

Surname	Centre Number	Candidate Number
Other Names		0

**GCSE**

4471/01



S15-4471-01

ADDITIONAL SCIENCE/BIOLOGY**BIOLOGY 2
FOUNDATION TIER**

P.M. TUESDAY, 12 May 2015

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	4	
3.	6	
4.	7	
5.	12	
6.	6	
7.	8	
8.	4	
9.	6	
Total	60	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

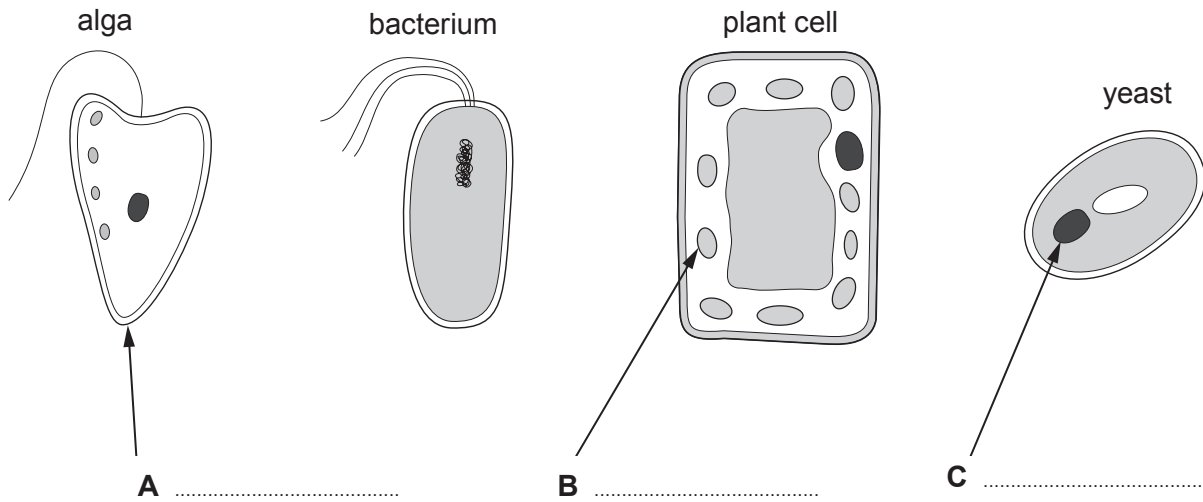
The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (QWC) used in your answer to question 9.

Answer all questions.

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1. (a) The diagrams below show some cells.



(Not drawn to scale)

- (i) Name the parts of the cells labelled **A**, **B** and **C** on the diagrams. [2]

- (ii) From the diagrams, state which cell [2]
 - I. is a fungus,
 - II. is a photosynthetic micro-organism,
 - III. reproduces by dividing in two.

(b) In the 19th century, scientists used microscopes to study living cells and put forward the cell theory.

(i) Complete the sentence by underlining the correct statement. [1]

According to the cell theory,

all living organisms are composed of many cells;

all cells in a living organism have the same function;

all organisms consist of one or more living cells.

(ii) State **one** reason why the cell theory does **not** apply to viruses. [1]

.....
.....

(iii) Use some of the words below to complete the following sentence. [1]

light microscopes electron microscopes laser imaging

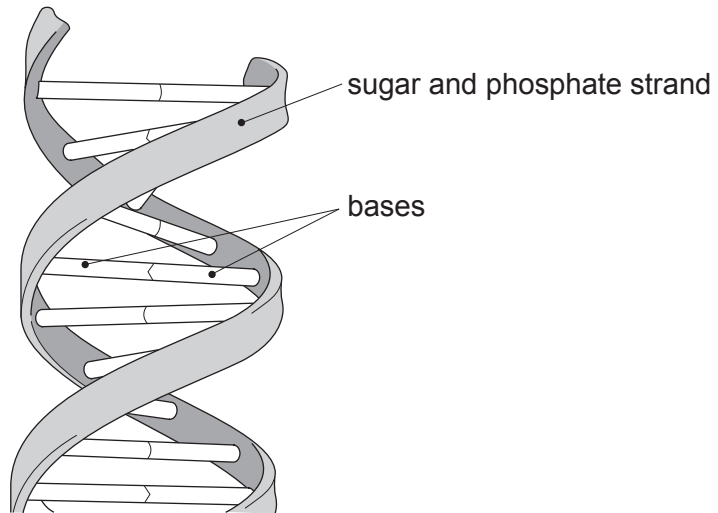
Modern scientists use when studying living cells but
..... if they are studying dead cells.

