Write your name here

Surname	Other names

Edexcel Certificate
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Centre Number | | | | | |

Candidate Number | | | | |

Biology

Unit: KBI0/4BI0
Science (Double Award) KSC0/4SC0
Paper: 1B

Wednesday 9 January 2013 – Morning
Time: 2 hours

Paper Reference
KBI0/1B 4BI0/1B
KSC0/1B 4SC0/1B

You must have:
Ruler
Calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 120.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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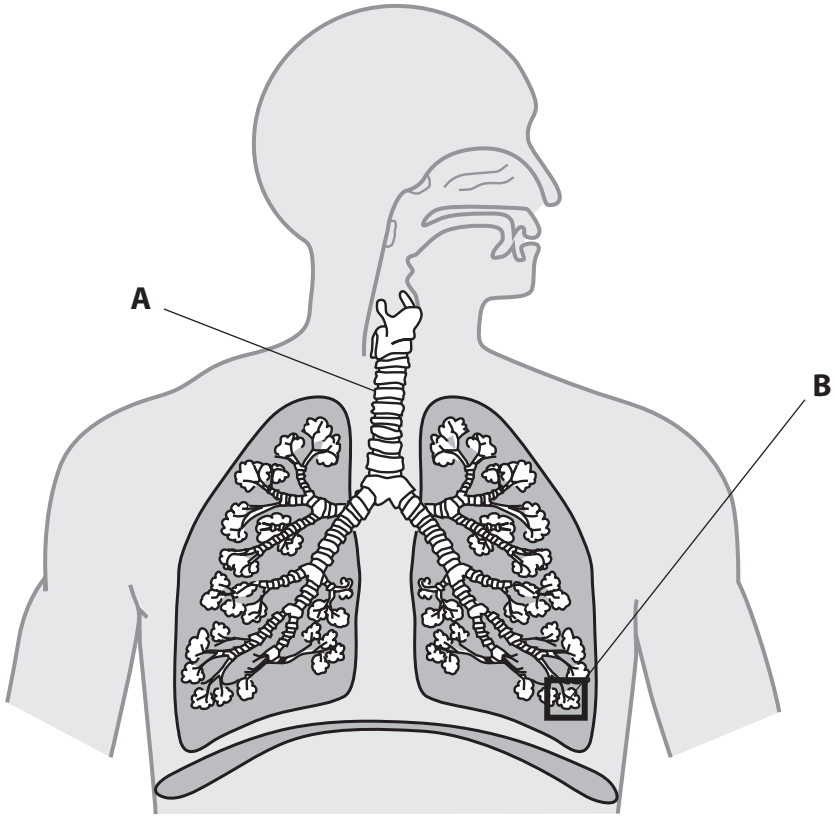
P 4 1 5 3 6 A 0 1 2 8

PEARSON

Answer ALL questions.

1 The diagram shows some structures in the human breathing system.



(a) Name structures **A** and **B**.

(2)

A .....

B .....

(b) The table shows the level of two gases, **X** and **Y**, in blood entering and leaving the lungs during the process of gas exchange.

Gas	Level of gas in cm^3 per 100 cm^3 of blood	
	Blood entering lungs	**Blood leaving lungs**
X	10.6	19.0
Y	58.0	50.0

(i) Name the two gases.

(2)

gas **X** .....

gas **Y** .....

(ii) How much of gas **X** enters 100 cm^3 of blood, before the blood leaves the lungs?

(1)

..... cm^3

(iii) What term is used to describe how the process of gas exchange takes place?

Put a cross ☒ in the box to indicate your answer.

(1)

☒ **A** active transport

☒ **B** diffusion

☒ **C** transpiration

☒ **D** osmosis

(Total for Question 1 = 6 marks)

2 The passage describes selective breeding.

Complete the passage by writing a suitable word in each of the spaces.

(4)

Selective breeding involves ..... choosing organisms

with desired ..... .

These organisms are allowed to breed and produce ..... .

The process is ..... for several generations.

(Total for Question 2 = 4 marks)

3 This food chain shows feeding relationships in paddy fields in Sri Lanka and India.

(a) (i) Name the producer.

