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5096/22

October/November 2012

2 hours

No Additional Materials are required.

Write your answers in the spaces provided on the question paper.

Answer **either** question **10** or question **11**.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use		
1		
2		
3		
4		
5		
6		
7		
Section A sub-total		
8		
9		
Section C		
10	11	
Total		



[Turn over

Section A

Answer **all** the questions.

Write your answers in the spaces provided.

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- 1 Fig. 1.1 is a diagram of a kidney, seen in longitudinal section.

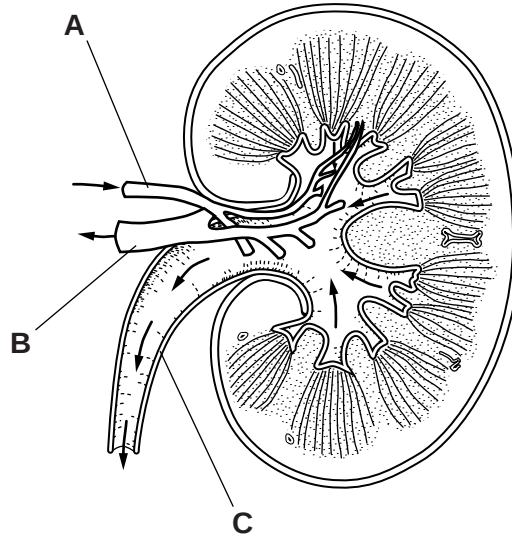


Fig. 1.1

- (a) Name the structures labelled **A**, **B** and **C**.

A

B

C

[3]

- (b) With reference to Fig. 1.1, explain what is meant by longitudinal section.

.....

.....

..... [2]

(c) Table 1.1 shows the concentrations of several substances in the blood and urine.

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Table 1.1

	concentration /g per 1000 cm ³	
	blood	urine
plasma proteins	80	0
glucose	0.8 to 1.1	0
urea	0.2 to 0.4	12 to 25
sodium chloride	6	9 to 36

(i) Explain why there are no plasma proteins in the urine.

.....
 [1]

(ii) Explain why there is no glucose in the urine.

.....

 [2]

(iii) Explain why there is some variation in the concentration of sodium chloride in the urine, but not in the blood.

.....

 [3]

- (iv) Explain why there is only a small variation in blood glucose concentration.

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.....

..... [3]

- (v) Suggest a reason why the urea concentration in both blood and urine might rise.

.....

..... [1]

- (d) A person with kidney failure may be treated using a dialysis machine. This removes waste substances from the blood. Fig. 1.2 shows a dialysis machine in which there are many layers of dialysis membranes (like Visking tubing) separating blood from dialysis fluid. The dialysis fluid contains controlled amounts of several dissolved substances including glucose and it flows through the machine at a steady rate.

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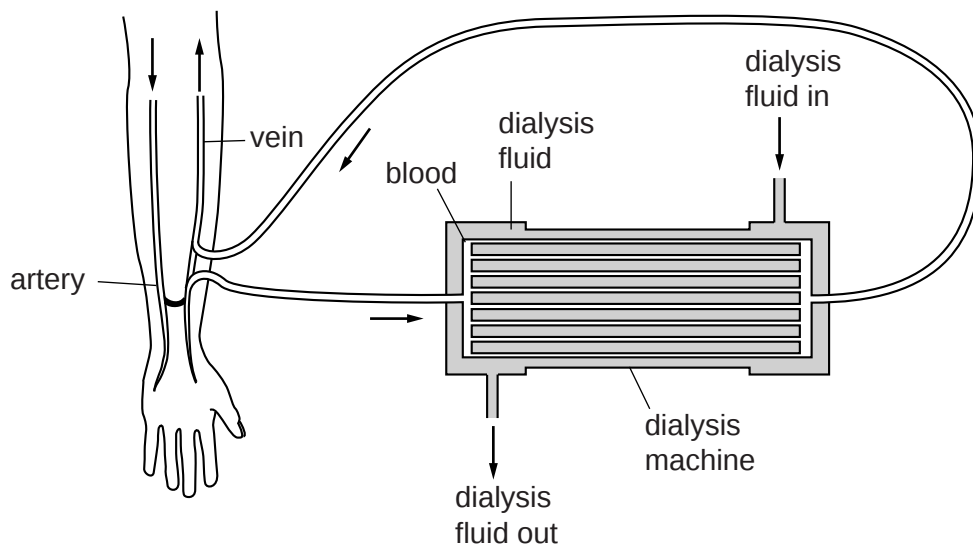


Fig. 1.2

- (i) Explain how the dialysis membrane works.

