

Surname	Centre Number	Candidate Number
Other Names		0

**GCSE**

4461/01

SCIENCE A/BIOLOGY**BIOLOGY 1****FOUNDATION TIER**

P.M. MONDAY, 10 June 2013

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	10	
3.	3	
4.	4	
5.	6	
6.	9	
7.	6	
8.	6	
9.	6	
10.	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 used in your answer to question **10**.

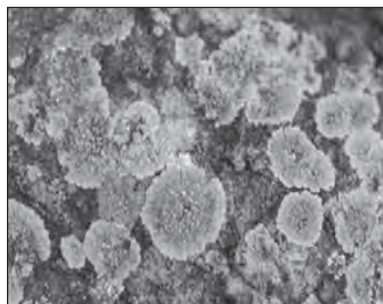
Answer **all** questions.

Examiner
only

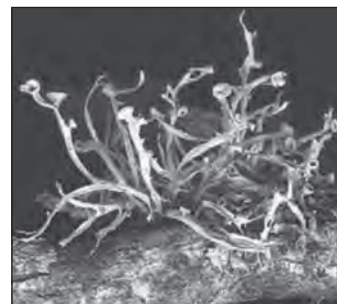
1. The photographs below show three forms of lichen.



crustose

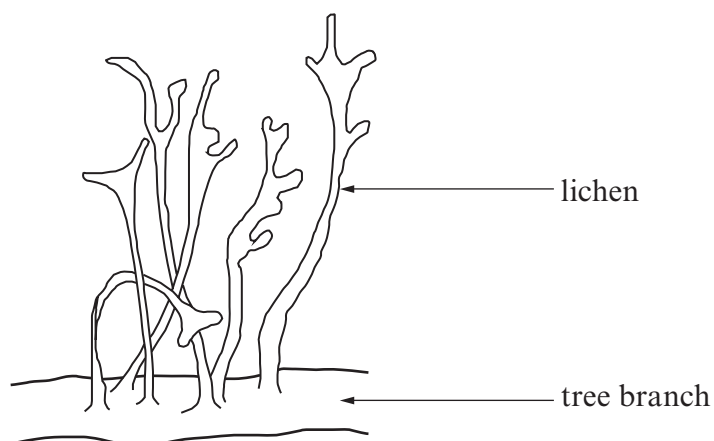


foliose



fruticose

A drawing of one form is shown below.



- (a) Use the photographs above to identify the form of lichen shown in the drawing.
Circle the correct answer.

