

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

A334/01

**TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A**

**Agriculture and Food
(Foundation Tier)**

FRIDAY 12 JUNE 2009: Morning

DURATION: 45 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the question paper

A calculator may be used for this paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil

Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Answer ALL the questions.**
- **Write your answer to each question in the space provided, however additional paper may be used if necessary.**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [] at the end of each question or part question.**
- **The total number of marks for this paper is 36.**

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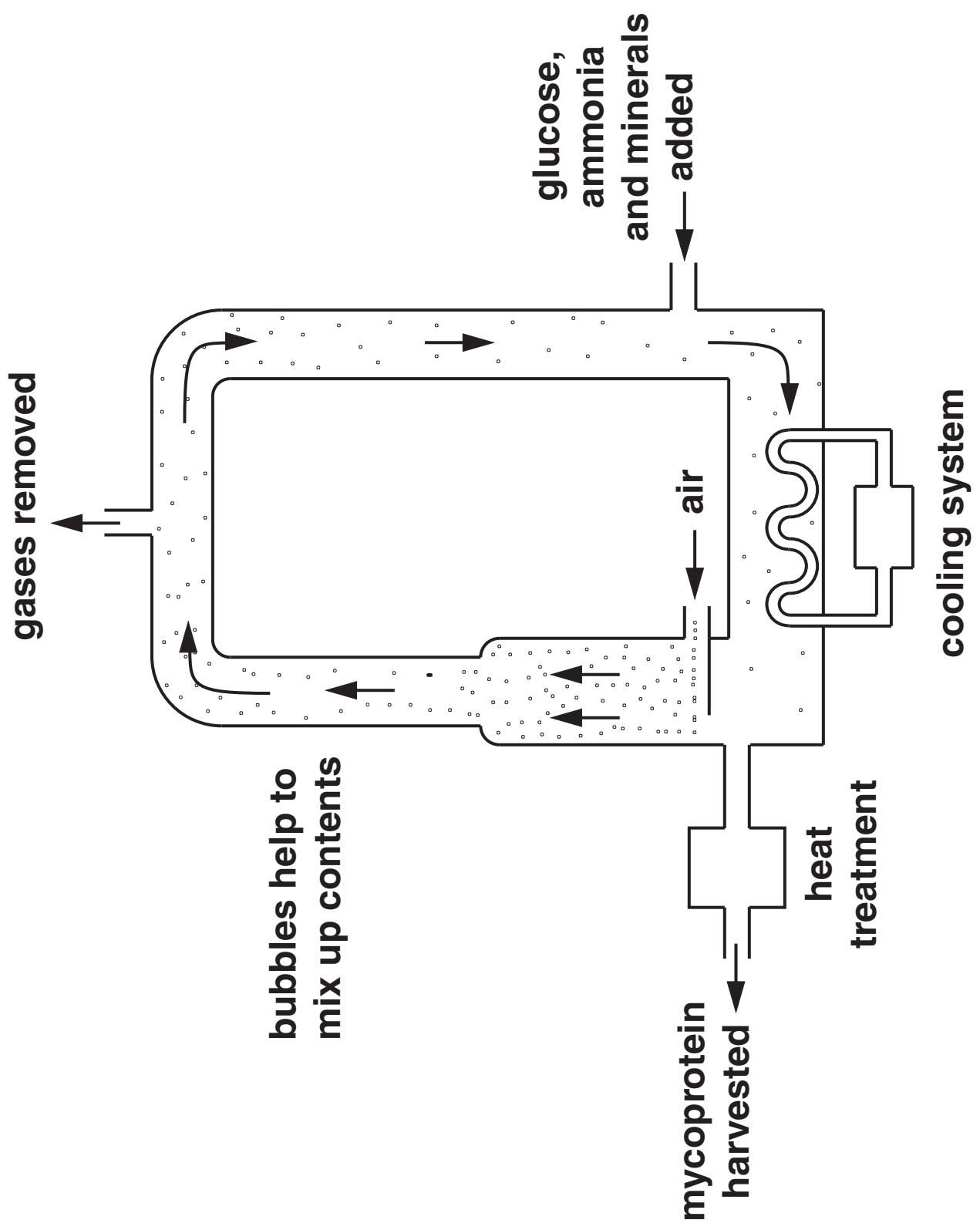
Answer ALL the questions.

