



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
NAME

CENTRE
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NUMBER

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HUMAN AND SOCIAL BIOLOGY

5096/23

Paper 2

May/June 2012

2 hours

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

Do not use staples, paper clips, highlighters, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

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

Section A

Answer **all** questions.

You are advised to spend no longer than 1 hour on Section A.

Section B

Answer **both** questions.

Section C

Answer **either** question **9** or question **10**.

At the end of the examination fasten all your work securely together.

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		
Section A sub-total		
7		
8		
Section C		
9	10	
Total		

This document consists of **21** printed pages and **3** blank pages.



Section A

Answer **all** the questions in this section.

Write your answers in the spaces provided.

- 1 (a) Fig. 1.1 shows a diagram of a section through the heart.

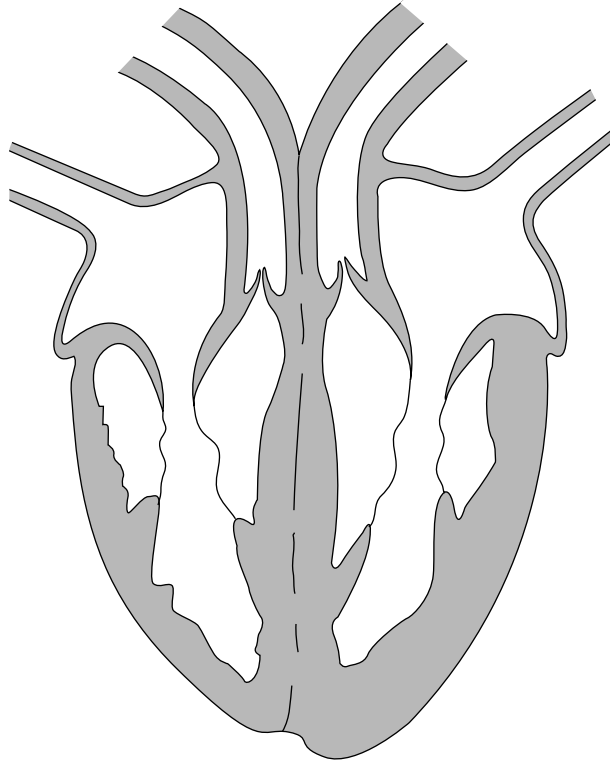


Fig. 1.1

Use label lines and the letters **A**, **B** and **C** to identify the pulmonary artery, the bicuspid valve and a semi-lunar valve on Fig. 1.1.

- A:** pulmonary artery
- B:** bicuspid valve
- C:** semi-lunar valve

[3]

- (b) The volume of blood pumped out by the left ventricle when it contracts is called **stroke volume**.

In an investigation a student at rest had a heart beat rate of 70 beats per minute and the volume of blood pumped out by the left ventricle was 5.6 dm^3 per minute.

- (i) Calculate the stroke volume at rest for this student.

Show your working.

answer = [2]

The student then took some mild exercise and the volume of blood pumped out by the left ventricle rose to 9.3 dm^3 per minute.

- (ii) Describe how the action of the heart altered to increase the volume of blood pumped out per minute.

.....
.....
.....
..... [2]

- (c) Fig. 1.2 shows how the blood of the student was distributed to parts of the body and during mild exercise.

