



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
NAME

CENTRE
NUMBER

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HUMAN AND SOCIAL BIOLOGY

5096/21

Paper 2

May/June 2011

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 B sub-total | |
| 9 | 10 |
| Total | |

This document consists of **22** printed pages and **2** blank pages.



Section A

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

Write your answers in the spaces provided.

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- 1 (a) Fig. 1.1 shows a photograph of blood as seen under the microscope.

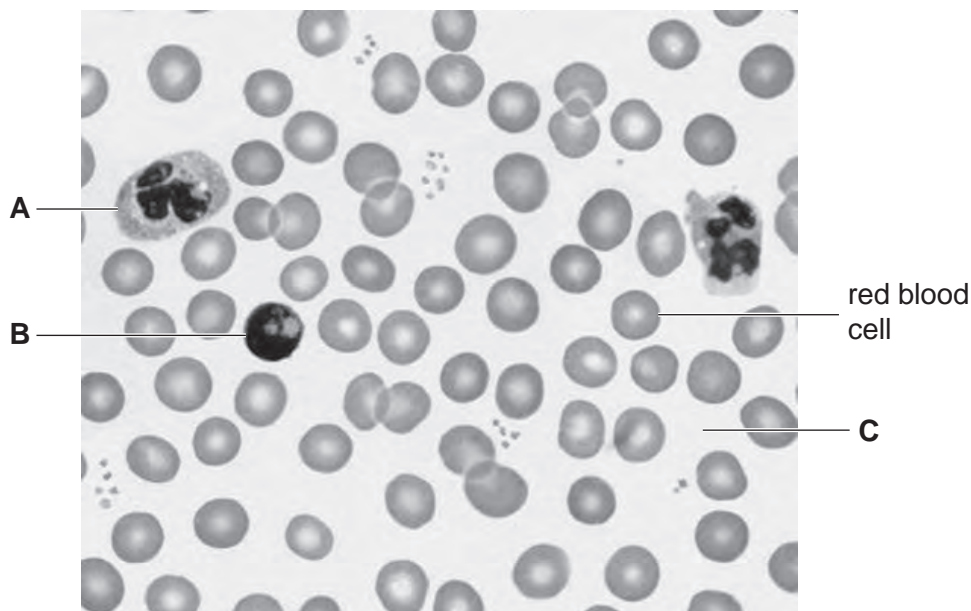


Fig. 1.1

- (i) Red blood cells transport oxygen.
State another function of red blood cells.

..... [1]

- (ii) Complete the table by naming **A**, **B** and **C** and stating a function for each.

| | name | function |
|----------|------|----------|
| A | | |
| B | | |
| C | | |

[6]

- (b) When the skin is cut the blood forms a clot.

State **two** functions that a blood clot performs.

1.

2. [2]

A scientist carried out an investigation into some aspects of the circulatory systems of four students, **D**, **E**, **F** and **G** while they were resting. The following measurements were taken:

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- haemoglobin content of the blood,
- oxygen content of oxygenated (arterial) blood,
- oxygen content of deoxygenated (venous) blood,
- the volume of blood pumped out by the heart at each beat (cardiac output).

The results are shown in Fig. 1.2.