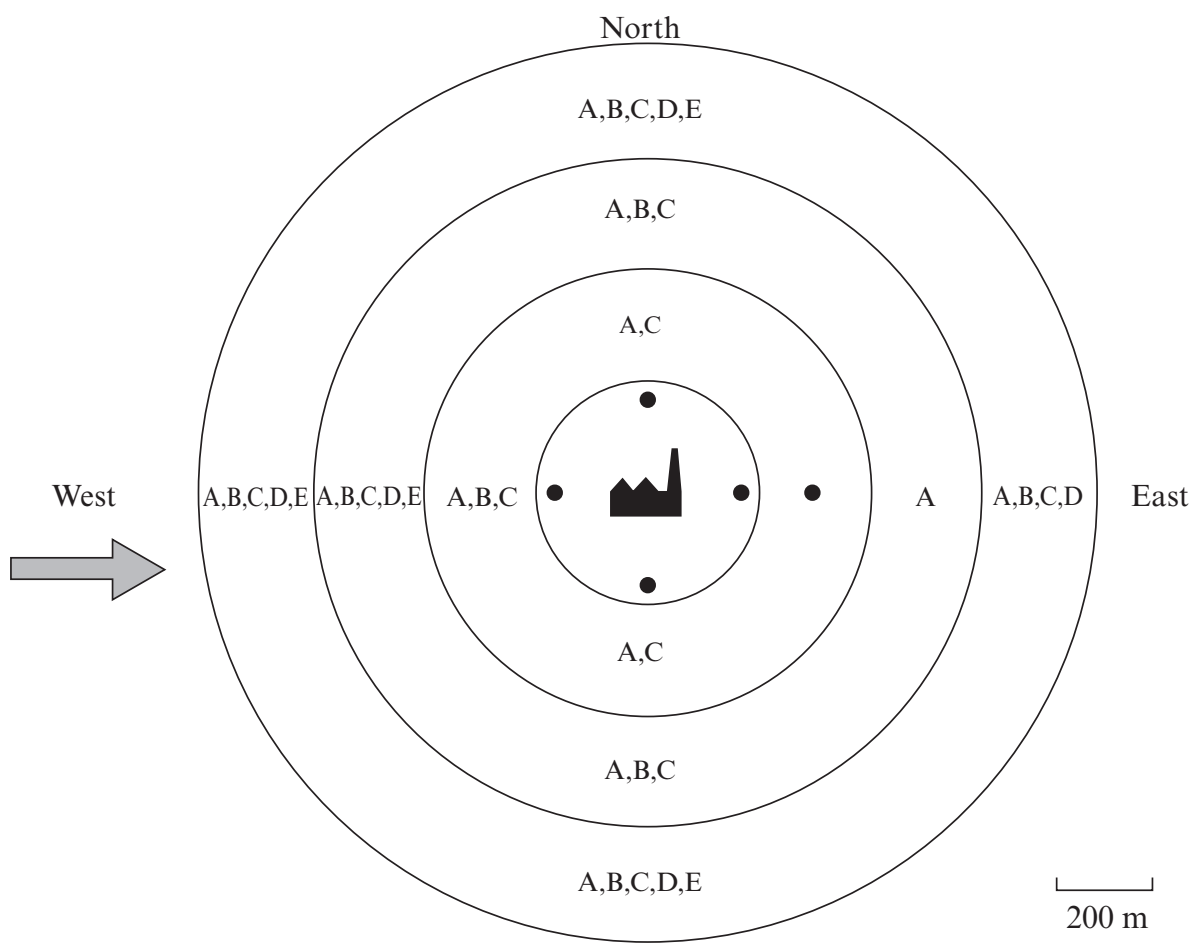
crustose



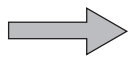
foliose

fruticose

[1]

(b) Gareth surveyed the positions of five lichen species (A to E) in woods surrounding a coal-burning factory. He plotted the results on the chart below.



- Key**
- A, B, C, D, E indicate which lichens are present
 -  factory
 -  no lichens
 -  usual direction of wind

Use information from the chart above to answer the following:

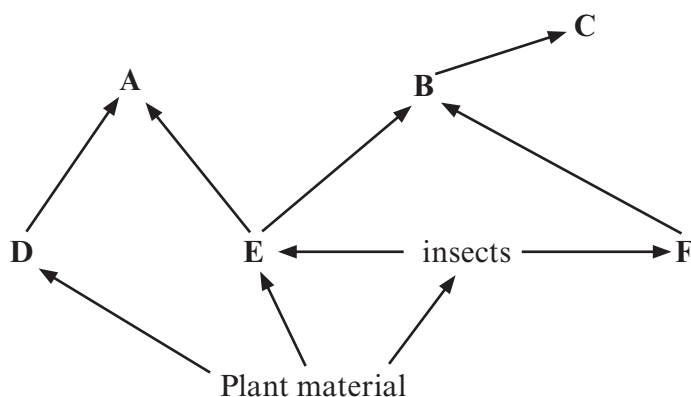
- (i) Complete the following sentence by underlining the correct answer. [1]
The usual wind direction is from the North / South / East / West.
- (ii) Give the letter of the lichen (A to E) **most** sensitive to air pollution. [1]
.....
- (iii) Give the letter of the lichen (A to E) **least** sensitive to air pollution. [1]
.....

2. Hamsters are common in many food webs.



©iStockphoto

(a) Hamsters eat plant material and insects. Hamsters are eaten by foxes and owls. In the food web below, six of the organisms are labelled A to F.



Choose a letter from the food web above which:

- (i) is a hamster; [1]
- (ii) could be a fox; [1]
- (iii) is a third stage consumer. [1]

(b) Read the following statements about hamsters.

