

Write your name here	
Surname	Other names
Pearson Edexcel	Centre Number
International GCSE	Candidate Number
Biology Unit: 4BI0 Science (Double Award) 4SC0 Paper: 1BR	
Tuesday 12 May 2015 – Afternoon	Paper Reference
Time: 2 hours	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.
- 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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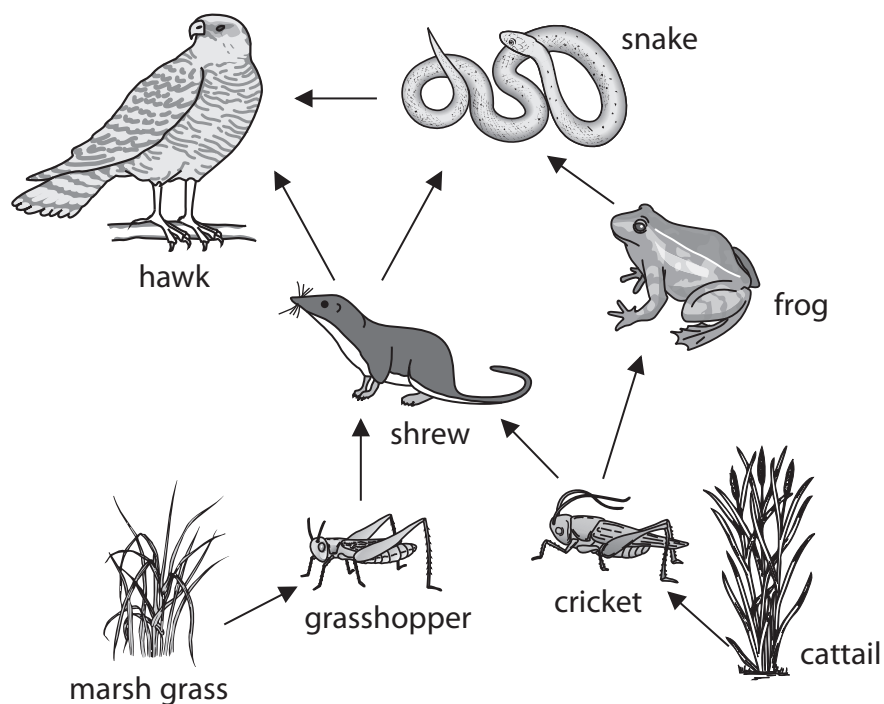
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PEARSON

Answer ALL questions.

- 1 The diagram shows a food web from a habitat.



- (a) Use information in the food web to complete the table.

The first one has been done for you.

(4)

number of organisms	8
number of different types of plant	
number of animals	
number of primary consumers	
number of food chains	

- (b) (i) The plants in this food web make the food for some of the animals to eat.

Give the name used to describe these plants.

(1)

- (ii) The hawk catches and eats its prey.

Give the name used to describe the hawk in this food web.

(1)

- (c) A pesticide can be used to kill the grasshoppers in this habitat.

- (i) Describe the effect that killing grasshoppers would have on the number of shrews.

(1)

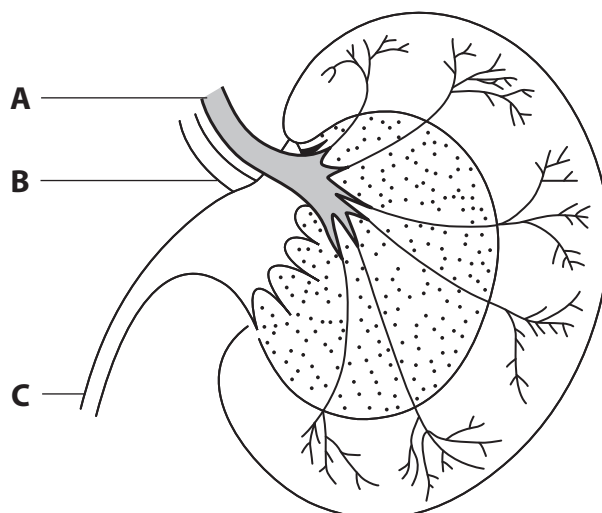
- (ii) Describe the effect that killing grasshoppers would have on the number of marsh grass plants.