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2. (a) The diagram below shows DNA.

Bases A, C, T and G join two strands of sugar and phosphate molecules.



(i) What name is given to the shape of DNA?

[1]

Underline your answer

double spiral

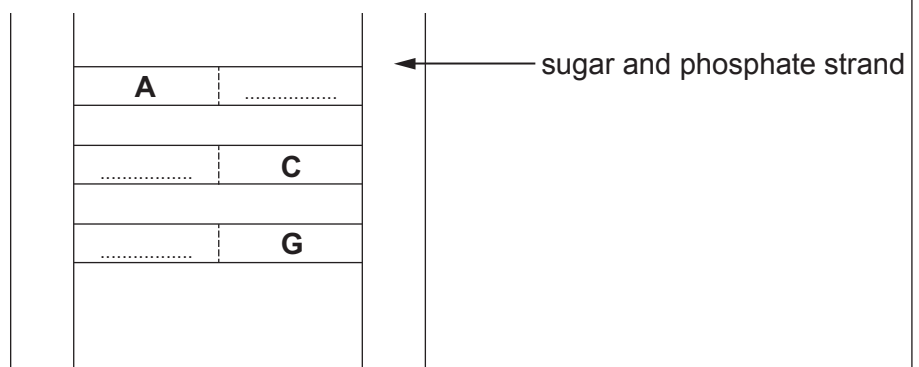
double fold

double helix

double coil

(ii) The diagram below shows a very small section of DNA. Complete the diagram by adding the missing bases.

[2]



(b) Use some of the words below to complete the sentence.

[1]

salts

amino acids

minerals

proteins

The bases in DNA form a code which is important in building

from

3. (a) Complete the table by matching some of the scientific terms below to the information about aerobic respiration in humans. [4]

oxygen **nitrogen** **glucose** **cells**
enzymes **energy** **water**

feature of aerobic respiration in humans	scientific term
where aerobic respiration occurs
gas required for aerobic respiration
waste product of aerobic respiration
control the chemical reactions of respiration

- (b) Name the gas which is produced during aerobic respiration and describe how lime water can be used to identify it. [2]

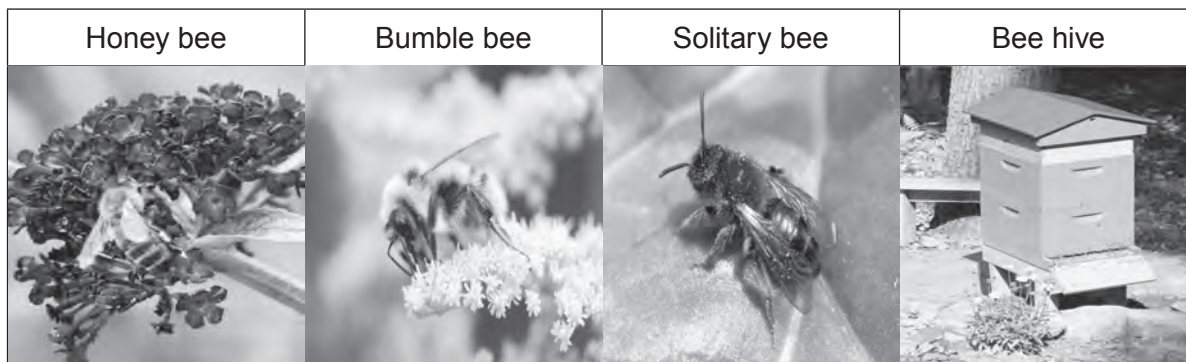
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4. Read the information below on bees.

- Bees are insects which feed on nectar from the flowers they pollinate.
- Scientists are concerned because the number of bees in the UK is declining.



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Bee Facts

	type of bee		
	Honey bee	Bumble bee	Solitary bee
number of species in UK	1	24	260
how the bee lives	hives of 60 000 bees	nests of 200 bees in grassland	nests of 1 bee in grass or bare soil
flowers pollinated by bee	fruit trees, vegetable plants, garden and wild flowers	mainly wild flowers	

Use the information opposite to answer the questions.

- (a) Insects which live in groups are called *social insects*. Which types of bees are social insects? [1]

.....