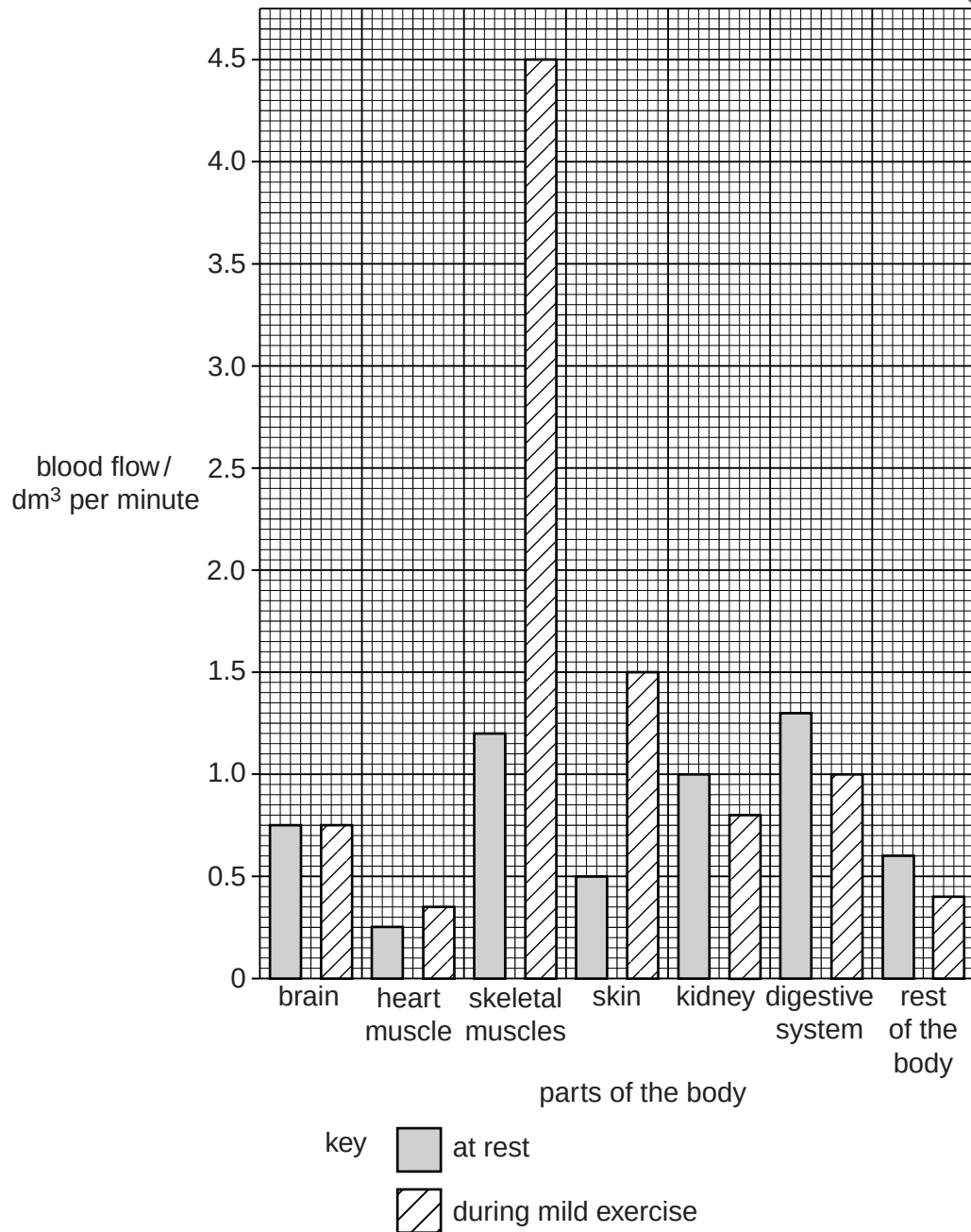


Fig. 1.2

- (i) Using the information in Fig. 1.2, state the volume of the student's blood that flowed to the **skeletal muscles** at rest and during mild exercise.

blood flow at rest dm^3 per min

blood flow during mild exercise dm^3 per min

[2]

- (ii) Explain why the blood flow to the **skeletal muscles** needs to increase during exercise.

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..... [4]

- (iii) Using the information in Fig. 1.2, express the increase in blood flow to the **skin** during mild exercise as a percentage of the level at rest.

Show your working.

answer = % [2]

- (iv) Explain why the blood flow to the **skin** needs to increase during mild exercise.

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.....

..... [3]

- (v) Suggest why the blood flow to the **digestive system** is reduced during exercise **but** the blood flow to the **brain** remains unchanged.

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..... [2]

- 2 Fig. 2.1 shows two chips that were cut from the same yam. They were blotted dry and weighed. They both had the same mass of 60 g.