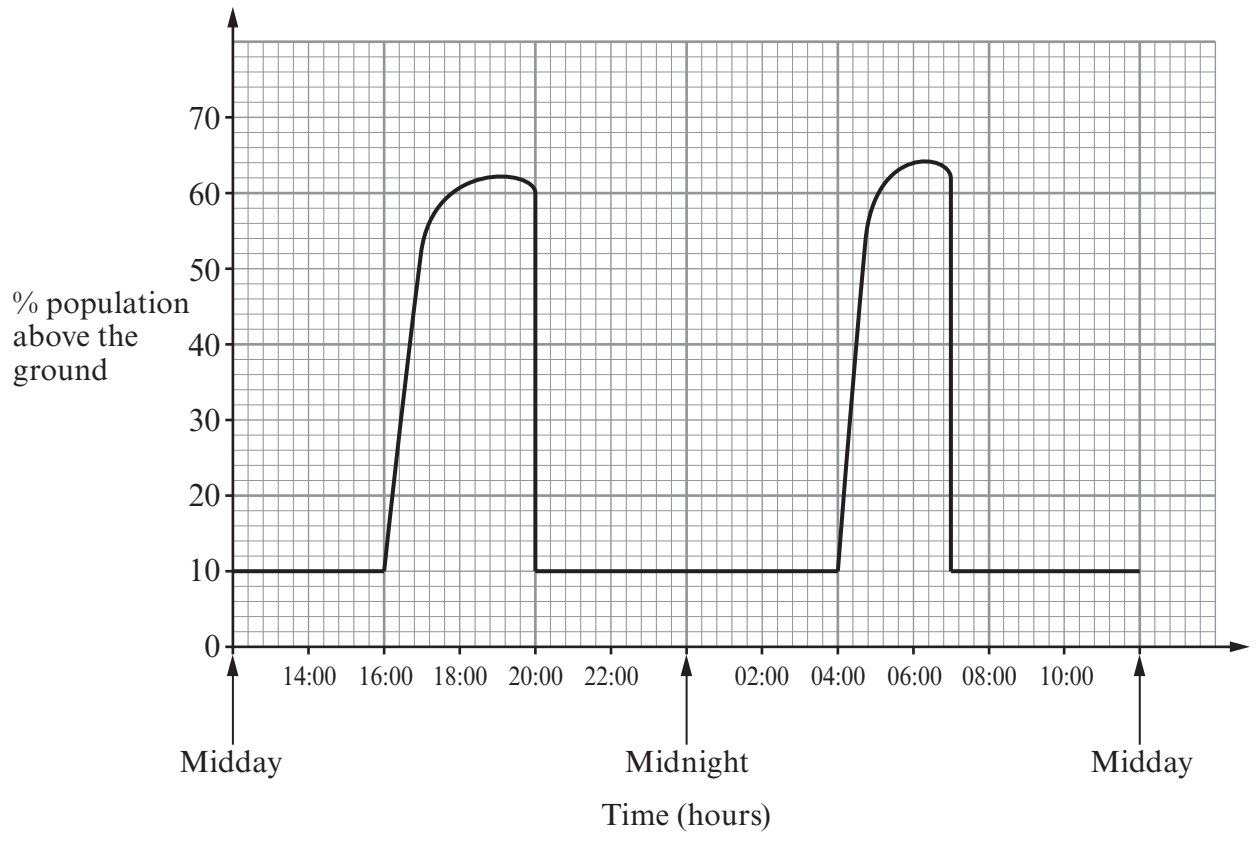
1. They live in burrows underground.
2. They come to the surface to feed.
3. They have poor eyesight.
4. They have sharp claws and strong front legs.
5. They use a lot of the energy in their food as heat.

Which of the statements (1-5) suggest that hamsters:

- (i) may rely on their sense of smell to find food; [1]
- (ii) have a high rate of respiration; [1]
- (iii) are adapted to dig burrows? [1]

Examiner only

Scientists investigated the proportion of a population of hamsters that were above ground during a period of 24 hours. The results are shown in the graph below.



(c) Use the graph above to answer the following questions

(i) Between which times during the 24 hour period were more than 10% of the population above ground?

I Between hours and hours [1]

II Between hours and hours [1]

(ii) Foxes and owls are active mostly at night. What is the evidence that hamsters try to avoid being caught by foxes and owls? [2]

.....

.....

.....

.....