(1)

.....

(ii) Name the secondary consumer.

(1)

.....

(b) Give **two** environmental factors that could affect the growth of the rice crop.

(2)

1 .....

2 .....

(c) Suggest why a farmer might choose to use a chemical pesticide in his paddy field.

(2)

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(d) Describe how the farmer could use biological control in his paddy field.

(2)

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(Total for Question 3 = 8 marks)

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4 The photograph shows a variegated leaf. The dark (green) part of the leaf has cells that contain chloroplasts. The white part of the leaf has cells that do not contain chloroplasts.

(a) Describe the role of chloroplasts in leaf cells.

(2)

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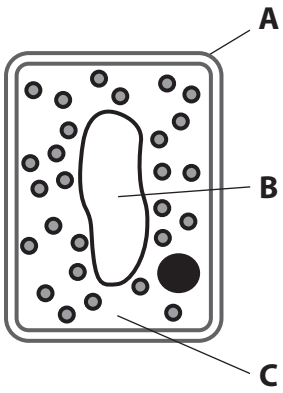
(b) The diagram shows a leaf cell from the green part of the leaf.



Name the parts labelled **A**, **B** and **C**.

(3)

A .....

B .....

C .....

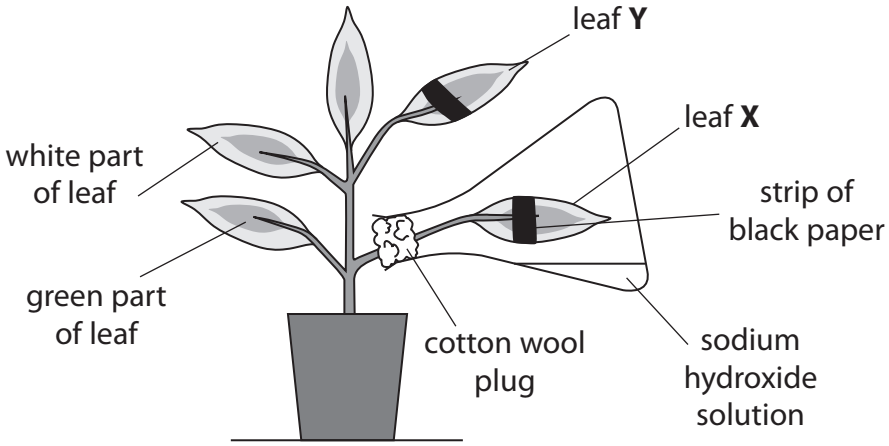
(c) The diagram shows a plant with variegated leaves.

The plant was destarched by leaving it in the dark for 24 hours.

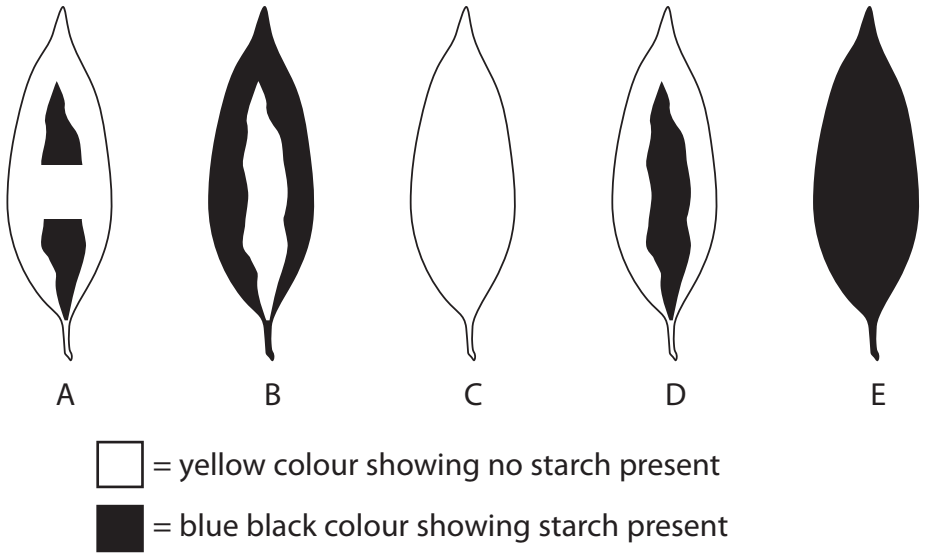
Leaf **X** then had a strip of black paper attached to both the upper and lower surfaces. It was then sealed in a flask containing a solution of sodium hydroxide, a substance that absorbs carbon dioxide.