- (b) (i) Give a reason why solitary and bumble bees decrease in number when more countryside land is used for grazing farm animals. [1]

.....

- (ii) In 1980 a bee keeper in west Wales had 8 bee hives. By 2010 he had only 3 bee hives.

Calculate the decrease in the number of his bees during this time.
 Show your working. [2]

Decrease in number of bees =

- (iii) Suggest why honey bees are thought to be more important to humans than the other types of bees. [1]

.....
.....

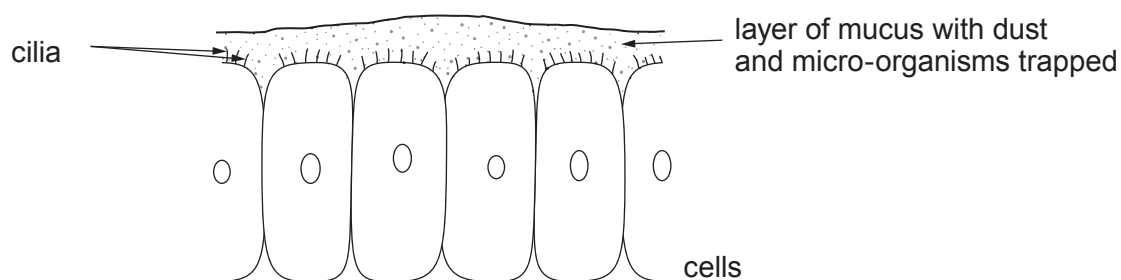
- (c) Conservationists are worried that the loss of bees could reduce biodiversity in the future. Suggest how the loss of solitary bees could reduce biodiversity. [2]

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.....

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5. The diagram below shows some cells from the inner surface of the human lung.



- (a) (i) Describe how cigarette smoke affects the cilia and mucus. [2]

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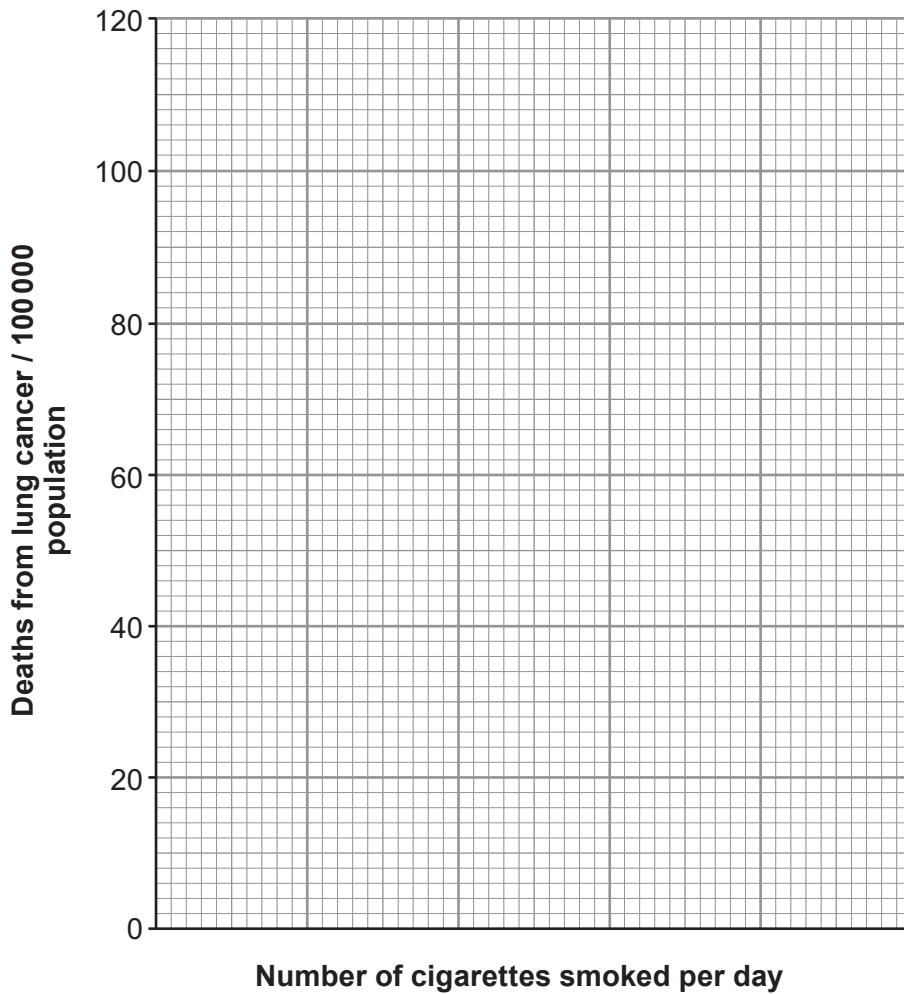
- (ii) State the substance which is present in cigarette smoke and causes lung cancer. [1]

.....