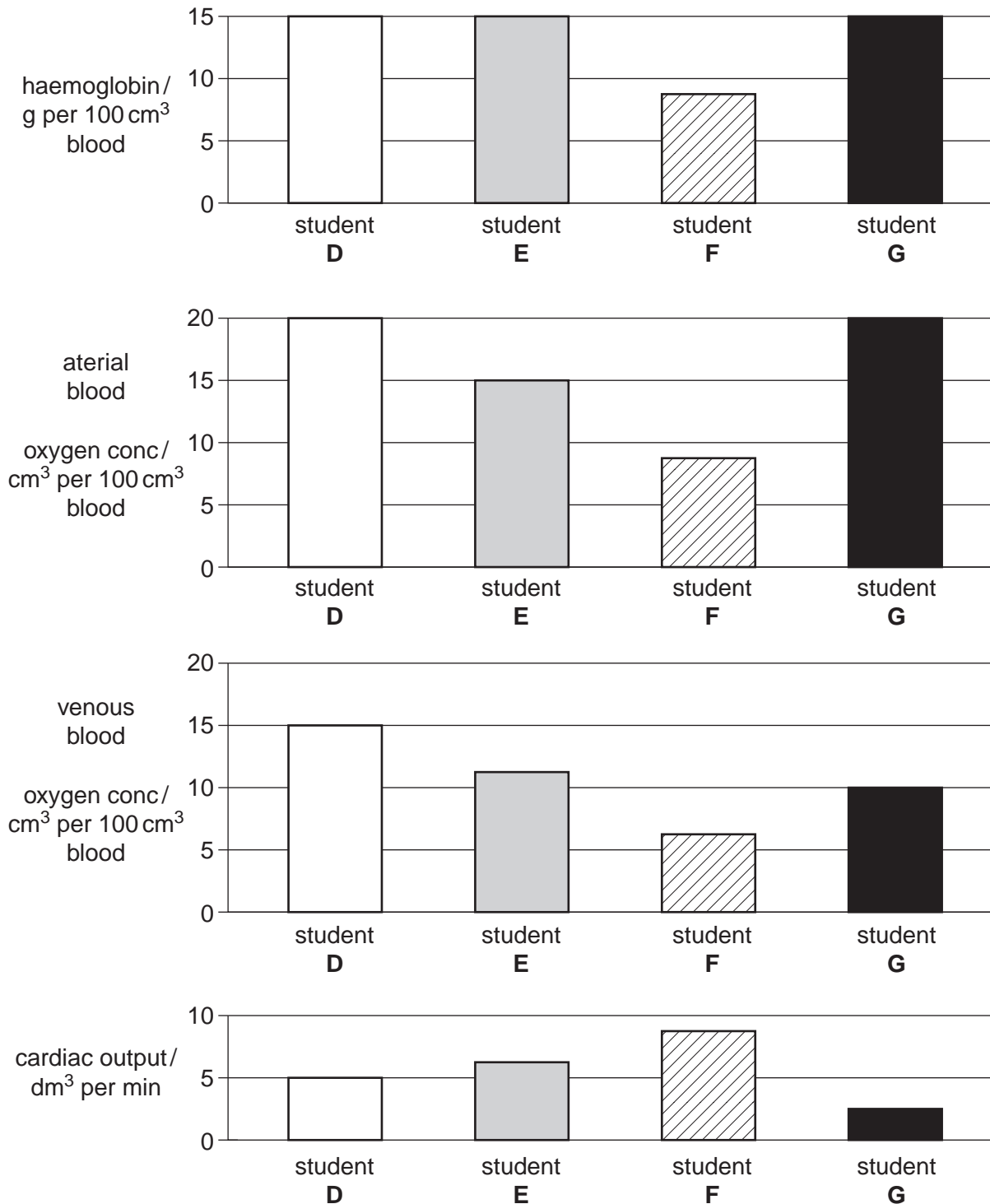


Fig. 1.2

Use the information from Fig. 1.2 to answer questions (c) to (f).

- (c) Student **D** has figures within the normal range.
As blood flows through the capillaries, oxygen will be lost to the tissues.

Calculate the percentage loss of oxygen as blood flows through the capillaries of student **D**.

Show your working.

answer = % [2]

Hypoxia is a condition where the availability of oxygen to the tissues is reduced. Students **E**, **F** and **G** all suffer from hypoxia, but for different reasons.

- (d) (i) The scientist suspected that student **F** was not obtaining enough iron from his diet. Explain the evidence for this.

.....

 [2]

- (ii) Using **only** evidence from Fig. 1.2, suggest how student **F**'s body is compensating for the results of his iron shortage.

.....
 [1]

- (e) Student **G**'s heart is pumping less efficiently than that of student **D**. Give **two** pieces of evidence from Fig. 1.2 to support this statement.

1.

 2.
 [2]

2 Fig. 2.1 shows the human digestive system.

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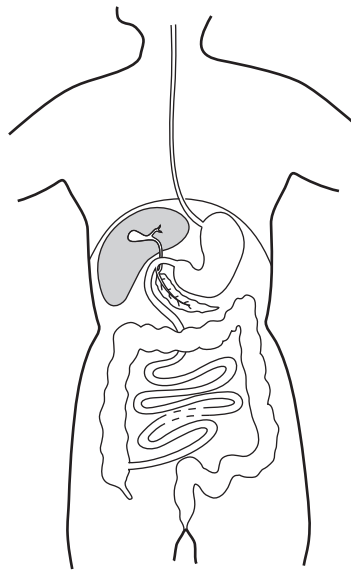


Fig. 2.1

(a) Use label lines and the letters **N** and **P** to indicate the areas of the alimentary canal where amino acids are absorbed and where most water is absorbed.

N: amino acids absorbed
P: most water absorbed

[2]

(b) Explain why chewing food is important in digestion.

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

(c) State the importance to health of having acid conditions in the stomach.

