OCR
RECOGNISING ACHIEVEMENT

H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE ADDITIONAL APPLIED SCIENCE A

A334/02

Agriculture and Food
(Higher Tier)

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)

Thursday 15 January 2009
Afternoon

Duration: 45 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- 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.
- Do **not** write in the bar codes.
- 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**.
- This document consists of **12** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	8	
2	9	
3	4	
4	7	
5	8	
TOTAL	**36**	

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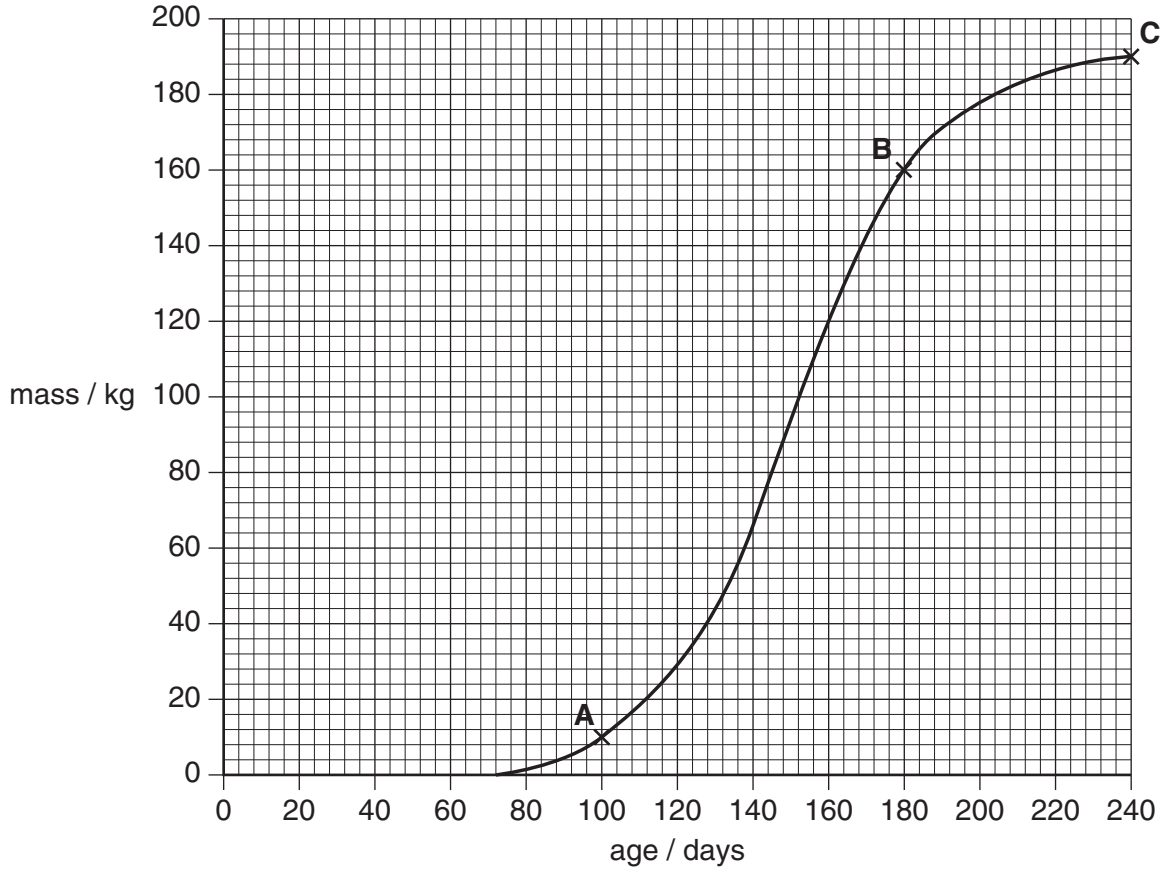
Answer **all** the questions.

1 There are not many cod fish in the North Sea.
This is because of "over fishing".
Cod fish are now being farmed by keeping them in sea lochs.
They are fed on high protein pellet food.

(a) What method of farming is this called?

..... **[1]**

(b) The graph shows the growth rate of these cod.



When should the fish be marketed?

Choose from **A**, **B** or **C**.
Give a reason for your answer.

.....

.....