Leaf **Y** also had a strip of black paper attached to both the upper and lower surfaces.

The plant was then placed in the light for 24 hours and then a starch test was carried out on leaf **X** and leaf **Y**.



The five leaves, A to E, show the possible appearance of leaf **X** and leaf **Y** after the starch test.



(i) Which of the leaves A to E matches the result you would obtain after testing leaf **X** and leaf **Y** for starch?

(2)

leaf **X** .....

leaf **Y** .....

(ii) Explain what happens in a leaf when it is destarched.

(2)

(iii) Describe how the green pigment in leaf cells is removed safely before testing a leaf for the presence of starch.

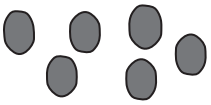
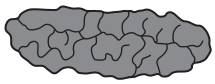
(3)

(iv) Name the chemical used to test for starch.

(1)

(Total for Question 4 = 13 marks)

5 The Bristol scale is used to classify human faeces. It is used to help diagnose patients who have problems with their alimentary canal.

Type 1		separate hard lumps, like nuts
Type 2		sausage-shaped but lumpy
Type 3		like a sausage but with cracks on the surface
Type 4		like a sausage, smooth and soft
Type 5		soft blobs with clear-cut edges
Type 6		fluffy pieces with ragged edges
Type 7		watery, no solid pieces

(a) Suggest why a patient might produce **Type 1** faeces.

(1)

.....

.....

.....

(b) Suggest why a patient might produce **Type 7** faeces.

(1)

.....

.....

.....

(c) Describe how food is moved through the gut.

(3)

(d) Name the part of the gut where faeces are

(i) stored

(1)

(ii) expelled

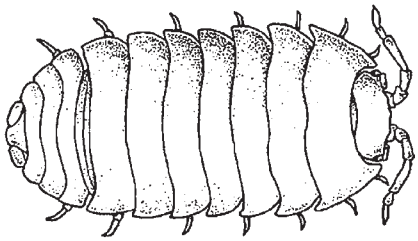
(1)

(e) Explain how egestion differs from excretion.

(3)

(Total for Question 5 = 10 marks)

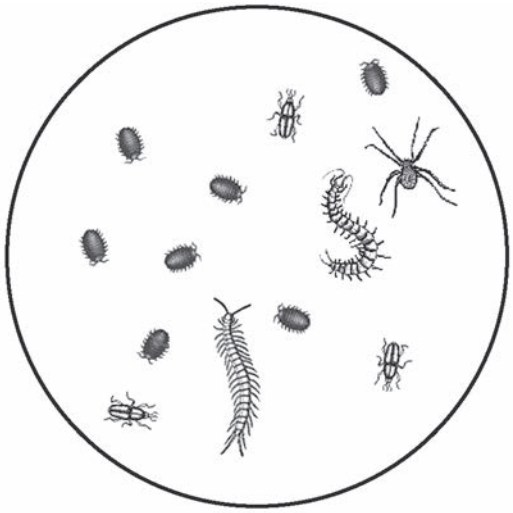
6 A student wanted to investigate the factors that influence the activity of soil organisms in a woodland. She decided to study one species of woodlouse, a small animal found under stones and rotting wood in damp and dark places.