4461 0100/05

3. (a) A human body cell has 46 chromosomes.
How many chromosomes are present in:
- (i) a sperm cell;
- (ii) a fertilised egg cell? [2]
- (b) Gavin and Tracy are expecting their second baby. Their first baby is female.
What is the chance that their second baby will also be female?
Circle the correct answer.

0% 25% 50% 100%

[1]

3

4. In May 2008, the Environment Agency reported that tonnes of untreated sewage had spilled into the river Ely in Wales, causing the death of hundreds of fish.

Complete the following sentences to explain why the fish died.

- (a) The nutrients in sewage caused the rapid growth of photosynthetic organisms such as
..... [1]
- (b) When the photosynthetic organisms died they were decayed by micro-organisms such as
..... and [2]
- (c) The micro-organisms used up the dissolved so the fish could not
breathe and died from suffocation. [1]

4

5. (a) Read the following information about alcohol.

Alcohol slows down our reactions. Regular drinking over the recommended daily limit causes diseases of the circulatory system and liver. Pregnant women are advised not to drink any alcohol.

(i) State the organ named above that is damaged by alcohol. [1]

.....

(ii) State the organ that controls the speed of reactions. [1]

.....

(iii) Suggest why pregnant women are advised not to drink any alcohol. [1]

.....

(b) The alcohol content of drinks may be shown as units of alcohol. The table below gives the units of alcohol in some drinks.

drink	quantity	volume (cm ³)	units of alcohol
cider	can	330	1.3
lager	can	330	2.0
vodka	small measure	25	1.0
wine	large glass	175	2.5
alcopop	bottle	275	1.4

Jane goes to a party. She drinks a can of lager and a large glass of wine.

(i) Calculate the total units of alcohol Jane consumes at the party. [1]

..... units

(ii) The government recommends that females should **not** regularly exceed 3 units of alcohol in one day.

By how much does Jane exceed the recommended limit of 3 units? [1]

..... units

(c) The government wants to reduce the number of patients with alcohol related disease. Why was a plan for a minimum price for alcohol suggested in 2012? [1]

.....

6. The photograph below shows crops being sprayed with herbicides.



© Buquet Christophe

- (a) Explain how herbicides increase crop yield.

[2]

.....

.....

.....

.....

- (b) Plants can be genetically modified (GM) to make them resistant to herbicides.

- (i) The statements below show how this genetic modification takes place, but they are not in the correct order.

- 1 insert the gene into the seeds of the crop plant
- 2 grow many different types of plants
- 3 find and cut out the gene for resistance from the surviving plants
- 4 spray the plants with herbicide
- 5 collect the surviving plants
- 6 trial for many years to test the safety of the method

Complete the sequence below to show the statements (1-6) in the correct order. One has been done for you.

..... → → 5 → → →

[4]

The table below gives some arguments for and against growing GM plants which are resistant to herbicide.

- (ii) Place a tick (✓) next to each argument for **or** a cross (✗) next to each argument against growing GM crop plants. Two have been done for you. [1]

argument	✓ or ✗
increased crop yield	✓
less herbicide used	✓
reduced biodiversity	
cheaper food	
long term effects unknown	



Soya bean plant

- (iii) GM herbicide resistant soya has been grown in Argentina for many years. Seeds from the GM soya have spread widely and the plant is now a serious pest growing in fields of crops such as maize. Farmers now have to use increased concentrations of herbicide to try to kill the pest soya.

From the information above, suggest reasons why the price of maize is likely to rise. [2]

.....

.....

