

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**

A334/02

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

Agriculture and Food (Higher Tier)

MONDAY 25 JANUARY 2010: Afternoon

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.**

Answer ALL the questions.

1 Sugar cane and sugar beet are plants that produce a lot of sugar.

(a) (i) Photosynthesis in plants produces sugars.

Complete the word equation for photosynthesis.

_____ + _____

⇒ sugars + _____
light

[2]

(ii) The rate of photosynthesis can be limited by various factors.

Write down TWO limiting factors, other than water, in photosynthesis.

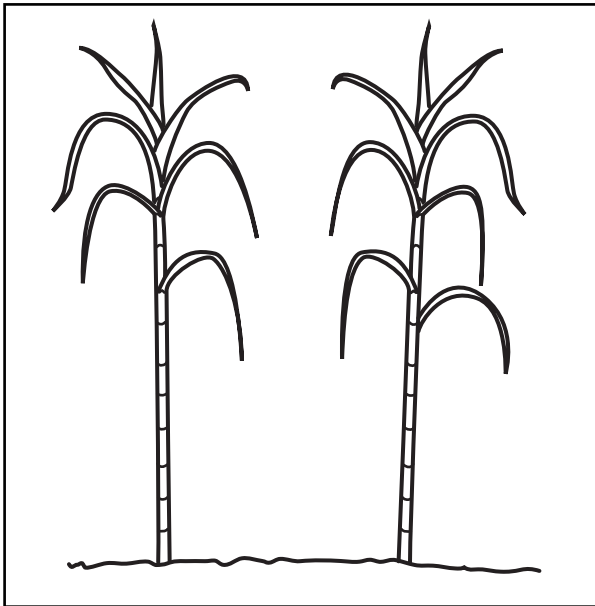
1 _____

2 _____

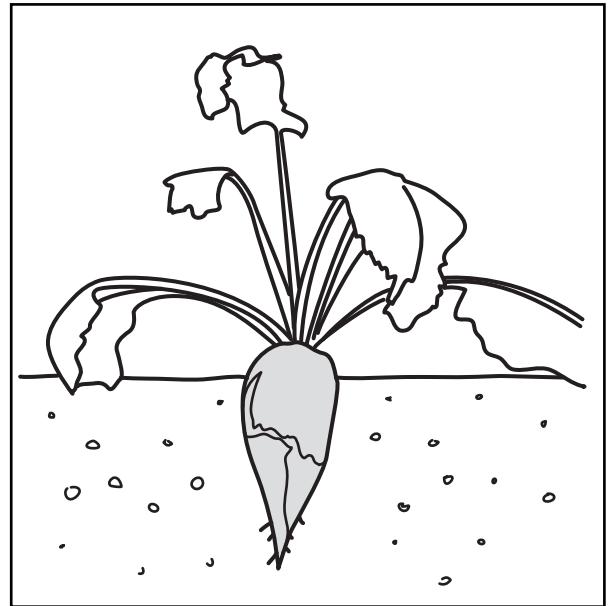
[2]

**(b) Ruby is a farmer in the UK.
She finds information on sugar cane and sugar
beet.**

SUGAR CANE



SUGAR BEET



NOT TO SCALE

large grass-like plants

looks like large carrots

**sugar is stored in the
stems**

**sugar is stored in the
roots**

**grows best in tropical
places (e.g. Jamaica)**

**grows best in temperate
places (e.g. UK)**

**can be harvested every
year**

takes two years to crop

**contains 10% sugar by
weight**

**contains 17% sugar by
weight**

**crop is 10 tonnes of
sugar per hectare**

**crop is 7 tonnes of
sugar per hectare**

- (i) Explain why she should choose to grow sugar beet instead of sugar cane.**

[2]

- (ii) Ruby thinks that growing sugar beet in polytunnels should produce a bigger yield.**

