Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4471/01

W16-4471-01

ADDITIONAL SCIENCE/BIOLOGY

BIOLOGY 2
FOUNDATION TIER

A.M. THURSDAY, 7 January 2016

1 hour

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

4471 010001

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**.

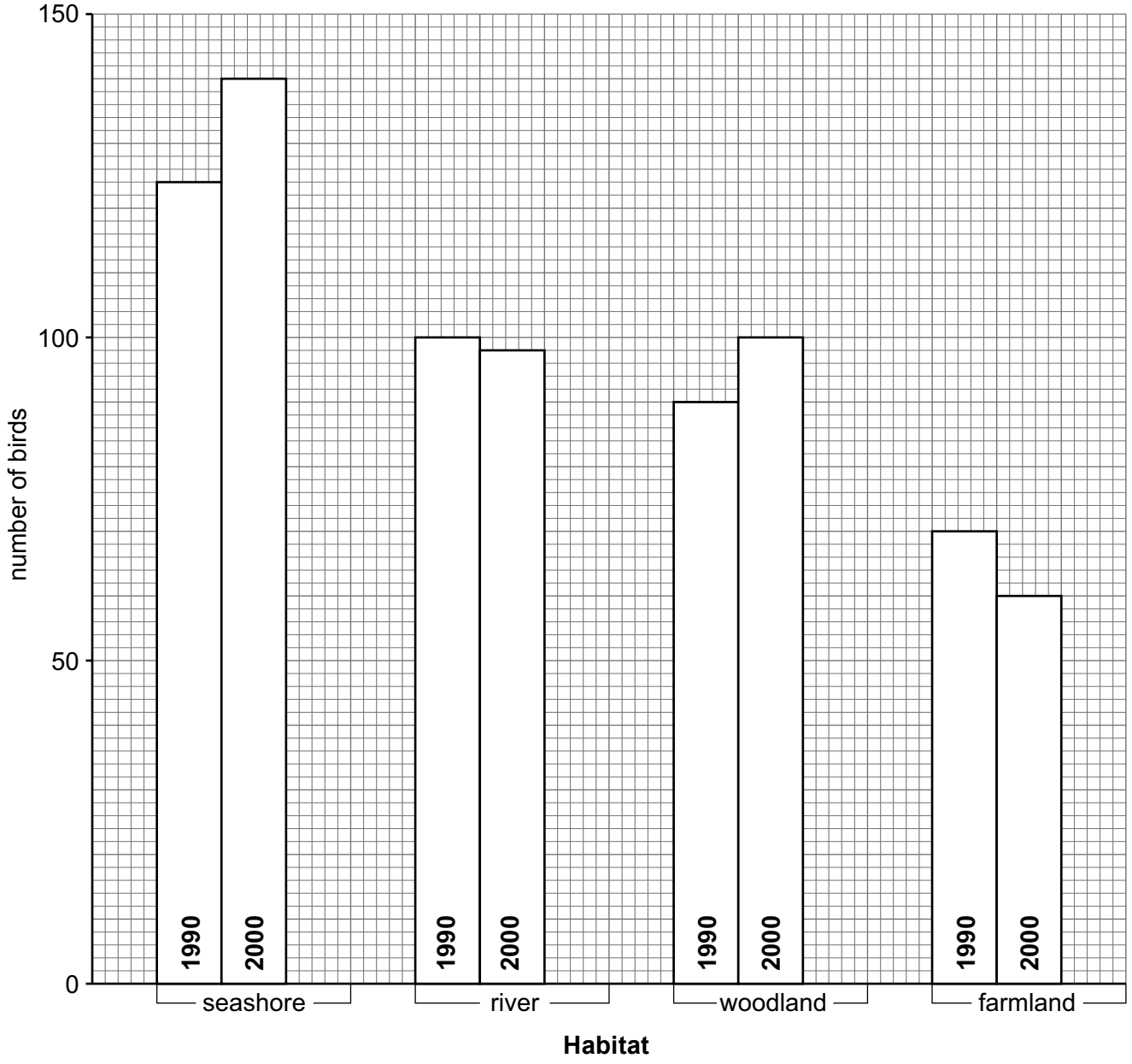
Examiner only

Answer **all** *questions.*

1. *(a)* Scientists recorded the number of birds in a small area of the UK in 1990, 2000 and 2010.