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

[Total: 6]

- 3 Fig. 3.1 shows a horizontal section through the eye of a student who is looking at a distant object in dim light.

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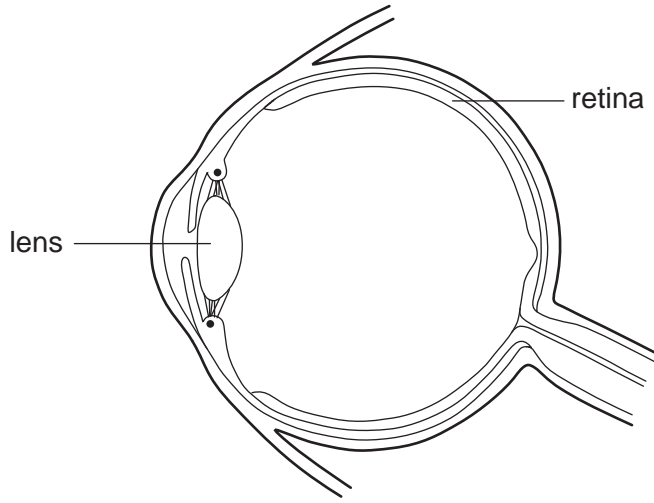


Fig. 3.1

- (a) Use label lines and the letters **L** and **M** to identify the blind spot and the cornea in Fig. 3.1.

L: blind spot

M: cornea

[2]

- (b) The student then focuses on an object that is close to the eye and in very bright light.

- (i) Describe what happens to the shape of the lens when the student does this.

.....
..... [1]

- (ii) Describe how this change to the lens is brought about.

.....
.....
.....
.....
.....
..... [3]

(iii) Describe the change that occurs in response to the very bright light.

.....
..... [1]

(iv) Explain how this change is brought about.

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

[Total: 9]

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- 4 The effect of nitrate fertiliser on the growth of maize crops was investigated. Six similar fields used for growing maize were treated with different quantities of nitrate fertiliser. The quantities of fertiliser added and the crop yields are shown in Table 4.1.

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Table 4.1

| field | nitrate fertiliser added/ kg per hectare | crop yield/ kg per hectare |
|-------|---|-------------------------------|
| 1 | 0 | 2200 |
| 2 | 40 | 6000 |
| 3 | 80 | 8200 |
| 4 | 120 | 8800 |
| 5 | 140 | 9000 |
| 6 | 200 | 9200 |

- (a) Complete Fig. 4.1 by drawing a line graph to show the relationship between the quantities of fertiliser added and the crop yield. Label the axes including units.

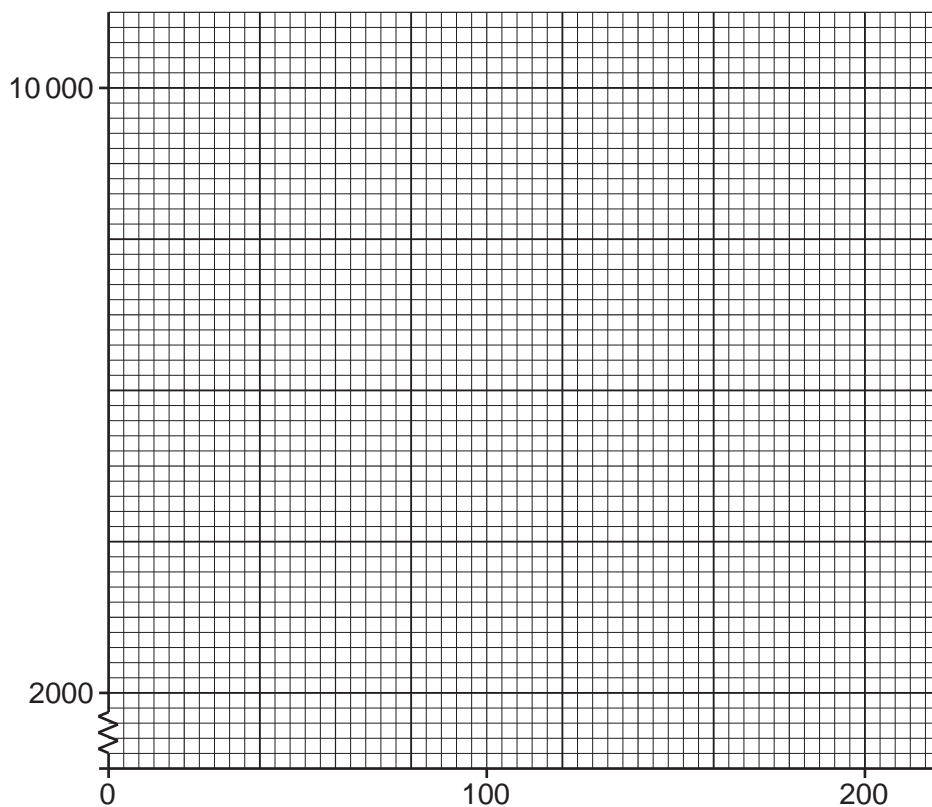


Fig. 4.1

[4]

(b) State a reason why the addition of nitrate fertiliser increases crop yields.