..... **[2]**

(c) These cod fish grow faster than those swimming freely in the North Sea.

Explain why.

.....

.....

.....

.....

..... **[3]**

(d) Wet mass is used as a measurement for growth in fish.

(i) Suggest why **dry** mass is not used.

.....

..... **[1]**

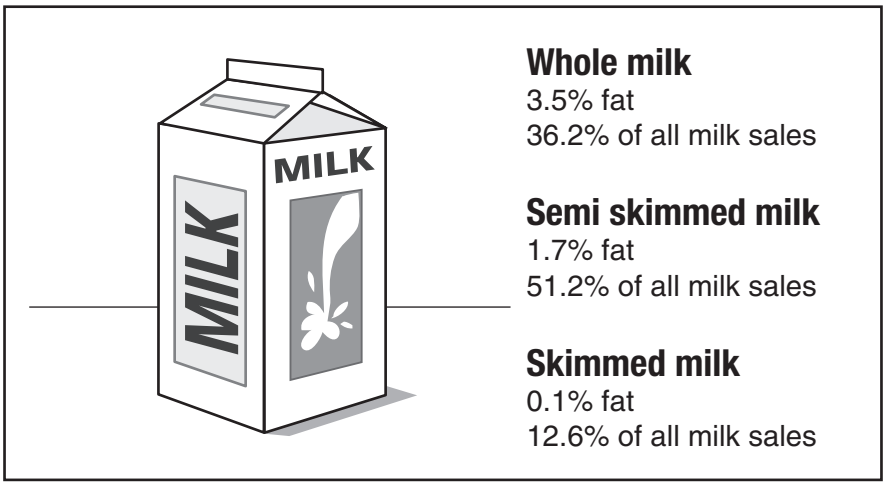
(ii) Name a crop which is usually measured in dry mass.

..... **[1]**

[Total: 8]

2 Cows produce milk.

(a) Look at the information about different types of milk.
Skimmed and semi-skimmed milk have different amounts of cream removed.



Semi-skimmed milk has the highest sales.

Suggest reasons why.

.....

.....

..... **[2]**

(b) Look at the information about how milk is processed.

Stage 1

Raw milk from cows collected daily.

Stage 2

Milk tested for
- appearance and smell
- chemical content
- number of bacteria

Stage 3

Milk pasteurised by heating it to 72°C for 15 seconds. This kills most bacteria.
Pasteurised milk lasts for about 7 days.

Stage 4

Milk goes into standardisation unit. Levels of fat changed to make different types of milk.

Stage 5

Milk cooled, put into cartons and refrigerated.

(i) In **Stage 2** the milk is tested.
Why is the milk tested?

Put ticks (✓) in the boxes next to the **two** correct answers.

so that everyone can buy it	☐
to ensure food quality	☐
to make sure it is safe to drink	☐
to control its price	☐
to make the cow healthy	☐

[2]

(ii) In **Stage 2**, which of the three tests is a **qualitative** test?

..... **[1]**

(iii) In **Stage 3**, milk is pasteurised.

Suggest why pasteurised milk only lasts about 7 days.

.....

.....

..... **[2]**

(iv) In **Stage 5**, the milk is cooled.

Explain why.

.....

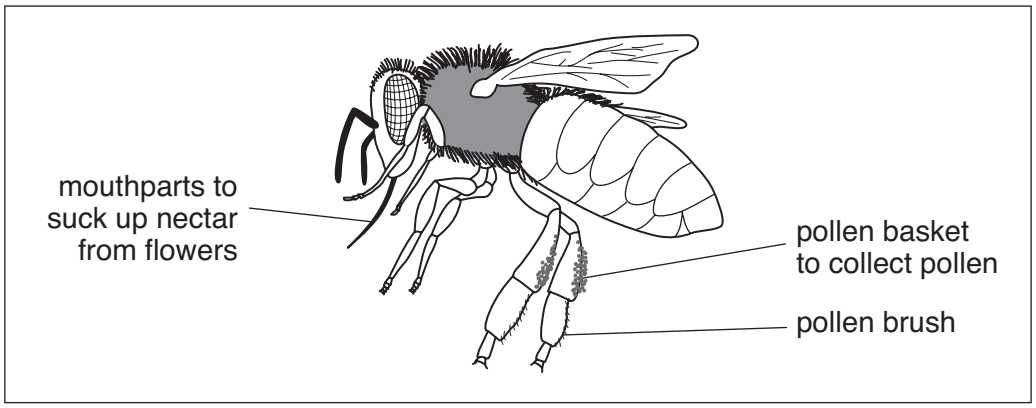
.....