They studied four habitats.

Their results for 1990 and 2000 are shown in the bar chart and results for 2010 are shown in the table.



habitat of bird	number of birds in 2010
seashore	120
river	95
woodland	96
farmland	44

Examiner only

(i) Use the table at the bottom of page 2 to complete the bar chart to show the number of birds in 2010. [3]

(ii) From the bar chart, identify [3]

I. a habitat where numbers of birds increased between 1990 and 2000 but decreased in the next ten years;

.....

II. a habitat which showed a decrease in numbers of birds for the periods 1990 to 2000 and 2000 to 2010;

.....

III. the habitat with the greatest decrease in numbers of birds from 1990 to 2010.

.....

(iii) The scientists also noted the number of different species of birds in each habitat.

Which habitat had the greatest biodiversity?
Underline your answer. [1]

Sea birds – 19 species

River birds – 26 species

Woodland birds – 38 species

Farmland birds – 17 species

(b) In another survey carried out in 2010, scientists found that many birds, commonly seen in Wales, had decreased in number since 1995. Their results are shown in the table below.

species of bird	number in 1995	number in 2010	decrease in number of birds
Yellow Wagtail	15000	0	15000
Starling	300000	60000	.....
Willow tit	.....	1200	2300

(i) Complete the missing data in the table above. [1]

(ii) Suggest a reason for the decrease in numbers of farmland birds in Wales in recent years. [1]

.....

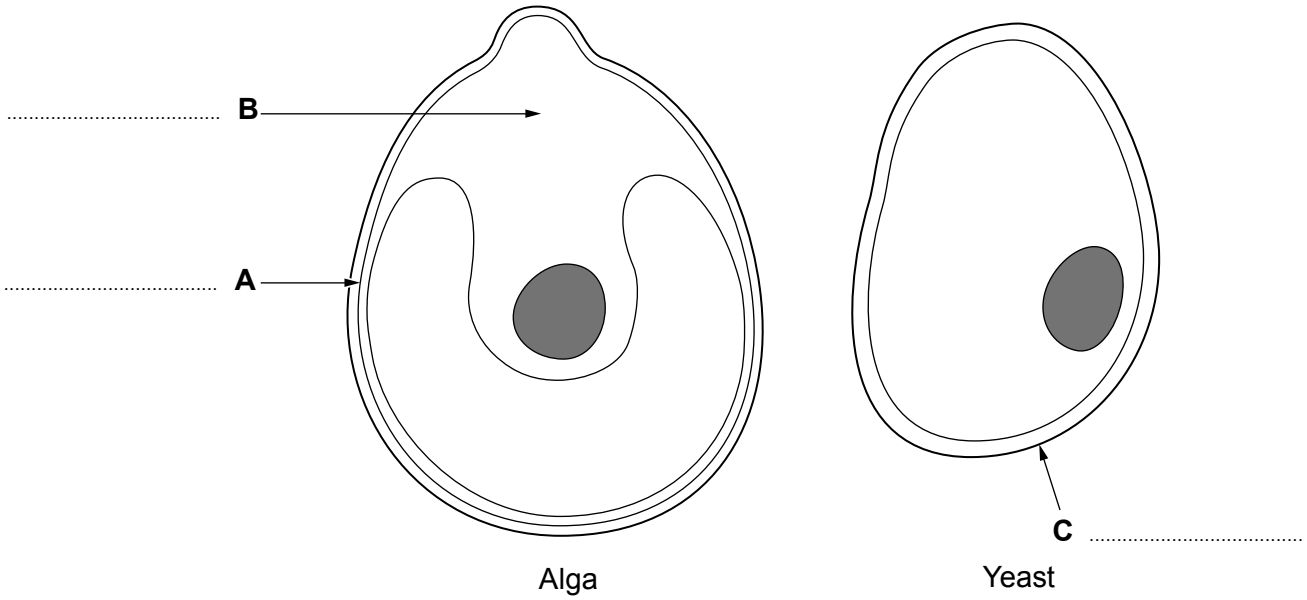
.....

4471 010003

Turn over.