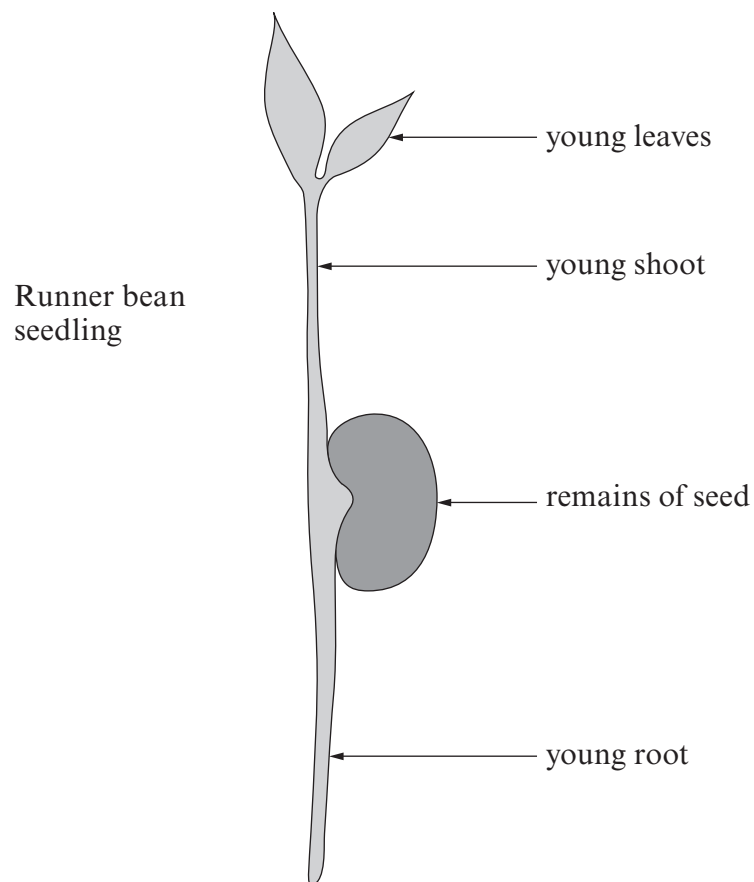
.....

7. (a) What is a *tropism*?

[2]

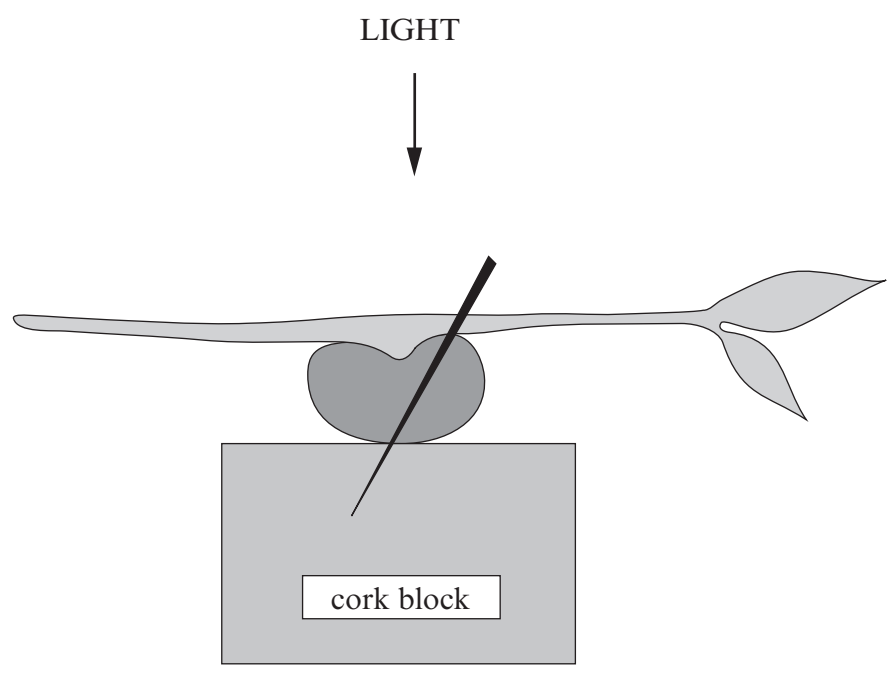
Examiner
only

(b) A number of runner bean seedlings were grown in soil in a laboratory. After 5 days the seedlings were removed from the soil and their young roots were washed. The straightest of the seedlings was then selected.

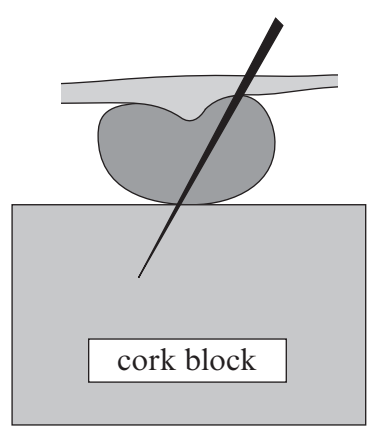


The runner bean seedling was positioned horizontally and pinned to a cork block as shown below.