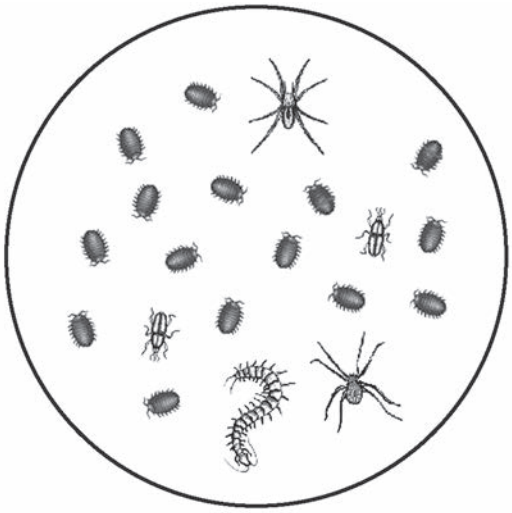
She used a trap to collect organisms in the woodland during the day time and during the night time.

She counted the organisms collected before releasing them.

Day time sample



Night time sample



From the day time sample she produced a table of results.

Organism	Tally	Number
woodlice	𝍸 ||	7
spiders	|	1
centipedes	||	2
beetles	|||	3

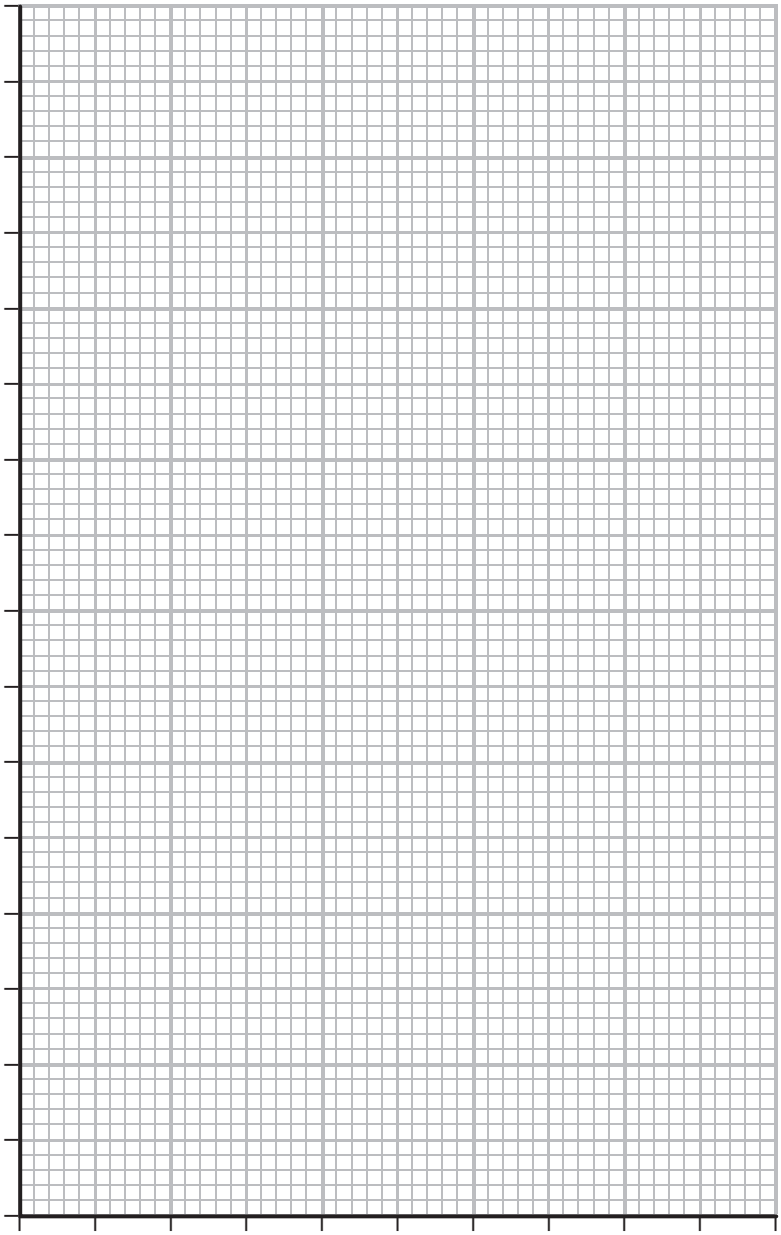
(a) Complete the table below to show the results for the night time sample.