.....

.....

.....

..... [2]

- (ii) Explain why glucose is included in the dialysis fluid.

.....

.....

.....

..... [2]

- (iii) Suggest a reason why it is important that the dialysis fluid keeps moving.

.....

..... [1]

[Total: 20]

2 Fig. 2.1 shows three stages of birth.

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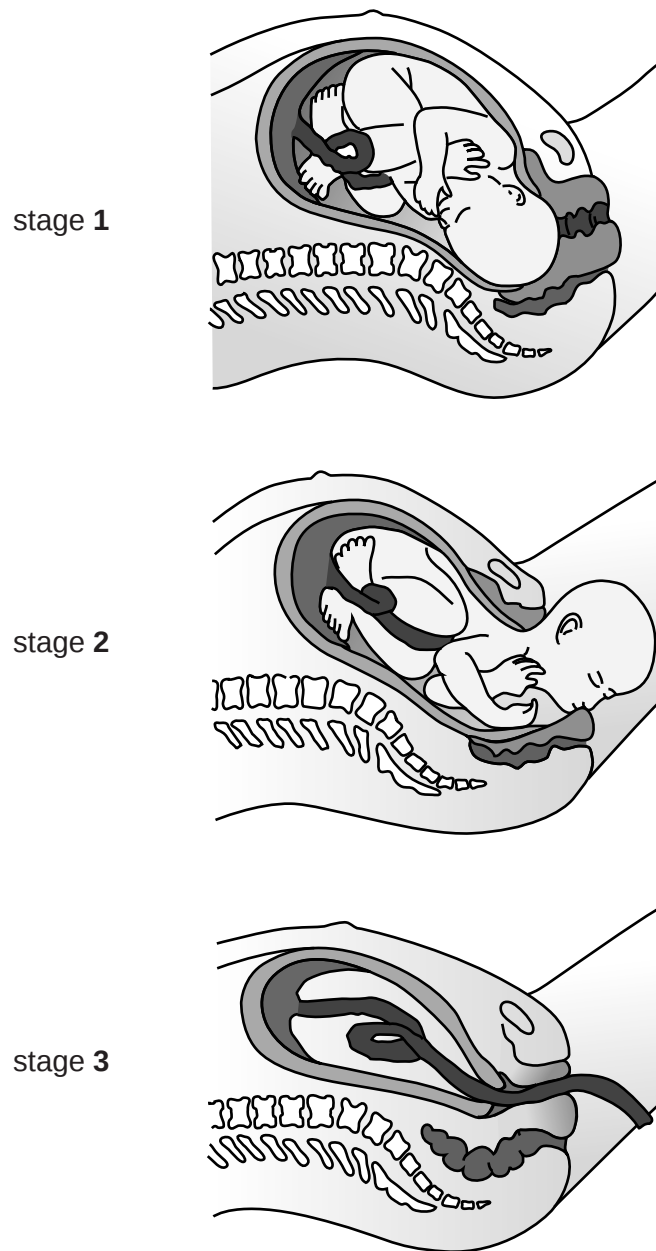


Fig. 2.1

(a) Suggest how the mother knows that birth is about to happen.

.....

.....

.....

..... [2]

(b) State what happens during stage 2.

.....

.....

.....

..... [2]

(c) State what happens in stage 3.

.....

..... [1]

[Total: 5]

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- 3 Fig. 3.1 represents the two types of nuclear division. Cells **D** and **E** are shown with four chromosomes each.