Examiner only

2. The diagrams show cells of two micro-organisms.



(a) (i) Complete labels **A**, **B** and **C** on the diagrams. [3]

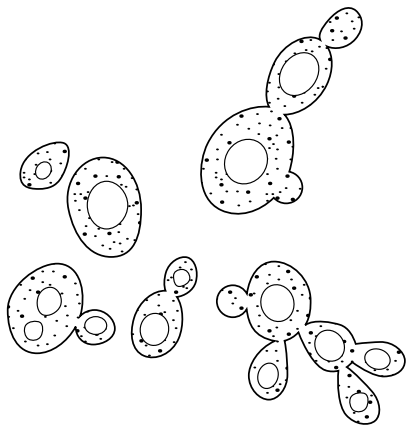
(ii) Name the group of organisms to which yeast belongs. [1]

.....

(b) Name a structure which is present in yeast and algal cells but is absent from bacteria. [1]

.....

(c) The diagram below shows asexual reproduction in yeast.



Name the process used in asexual reproduction in yeast, as shown in the diagram. [1]

.....

(d) How do bacterial cells reproduce asexually? [1]

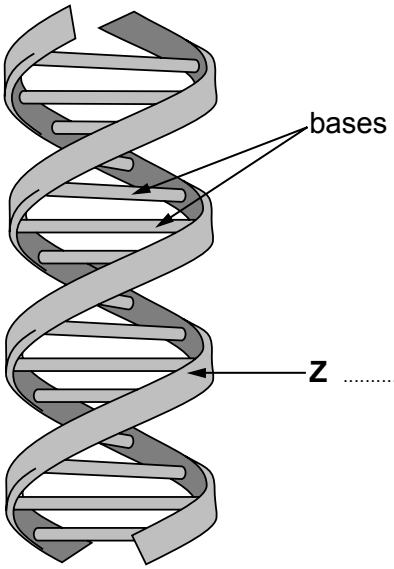
.....

7

BLANK PAGE

Examiner only

3. *(a)* The diagram shows the structure of a small section of DNA.



..... and .....

(i) Complete the diagram by writing the names of the **two** molecules which make up the chain shown by **Z**. [1]

(ii) The bases are known by four letters. One is **A**.

I. State the letter names of the other **three** bases. [1]

A ....

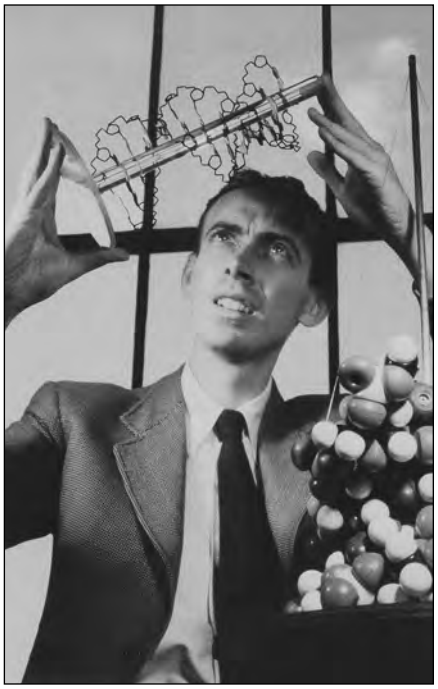
II. Describe how the bases are arranged in DNA. [2]

.....

.....

Examiner only

(b) The photograph shows James Watson, a scientist who investigated the structure of DNA in the 1950s.



Choose the correct statement to complete the sentence. [1]

The structure of DNA was discovered by

A one scientist using one technique.

B one scientist using many different techniques.

C a number of scientists using different techniques.

D a number of scientists using the same technique.

Answer .....

(c) State the part of a living cell which contains DNA. [1]

.....

4471 010007

6

Turn over.