(2)

Organism	Tally	Number
woodlice		
spiders		
centipedes		
beetles		

(b) Use the data from the day time and night time samples to draw a bar chart to compare the number of organisms collected.

(5)



(c) (i) Compare the number of organisms collected during the day time and during night time.

(3)

(ii) Suggest an explanation for the change in the numbers of woodlice.

(2)

(d) The organisms caught in the trap remained there for up to 10 hours before being counted.

Suggest how this might affect the results obtained.

(2)

(e) Ecology involves the study of organisms in their environment.

With reference to the investigation in this question, explain the terms

(i) population

(1)

.....

.....

.....

(ii) community

(1)

.....

.....

.....

(iii) habitat

(1)

.....

.....

.....

(Total for Question 6 = 17 marks)

7 (a) Complete the table to show the characteristic features of the three groups of organisms.

Use a tick (✓) if the group has the characteristic and a cross (×) if the group does not have the characteristic. The first box has been done for you.

(4)

Group	Can carry out photosynthesis	Have a cell wall	Can be pathogenic
bacteria	✓		
fungi			
viruses			

(b) The table below shows some characteristics shared by most animals.

Complete the table by giving the missing characteristics and examples.

(4)

Characteristic	Example
they require nutrition	eating food
they respire	releasing energy from carbohydrate
	some animals can fly
they control their internal conditions	
	increase of the population of foxes
they grow	

(c) Another characteristic shown by animals is the ability to respond to their surroundings. For example, a person may withdraw their hand from a hot object.

Describe the sequence of events that cause this response.

(5)

(Total for Question 7 = 13 marks)

8 Mendel crossed together pure breeding pea plants with purple flowers and pure breeding pea plants with white flowers. The offspring plants all had purple flowers.

(a) Explain which phenotype is dominant.

(2)

(b) In a second cross, the purple offspring plants were self-pollinated (pollen from a flower put on the stigma of the same flower).

Suggest how Mendel made sure that all the purple offspring plants were self-pollinated.

(2)

(c) (i) Use a genetic diagram to show the ratio of plants expected by crossing the purple offspring plants in part (b).

Show the parental genotypes and gametes, and the offspring genotypes and phenotypes. Use **F** and **f** to represent the alleles.

(4)

Parent genotypes

Gametes

Offspring genotypes

Offspring phenotypes

(ii) The plants actually produced in this cross were 36 purple and 8 white flowered plants.

Calculate the ratio of purple to white flowered plants.

(1)

Answer .....

(iii) Suggest why the actual ratio of phenotypes differs from the one predicted by your genetic diagram.

(2)

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(d) A student suggested that purple flowers are more likely to be visited by bees than white flowers.

Use your knowledge of natural selection to suggest how this might affect the number of purple and white flowers in the wild.

(5)

(Total for Question 8 = 16 marks)

9 Fish can be produced in large numbers on fish farms.

Design an investigation to find out if the growth of fish is affected by the temperature of the water in which they are farmed.

(6)

(Total for Question 9 = 6 marks)

10 The table gives statements about blood cells. Some apply to red blood cells and some to white blood cells.

(a) Complete the table by using a tick (✓) or a cross (×) to show if each statement applies to red blood cells or to white blood cells. The first statement has been done for you.

(5)

Statement	Red blood cells	White blood cells
transport oxygen	✓	×
contain a nucleus		
produce antibodies		
biconcave shape		
ingest pathogens		
numbers may increase following infection		

(b) Some athletes preparing for a long distance race train at high altitude for several weeks. The availability of oxygen at high altitude is lower so the body responds by increasing the number of red blood cells. The number of red blood cells remains high when the athletes return to lower altitude to compete.

Explain how having more red blood cells is an advantage to athletes who take part in long distance races.

(4)

(c) A 100 m sprint race takes less than 10 seconds to complete.

Suggest why sprint athletes gain no advantage from training at altitude.