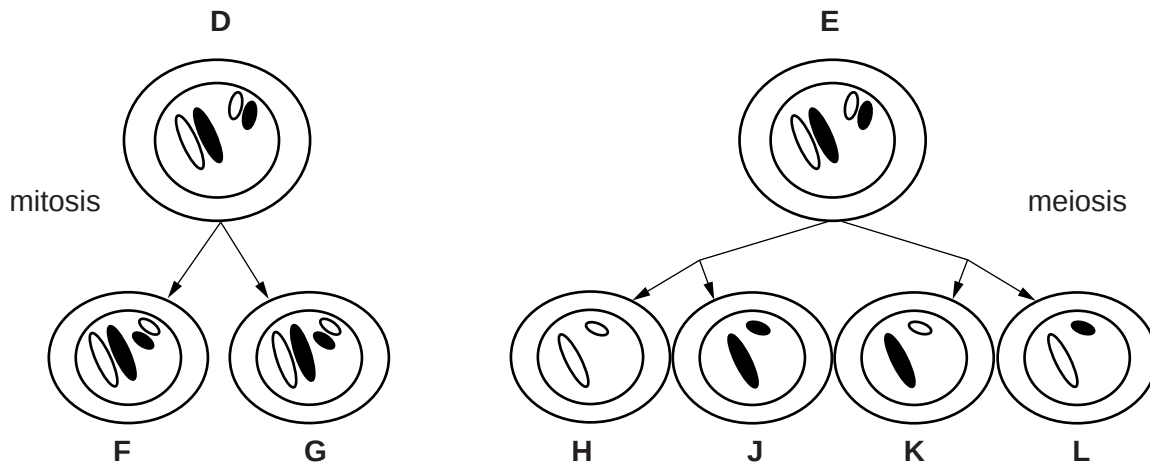


Fig. 3.1

- (a) In Fig. 3.1 eight cells are identified by the letters **D** to **L**. Use the letters to complete Table 3.1 to show **three** cells which are **genetically identical** and **three** cells which are **genetically different**.

Table 3.1

	cells		
genetically identical			
genetically different			

[2]

- (b) Complete Table 3.2 to compare mitosis and meiosis in humans.

Table 3.2

feature	mitosis	meiosis
location in the body		
role in the body		
number of chromosomes in daughter cells		

[6]

[Total: 8]

- 4 Haemoglobin in red blood cells normally transports oxygen. It combines reversibly with oxygen as shown below:



- (a) Haemoglobin combines with oxygen in the blood vessels surrounding the alveoli in the lungs.

State where haemoglobin releases the oxygen.

..... [1]

Haemoglobin can also combine with carbon monoxide:



This reaction is **not** reversible.

The oxygen carrying capacity of the blood is the volume of oxygen that is carried by a known volume of blood.

- (b) State why the oxygen carrying capacity of blood is reduced by exposure to carbon monoxide.

..... [1]

- (c) State why a reduction in the oxygen carrying capacity of blood puts strain on the heart.

.....

 [2]

- (d) Suggest a source of carbon monoxide that could affect the human body.

..... [1]

[Total: 5]

