through the heart.

.....

.....

.....

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..... [4]

(d) Other than in the heart, state where valves similar to those at **O** are found in the circulatory system.

.....

..... [1]

[Total: 13]

Blood vessels Click for more variations

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8 Fig. 6.1 is a photomicrograph of a blood clot.

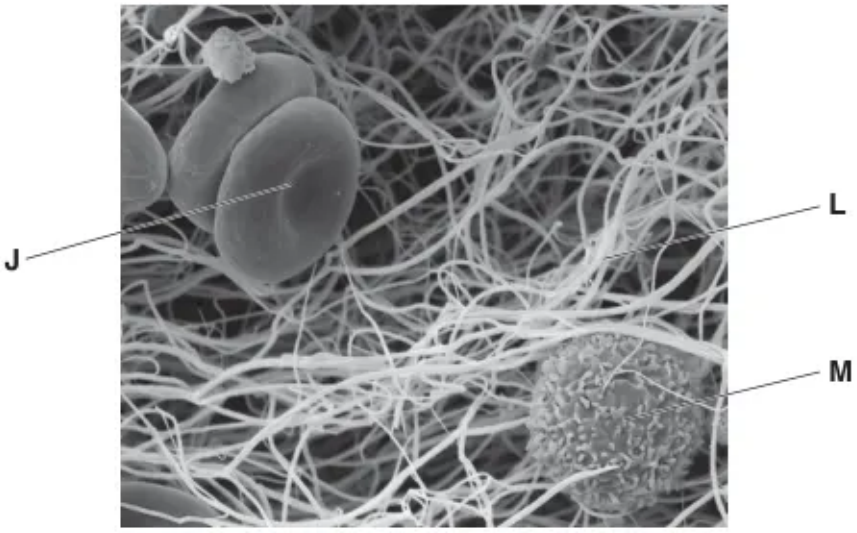


Fig. 6.1

(a) Describe how a blood clot forms.

Use the letters in Fig. 6.1 in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

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(b) State the importance of blood clotting.

.....

.....

.....

.....

..... [2]

(c) There are four blood group phenotypes A, B, AB and O in humans.

(i) Define the term *phenotype*.

.....

.....

..... [1]

(ii) State the name of the type of inheritance that is shown by blood groups.

..... [1]

(iii) State the **two** possible genotypes for a person who has the phenotype blood group A.

1 .....

2 .....
[2]

[Total: 11]

Blood Click for more variations

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9 Pathogens cause disease.

(a) Fig. 2.1 shows some cells that are part of the human immune system. These cells are responding to one type of pathogen.

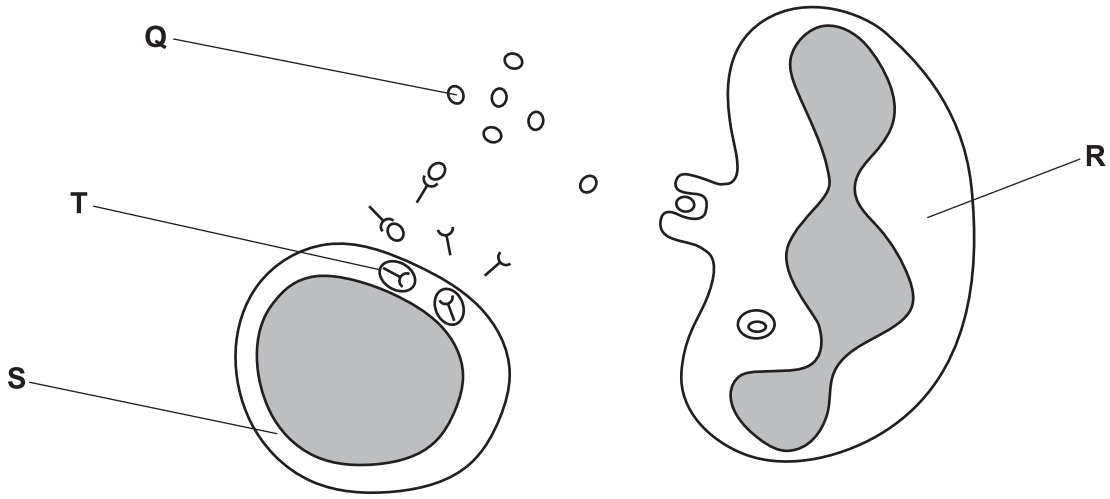


Fig. 2.1

Explain how the immune system responds to an invasion of pathogens.