- (b) In the 1960s doctors carried out investigations on men over the age of 35 to see if there was a link between smoking cigarettes and lung cancer. The results are shown in the table below.

number of cigarettes smoked per day	deaths from lung cancer (per 100 000 population)
0	2
5	4
10	8
20	18
40	104

- (i) Plot a line graph of the results above on the grid opposite by: [4]
- I. choosing a scale for the number of cigarettes smoked per day,
 - II. plotting the values,
 - III. using a ruler, drawing a line to join the plots.



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- (ii) From your graph, describe in detail how an increase in the number of cigarettes smoked relates to the number of deaths from lung cancer. [2]

.....

.....

.....

- (iii) Use your graph to estimate the deaths from lung cancer for people smoking 30 cigarettes a day. [1]

Deaths per 100 000 =

- (iv) Cigarette manufacturers argued that **this set of results** did not prove that lung cancer was caused by cigarettes and could be caused by other factors. Use the data to suggest a reason for their statement. [1]

.....

- (c) In April 2007 the Welsh government banned people from smoking in enclosed public spaces such as cinemas. What was the reason for this ban? [1]

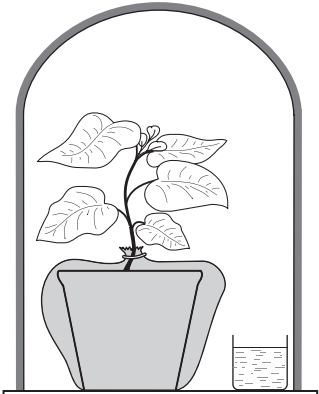
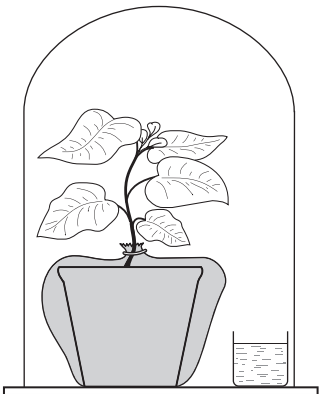
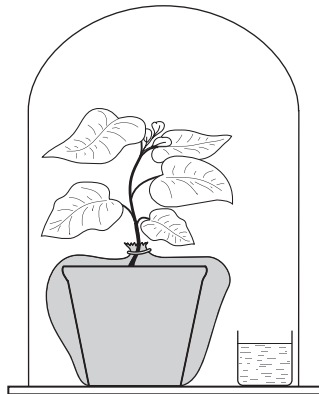
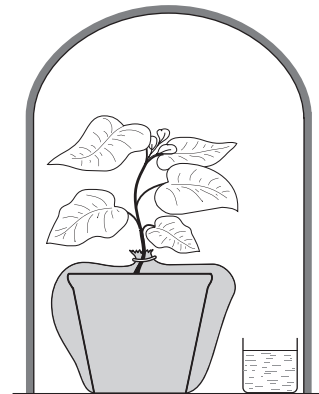
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6. (a) Complete the word equation for photosynthesis shown below. [2]

carbon dioxide + \longrightarrow glucose +

- (b) The diagrams below show four experiments used to investigate the conditions needed for photosynthesis. Four well-watered potted green plants were placed in glass bell jars, which were sealed onto greased glass plates. The soil in each pot was covered with a polythene sheet. Each apparatus was then subjected to different environmental conditions.

<p>Experiment A</p> <ul style="list-style-type: none"> • Bell jar covered in thick black paper • Beaker contains a chemical that produces carbon dioxide 	<p>Experiment B</p> <ul style="list-style-type: none"> • Beaker contains a chemical that produces carbon dioxide 
<p>Experiment C</p> <ul style="list-style-type: none"> • Beaker contains a chemical that absorbs carbon dioxide 	<p>Experiment D</p> <ul style="list-style-type: none"> • Bell jar covered in thick black paper • Beaker contains a chemical that absorbs carbon dioxide 

- (i) After 3 days, leaves from each of the four plants were tested for starch. Complete the table below by placing a ✓ or a X in each box to show the presence or absence of starch. [2]

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experiment	presence or absence of starch ✓ or X
A	
B	
C	
D	

- (ii) The results from which **two** experiments should be compared to show that

I. carbon dioxide is needed for photosynthesis,

[1]

.....

