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Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Biology

Unit: 4BI0
Science (Double Award) 4SC0
Paper: 1BR

Tuesday 15 May 2018 – Afternoon
Time: 2 hours

Paper Reference
4BI0/1BR
4SC0/1BR

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.
- 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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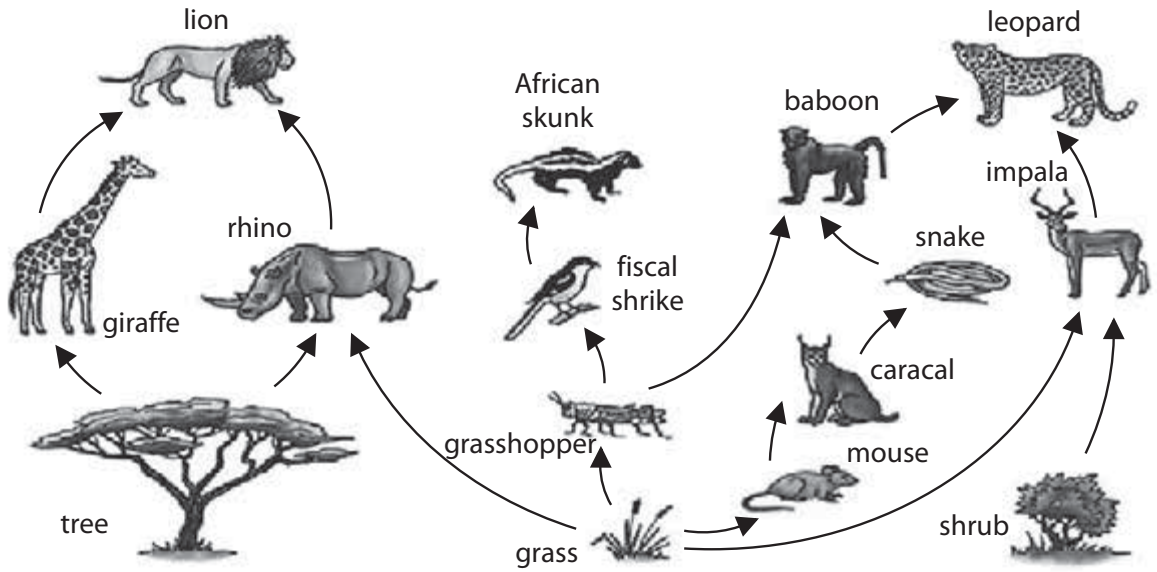
Answer ALL questions.

1 This food web comes from an African ecosystem.



(a) (i) What is meant by the term **ecosystem**?

(1)

(ii) Identify all the producers in this food web.

(1)

(iii) Give the trophic level of the lion in this food web.

(1)

(iv) Name an organism that occurs at two different trophic levels in this food web.

(1)

(v) Give the food chain from this web that contains four different organisms including the baboon.

(2)

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(b) Explain why the number of organisms usually decreases along a food chain.

(4)

(Total for Question 1 = 10 marks)

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2 Blood is circulated through the body in blood vessels.

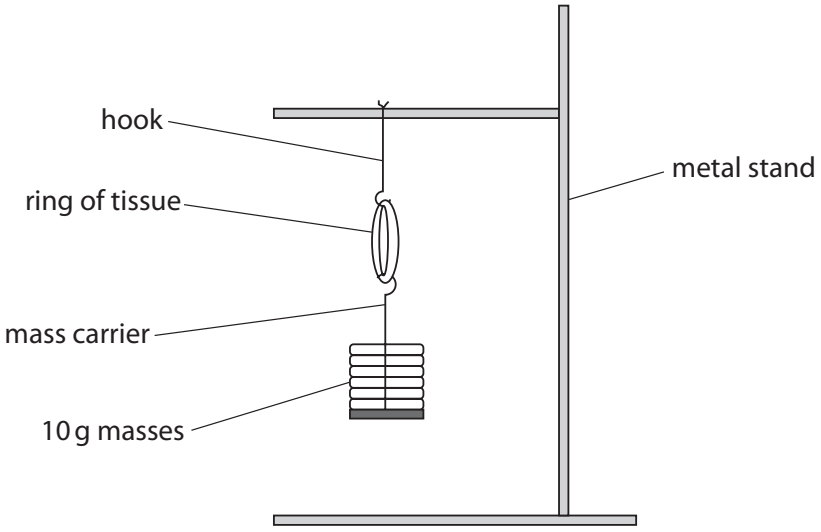
(a) The table lists some blood vessels.