(1)

(Total for Question 1 = 8 marks)



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



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

(1)

(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)



(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 2 = 12 marks)



3 Some rice farmers use ducks as a method of biological control.

The photograph shows ducks swimming in a rice paddy field.



© Takao Furuno

The ducks help rice plants to grow because they eat insects and weeds in the paddy fields.

(a) (i) Suggest how the ducks eating insects helps rice plants to grow.

(1)

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(ii) Explain how the ducks eating weeds helps rice plants to grow.

(2)

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(b) Explain why faeces from the ducks helps rice plants to grow.

(2)

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- (c) The ducks stir up the soil in the rice paddy field with their feet, which increases the oxygen content of the soil.

Suggest how increasing the oxygen content of the soil helps rice plants to grow.

(2)

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- (d) Using ducks as a method of biological control allows the farmer to grow rice without using herbicide or pesticide.

(i) Suggest what is meant by the term **herbicide**.

(1)

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(ii) Give three advantages of using biological control rather than using pesticide.

(3)

1

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2

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3

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(Total for Question 3 = 11 marks)



- 4 The photograph shows a mouflon sheep. The wool of this sheep is very valuable.



© Volker.G

This breed of sheep is only found in small numbers on some Mediterranean islands. Scientists hope to increase the population of mouflon sheep using cloning.

Describe the steps that need to be taken to clone mouflon sheep.

(5)

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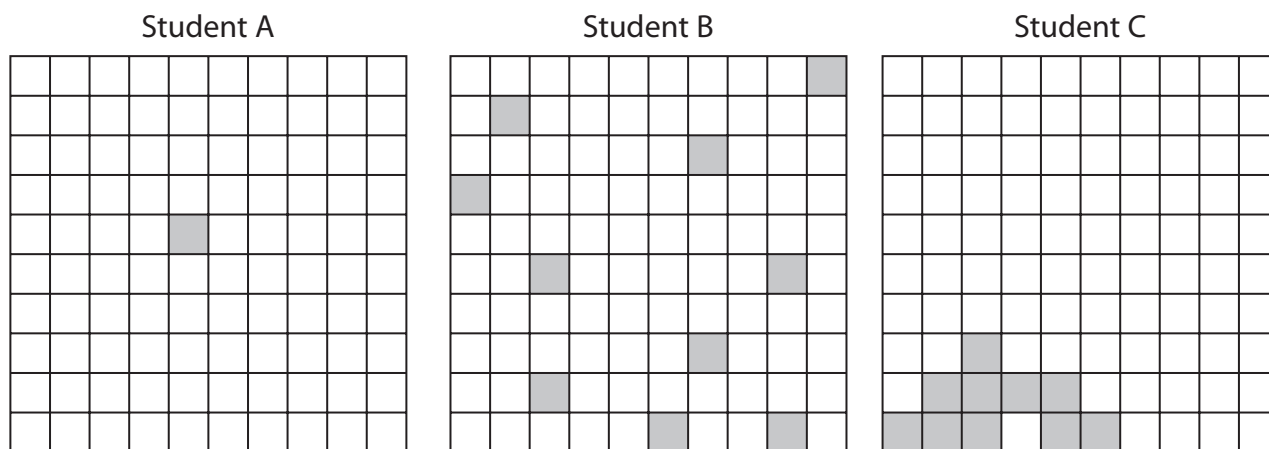
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(Total for Question 4 = 5 marks)



- 5 Three students were asked to estimate the population size of a plant species in an area by using a quadrat.

The diagram shows where each student placed their quadrat in the area.



- (a) (i) Which student would obtain the most reliable estimate?

Give reasons for your answer.

(2)

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- (ii) State what is meant by the term **population**.