Examiner only

4. *(a)* Complete the word equation for photosynthesis. [2]

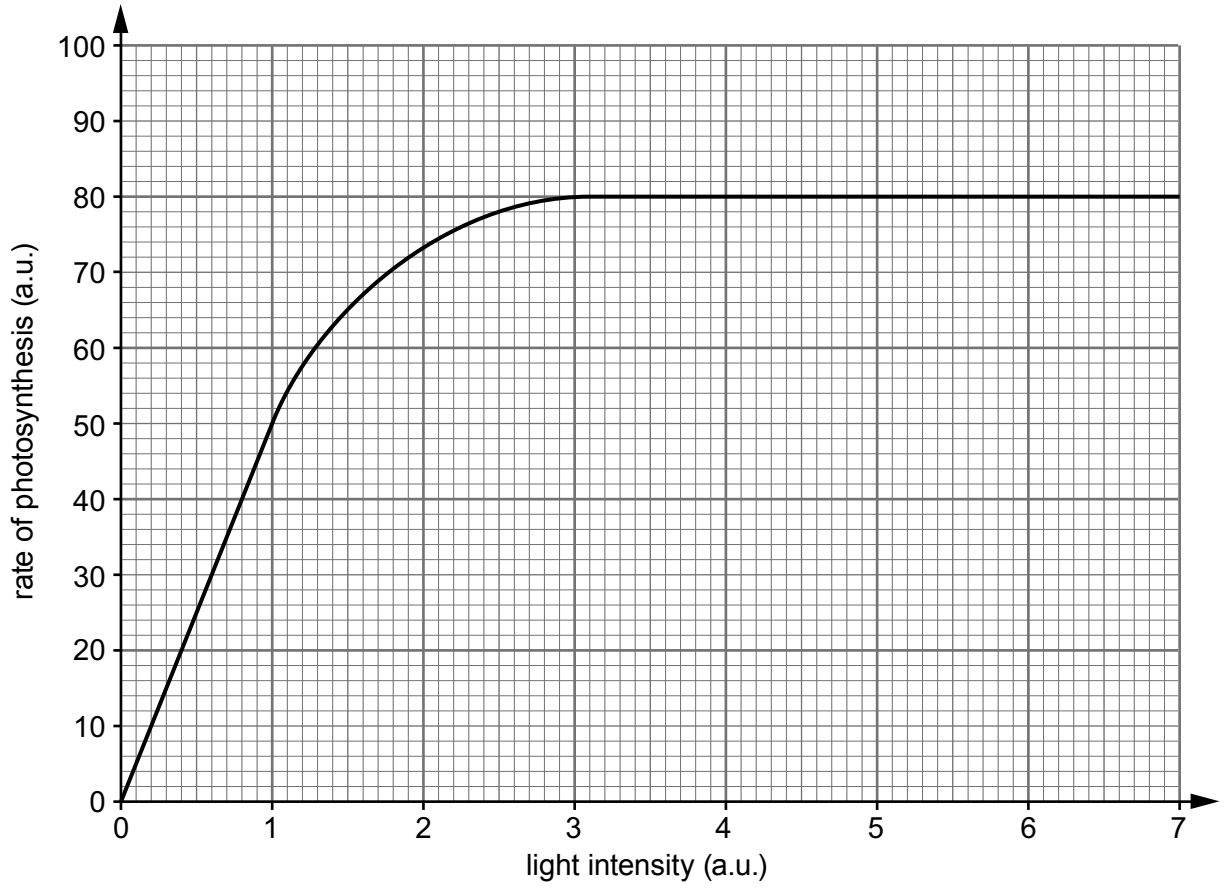
..... + water $\xrightarrow{\text{light}}$ ..... + glucose

(b) Photosynthesis occurs in chloroplasts. Explain why chloroplasts are necessary for photosynthesis to occur. [2]

.....

.....

(c) The graph below shows how the rate of photosynthesis varies in different light intensities.



Examiner only

Use the graph to:

(i) describe how the rate of photosynthesis changes as the light intensity increases; [2]

.....

.....

(ii) calculate the change in the rate of photosynthesis between 1 and 3 units of light intensity. [2]

Answer ..... a.u

8

4471 010009

Turn over.

Examiner only

5.

Ragwort – a problem plant

- The poisonous weed, ragwort *(Jacobaea vulgaris)* was taken to New Zealand in 1870 and the plants became a serious problem on cattle farms by the 1930s.
- Chemical weed-killers, which controlled ragwort on sheep farms, were poisonous to cattle, so scientists investigated using plant-eating insects to control the ragwort.

Results of investigations.

name of insect	original habitat of insect	observations
cinnabar moth	New Zealand	reproduced slowly and ate ragwort leaves
weed beetle	New Zealand	reproduced slowly and ate leaves and stems of ragwort
plume moth	Europe	reproduced quickly and ate all parts of ragwort

In 2005 the Environmental Authority gave permission for plume moths to be used freely on cattle farms throughout New Zealand.