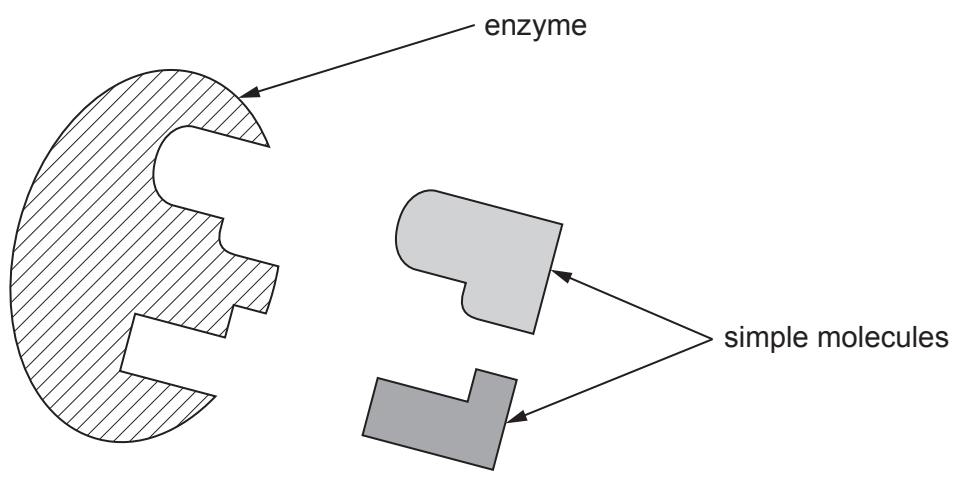
II. light is needed for photosynthesis?

[1]

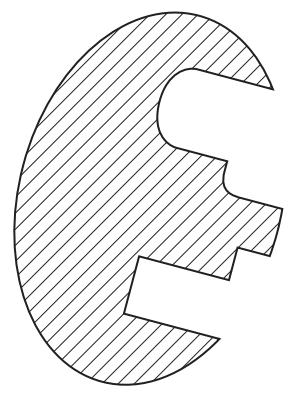
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7. (a) (i) The diagram shows an enzyme which builds up complex molecules from simple molecules.



Complete the diagram below to show the next stage in the reaction between this enzyme and the two simple molecules shown above. [2]



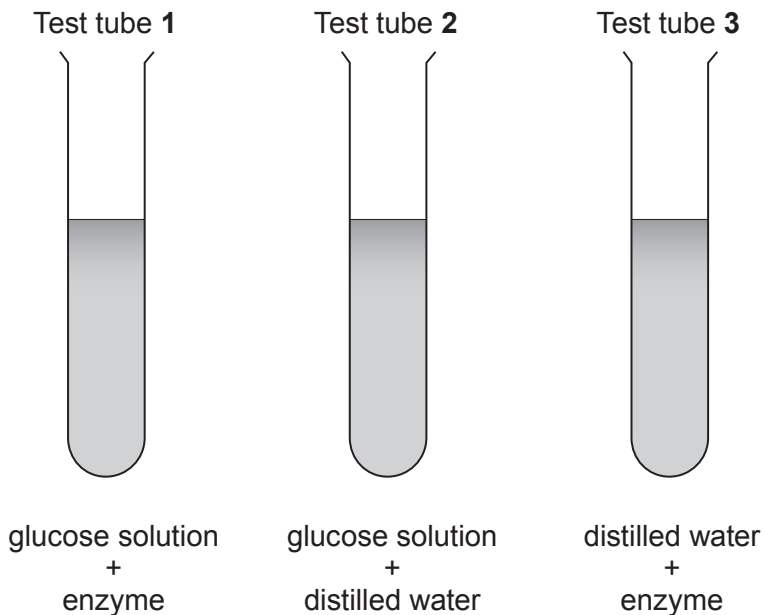
- (ii) What name is given to this **model** of enzyme action? [1]

.....