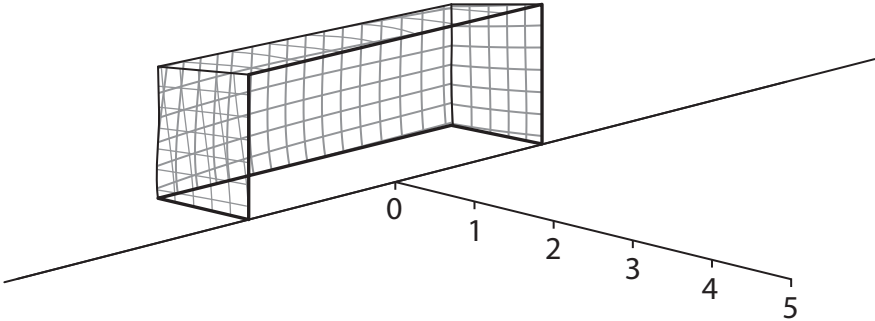
(1)

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(b) Five other students investigated the distribution of grass in the goal area of a football pitch.

They placed a small quadrat at the goal line and then at one metre intervals in a straight line away from the goal line. The diagram shows their method.



The quadrat was 10 cm by 10 cm and was made from clear plastic. It was marked into 100 squares of 1 cm x 1 cm. If grass could be seen in 10 of the squares the percentage cover would get a score of 10%.

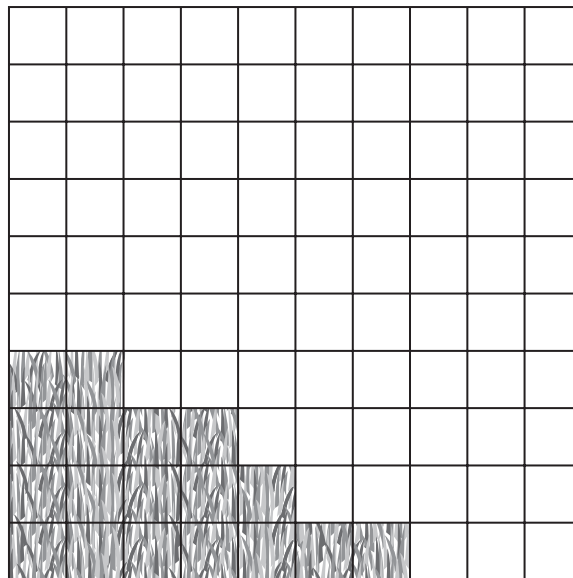
The table shows the results obtained by the five students.

Student	Percentage cover of grass at different distances from the goal line					
	0 m	1 m	2 m	3 m	4 m	5 m
A	14	14	38	41	90	100
B	20	13	5	47	82	90
C	15	14	45	50	86	85
D	10	18	35	50	75	83
E	10	15	30	50	70	90
average	14	15	37	48	81	90

(i) One of the averages of the results has been calculated ignoring an anomalous result.
Which student obtained the anomalous result?

(1)

- (ii) The diagram shows a quadrat used by one of the students, and the number of 1cm squares where grass can be seen.



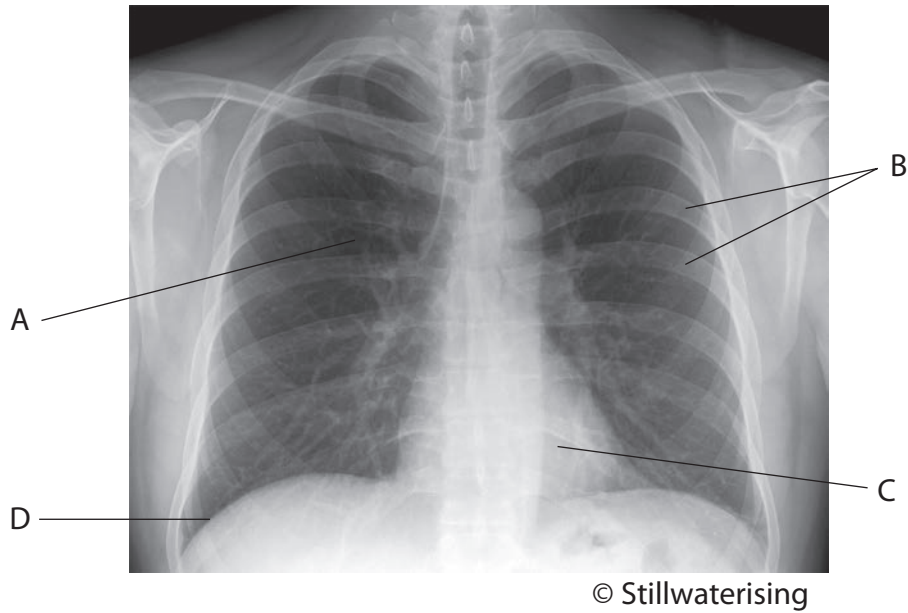
Which student obtained the results shown in this quadrat?