Use this information and your knowledge to answer the questions.

(a) Give a reason why ragwort caused serious problems for cattle farmers in the 1930s. [1]

.....

Examiner only

(b) Ragwort was introduced to New Zealand by people arriving from another country.

State the scientific term used for a species which is introduced in this way and give **one** *other* example from the table. [2]

.....

.....

(c) What name is given to the type of control where insects are used to control pest species such as ragwort? [1]

.....

(d) From the table, state **one** way in which the plume moth was better than the weed beetle in controlling ragwort. [1]

.....

.....

(e) Suggest what the Environmental Authority would have to do before giving permission for the plume moth to be used freely in New Zealand. [1]

.....

.....

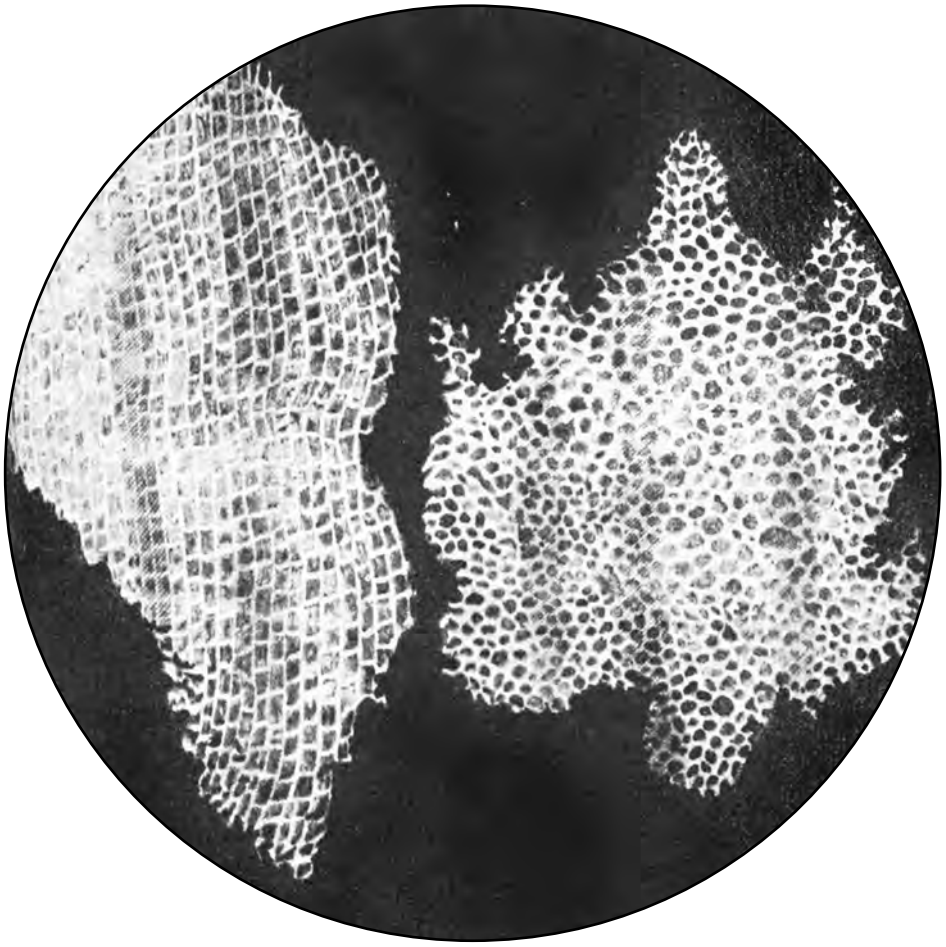
6

Turn over.

Examiner only

6. Robert Hooke (1635 – 1703) was an English scientist who studied the structure of living organisms using one of the first light microscopes. In 1665 Hooke viewed a thin cutting of cork (tree bark) and discovered empty spaces, surrounded by walls, which he called cells. The work of Hooke and other scientists led to the development of the Cell Theory.

Hooke's drawing of cork as viewed under the light microscope



(a) What does the Cell Theory state? [1]

.....

.....