..... **[2]**

[Total: 9]

3 DEFRA is an organisation that regulates agriculture.
DEFRA has recently delayed the planting of a GM potato crop.
The field chosen for the GM crop was near fields used to grow borage.
Borage is a useful crop plant.

Look at the information linking a potato crop, bees and borage.



Bees collect pollen and nectar.
They make honey in bee hives.

potato crop

borage plant

(a) Why is it important for the borage plants to be pollinated?

.....

..... **[1]**

(b) The owners of the bee hives had refused to put their hives in the borage fields.

Suggest why.

.....

..... **[1]**

(c) The borage crop is used to make oil.
An average borage oil crop is about 0.5 tonnes / hectare.
The oil is sold for £2000 a tonne.

A borage farmer has three fields, each of 6 hectares in size.

What would his total average borage crop be worth?
You must show your working.

value of total borage crop ..... **[2]**

[Total: 4]

4 Agave nectar is used as a sweetener in foods.

It comes from the Blue Agave plant which grows in Mexico.

The stem is harvested and squashed to extract the sugary liquid.

The liquid is fermented to produce alcohol, which is then distilled to make a drink called Tequila.

Source: http://www.volcanicnectar.com

(a) Fermentation is an example of anaerobic respiration.

(i) Name the **type** of organism that can be used to ferment the Agave nectar.

..... **[1]**

(ii) Write down the word equation for anaerobic respiration.

..... **[2]**

(iii) The fermentation of Agave nectar is done using a continuous culture method.

Describe the advantages of using a continuous culture method.

.....

.....

..... **[2]**

(b) The Mexican farmers want to produce other plants with a higher sugar content.
They want to use genetic modification (GM).

These are some stages they may use.

A Cross-pollinate the plants.

B Identify the "sugar gene" from Blue Agave's DNA.

C Insert the "sugar gene" into the other plant's DNA.

D The other plant produces a new protein to increase sugar content.

E Add hormones to the other plants.

F Cut out the "sugar gene" from the Blue Agave's DNA.

Select the **correct** stages from **A**, **B**, **C**, **D**, **E** and **F**.

Write them in the correct order in the boxes.
The first one has been done for you.

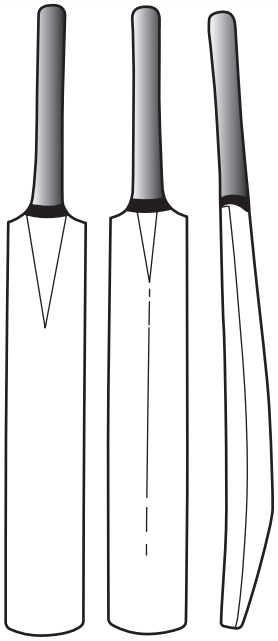
B			

[2]

[Total: 7]

5 Read the newspaper story about cricket bats.

Better bats?



Cricket bats are made of wood from willow trees.

Wood with straight grain, without knots, is needed to make high quality cricket bats.

Willow trees in England produce this type of wood to make cricket bats which cost about £300.

Most willow trees in Kashmir are fast growing but produce poor quality wood.
Cricket bats made from this wood sell for as little as 70 pence.

Cricket bat manufacturers in Kashmir want to make better bats.

Use the information to answer the questions.

(a) Why are cricket bats from Kashmir much cheaper than those from England?

.....

..... **[1]**

(b) Scientists in Kashmir are searching for different types of willow trees to make better bats.

Write down **two** characteristics they will be looking for.

1 .....

2 ..... **[1]**

(c) The scientists will then use selective breeding with the willow trees.

(i) Describe the stages of selective breeding to produce willow trees with high quality wood.

.....

.....

.....

.....

..... **[4]**

(ii) The scientists say that it will take at least 20 years to produce high quality cricket bats.

Explain why it will take so long.

.....

.....

..... **[2]**

[Total: 8]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE