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5096/21

October/November 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** the 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.

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1		
2		
3		
4		
5		
6		
Section A sub-total		
7		
8		
Section C		
9	10	
Total		

This document consists of **18** 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 two gametes: a sperm cell and an egg cell.

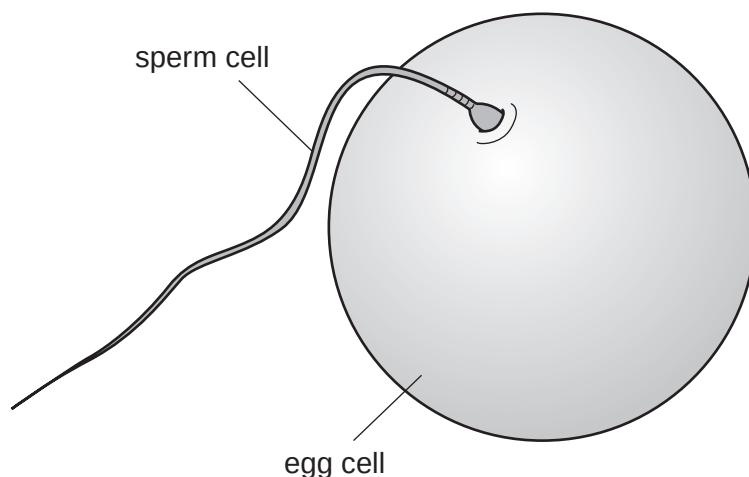


Fig. 1.1

- (i) State **one** way in which both of these cells differ from other cells of the body.

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

- (ii) Suggest an advantage of the egg cell being larger than the sperm cell.

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

- (iii) A fertilised egg divides into a ball of cells and becomes attached to the lining of the uterus.

Explain why it is important that this ball of cells soon becomes attached to the lining of the uterus.

.....
.....
.....
.....
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.....
.....
.....
.....
..... [4]

Fig. 1.2 shows a developing fetus inside its mother's body.

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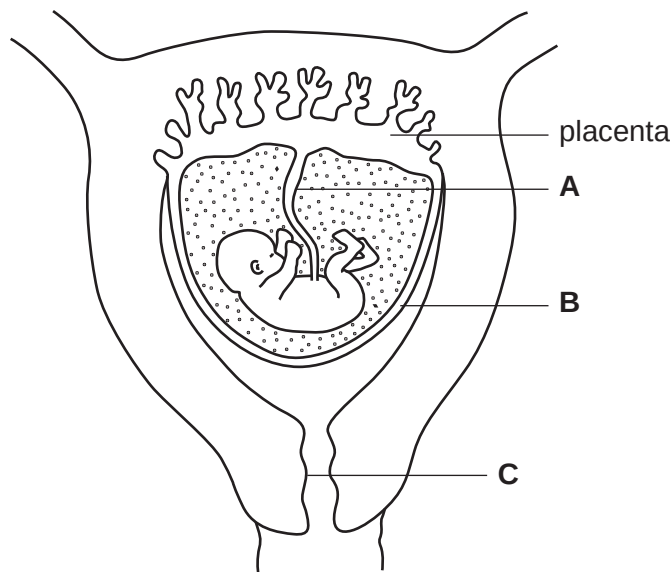


Fig. 1.2

(b) (i) Identify the parts labelled **A**, **B** and **C**.

A.....

B.....

C..... [3]

(ii) State what causes blood to flow along **A**.

..... [1]

(iii) State a function of the fluid inside structure **B**.

..... [1]

(iv) State **two** substances which pass from the mother to the fetus, and **two** waste substances which pass from the fetus to the mother.

from mother to fetus

1.

2. [2]

from fetus to mother

1.

2. [2]

(c) The placenta acts as a barrier keeping the blood of the mother and the fetus separate.

(i) Suggest why the blood of the mother is separated from the blood of the fetus.

.....

 [2]

(ii) Despite the barrier between the maternal and fetal blood systems, some harmful chemical substances may pass from the mother to the fetus.

Suggest one example.

chemical substance..... [1]

(d) After it is born, the baby's main source of food is milk.

Give **two** advantages of feeding a baby on breast milk rather than using milk prepared from milk powder.

1.

 2.
 [2]

[Total: 20]

- 2 Scientists on the International Space Station have carried out experiments on the growth of green plants in space. They have kept the plants in growth chambers and measured the production of biomass over time. Biomass consists of all the biological molecules (excluding water) produced by plants as they grow.

(a) Name the chemical substance that makes the plants green in colour.

.....[1]

(b) Explain why the growth chamber includes a source of light.

.....

.....[2]

(c) Suggest **two** types of substance contained in the biomass produced by the green plants.

.....

.....[2]

[Total: 5]

- 3 Fig. 3.1 is a diagram of some of the muscles and bones of the arm and shoulder.

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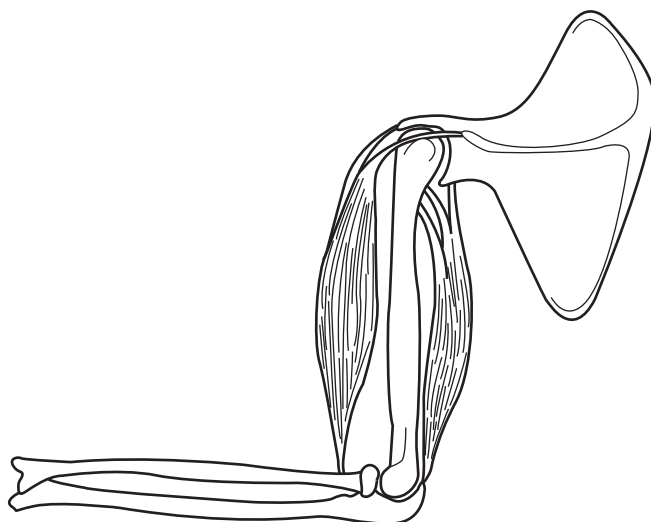


Fig. 3.1

- (a) (i) Name the type of joint at the elbow.

..... [1]

- (ii) State the type of action that this joint allows.

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

- (b) Draw label lines and use the terms **origin** and **insertion** to indicate on Fig. 3.1 the origin and insertion of the biceps muscle. [2]

- (c) Name the structures that attach muscles to bone, and state the tissue that makes up these structures.

name.....

tissue [2]

[Total: 6]

- 4 A student investigated the perception of touch by different areas of the skin. The student recorded the minimum distance between two pins that were perceived by a blindfolded student as two separate points rather than one.

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The results are shown in Table 4.1.

Table 4.1

areas of skin	minimum distance between two points / mm
thumb (palm side)	3
back of hand	21
upper arm	45
tip of big toe (lower surface)	7
upper surface of foot	24
thigh	38

Fig. 4.1 shows results for three areas of skin.

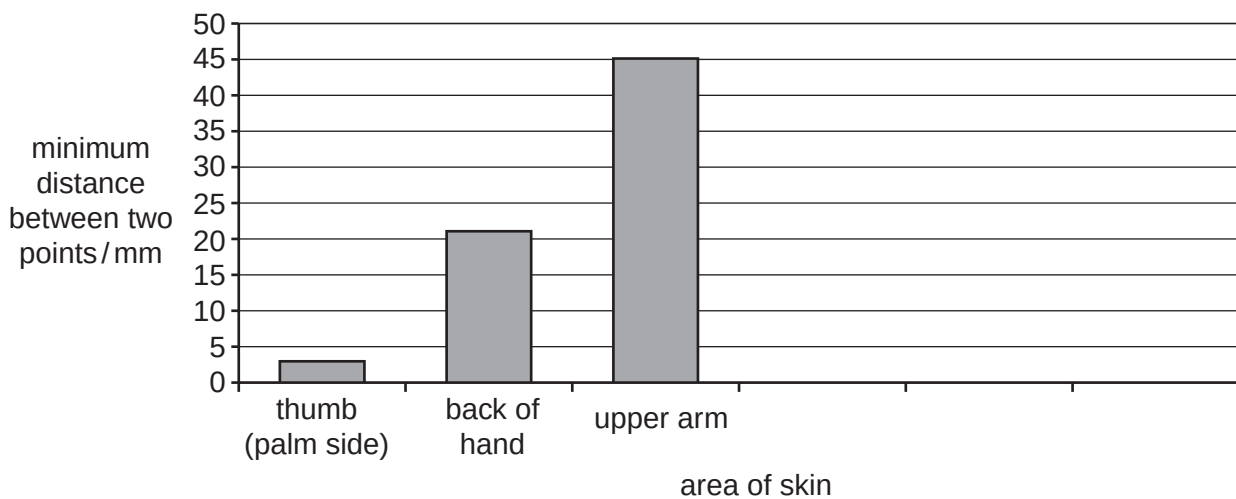


Fig. 4.1

- (a) Use the data in Table 4.1 to complete the bar chart. [2]
- (b) What can you conclude by comparing the result for the thumb with the result for the back of the hand?