1 Protein is an important part of our diet.

A fungus called *Fusarium* is grown in large fermenters.

The fungus produces large amounts of protein called mycoprotein.

Look at the diagram opposite showing the production of mycoprotein.



(a) Complete the sentences about the production of mycoprotein.

Put a tick (✓) in the box next to the CORRECT answer.

Use information in the diagram on page 5 to help you.

(i) *Fusarium* uses

air	<input type="checkbox"/>
glucose	<input type="checkbox"/>
water	<input type="checkbox"/>

as food. [1]

(ii) *Fusarium* needs

carbon dioxide	<input type="checkbox"/>
carbon monoxide	<input type="checkbox"/>
oxygen	<input type="checkbox"/>

from the air. [1]

(iii) *Fusarium* uses

aerobic	<input type="checkbox"/>
anaerobic	<input type="checkbox"/>
antibiotic	<input type="checkbox"/>

respiration. [1]

(iv) In the fermenter

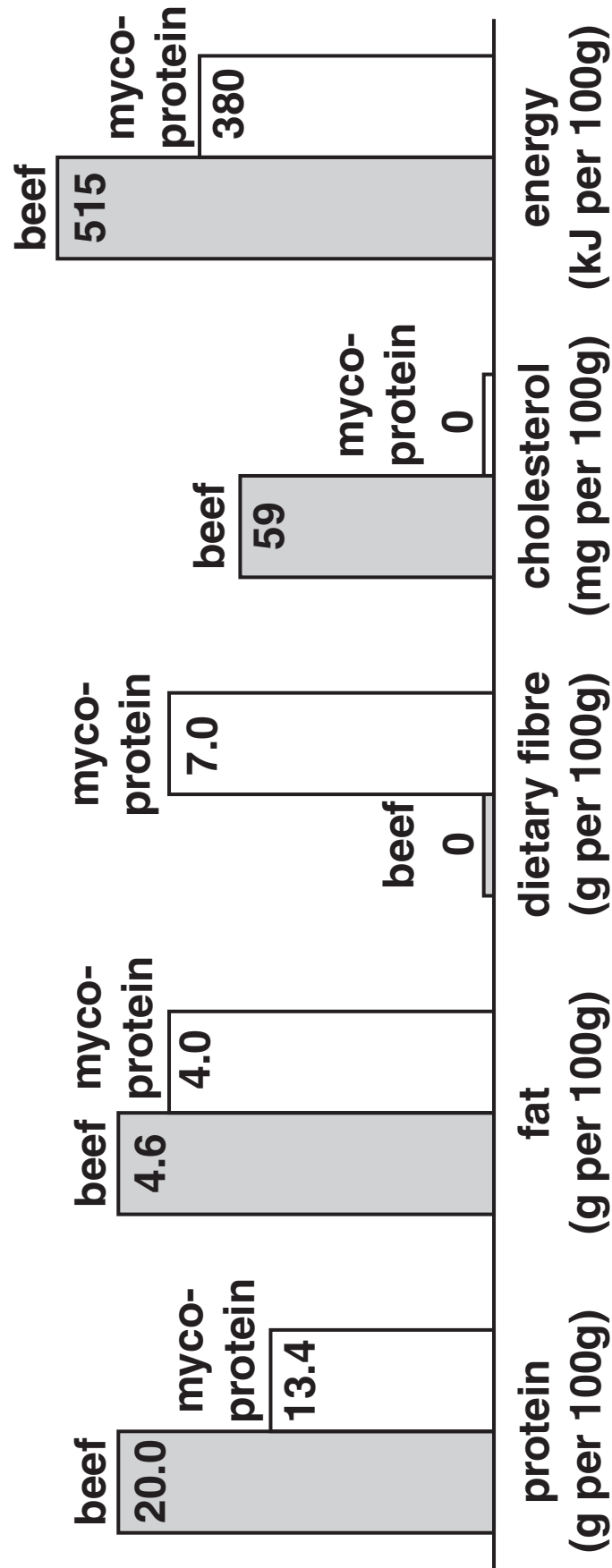
stirrers	
bubbles of air	
minerals	

mix up the contents. [1]

(b) Suggest reasons why the mycoprotein is heated.