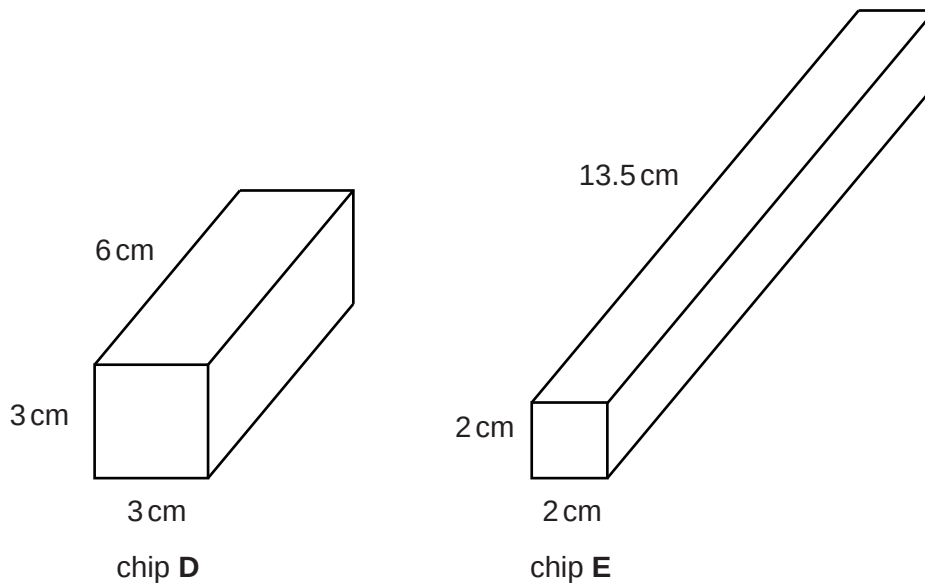


Fig. 2.1

Both chips were placed in distilled water for ten minutes.

They were then taken out of the water, blotted dry and re-weighed. The results are shown in Table 2.1.

Table 2.1

chip	original mass/g	mass after ten minutes in distilled water /g
D	60	70
E	60	78

- (a) (i) Explain why the mass of both chips increased.

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..... [3]

(ii) Explain why chip **E** gained more mass than chip **D** during the ten minutes.

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.....[2]

Fig. 2.2 shows a photograph of some red blood cells immersed in plasma as seen with a microscope.



Fig. 2.2

(b) Name the chemical that gives the cells their red colour.

.....[1]

(c) A student extracted some of these cells and placed them on a slide in distilled water. After three minutes the student looked at the slide using a microscope. No cells were visible, but the surrounding liquid was coloured pink.

Deduce and explain what had occurred to the cells during the three minute period.

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.....

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.....[3]

[Total: 9]

3 The **gestation period** is the duration of pregnancy.

Table 3.1 gives the average body mass and gestation period for some mammals.

Table 3.1

mammal	body mass/kg	gestation period /days
rat	0.3	21
rabbit	1.0	31
cat	1.5	56
dog	5.0	70
human	60.0	266
horse	1000.0	336
rhinoceros	3000.0	480
elephant	5000.0	624

The data for the rat, rabbit, dog, horse and elephant have been entered on Fig. 3.1 opposite.

(a) Complete Fig. 3.1 by

- labelling the y-axis,
- inserting the data for the cat, human and rhinoceros.