Use the letters in Fig. 2.1 in your answer.

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..... [6]

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(b) A vaccine was introduced in 1942 for a particular disease.

Fig. 2.2 shows the effect of introducing the vaccine on the number of cases of the disease in one country.

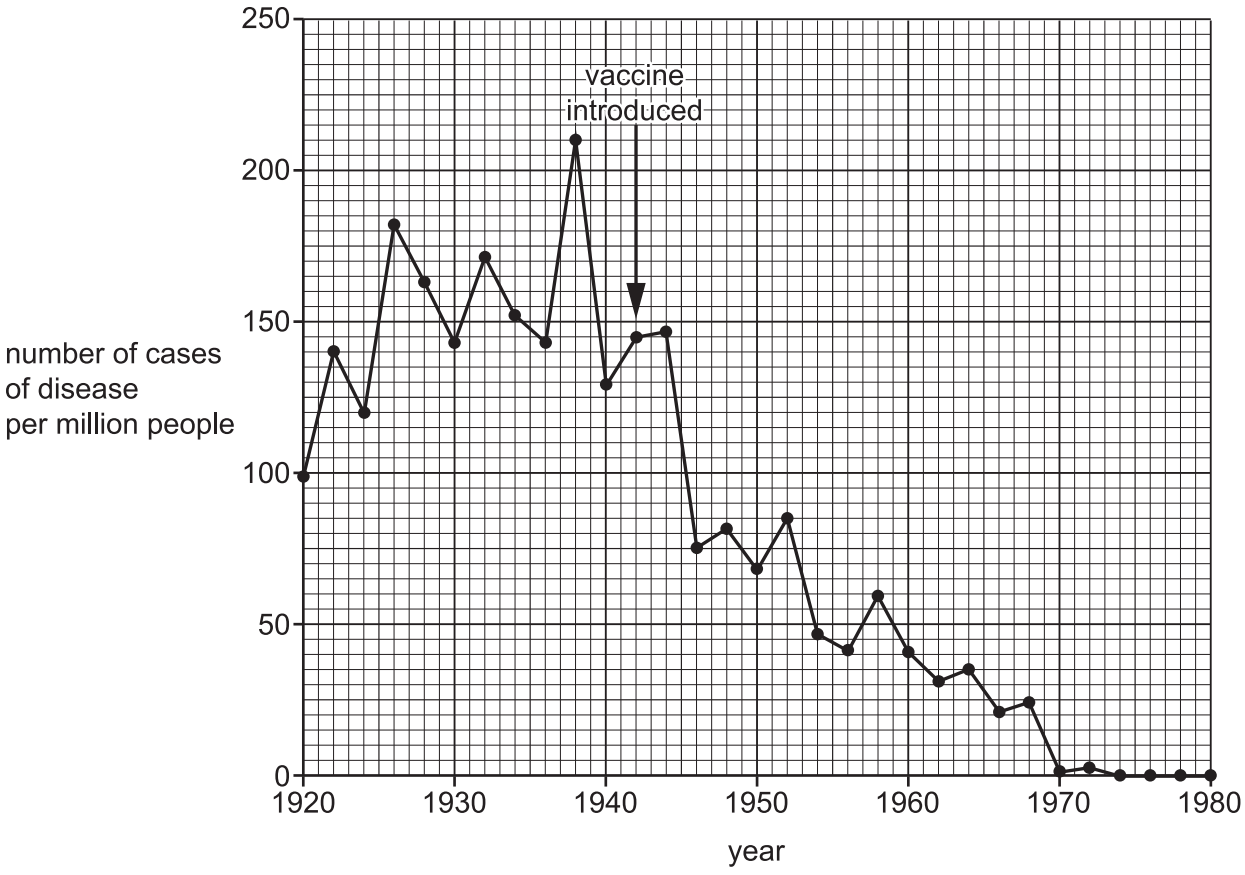


Fig. 2.2

In 1946 the government of the country concluded that the vaccine was successful.

Discuss the evidence, shown in Fig. 2.2, for **and** against this conclusion.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 10]

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Blood Click for more variations

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

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..... [6]

Heart and circulation Click for more variations

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