.....

.....

.....

.....

.....

..... [2]

- (c) What can you conclude by comparing the results for the parts of the hand with the results for the parts of the foot?

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.....

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.....

.....

.....

.....

.....[2]

[Total: 6]

- 5 Water is an increasingly scarce resource, so water engineers are always looking for new sources and ways to use what is available. It is important to check the purity of water from various sources. For example, sources of water like rivers, lakes and shallow wells may be situated near farmland or factories, whereas boreholes obtain purer water from deep underground.

Microbiological and chemical purity of water can be assessed on a scale of 1 to 5:

- 1 = least pure
- 5 = pure

Table 5.1 shows the range of water purity from different sources.

Table 5.1

source	microbiological purity	chemical purity
rainwater	5	5
river water	1 to 3	1 to 3
lake water	1 to 2	1 to 2
shallow well	2 to 3	3
borehole	5	4

(a) Suggest

- (i) why river water has a lower **chemical** purity than rainwater,

.....
 [1]

- (ii) the conditions under which river water would have a low **microbiological** purity of 1 rather than a higher purity of 3,

.....

 [2]

- (iii) why water from a lake is less pure than water from a river,

.....

 [2]

- (iv) why water from a borehole has a higher **microbiological** purity than water from a shallow well,

.....

.....

.....

..... [2]

- (v) **two** types of chemicals that might contaminate water near a farm or a factory.

1.

2. [2]

- (b) In the past, lead was used to make pipes and storage tanks. Lead has been replaced by copper and plastic because lead dissolves in water.

What effect can dissolved lead have on the body?

.....

..... [1]

[Total: 10]

- 6 Anaemia is the name given to a number of conditions where there is a reduced number of red blood cells in the body. It may be caused by a number of factors:

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- dietary
- parasitic
- sex-related
- genetic

- (a) Explain why people with anaemia feel tired and easily become breathless after a little exercise.

.....

.....

.....

.....

.....

..... [3]

- (b) Explain why a diet that is deficient in iron may cause anaemia.

.....

..... [1]

- (c) Suggest how anaemia may be caused

- (i) during a malarial infection,

.....

- (ii) during an infection by *Schistosoma mansoni*.

..... [2]

- (d) Anaemia may be caused by environmental factors, such as diet and parasites.

Suggest **two non-environmental** reasons why a young woman may suffer from anaemia.

1.

.....

2.

..... [2]

[Total: 8]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

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- 7 (a) Vitamin C, vitamin D and calcium are needed by the body so they are important in the diet. For each of these nutrients, complete Table 7.1 by stating
- (i) a possible food source, [3]
 - (ii) a main use in the body, [3]
 - (iii) the name of a deficiency disease, [3]
 - (iv) a sign or symptom of the resulting condition. [3]

Table 7.1

	vitamin C	vitamin D	calcium
(i) possible food source			
(ii) main use in the body			
(iii) name of deficiency disease			
(iv) sign or symptom			

- (b) Some of the nutrient value in food may be lost as it is prepared for eating.

Describe what can be done to make sure that the vitamins and minerals are conserved.

.....

.....

.....

.....

.....

..... [3]

[Total: 15]

- 8 (a) Explain what is meant by the term *disease*.

.....
 [1]

Typhoid and tuberculosis (TB) are two infectious diseases caused by bacteria.

- (b) Compare these two diseases using the following headings:

- name of causative organism
- method of spread
- control measures and treatment

- (i) typhoid

name of causative organism

.....

method of spread

.....

.....

.....

.....

.....

.....

control measures and treatment

.....

.....

.....

.....

.....

.....

..... [7]

(ii) tuberculosis

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name of causative organism

.....

method of spread

.....

.....

.....

.....

.....

control measures and treatment

.....

.....

.....

.....

.....

.....

.....

..... [7]

[Total: 15]

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

Write your answers in the spaces provided.

- 9** Athletes participating in endurance events, such as running a marathon, often consume a large amount of starchy food shortly before competing. The carbohydrate in this food is used as the energy source for the muscular activity involved.

- (a)** Explain how starch in the food is converted into simple sugars in the alimentary canal.

[6]

- [9]

[Turn over
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- [6]

Explain how oxygen is absorbed from the blood and used by muscle cells.

[illegible]

[9]

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