.....
..... [1]

(c) A farmer has two fields of the same size on which he is going to grow maize. He can afford to buy enough fertiliser to apply it at the rate of 40 kg per hectare.

Deduce **and** explain why it would be better to apply nitrate fertiliser at the rate of 40 kg per hectare to both fields, rather than at the rate of 80 kg per hectare to just one field.

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.....
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..... [3]

[Total: 8]

- 5 A student carried out an investigation on houseflies.

A covered glass dish containing nutrient agar jelly was prepared under sterile conditions. A housefly was put into the dish and left there for ten minutes with the lid closed. During this time it walked over the agar jelly and showed feeding behaviour. Afterwards the fly was removed, the lid replaced and the dish was incubated at 30°C for several days. The results are shown in Fig. 5.1.

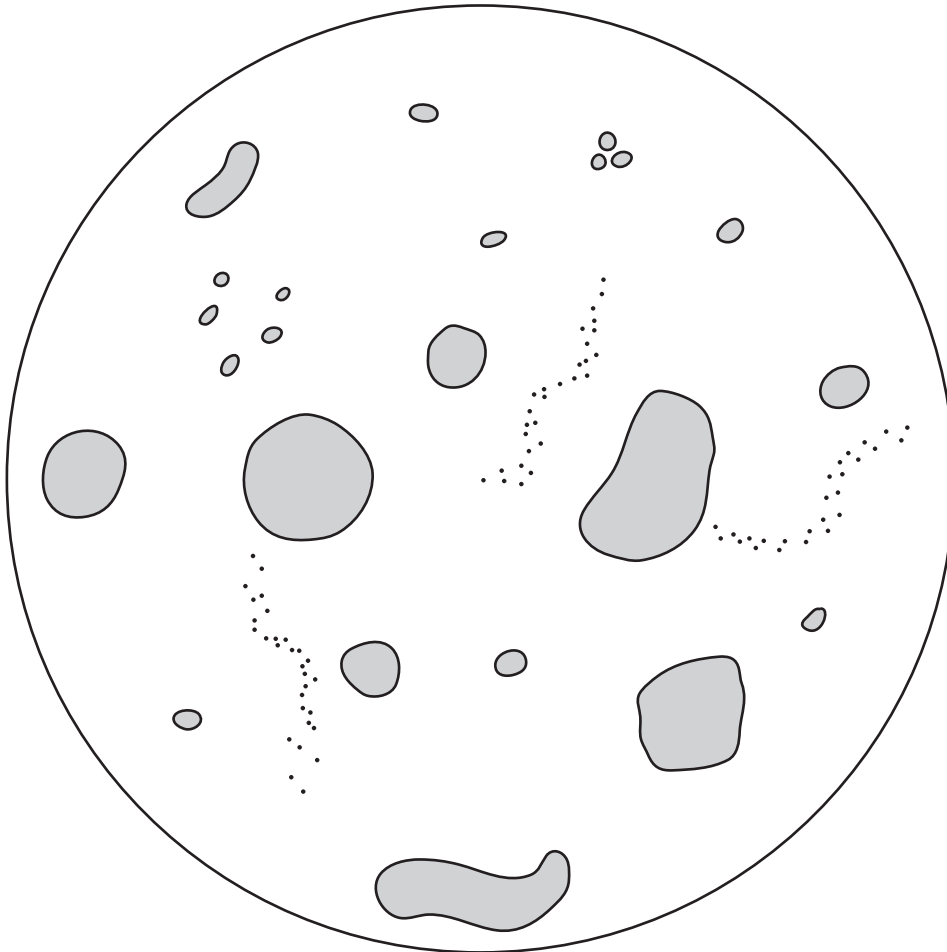


Fig. 5.1

- (a) (i) State what has grown on the surface of the agar jelly.