(1)

(Total for Question 5 = 5 marks)

6 Doctors use X-rays to produce images of structures inside the body.

The image shows an X-ray of a normal human thorax.



(a) Identify the structures labelled A, B, C and D.

(4)

B

C

D.....

(b) Describe how structures B and D help a person to breathe in.

(5)

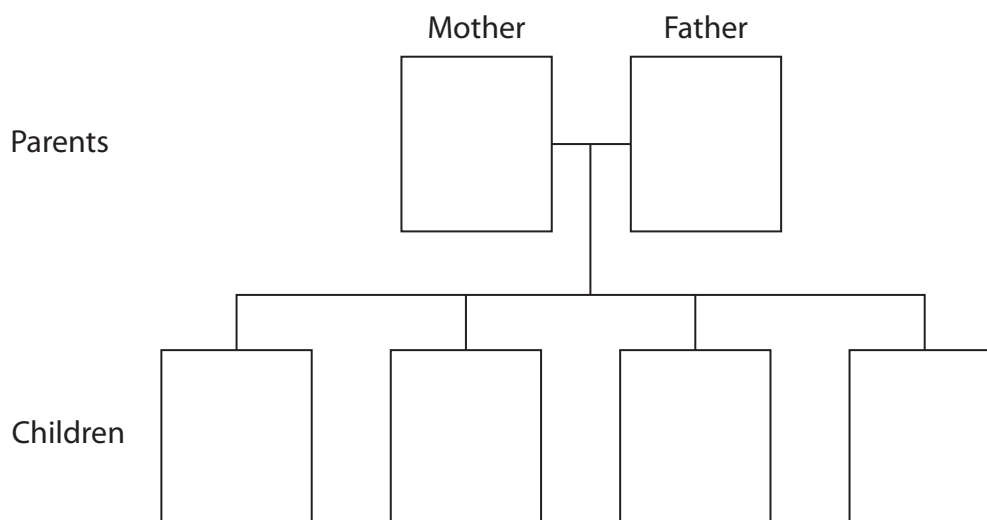
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- (c) Some cells lining the bronchioles in the lung produce mucus. Cystic fibrosis is an inherited condition in which these cells produce very sticky mucus which blocks the bronchioles.

The allele for producing very sticky mucus, **f**, is recessive to the allele for producing normal mucus, **F**.

- (i) In the boxes below give the genotypes of the parents, and all the possible children, for a cross between a heterozygous mother and a heterozygous father.

(2)



- (ii) Suggest why people with cystic fibrosis often have lung infections.

(2)

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- (iii) Suggest why gas exchange is reduced in someone with cystic fibrosis.

(2)

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(Total for Question 6 = 15 marks)



- 7** The table lists different places in the world arranged in order, from the warmest to the coldest. It also shows the average mass of a mouse found in each place.

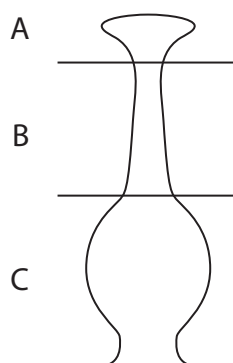
Climate	Place in world	Average mass of a mouse in g
warmest coldest	Enewetak (a tropical coral island)	9.2
	Hawaii in the mid Pacific	11.6
	Southern England	13.4
	Isle of May in Scotland	17.0
	South Georgia in Antarctica	18.6

Use your understanding of natural selection to suggest why the mice in Antarctica have the biggest average mass.