5

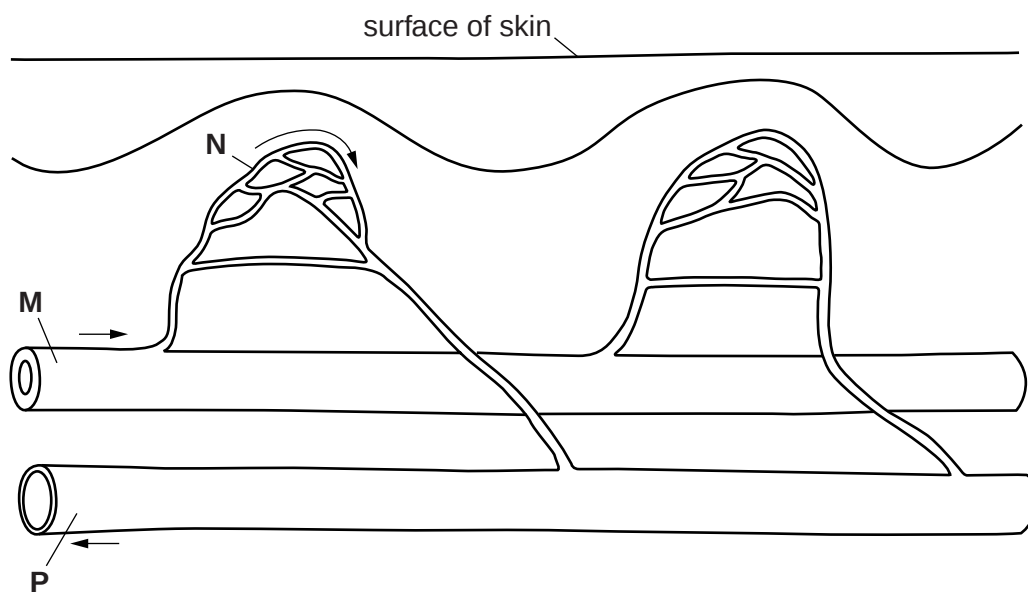


Fig. 5.1

- (a)** Name the types of blood vessel labelled **M**, **N** and **P** on Fig. 5.1.

M

N

P

[3]

- (b)** Describe what happens in these blood vessels when the body temperature rises.

In your answer you may refer to the blood vessels by the letters **M**, **N** and **P** as shown in Fig. 5.1.

[4]

[4]

[Total: 7]

6 The body uses two types of control system: hormonal and nervous.

(a) Explain why a hormonal control system has a more widespread response than a nervous control system.

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.....

.....

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.....

.....

..... [4]

(b) Explain why a hormonal control system has a longer lasting response than a nervous control system.

.....

.....

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..... [2]

[Total: 6]

- 7 A long-term investigation of the effects of various factors on health has been carried out on doctors.

The doctors were 35 years old at the beginning of the study. Some were cigarette smokers and some were non-smokers. The researchers recorded how old the doctors were when they died. The results of the study are shown in Fig. 7.1.