[2]

(c) Beef contains protein.
 Look at the information comparing mycoprotein with beef.



**Mycoprotein could be a better food than beef.
Use this information to suggest reasons why.**

[2]

[Total: 8]

2 (a) Milk is a gathered harvest.

It comes from cows.

What is a GATHERED HARVEST?

Put a tick (✓) in the box which best describes why milk is a gathered harvest.

Cows are female cattle.

Cows die after producing milk.

Cows produce beef.

Cows still live after producing milk. [1]

(b) The Milk Development Council helps farmers.

How does it help farmers?

Put a tick (✓) in the box next to the best description.

The Milk Development Council helps farmers by ...

... doing research on milk quality.

... selling the milk.

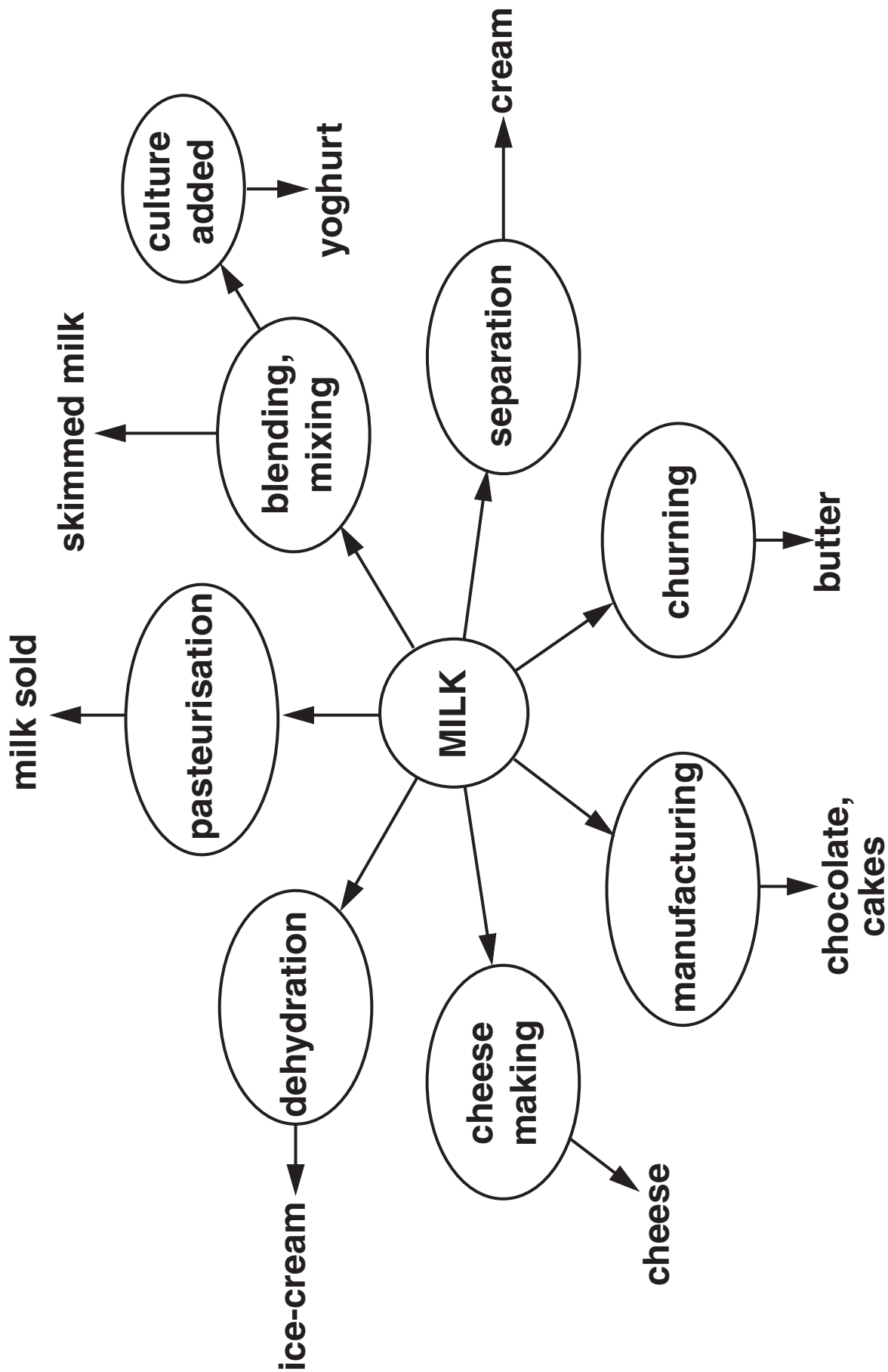
... collecting the milk from farms.