(5)

(Total for Question 7 = 5 marks)

- 8 The drawing shows part of a flower involved in sexual reproduction. The drawing has been separated into three sections A, B and C.



- (a) Complete the table by giving the correct letter for the section that matches each statement.

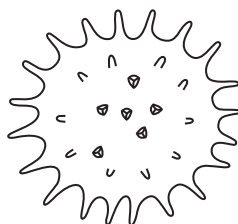
Each letter may be used once, more than once or not at all.

The first one has been done for you.

(4)

Statement	Section letter
This is the stigma	A
This is where fertilisation occurs	
This is where the pollen grains land at pollination	
This is where most pollen tube growth occurs	
This is where a seed will develop	

- (b) The drawing shows a pollen grain from an insect-pollinated flower as seen using a microscope.



Suggest how the structure of this pollen grain shows it is from an insect-pollinated flower.

(2)

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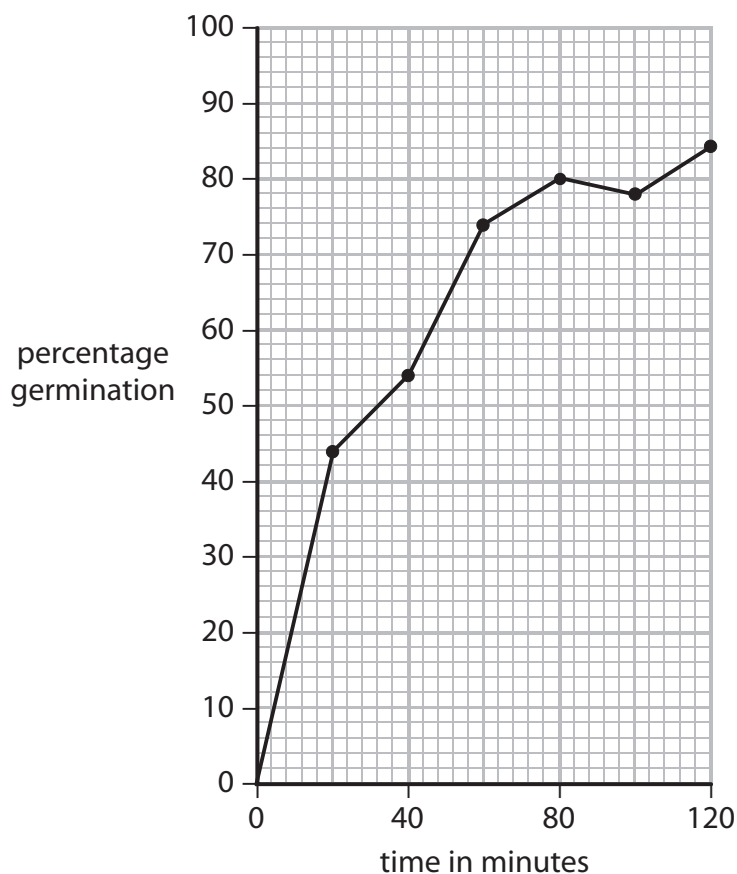
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- (c) Pollen grains were placed in a solution that helps them to germinate (grow a pollen tube). A microscope was used to observe the pollen grains for two hours.

The percentage of pollen grains that had started to germinate was measured during the two-hour period.

The graph shows the results.



- (i) Describe how the percentage germination changed during the two-hour period.