Complete the table by naming an organ supplied with blood by each blood vessel.

(4)

Blood vessel	Organ
hepatic artery	
renal artery	
pulmonary artery	
hepatic portal vein	

(b) A student uses this apparatus to compare the strength of arteries and veins.



This is the student's method.

- cut a cross-section from an artery and from a vein to make rings of tissue
- hang a ring of tissue from the hook
- add 10 g masses to the ring of tissue one at a time
- record the total mass at which the ring of tissue breaks
- repeat the method with the other ring of tissue

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(i) Explain the results that you would expect the student to obtain.

(3)

(ii) Give one way that the student could modify his investigation to improve the reliability of his results.

(1)

(iii) Give one way that the student could modify his investigation to improve the accuracy of his results.

(1)

(Total for Question 2 = 9 marks)

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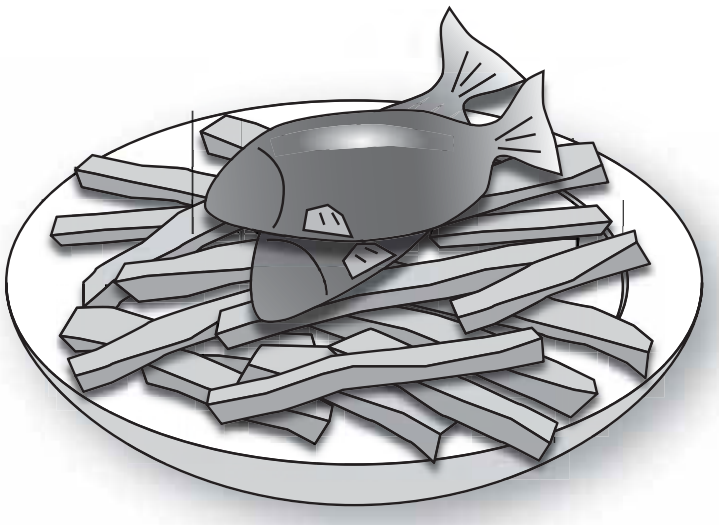
3 Many people in the UK eat fish and chips.

The drawing shows a plate of fish and chips.



(a) Describe what happens to fish protein in the stomach.

(4)

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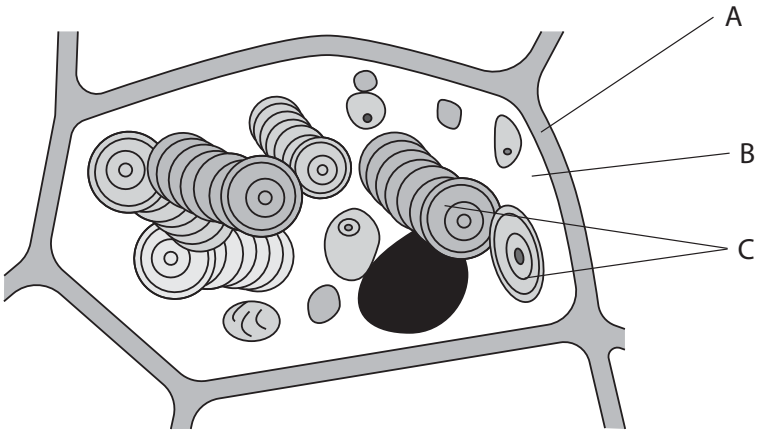
(b) The chips are made from potatoes.

Potatoes are the underground carbohydrate storage organs of the potato plant.

The diagram shows a cell from potato tissue, as seen through a microscope.



Name the parts labelled A, B and C.

(3)

A .....

B .....

C .....