... processing the milk. [1]

(c) Suggest why the price of milk can change.

[2]

(d) Look at the diagram about some uses of milk.



(i) Write down THREE products from milk.

1 _____

2 _____

3 _____ [2]

(ii) Name ONE PRODUCT from milk that is made using microorganisms.

_____ [1]

(iii) Name ONE type of FOOD PROCESSING shown in the diagram that kills microorganisms.

_____ [1]

(e) Explain how microorganisms can spoil some food products.

_____ [2]

[Total: 10]

3 Read the newspaper story about a monster pig.

A MONSTER PIG!

A large male pig weighing 477 kg and measuring over three metres long has been hunted and shot in America.

It could produce about 320 kg of sausages!

A spokesperson said, “It’s a pity it is dead.

It could have been used in a selective breeding programme.”

The technique of artificial insemination would have been used.

(a) Explain how the monster pig would have been used in a SELECTIVE BREEDING programme.

[2]

(b) Look at the following descriptions.

A Sperm is extracted from a male and placed inside a female.

B Fertilised eggs are taken from a pregnant female and put into other females.

C During sexual reproduction a sperm fertilises an egg.

D Sperm and eggs are cloned.

Which description best describes the following processes?

Choose from A, B, C or D.

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

a natural breeding programme _____

an artificial insemination programme _____

implanting embryos _____ [3]

- (c) Natural breeding programmes have about a 70% chance of a successful pregnancy.
Artificial insemination programmes have about a 90% chance of a successful pregnancy.
Embryo implantation programmes have about a 20% chance of a successful pregnancy.**

Which method has the greatest chance of success?

Explain why.

[2]

[Total: 7]

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4 Charlie grows rhubarb in her garden.

She harvests the rhubarb and sells it.

(a) Charlie knows that the rhubarb leaves use light to photosynthesise.

Which is the CORRECT word equation for photosynthesis?