(b) Viruses were discovered in the 1950s. State **two** reasons why viruses are not thought to be living organisms. [2]

(i) .....

(ii) .....

Examiner only

(c) You are provided with a sample of pond water containing single-celled swimming organisms. Which microscope would you use to observe the swimming action of these organisms? Place a tick (✓) in the box under the microscope you would choose and state the reason for your choice. [1]

Light microscope
(magnification up to x 1 500)

☐

Electron microscope
(magnification up to x 500 000)

☐

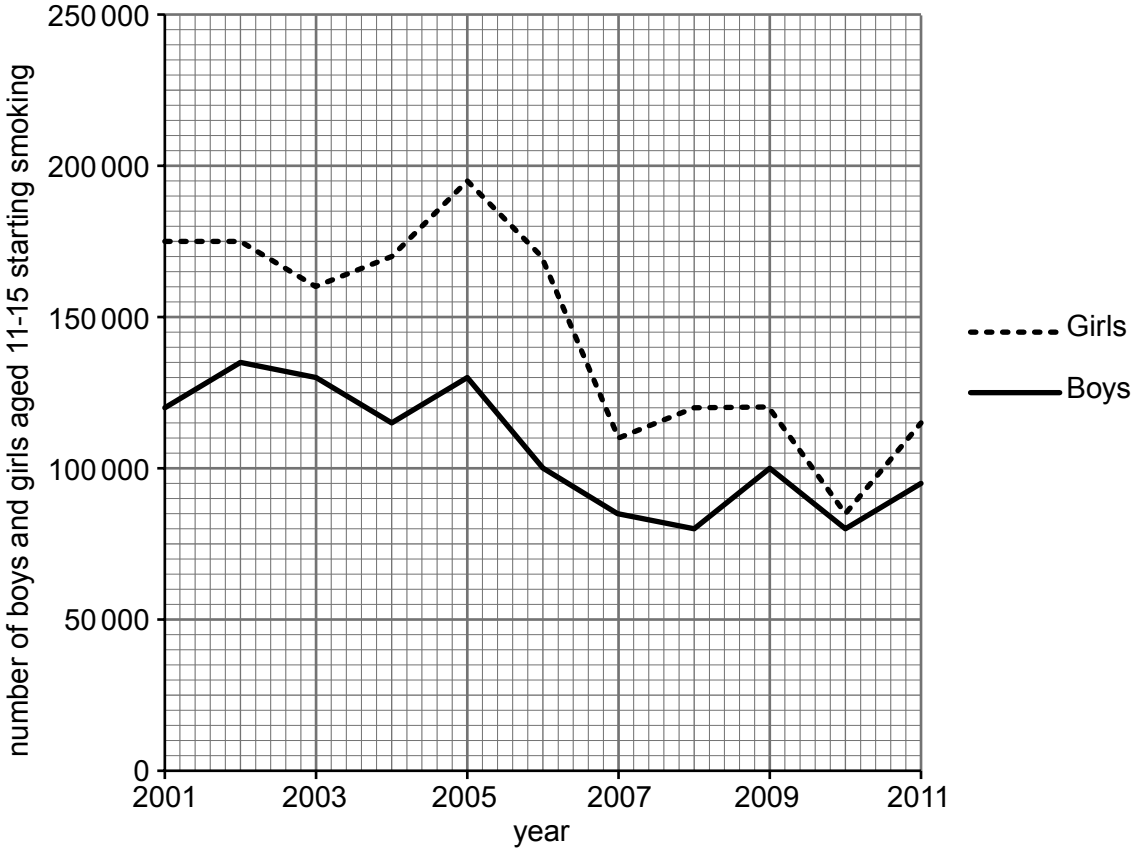
Reason .....

.....

4

Examiner only

7. The graph below shows the number of boys and girls aged 11 – 15 who started smoking each year between 2001 and 2011 in the UK.



Cancer Research UK

(a) (i) Give **two** trends which are shown in the graph. [2]

I. .....

II. .....

(ii) In 2009 the population of the UK was estimated at 62 million. In the same year, 102 000 people died in the UK from tobacco smoking related disease.
Calculate the percentage of the UK population who died from tobacco smoking related disease in 2009. Show your working. [2]

Percentage of population = ... **%**

Examiner only

(b) Cotinine is a chemical found in tobacco smoke. It is found in the saliva and urine of tobacco smokers. Simple test kits are available which can test for the presence of cotinine in saliva and urine.

