1 The photographs show an adult insect called an ash borer and an adult insect called a wasp.



ash borer



wasp

Ash borers reproduce by laying eggs which develop into maggots. The maggots eat their way into ash trees and feed on carbohydrates in the trees. This can kill the trees because the root cells lack the carbohydrate needed to release energy for the absorption of mineral ions.

(a) (i) Suggest why the maggots need to feed on carbohydrate.

(1)

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(ii) Name and describe the process used by root cells to absorb mineral ions.

(2)

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(iii) Describe how magnesium ions are used to help trees to grow.

(2)

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(b) Wasps defend themselves from predators by using a sting. This means that predators avoid attacking wasps.

Ash borers look very similar to wasps.

Use your knowledge of natural selection to explain why ash borers have evolved to look like wasps.

(4)

(Total for Question = 9 marks)

2 The table shows the percentage of protein, fat and minerals found in the same mass of meat from different animals.

Meat	Protein (%)	Fat (%)	Minerals (%)
beef	19.0	17.0	0.9
chicken	21.0	2.5	1.1
lamb	17.5	20.0	1.0
pork	16.0	25.0	0.9
rabbit	21.0	3.5	1.5

(a) (i) Which meat contains the least protein?

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(1)

(ii) Calculate how many grams of protein are present in one kilogram of rabbit meat. Show your working.

(2)

Answer ..... g

(b) Which type of meat would provide the most energy?

(1)

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(c) Give **two** uses of fat in the human body.

(2)

1 .....

2 .....

(d) Name the mineral in meat that is needed to make haemoglobin.

(1)

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(Total for Question = 7 marks)

3 Complex carbohydrates are broken down in the human digestive system.

(a) Name the elements present in a carbohydrate molecule.

(1)

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(b) Starch and glucose are carbohydrates found in living organisms.

Complete the table to show some of the properties of starch and glucose.
Insert a tick (✓) if the property applies or a cross (✗) if it does not.

(5)

Carbohydrate	Soluble in water	Found in animal cells	Broken down by amylase	Small molecule	Absorbed in the stomach
starch					
glucose					

(c) (i) Describe how you could test for the presence of glucose in a substance.

(3)

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(ii) Give **two** safety precautions you would take when carrying out the test.

(2)

1 .....

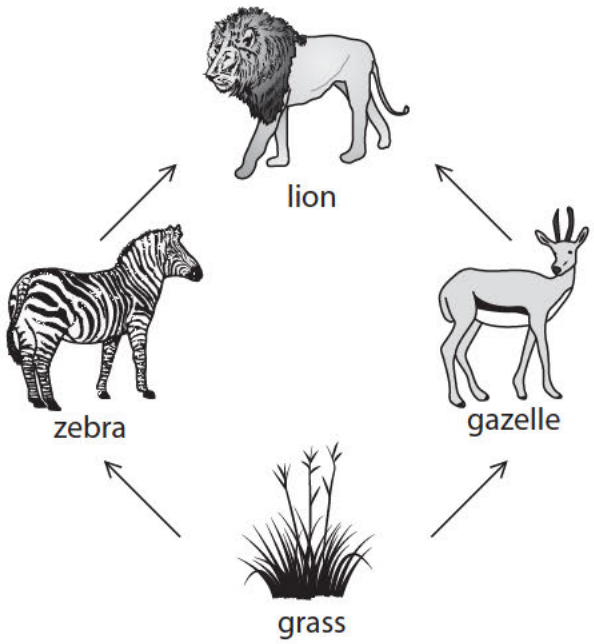
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2 .....

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(Total for Question = 11 marks)

4 The diagram shows a simple food web in East Africa.



(a) Name the producer in this food web.

(1)

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(b) Gazelles try to avoid being caught by lions by running away quickly. They can run at a top speed of 96 km per hour.

(i) Calculate the distance in metres a gazelle runs in one minute at a speed of 96 km per hour.

Show your working.

(2)

distance = ... metres

(ii) Gazelles cannot maintain their top speed for a long time because a change in the type of respiration takes place in their muscle cells.

Explain how this change in respiration stops gazelles from running at a top speed for a long time.

(3)

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(c) Zebras also try to avoid being caught by lions. It was thought that the striped coat of zebras helps to camouflage them.

A new theory suggests the striped coat evolved because it reduces the number of biting flies that feed on zebra blood.

Use your knowledge of natural selection to explain how a striped coat that reduces the number of flies feeding on zebra blood may have evolved.

(4)

(d) Lions' eyes are adapted to help them see in dim light.

(i) Their eyes have a layer of cells behind the retina that reflects light which has passed through the retina.

Suggest how this would help a lion see in low light intensities.

(1)

(ii) Suggest one other adaptation in the structure of a lion's eye that helps the lion to see in low light intensities.

(1)

(e) When a lion catches its prey it tears the meat into smaller pieces in its mouth before swallowing.

(i) Suggest why the saliva released into the lion's mouth does not contain amylase.

(2)

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(ii) Explain how tearing the meat into smaller pieces helps digestion in the stomach.

(2)

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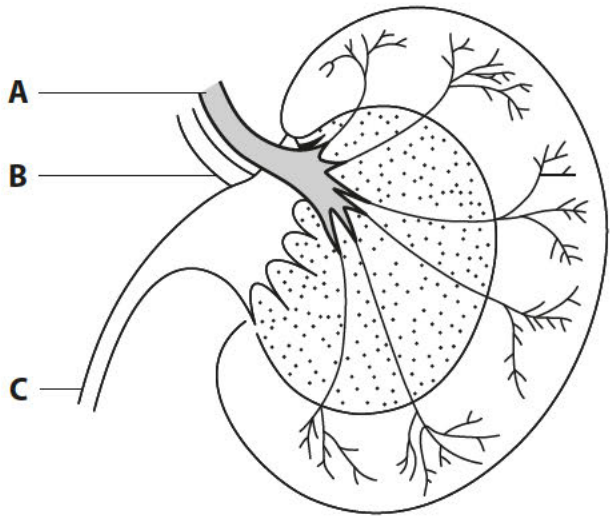
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(Total for Question = 16 marks)

5 The diagram shows the human kidney with tubes labelled A, B and C.



(a) Which letter shows the tube that would contain urine?

(1)

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(b) The table shows the concentration of plasma proteins and glucose in the blood entering the kidney and in the urine.

Name of substance	Concentration of substance in mg per 100 ml	
	blood entering the kidney	urine
plasma proteins	740	0
glucose	90	0

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

(2)

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

(2)

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(iii) Water is found in the urine.

Name two other substances you would also find in the urine.

(2)

1 .....

2 .....

(c) Some people do have glucose in their urine. These people have diabetes.

Suggest why a person with diabetes has glucose in their urine.

(2)

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(d) On a hot day there is less water in urine.

Explain how the kidney is able to reduce the water content of urine produced on a hot day.

(3)

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(Total for Question = 12 marks)

6 (a) The table contains names and descriptions of processes involved in the digestive system.

Complete the table by filling in the missing names and descriptions.

(5)

Name of process	Description of process
	food enters the mouth
digestion	
	small food molecules move from the small intestine into the blood
	small food molecules are used to build large molecules
egestion	

(b) Describe the process of digestion in the mouth.

(3)

(c) A student carried out some food tests on two samples of food, A and B. The table shows the results.

Sample	Reagent used in food test	Colour seen after adding the reagent
A	iodine solution	blue black
B	Benedict's	brick red

The student concluded that both samples of food contained carbohydrates.

Do you agree with this conclusion?

Give reasons for your answer.

(2)

(Total for Question = 10 marks)