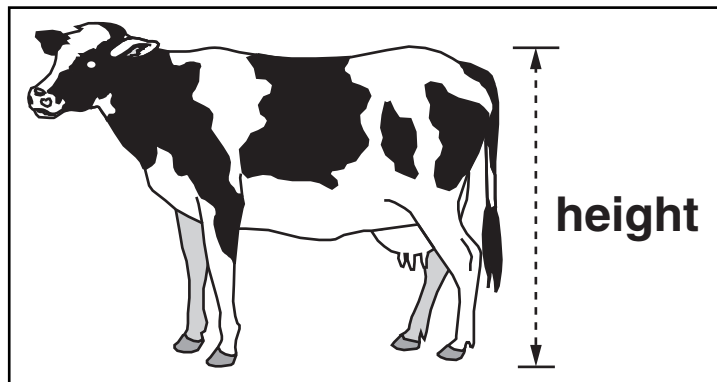
Write down reasons why using polytunnels may produce a bigger yield.

[2]

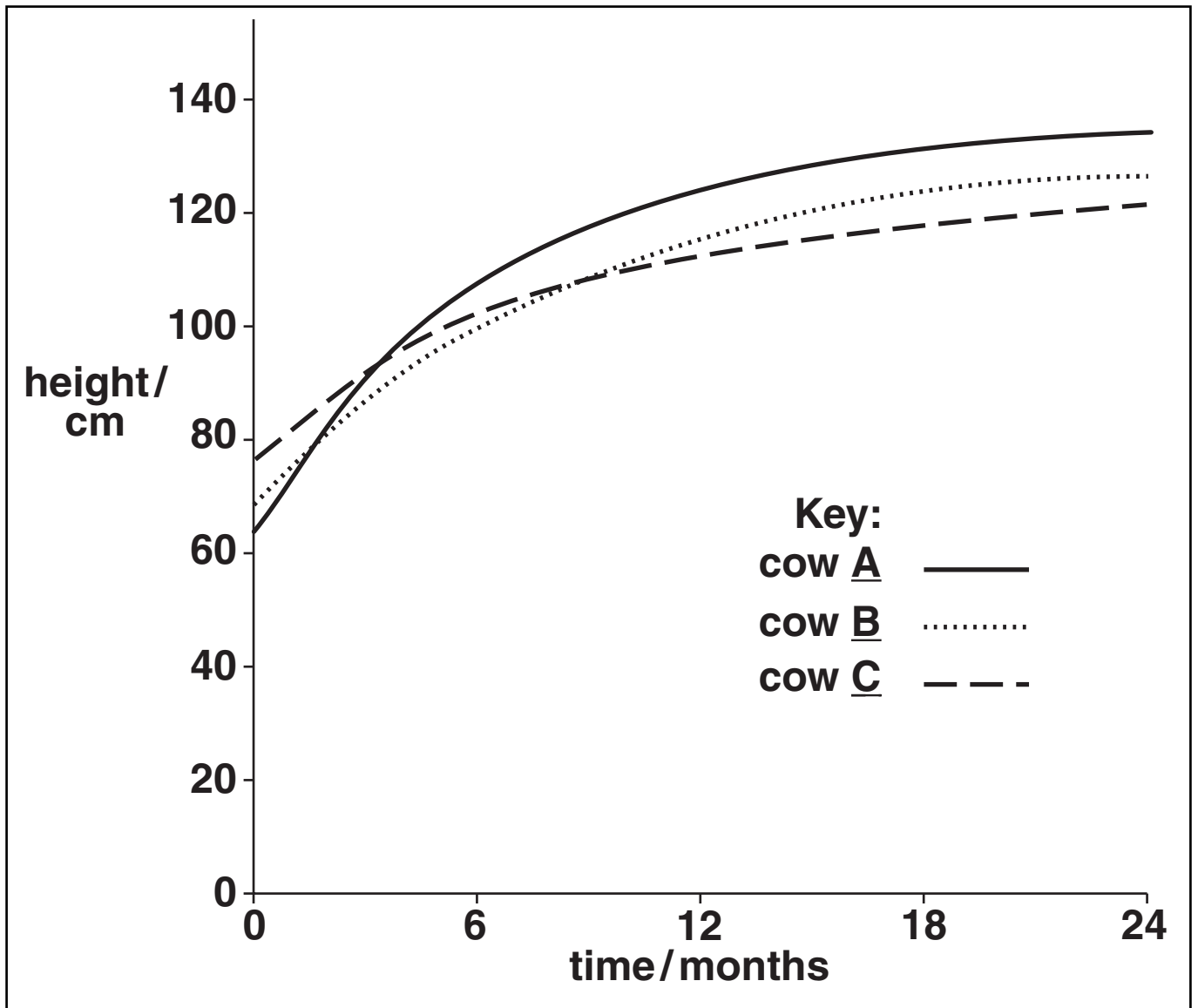
[Total: 8]