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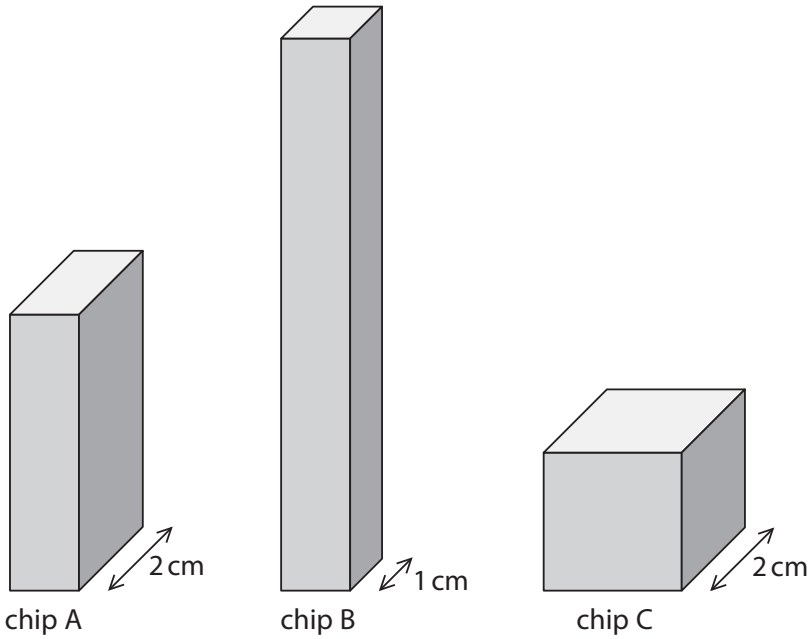
(c) Chips are cooked by frying them in lipid (oil). Some of this lipid is left on the surface of the chips after cooking.

The diagram shows three different shaped chips from the same potato.

Each chip has the same mass.



(i) The table shows the surface area, the volume and the surface area to volume ratio for chips A and B.

Use the diagram to complete the table for chip C, which is a cube.

(3)

Chip	Surface area in cm^2	Volume in cm^3	Surface area to volume ratio
A	28.0	8.00	3.50 : 1
B	34.0	8.00	4.25 : 1
C			

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(ii) Eating too much lipid is harmful to health.

Explain which shape of chip, A, B or C, is the most healthy to eat.

(3)

(Total for Question 3 = 13 marks)

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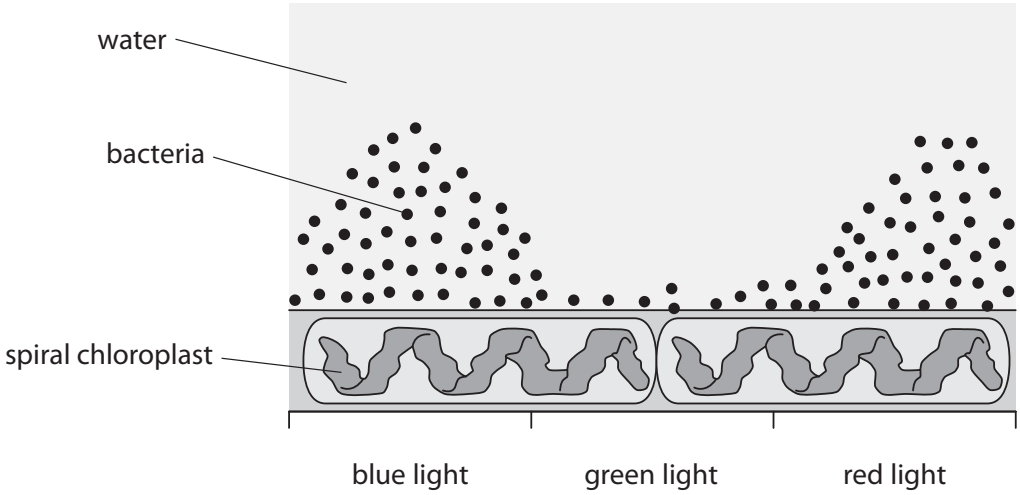
4 A scientist does an experiment using a photosynthetic organism and bacteria.