(2)

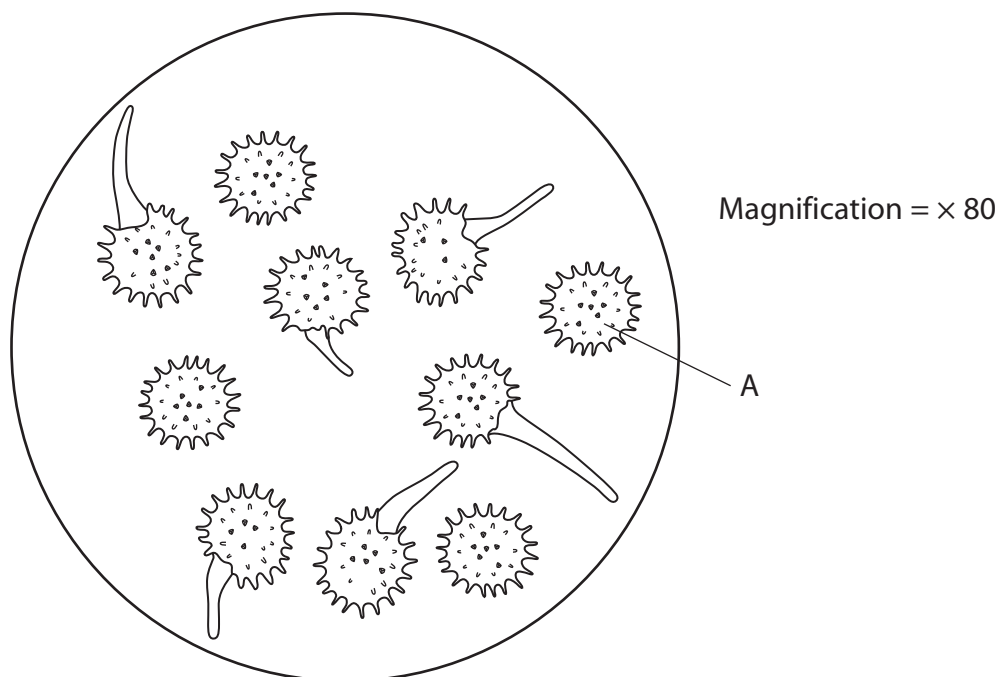
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- (ii) The drawing shows pollen grains seen using the microscope at one time during the two hours.



Use the drawing and the graph to determine the time when these pollen grains were observed.

Show your working.

(2)

Answer minutes

- (iii) Calculate the actual size of the pollen grain labelled A. Show your working.

(2)

Answer mm



(d) Explain the benefit to the plant of producing offspring by sexual reproduction rather than by asexual reproduction.

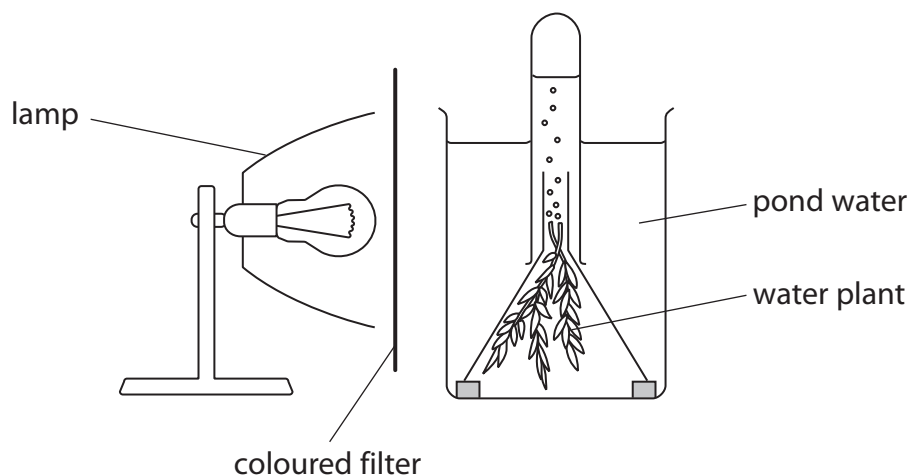
(2)

(Total for Question 8 = 14 marks)



- 9 A student carries out an experiment to investigate the effect of changing the colour of light on the rate of photosynthesis in a water plant.

She sets up the apparatus shown.



- (a) (i) Name the gas given off during photosynthesis.

(1)

- (ii) Explain how the student should control two variables in her investigation.

(4)

1

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(b) The table shows the results the student obtained from her investigation.