2 Dan has a herd of cattle.

He keeps a record of their growth by measuring their height.



(a) The graph shows the height of three cows over 24 months.



(i) Which cow, A, B or C, grew the fastest in the first 12 months?

cow _____

[1]

(ii) All the cows were fed the same amount and type of food.

Suggest TWO reasons for their different rates of growth.

1 _____

2 _____ [2]

(b) Dan's cows produce a lot of manure.

Explain how this manure can be useful on his farm.

[2]

(c) Microorganisms can break down the manure by ANAEROBIC RESPIRATION.

Anaerobic respiration is also used in FOOD PRODUCTION.

Write down an example of a microorganism used to make food and the food product it makes.

microorganism used _____

product _____ **[2]**

[Total: 7]

3 Josh keeps hens.

The table shows the three different ways hens are kept in the UK.

	<u>BATTERY HENS</u>	<u>BARN HENS</u>	<u>FREE RANGE HENS</u>
conditions	Kept in small cages inside sheds. Automatically fed on a carefully controlled diet. Eggs collected automatically.	Kept in large barns. Can move around inside barn. Farmer feeds hens on a carefully controlled diet. Farmer walks around the barn to collect eggs.	Kept on a farm. Can move around farm. They eat a varied diet. Farmer walks around field to collect eggs.
percentage in the UK	63	5	32
price of 6 eggs	£0.70	£0.80	£1.40

(a) Eggs produced by battery hens are the cheapest.

Explain TWO reasons why.

[2]

(b) Keeping battery hens in the UK will be banned from 2011.

(i) Explain why this will be a problem for

- **UK poultry farmers**
- **UK customers.**

[2]

(ii) Many people think that keeping battery hens in this way is cruel.

Explain why keeping battery hens is thought to be cruel.

[2]

(c) The eggs from Josh's farm have a quality mark stamped on them.

What does a quality mark tell you about the eggs?

[1]

[Total: 7]

4 Jo keeps a flock of sheep.

Female sheep are called ewes and male sheep are called rams.

(a) Jo wants to use selective breeding to produce sheep with more meat.

Describe the main stages in selective breeding.

[3]

(b) Artificial insemination can be used with sheep.

Describe the process of ARTIFICIAL INSEMINATION.

[3]

(c) Hormone injections can be used to increase growth in sheep.

Explain one OTHER reason for using hormones in animals such as sheep.

[2]