The photosynthetic organism lives in water and has a spiral chloroplast.

The bacteria need oxygen to survive.

The scientist shines different colours of light on the photosynthetic organism and adds the bacteria to the water.

The diagram shows the location of the bacteria during the experiment.



(a) Use the information from the diagram to suggest two conclusions that can be made about photosynthesis.

(2)

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(b) The scientist concludes that bacteria are living organisms.

Explain how the diagram supports this conclusion.

(2)

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(c) Name two structures found in bacteria.

(2)

1 .....

2 .....

(Total for Question 4 = 6 marks)

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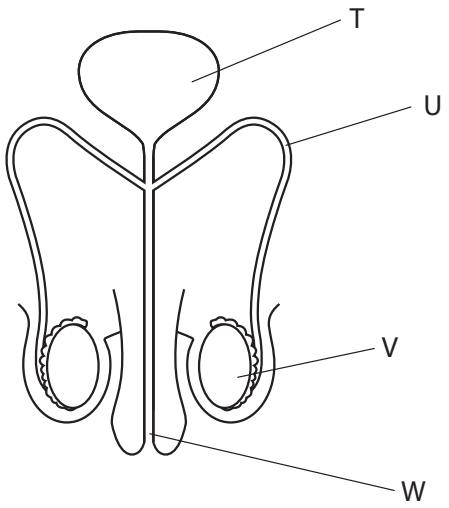
5 The diagram shows the male reproductive organs.



(a) Name the structures labelled T and U.

(2)

T .....

U .....

(b) Name two different liquids transported in tube W.

(2)

1 .....

2 .....

(c) Explain the functions of structure V.

(3)

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(Total for Question 5 = 7 marks)

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6 (a) The passage describes reproduction in humans and in chickens.

Complete the passage by writing a suitable answer in each blank space.

(8)

In humans, the hormone called ..... stimulates the repair of the uterus lining. The ovum is then released from the ..... .

The ovum has a haploid number of 23 chromosomes.

Fertilisation occurs in the ..... tube. Fertilisation results in a single cell called a ..... with a diploid number of ..... chromosomes. This cell divides by ..... to produce an embryo.

Sex inheritance in chickens is different from humans. In chickens the sex chromosomes are called Z and W. In humans, the sex chromosomes are called ..... .

The sex chromosomes of a male chicken are ZZ and of a female chicken are ZW. This means that the probability of parent chickens producing a male offspring is ..... .

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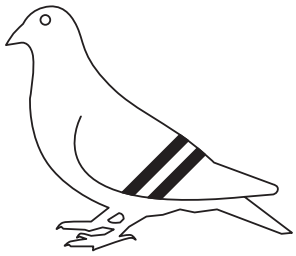
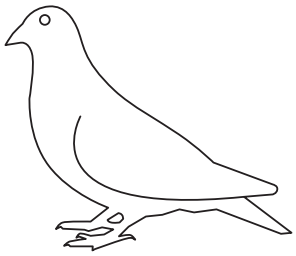
(b) In pigeons, the inheritance of bars at the end of the wings is controlled by a gene with two alleles.

The allele for wing bars (B) is dominant to the allele for no wing bars (b).

The diagram shows the phenotype of a pigeon with wing bars and the phenotype of a pigeon with no wing bars.



wing bars

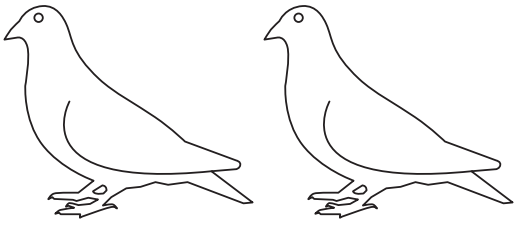


no wing bars

(i) In a first cross, a heterozygous parent mates with a homozygous recessive parent.

Complete the table by giving the genotype of each parent and the possible phenotypes of their offspring.

(2)

Genotypes of parents	Possible phenotypes of offspring
..... and	

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(ii) In a second cross, two heterozygous pigeons mate.

Give the possible genotypes of their offspring.

(1)

(iii) This second cross only produces one offspring.