.....[1]

6 Fig. 6.1 shows the relationship between body height and mass in humans.

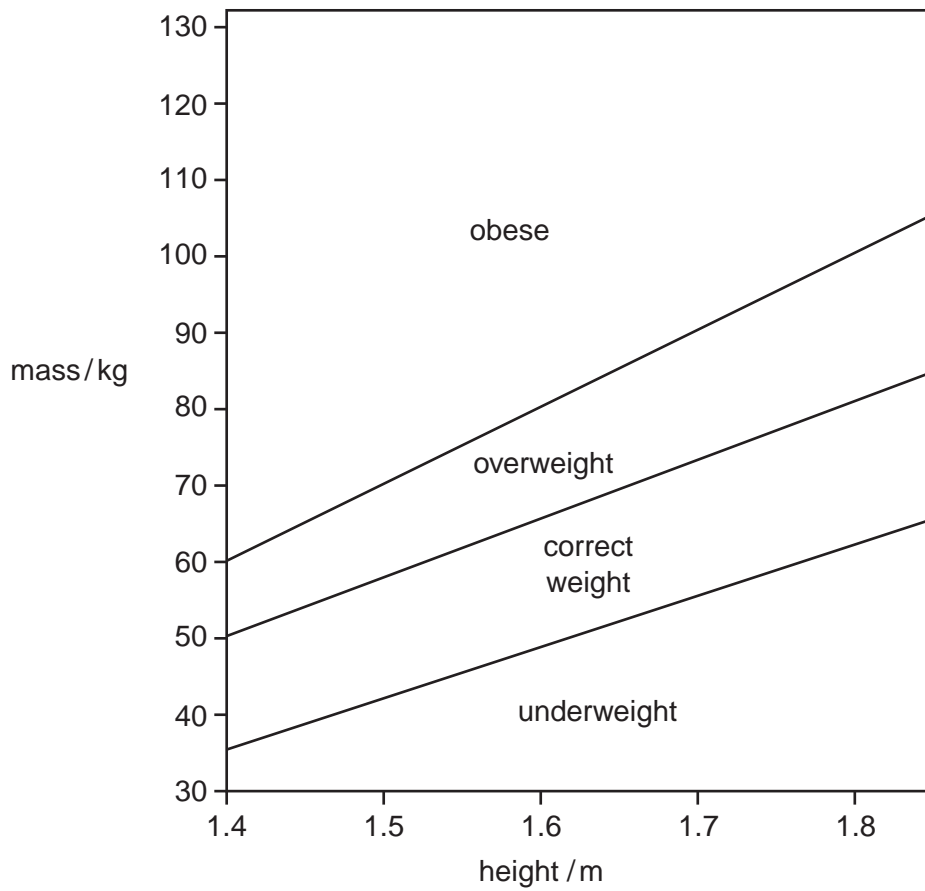


Fig. 6.1

The heights and masses of three students are:

| | |
|------------------|------------------|
| student H | 1.80 m and 80 kg |
| student J | 1.50 m and 73 kg |
| student K | 1.75 m and 75 kg |

(a) State which student is obese.

.....[1]

- (b) Table 6.1 gives information about the energy and nutrients provided by 1 kg of six types of foods.

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| food | energy /kJ | protein/g | fat/g | carbohydrate /g | vitamin A /mg | vitamin C /mg | vitamin D /mg |
|-----------------|------------|-----------|-------|-----------------|---------------|---------------|---------------|
| eggs | 6700 | 120 | 124 | 0 | 3000 | 0 | 15 |
| oily fish | 9700 | 166 | 180 | 0 | 450 | 0 | 220 |
| cheese | 16 100 | 254 | 311 | 0 | 4200 | 0 | 4 |
| leafy vegetable | 1100 | 27 | 0 | 38 | 50 | 600 | 0 |
| milk | 2900 | 31 | 39 | 50 | 440 | 20 | 2 |
| beef | 13 100 | 145 | 280 | 0 | 0 | 0 | 0 |

Table 6.1

- (i) Name **two** foods in Table 6.1 that should be avoided if the student identified in (a) wished to reach an acceptable body mass.
 [1]
- (ii) State which food in Table 6.1 would give the most protection against rickets.
 [1]
- (iii) Name the food in Table 6.1 that would best promote the healing of wounds.
 [1]
- (c) It is important that the diet contains enough fibre (roughage) to prevent constipation. What is fibre?

 [1]

[Total: 5]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

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- 7 Describe how the body maintains a constant temperature under the following headings: heat gain, heat retention and heat loss.

heat gain

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..... [3]

heat retention

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..... [7]

(c) State **two** other categories of disease and give an example of each one.

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.....

.....

..... [4]

[Total: 15]

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