Colour of light	Number of gas bubbles released in one minute			
	trial 1	trial 2	trial 3	average
Red	23	26	25	
Blue	19	18	21	19
Green	12	16	6	14

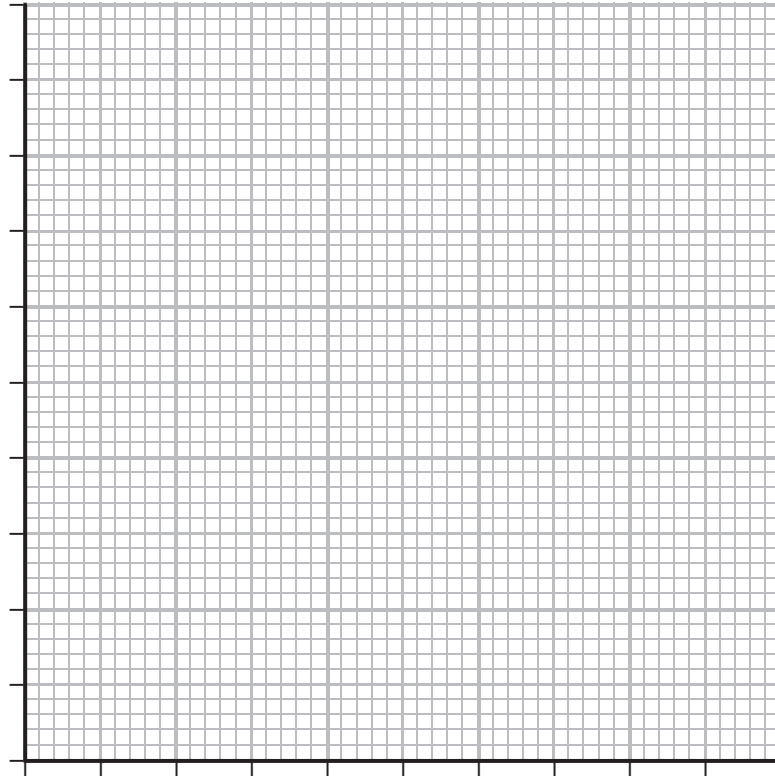
(i) Complete the table by calculating the average rate of photosynthesis for red light. (1)

(ii) Explain whether the results for each colour are reliable. (2)



- (c) Plot a bar graph to show the effect of the different colours of light on the average rate of photosynthesis.

(5)



- (d) Suggest why there is a difference in the average rate of photosynthesis between blue light and green light.

(2)

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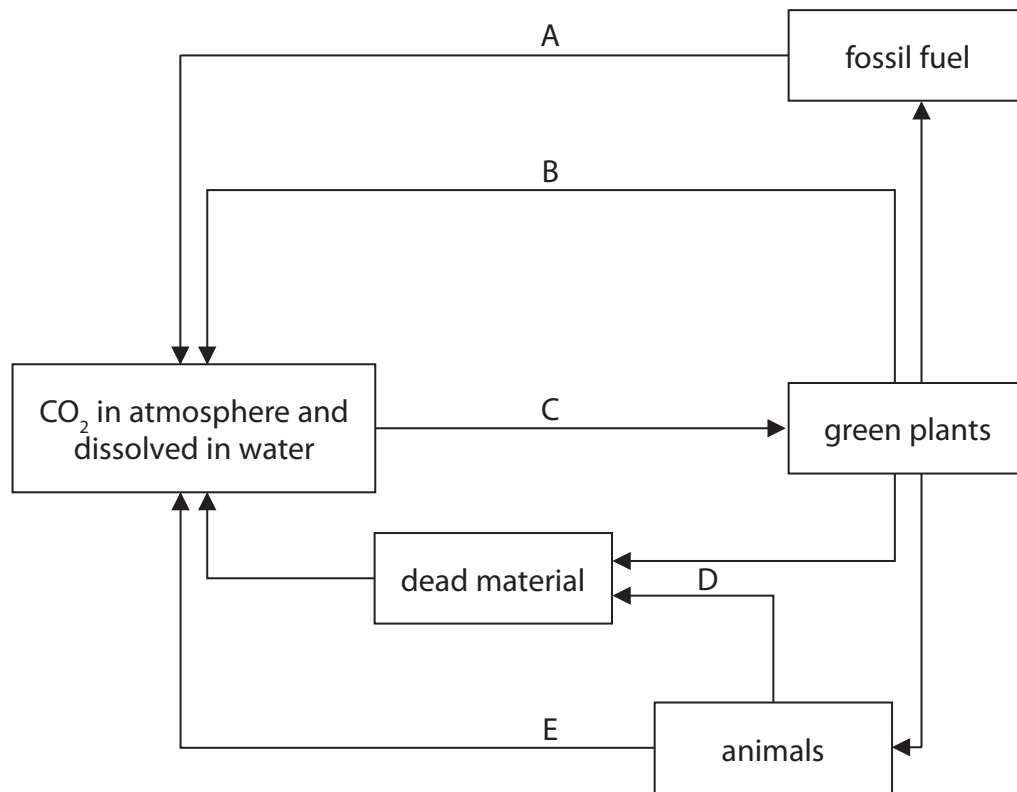
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(Total for Question 9 = 15 marks)