Give the probability that this offspring will have wing bars.

(1)

(Total for Question 6 = 12 marks)

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7 A scientist investigates how nitrate fertiliser, and the number of seeds planted per square metre, affect the yield of wheat.

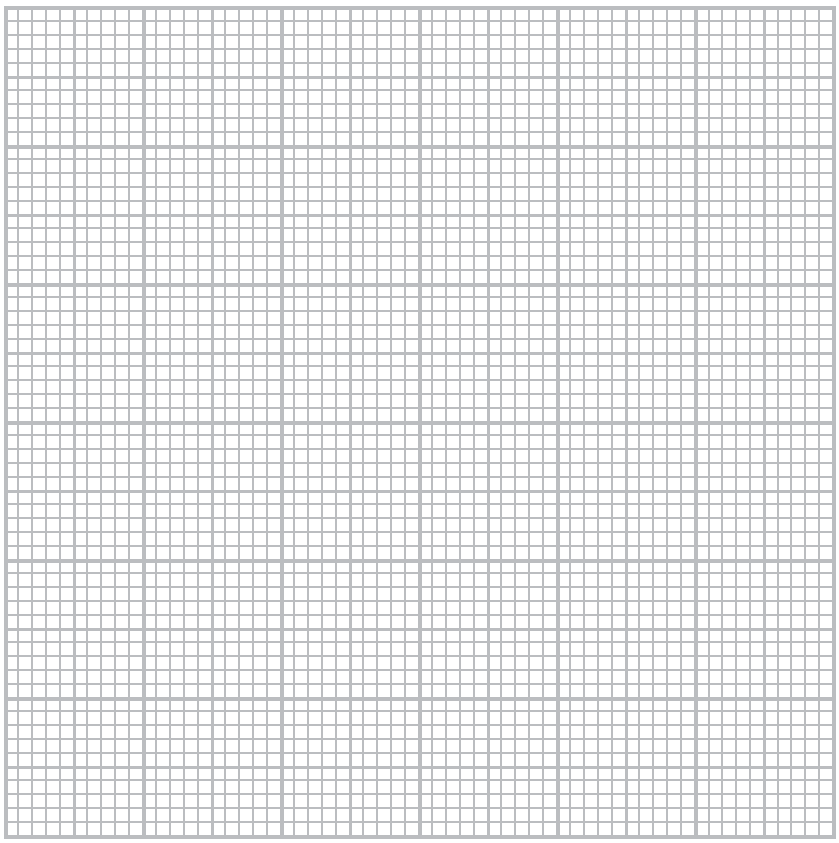
She adds different masses of nitrate fertiliser to fields containing different numbers of wheat seeds, and measures the yield after a few months.

The table shows her results.

Mass of nitrate fertiliser added in kg per hectare	Number of seeds planted per m^2	Yield of wheat in tonne per hectare
0	200	10.8
	400	10.5
30	200	11.0
	400	10.6
60	200	8.5
	400	7.5

(a) Plot a bar graph of these results to show how the yield varies with the mass of fertiliser added and the number of seeds planted.
For each mass of fertiliser, draw two separate bars.

(5)



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(b) Describe the effect that changing the mass of nitrate fertiliser has on the yield of wheat.
(3)

(c) Explain the effect that changing the number of seeds planted has on the yield of wheat.
(2)

(Total for Question 7 = 10 marks)

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8 Fish farms provide food for many people.

(a) State one way in which intraspecific predation can be reduced on fish farms.

(1)

(b) Antibiotics are used on fish farms.

Explain the advantages and disadvantages of using antibiotics on fish farms.

(3)

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(c) Fish produce faeces that can build up in the water. This may affect the fish growth.

Design an investigation to find out the effect of fish faeces on fish growth.

Your answer should include experimental details and be written in full sentences.