Examiner only

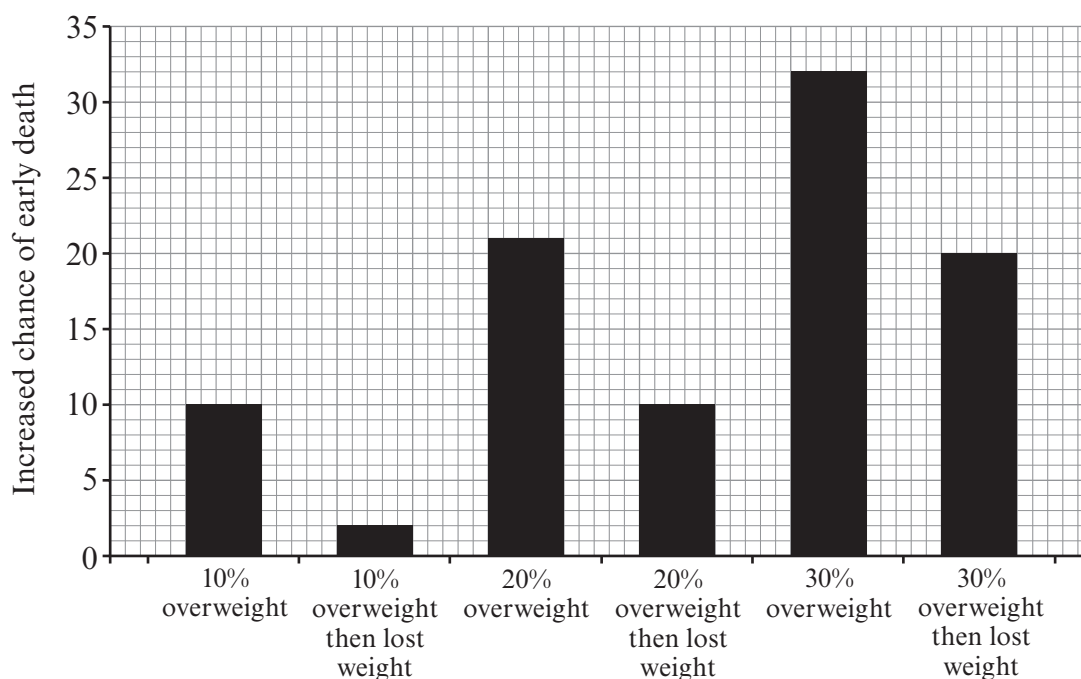


- (i) After 3 days the seedling was examined. Complete the diagram below by sketching the expected appearance of the young root **and** shoot. [2]



- (ii) Name the response shown by
- I the root, [1]
 - II the shoot. [1]

8. The chart below shows the relationship between being overweight and increased chance of an early death in the human population in the UK.



- (a) From the evidence in the chart state **two** relationships between being overweight and an increased chance of early death. [2]

(i)

(ii)

- (b) The recommended daily energy intake for a man is 10 500 kJ.
The table below shows the energy content of some foods.

food	energy (kJ)
milk 100 g	272
1 egg	15
1 bacon rasher	200
soup 100 g	300
bread & butter 1 slice	520
marmalade 100 g	500
chocolate 100 g	3300

food	energy (kJ)
fried fish 100 g	550
chips 100 g	1065
apple pie 100 g	1200
custard 100 g	500
cheese 100 g	1682
biscuits 100 g	500
sugar /teaspoon	170

John is a 42 year old man who is severely obese. His typical lunch is shown in the table below:

Examiner
only



©iStockphoto

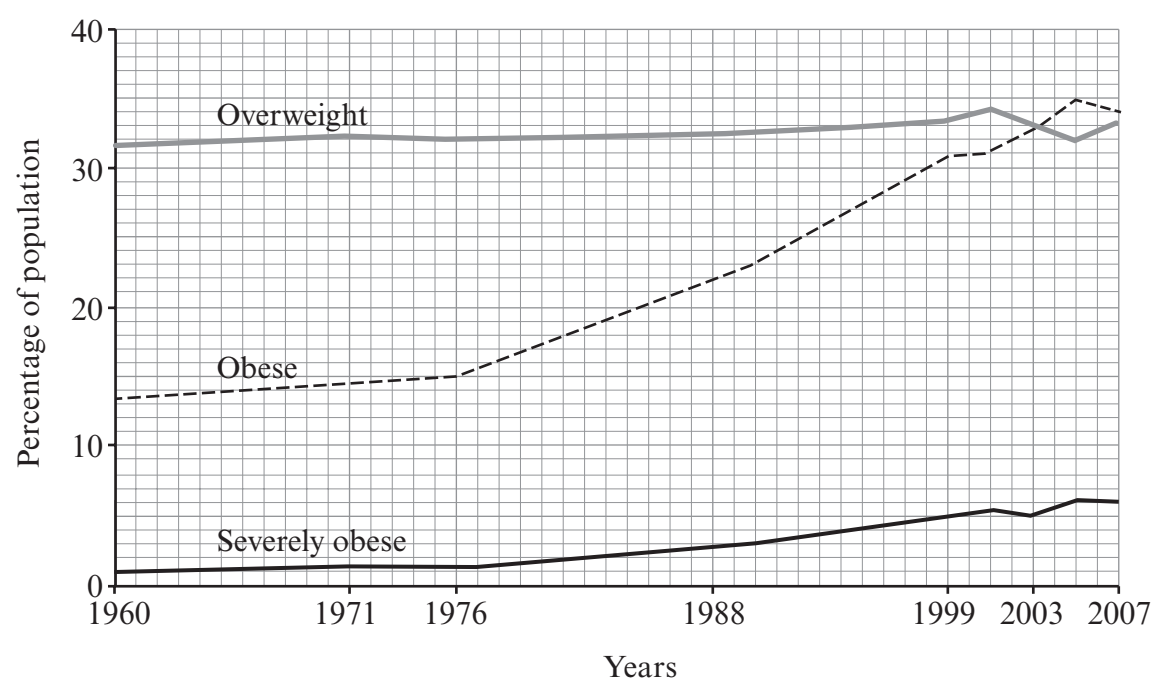
John's lunch	energy content (kJ)
large portion of chips 300 g	3195
4 slices of bread and butter
large fried fish 250 g	1375
2 cups of black coffee with 4 teaspoons of sugar per cup	1360
portion of apple pie 200 g
portion of custard 50 g
Total energy content of John's lunch

- (i) Complete the table above by using the table opposite to calculate the energy content of the foods John has eaten and the total energy content of his lunch. Some of the table has been completed for you. [2]
- (ii) John has exceeded his recommended daily energy intake in this single meal alone. Calculate how many kJ he has eaten in excess of his recommended daily energy intake. [1]

..... kJ

Examiner only

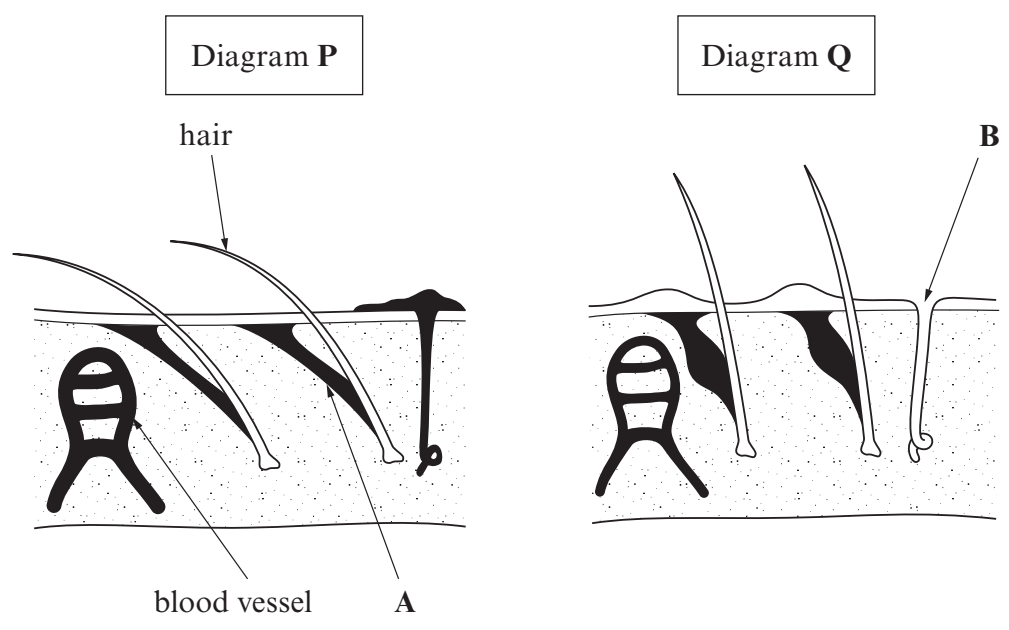
(iii) John's eating habits are typical of many adults living in developed countries. The graph below shows the trends in being overweight, obese and severely obese among adults aged 20 - 74 in the USA between 1960 and 2007.