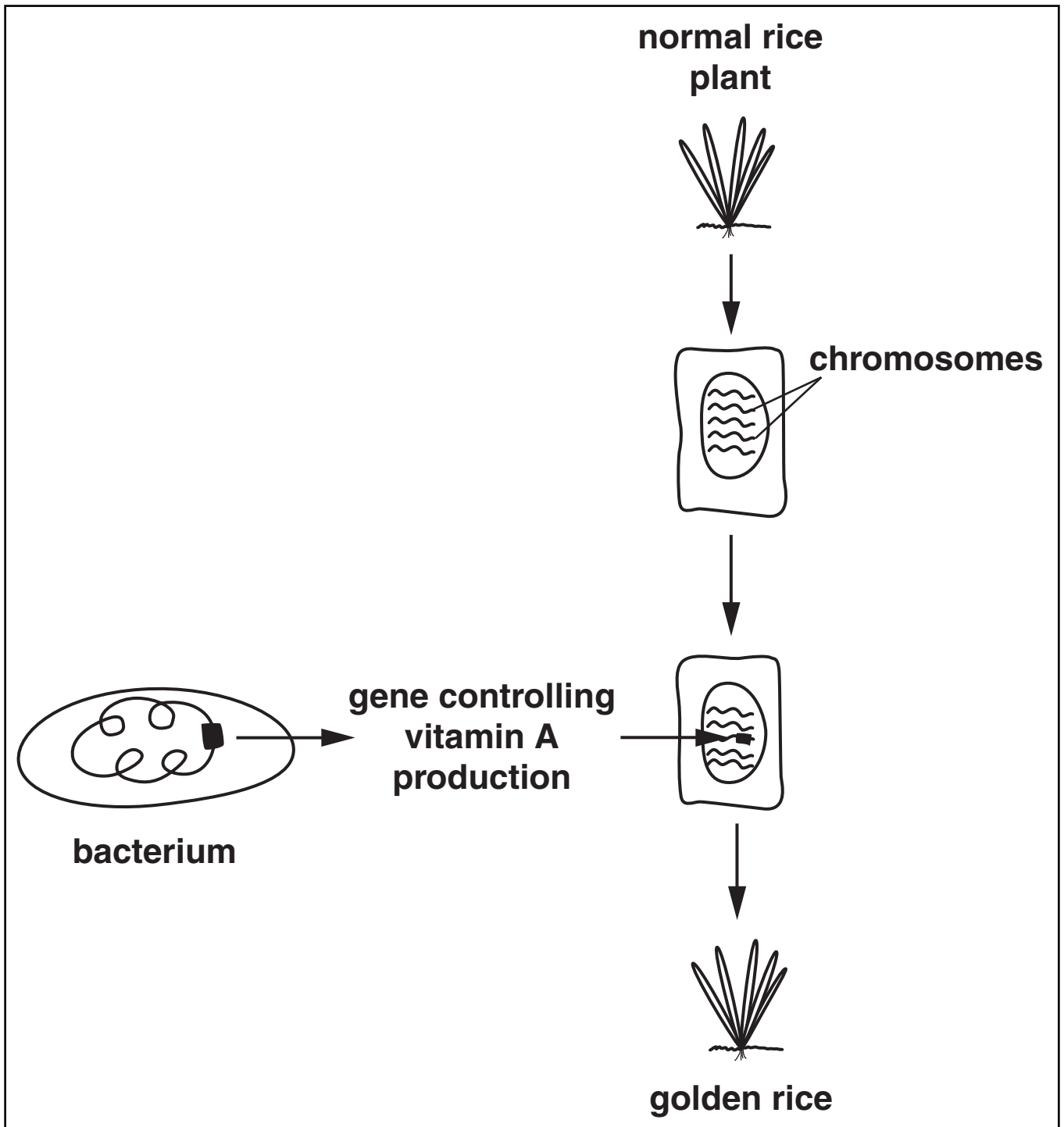
[Total: 8]

5 Rice is the main part of people's diet in many countries.

However it does not contain vitamin A.

Vitamin A is necessary for good vision.

Scientists in America have genetically modified rice so it contains genes that control the production of vitamin A. The new type of rice is called Golden Rice.



(a) What is the name of the genetic material in chromosomes?

_____ [1]

(b) Describe how the gene responsible for vitamin A production gets into the rice plant.

Use the information in the diagram to help you.

[3]

(c) Explain how the Golden Rice produces vitamin A.

[2]

[Total: 6]

END OF QUESTION PAPER



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