A carbon dioxide + water \Rightarrow oxygen

B carbon dioxide + water \Rightarrow glucose + oxygen

C glucose + oxygen \Rightarrow carbon dioxide + water

D glucose \Rightarrow oxygen + carbon dioxide

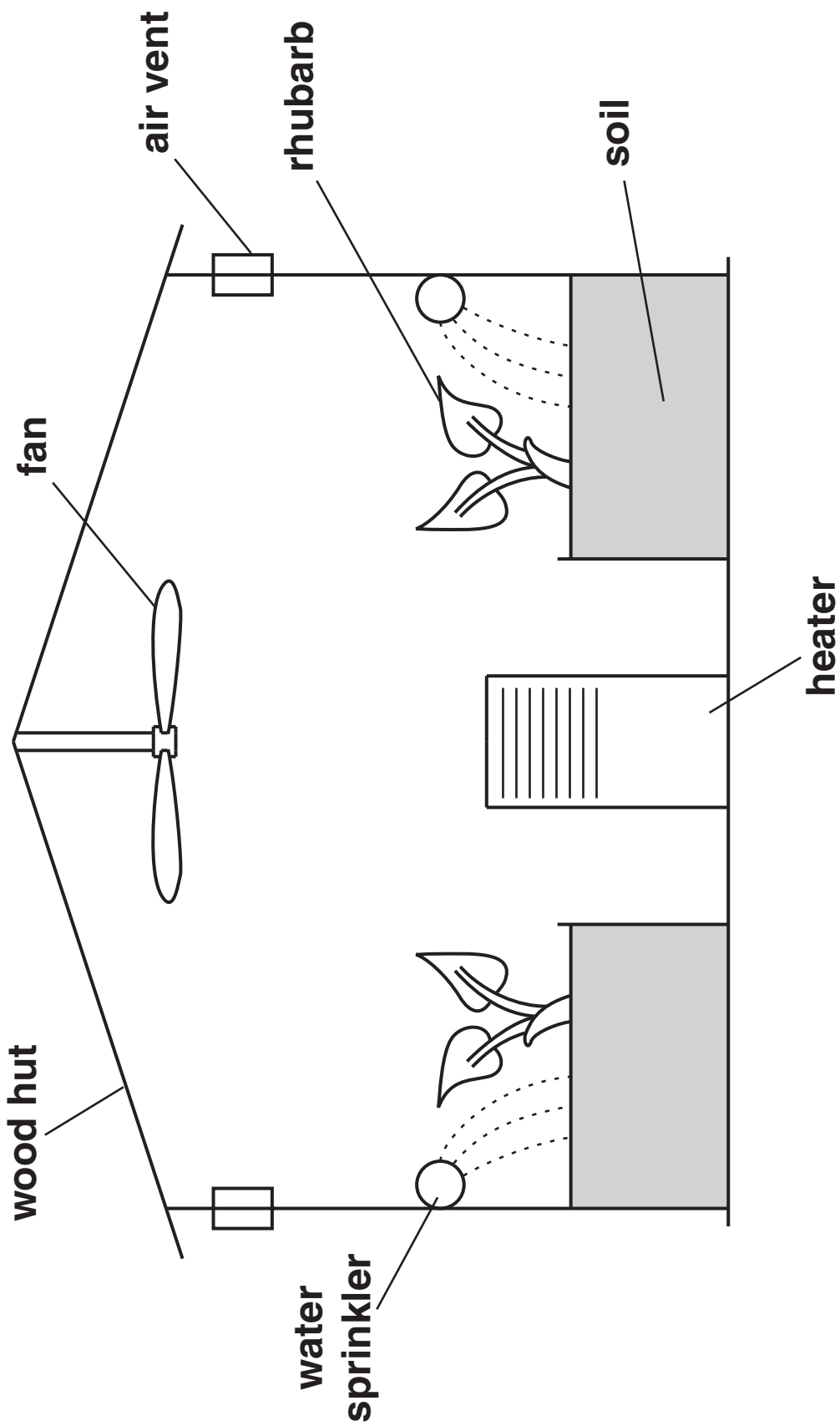
The correct word equation is _____ [1]

(b) Charlie does a web search.

She finds out that rhubarb can also be grown inside.

She uses a hut, shown opposite, to grow rhubarb in controlled conditions.

The rhubarb grows much quicker and is soft and tender.



- (i) Write down one condition, apart from light, that is being controlled in the hut.

Describe its effect on the growth of plants such as rhubarb.

condition _____

effect _____

_____ [2]

- (ii) Charlie does tests as the rhubarb grows.

Draw a straight line from each DESCRIPTION to the correct TYPE OF TEST.

DESCRIPTION

TYPE OF TEST

uses a pH meter to test the soil

semi-quantitative

inspects leaves for mineral deficiency

qualitative

uses pH indicator paper to test the soil

quantitative

[2]

- (c) Charlie grows the same number of rhubarb plants in both her garden and her hut. She compares the two crops every year for three years.

year	mass of rhubarb crop from garden (in kg)	mass of rhubarb crop from hut (in kg)
1	30.5	40.1
2	28.5	44.5
3	23.5	46.2
total mass		130.8
average mass	27.5	

- (i) Complete the table by calculating the TWO missing values. [2]

(ii) Suggest why the crop yield from the hut is higher than that from the garden.

[2]

(iii) Explain why Charlie can charge more for the rhubarb grown in her hut.

[2]

[Total: 11]

END OF QUESTION PAPER

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