Use the graph above to **calculate** the increase in the percentage of obese adults in the USA between 1976 and 2007. [1]

..... %

9. The diagrams below show the skin under two different environmental conditions.



(a) Name the parts **A** and **B** labelled on the diagrams. [2]

A

B

(b) Diagram **P** shows how the skin responds to cool the body down. Identify **two** of these responses and explain how each cools the body.

(i) Response [1]

Explanation of cooling effect. [1]

.....

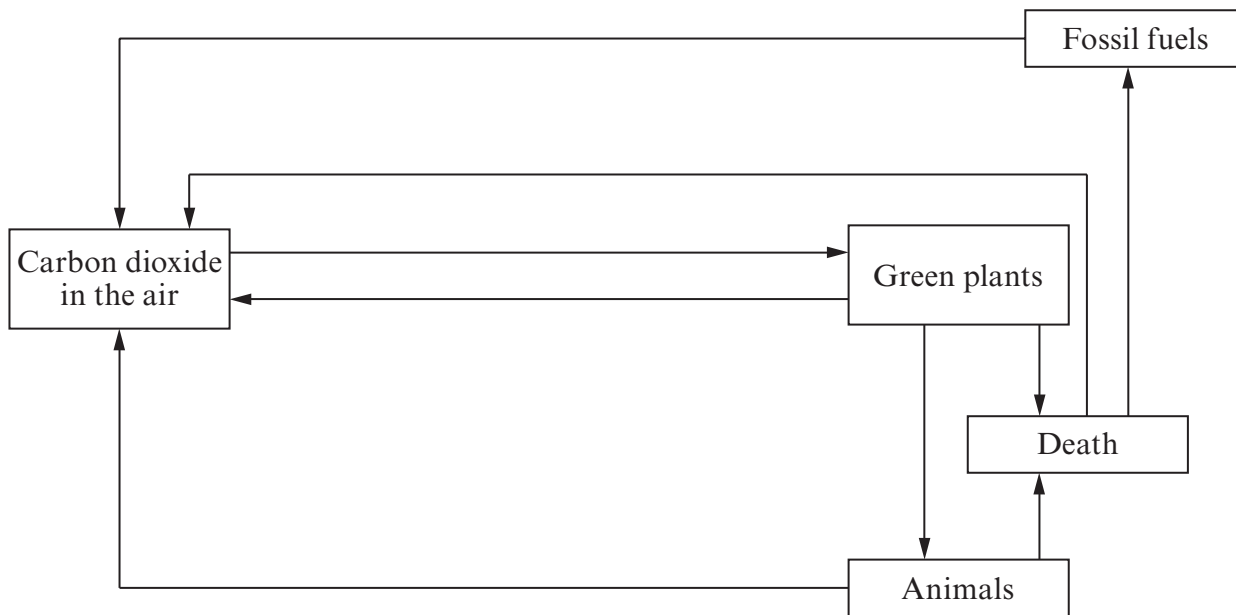
(ii) Response [1]

Explanation of cooling effect. [1]

.....

10. The diagram shows the basic outline of the carbon cycle.

Examiner only



Use the diagram above **and your own knowledge** to explain **in detail** how carbon is cycled in nature. Start your account with carbon dioxide being taken up by green plants. [6 QWC]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....