(2)

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(Total for Question 10 = 11 marks)

11 The human kidney removes urea from the blood.

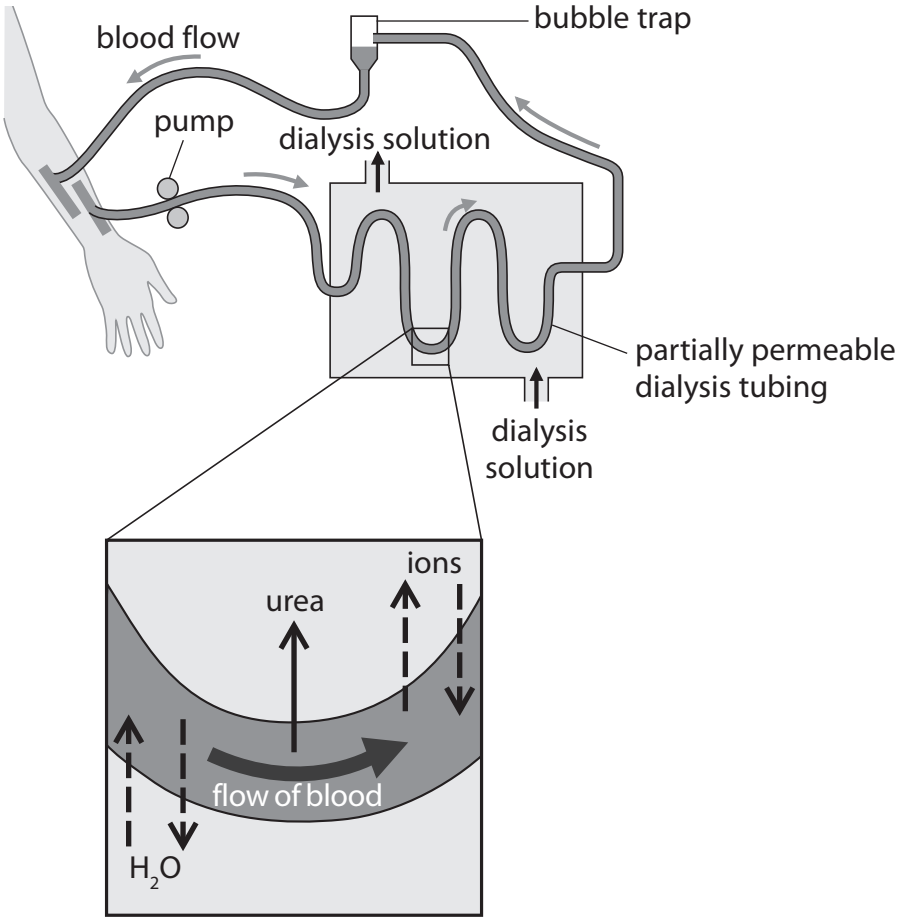
(a) Name **two** other substances the kidney removes from the blood.

(2)

1 .....

2 .....

(b) The diagram shows a simple kidney machine that uses dialysis to remove urea from the blood.



Dialysis allows small molecules to be removed from the blood. This is done by passing the dialysis solution over the tube containing the blood. The small molecules move from a region of high concentration to a region of low concentration.

(i) Give one way in which dialysis is similar to diffusion. **(1)**

(ii) Give one way in which dialysis is similar to osmosis. **(1)**

(iii) Describe how the kidney machine removes urea from the blood. **(2)**

(iv) Another function of the kidney machine is to maintain normal blood glucose concentration.

Suggest how the concentration of glucose in the dialysis solution helps to maintain a normal glucose concentration in the blood. **(2)**

(v) Describe **two** processes that take place in the kidney but not in the kidney machine.

(4)

1 .....

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.....

.....

2 .....

.....

.....

.....

(c) Kidney failure can be treated by transplanting a healthy donor kidney into the patient.

(i) The procedure involves connecting two blood vessels and a tube to the transplanted kidney.

Name the two blood vessels and the tube.

(2)

blood vessel .....

blood vessel .....

tube .....

(ii) Suggest why the transplanted kidney is placed in the lower abdomen instead of in the kidney's usual location.

(2)

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(Total for Question 11 = 16 marks)

TOTAL FOR PAPER = 120 MARKS

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