In 2011 the percentage of 15 year old boys and girls in the UK who admitted smoking tobacco regularly was:

Boys 8% Girls 10%

However, based on cotinine test results of volunteer 15 year old boys and girls, the figures are more likely to be:

Boys 21% Girls 19%

(All data from Cancer Research UK)

Suggest why the admitted levels of smoking amongst 15 year old boys and girls is almost 50% less than the results indicated from the cotinine tests. [1]

.....

.....

.....

(c) Explain how the smoking related disease, emphysema, affects the function of the lungs. [2]

.....

.....

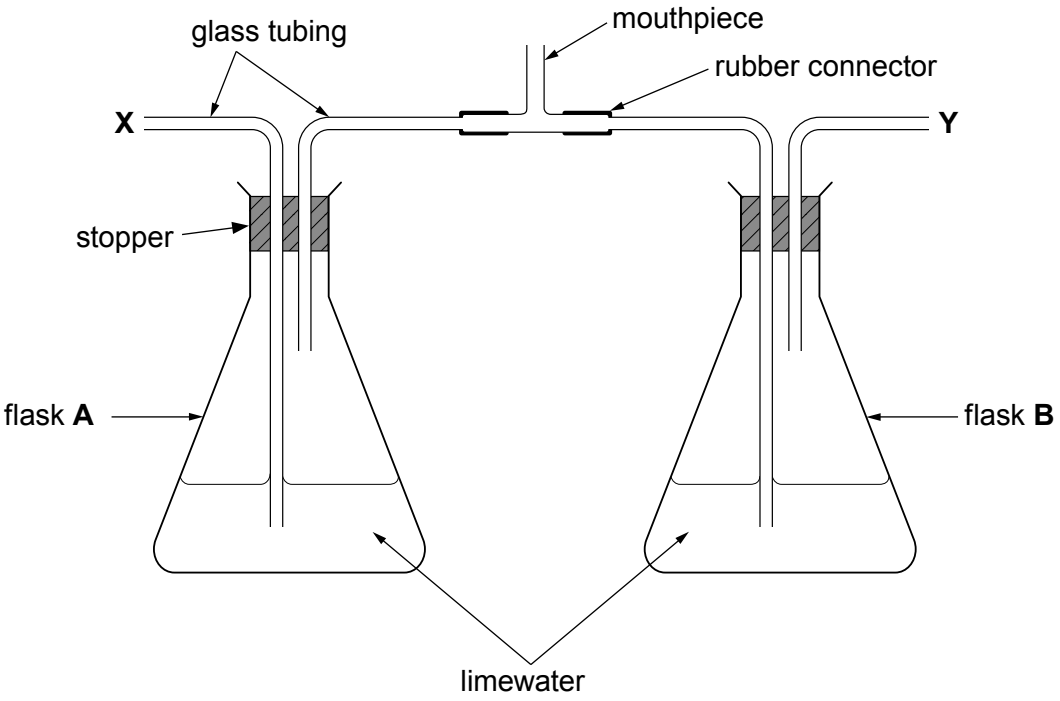
.....

7

Turn over.

Examiner only

8. Mair set up the following apparatus in a school laboratory in order to investigate the difference between inspired and expired air.



(a) Draw an arrow at **X** and another at **Y** to show the direction of air flow through the apparatus when air is gently breathed in and out at the mouth piece. [2]

(b) Mair breathed gently in and out through the mouth piece for 1 minute.

(i) Complete the table below to show the expected **appearance** of the limewater after 1 minute. [2]

	flask **A**	flask **B**
appearance of limewater after 1 minute	.....	.....

(ii) Explain the **difference** in the appearance of the limewater after 1 minute. [2]

.....

.....

(c) If Mair had breathed gently in and out through the mouthpiece for 5 minutes, how would the results she obtained have been different? [1]

.....

7

Examiner only

9. A student ate a chicken sandwich made from bread, butter and chicken for lunch. Describe fully what happens to the food in the sandwich from the time it enters the **mouth** to the time it leaves the **stomach**. [6 QWC]

6

END OF PAPER

BLANK PAGE

BLANK PAGE