- (iii) Explain how boiling would affect the action of the enzyme shown in the diagrams above. [2]

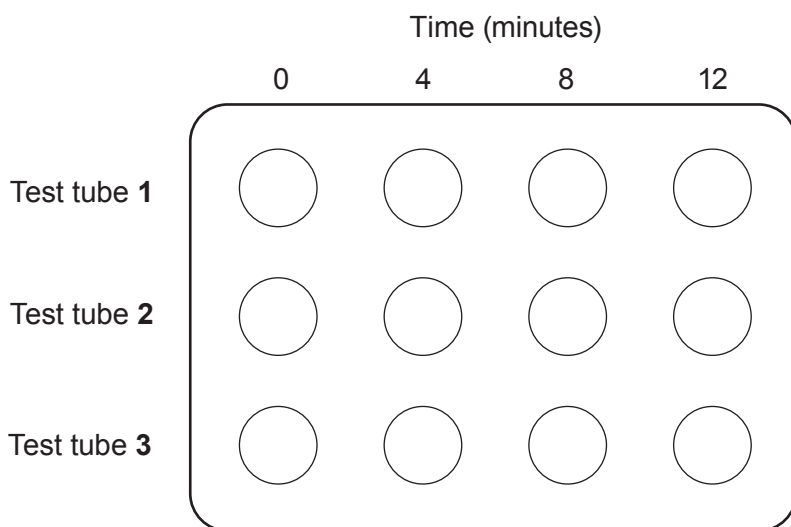
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(b) Potatoes contain an enzyme which converts glucose molecules into starch molecules. In the following experiment three test tubes were set up as shown in the diagram below.



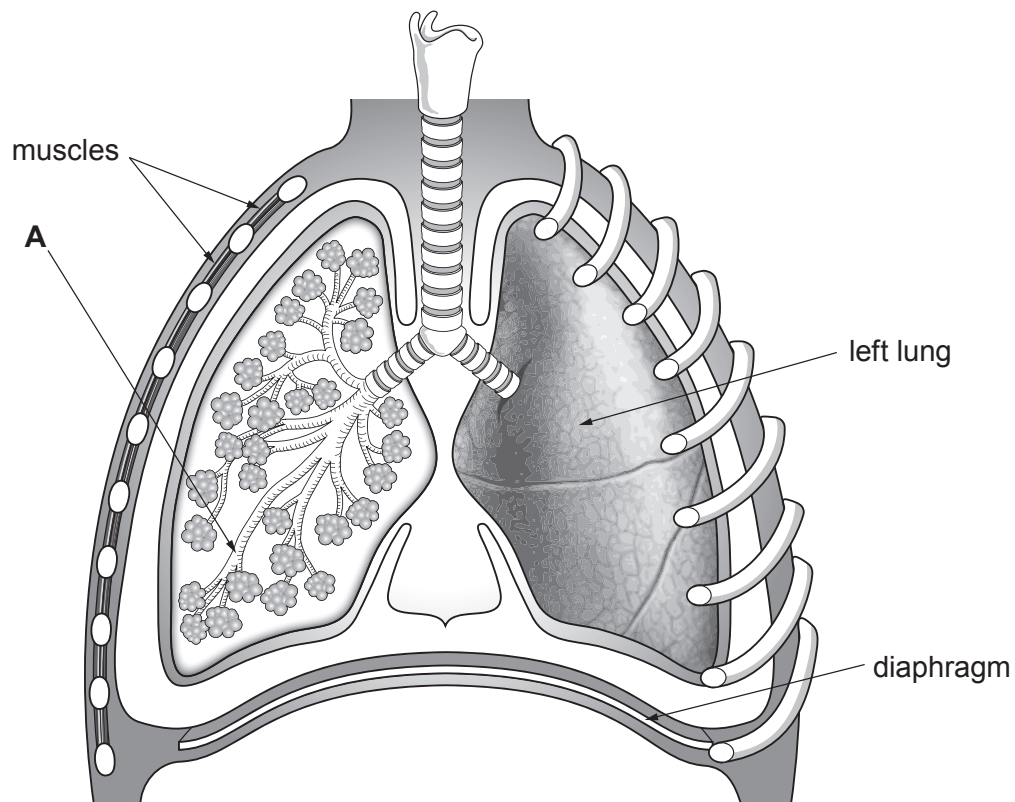
At the start of the experiment, and at four minute intervals, samples from each of the test tubes were added to each of the cavities in a spotting tray and then iodine solution was added to each sample.