10 The diagram shows the carbon cycle.



(a) (i) Identify the processes labelled A, B, C, D and E.

(5)

- A
- B
- C
- D
- E

(ii) Give the letter of the process that reduces the carbon dioxide in the atmosphere.

(1)

(b) An increase in the level of carbon dioxide in the atmosphere can lead to an enhanced greenhouse effect.

Describe the possible consequences of an enhanced greenhouse effect.

(4)

(c) Suggest two ways to reduce the build up of greenhouse gases in the atmosphere.

(2)

1

2

(Total for Question 10 = 12 marks)



11 The passage describes the role of the blood transport system.

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

(8)

The blood cells are transported in a straw-coloured liquid

called In this liquid there are

..... blood cells that contain the protein

..... that is used to carry oxygen around the body.

The oxygen is used by the body cells in respiration.

The gas produced by the cells in respiration is

transported to the lungs and is exhaled with water vapour when we breathe out.

Other components transported in the plasma are

that help the blood to clot following a cut or injury, and white blood cells that are

involved in preventing infection. Some of these white blood cells release specific

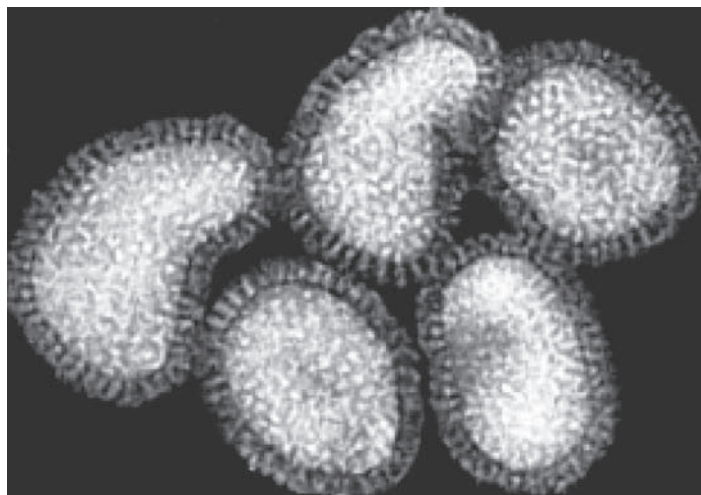
molecules called to destroy bacteria. Other white

blood cells called can surround and engulf

invading bacteria.

(Total for Question 11 = 8 marks)

12 The photograph shows some viruses.



(a) Suggest two reasons why most biologists do not classify viruses as living organisms.

(2)

1

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2

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(b) Name one example of a virus.

(1)

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(c) Give one structural difference between a bacterium and a virus.

(1)

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(Total for Question 12 = 4 marks)

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13 Describe an investigation to find out if adding vitamin D to the diet of young children will help to prevent rickets (a deformation of the legs).

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

(6)

(Total for Question 13 = 6 marks)

TOTAL FOR PAPER = 120 MARKS



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