(6)

(Total for Question 8 = 10 marks)

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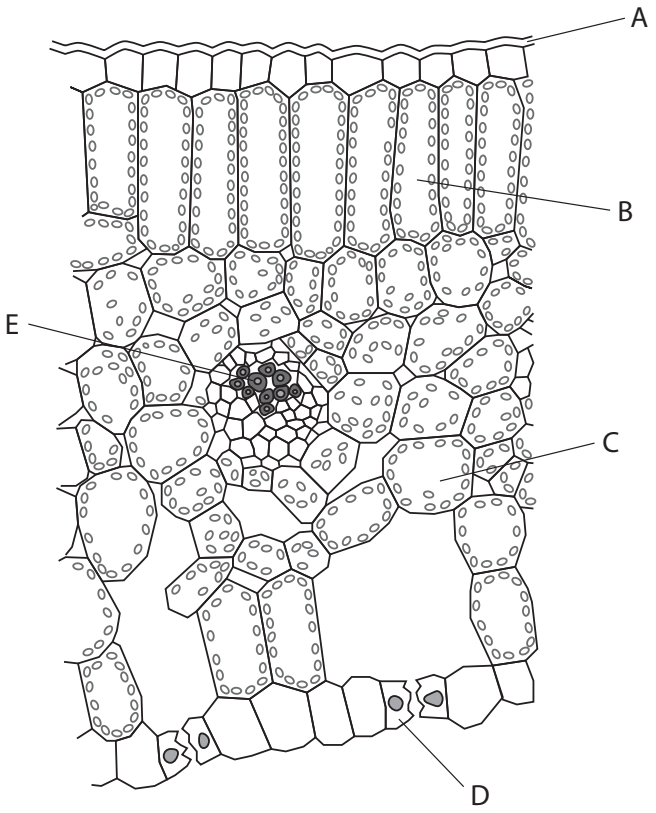
9 The diagram shows part of a cross-section of a plant leaf.



(a) (i) Describe the function of layer A.

(1)

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(ii) Name the cells labelled B, C and D.

(3)

B .....

C .....

D .....

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(b) (i) Explain the role of cell D in controlling gas exchange in the leaf.

(3)

(ii) Describe the function of the tissue labelled E.

(3)

(Total for Question 9 = 10 marks)

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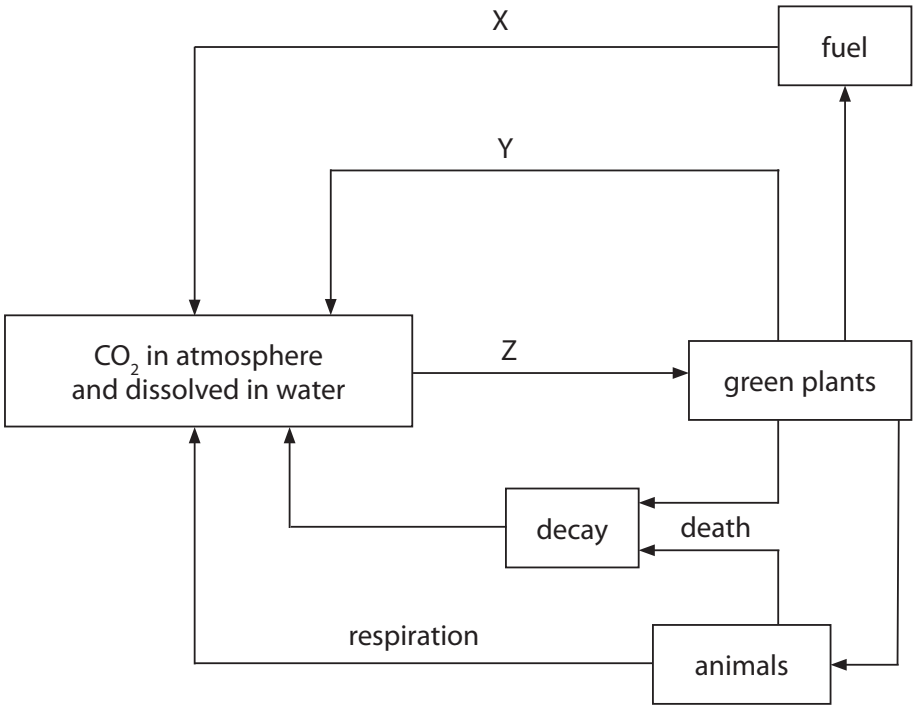
10 The diagram shows an important cycle.