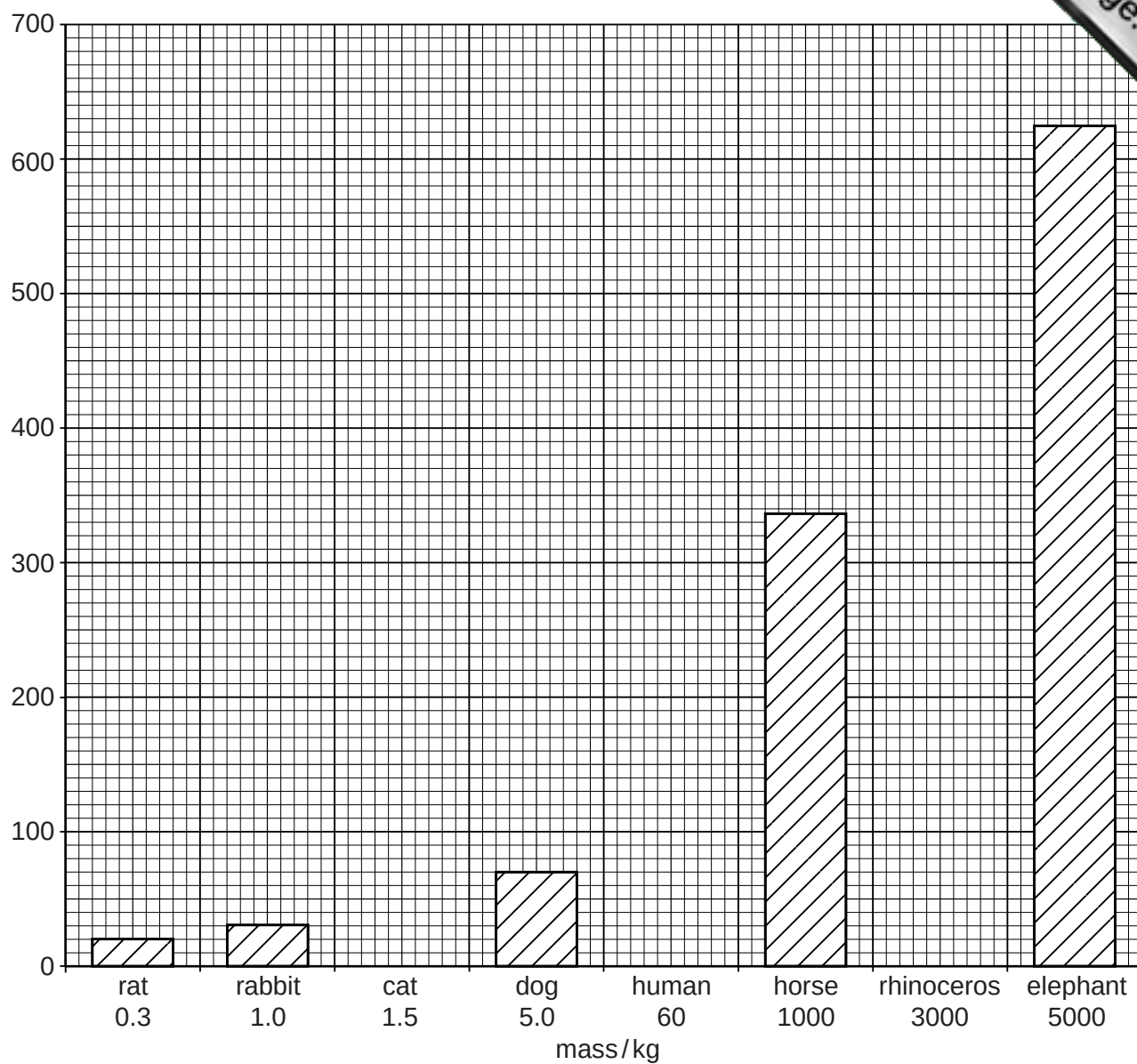


Fig. 3.1

[5]

(b) Outline **two** conclusions that can be deduced from Fig. 3.1.

1.
2.

[2]

[Total: 7]

- 4 Some scientists developed an artificial fat that they called **lipoleum**.

Lipoleum has a similar structure to a natural fat, but it cannot be digested by enzymes in the body.

In an investigation, a student ate identical sized pieces of a natural fat and lipoleum.

- (a) Describe what happens to **both** fats while they are in the mouth.

.....
.....
.....
..... [2]

The student then swallowed the fats and they passed along the alimentary canal.

- (b) (i) Describe **one** change that would occur to **both** fats while they are in the duodenum **and** explain how this change is brought about.

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.....
.....
..... [2]

- (ii) State **one** change that will occur to the natural fat when it is in the duodenum that will **not** affect lipoleum.

.....
.....
.....
..... [2]

- (iii) Suggest **three** advantages to human health of including lipoleum in the diet.

advantage 1
.....
advantage 2
.....
advantage 3
..... [3]

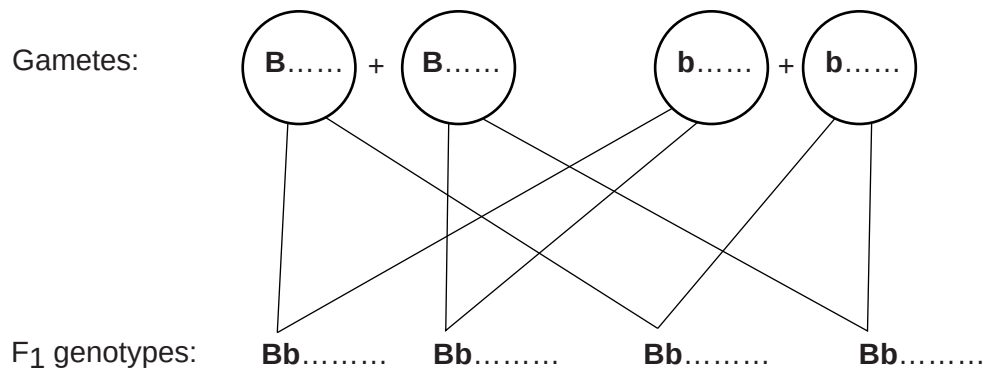
- 5 In mice, the allele for black fur is dominant to the allele for white fur. Sex in mice is determined in the same way as in humans.

Fig. 5.1 shows how fur colour is inherited when a male mouse with black fur is crossed with a female mouse with white fur.

For fur colour, the dominant allele is represented by **B** and the recessive allele is represented by **b**.

Parental phenotypes: male with black fur x female with white fur

Parental genotypes: **BB**..... x **bb**.....



F₁ phenotypes: black fur black fur black fur black fur

F₁ sexes

Fig. 5.1

Half the offspring are male and half are female.