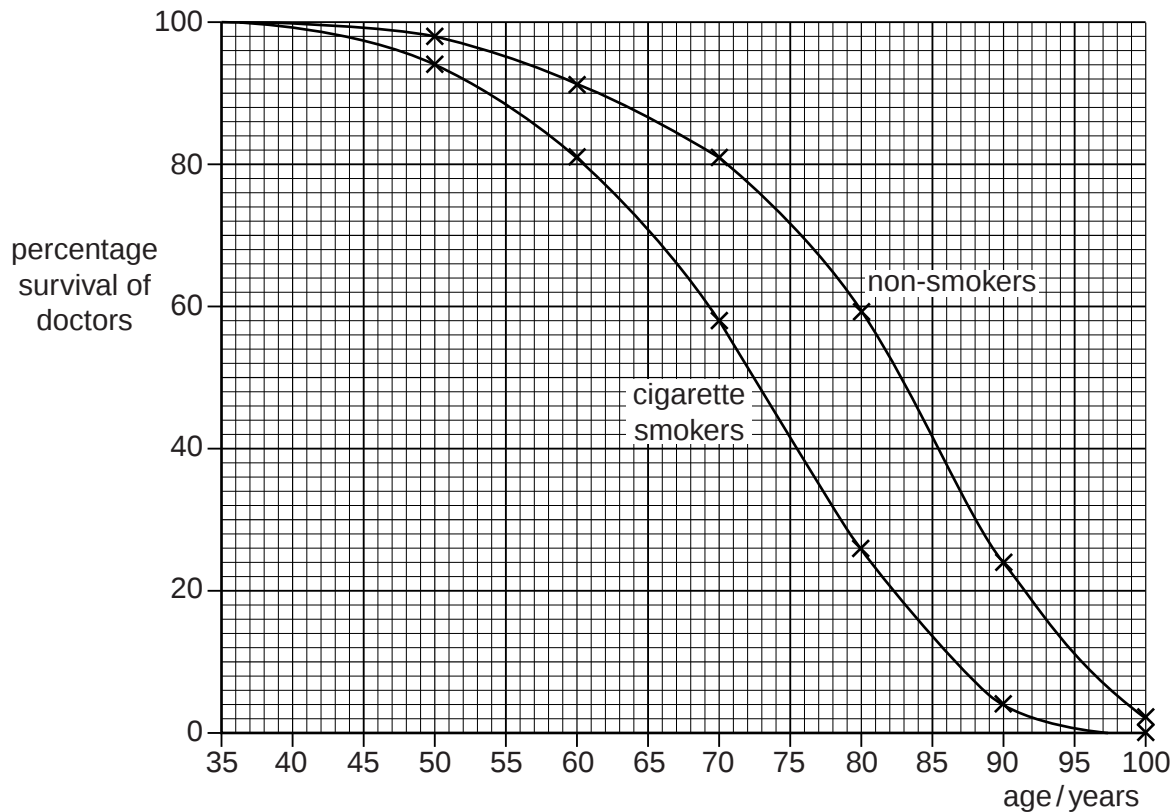


Fig. 7.1

- (a) Suggest **one** reason why doctors were such a suitable group for this study.

.....
 [1]

- (b) (i) From the graph, state the difference in the percentage of doctors alive in the two groups at age 70.

..... [1]

- (ii) Explain the conclusions that can be made from the results of this study.

.....

 [2]

[Total: 4]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

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- 8 Fig. 8.1 is a diagram of the thorax.

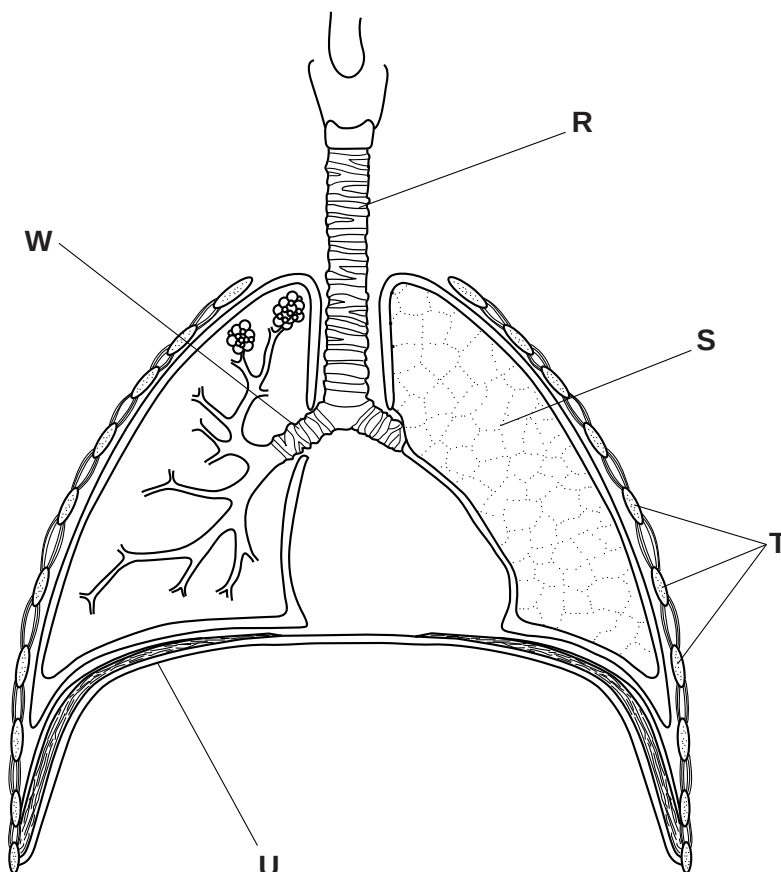


Fig. 8.1

- (a) Name the structures labelled **R** to **W**.

R

S

T

U

W

[5]

- (b) Describe how muscles cause movements of the thorax when we breathe in.

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..... [5]

- (c) A student used the apparatus shown in Fig. 8.2 to investigate the differences between inspired and expired air.