(a) (i) Give the name of this cycle.

(1)

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(ii) Identify the processes labelled X, Y and Z.

(3)

X .....

Y .....

Z .....

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(b) The rate of process X has increased rapidly because of human activities.

Describe the consequences that this increase could have on ecosystems.

(5)

(Total for Question 10 = 9 marks)

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11 A student uses this method to investigate the effect of temperature on the digestion of lipid.

Step 1 Add five drops of an indicator to a test tube.

Step 2 Add 5 cm^3 of milk to the test tube.

Step 3 Then add 7 cm^3 of sodium carbonate solution to the test tube.

Step 4 Place a thermometer in the test tube, put the test tube in a water bath and leave it until the contents reach a temperature of 20 °C.

Step 5 Add 1 cm^3 of lipase solution to the test tube and start a timer.

Step 6 Stir the contents of the test tube.

Step 7 Record the time it takes for the indicator to change colour.

The student then repeats these steps using water baths at five higher temperatures, increasing the temperature by 10 °C each time.

(a) (i) Name the independent variable in the student's investigation.

(1)

.....

(ii) Identify two variables that the student controls in his investigation.

(2)

1 .....

2 .....

(iii) Give the reason for including step 6.

(1)

.....

.....

(b) Sodium carbonate solution is an alkali that turns the indicator pink in step 3.

Explain why the indicator changes colour in step 7.

(3)

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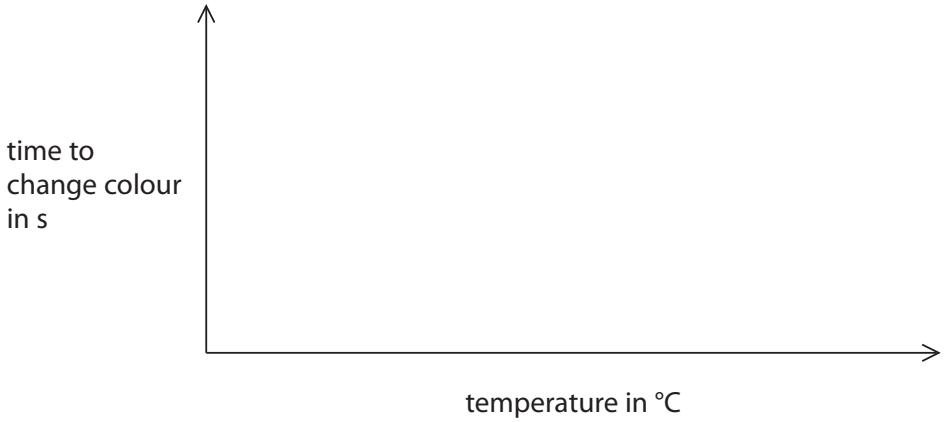
(c) (i) Sketch a graph on the axes to show the results you would expect the student to obtain.

(2)



(ii) Explain the effect of temperature on the time taken for the indicator to change colour.

(4)

(d) Describe the role of bile in the digestion of lipid.

(2)

(Total for Question 11 = 15 marks)

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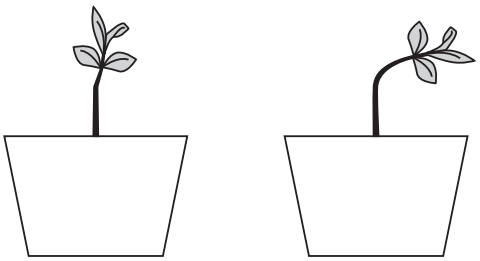
12 A teacher demonstrates how plants respond to light.

He grows plant A in full light.

He grows plant B in light from one side only.

The diagram shows the plants after several days.



plant A plant B

(a) (i) Name the type of response shown by plant B.

(2)

.....

(ii) Explain the advantage to plant B of this response.

(2)

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(iii) Suggest how the teacher could ensure that plant B has light from one side only.

(1)

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(b) Describe the differences between an animal response to light and a plant response to light.

(4)

(Total for Question 12 = 9 marks)

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