On the dotted lines in Fig. 5.1, insert

- symbols for the sex chromosomes in all the stages,
- words for the sexes in the F₁ generation.

[4]

[Total: 4]

- 6 A group of students carried out an investigation into reaction times.

The test involved a student catching a ruler as shown in Figs. 6.1 and 6.2.

Fig. 6.1 shows a student ready to catch a ruler.

Fig. 6.2 shows a ruler after it had been caught.

The position of the thumb on the ruler when it had been caught was the number recorded. This is an indication of the reaction time.

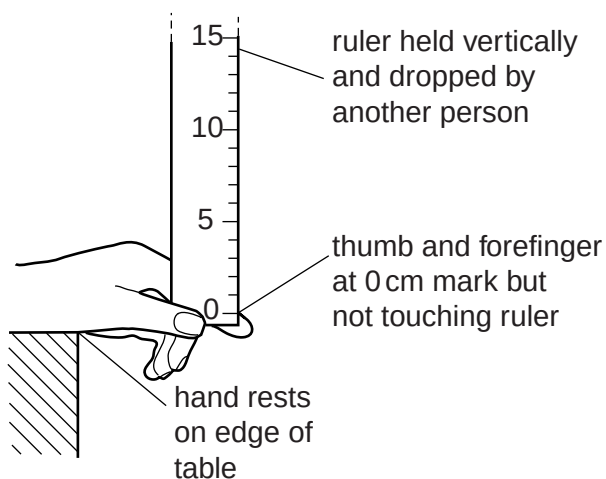


Fig. 6.1

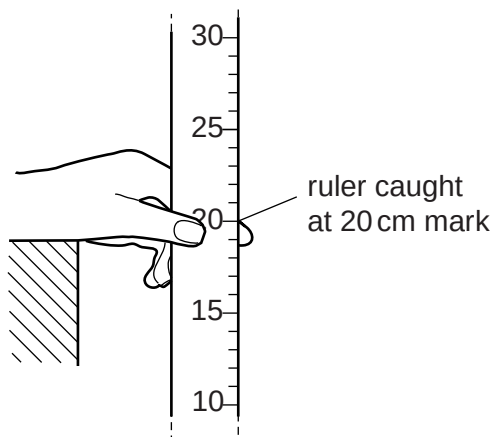


Fig. 6.2

Each student carried out the test ten times. The mean results were calculated.

- (a) (i) Explain the importance of repeating the test and obtaining a mean result.

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..... [2]

Table 6.1 gives the mean results for five female students.

Table 6.1

student	mean distance dropped before ruler caught/cm
F	18
G	19
H	19
J	20
K	18

(ii) State **one** conclusion that can be drawn from the results shown in Table 6.1.

.....
 [1]

The investigation was repeated with five male students.

The students predicted that the reaction times would be increased as their bodies were larger.

(b) (i) Explain the reasoning that led them to this prediction.

.....

 [2]

The mean results for the male students are given in Table 6.2.

Table 6.2

student	mean distance dropped before ruler caught/cm
L	15
M	14
N	15
P	14
Q	13

(ii) Suggest a reason for these results.

.....
 [1]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

- 7 (a)** How is nervous control different from hormonal control?

[3]

- (b)** Describe the roles played by oestrogen and progesterone in the control of the menstrual cycle.

oestrogen

progesterone [7]

15

(c) State the main events that occur in the three stages of birth.

first stage

.....

.....

.....

second stage

.....

.....

third stage

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..... [5]

[Total: 15]

8 (a) (i) Name the pathogen that causes malaria.

..... [1]

(ii) Explain how the pathogen enters the body of a human.

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..... [4]

(b) State **five** methods that are used to control the spread of malaria.

For each method, explain why it is effective.

method 1.....

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explanation

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method 2.....

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explanation

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method 3.....

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explanation

.....

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method 4.....

.....

explanation

.....

.....

method 5.....

.....

explanation

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[10]

[Total: 15]

Section C

Answer **either** question 9 **or** question 10.

Write your answers in the spaces provided.

- 9 (a)** How is inspired air different from expired air?

[3]

- (b)** Describe and explain how air from the lungs reaches the atmosphere when a person breathes out.

[7]

(c) Cigarette smoke contains many different chemicals. One of these is nicotine.

Explain how nicotine causes damage to the arterial system.

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..... [5]

[Total: 15]

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- (c) (i) Tissue fluid is formed at the capillary.

State the functions of tissue fluid.

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.....[3]

- (ii) Outline what happens to the tissue fluid that does **not** return to the capillary.

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.....[2]

[Total: 15]

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