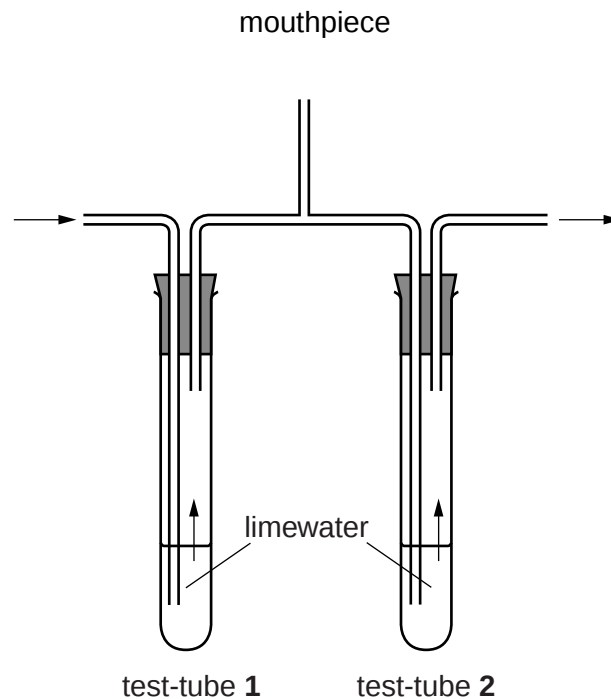


Fig. 8.2

The student breathed in and out through the mouthpiece. The design of the apparatus meant that air moved in through test-tube 1 and out through test-tube 2, as shown.

After about ten breaths, the limewater in test-tube 2 went cloudy.

- (i) State what you can conclude about the composition of expired air, compared to inspired air.

.....

.....

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..... [2]

- (ii) Explain why it was important that the student did not remove the mouthpiece while breathing in and out of the apparatus.

.....

..... [1]

- (iii) After several more breaths, the limewater in test-tube **1** started to go slightly cloudy. Explain why this is so.

.....

.....

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..... [2]

[Total: 15]

- 9 The group of plants known as legumes are important crop plants and their seeds are a good source of protein.

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The soybean plant shown in Fig. 9.1 is a legume. Proteins are made by the plant and then transferred to the seeds.

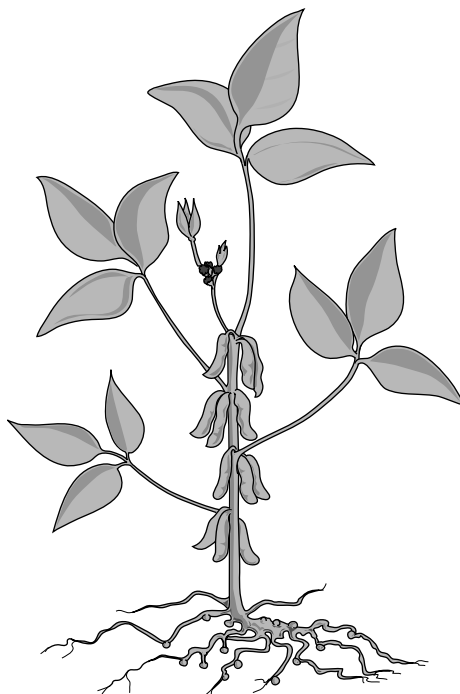


Fig. 9.1

- (a) Explain how the roots and leaves of the soybean plant are involved in the production of protein.

- (i) roots

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..... [5]

(ii) leaves

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..... [5]

- (b) Cereal plants, such as wheat, rice and maize, produce grain that does not contain as much protein as the seeds of soybean, but contain large quantities of carbohydrates.

These cereals are staple foods in the human diet as they provide carbohydrates.

Describe the roles of carbohydrates in human nutrition.

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..... [5]

[Total: 15]

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Write your answers in the spaces provided.

- (a)** Describe the effects of heroin on the body.

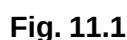
[6]

- [6]

- [3]

[Turn over
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- The concentration of antibodies against measles was measured at intervals after vaccination for 65 days. The results are shown in Fig. 11.1.



- *between day0 and day40*

[illegible]

- *from day 40 onwards*

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[12]

- (b) At day 60, the person is exposed to a different infectious organism to which they have **not** been previously exposed. Draw a line on Fig. 11.1 to show what would happen to the number of antibodies in the blood after exposure to this different infectious organism.

[3]

[Total: 15]

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