Complete the diagram below by shading the cavities you would expect to show the presence of starch when tested with iodine solution. [3]



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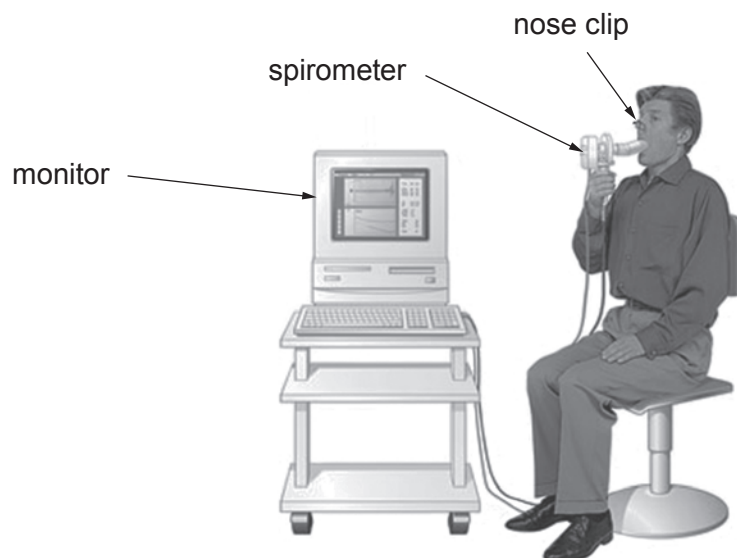
8. The diagram below shows the human respiratory system.



- (a) Name structure **A** on the diagram.

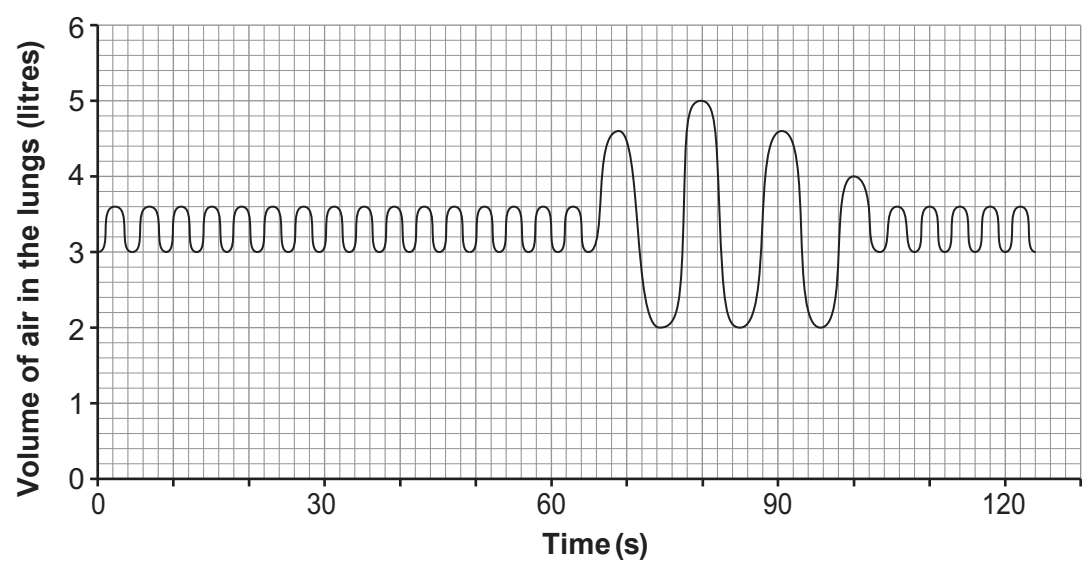
[1]

- (b) A person's breathing rate was measured on a spirometer for 120 seconds.



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The person breathed normally, then took deep breaths and then breathed normally again. A graph of this breathing pattern was printed and is shown below.



Use the graph to:

- (i) calculate the normal breathing rate for this person, [1]

normal breathing rate = breaths per minute

- (ii) calculate the difference between the volume of air inspired during a single normal breath and the **second** deep breath taken. [2]

difference in volume =

4

9. Describe, in detail, how you would show that living peas produce heat. The apparatus and materials for this investigation are listed below. Your account must refer to the order in which you set up the equipment, including a suitable control. **Diagrams will not gain credit in your answer.**

[6 QWC]

2 Thermos (vacuum) flasks
2 thermometers
cotton wool
liquid disinfectant
living peas
dead peas

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END OF PAPER