

Candidate Name	Centre Number	Candidate Number
		2



GCE AS/A level

311/01

BIOLOGY – B11

A.M. TUESDAY, 3 June 2008

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	4	
2	16	
3	8	
4	13	
5	9	
6	10	
7	10	
TOTAL MARKS		

INSTRUCTIONS TO CANDIDATES

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 of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

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1. In recent years crop plants have been genetically modified. Give **two** advantages (benefits) of using genetically modified plants and **two** disadvantages (hazards) of using genetically modified plants. [4]

Advantages:

.....

.....

.....

Disadvantages:

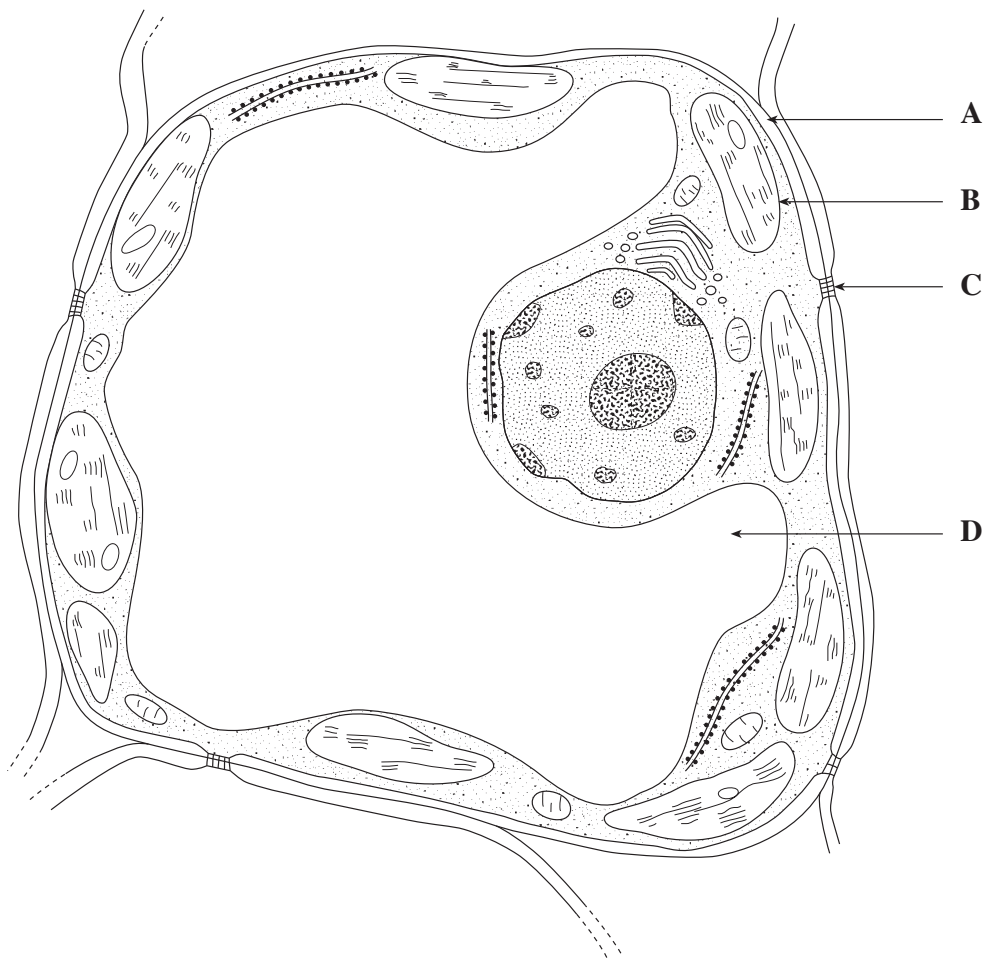
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(Total 4 marks)

2. The diagram below is of a plant cell as seen under an electron microscope.



(a) Name the structures **A–D** and give **one** function of each. [4]

A

Function

.....

B

Function

.....

C

Function

.....

D

Function

.....

(b) State concisely how each of the following structures would be involved in the process of protein synthesis. [7]

Mitochondria

.....

Ribosomes

.....

Endoplasmic reticulum

.....

Golgi body

.....

Cell surface membrane

.....

Nucleus

.....

Nucleolus

.....

(c) An amino acid was taken up by the cell and incorporated into a protein which was then secreted from the cell. The route taken can be represented by the flow diagram of cell structures shown below.



From the list in (b) identify: [2]

A

B

C

(d) Name the **carbohydrates** in the cell opposite which are found: [3]

(i) in the cell wall;

(ii) as a storage compound in the cell;

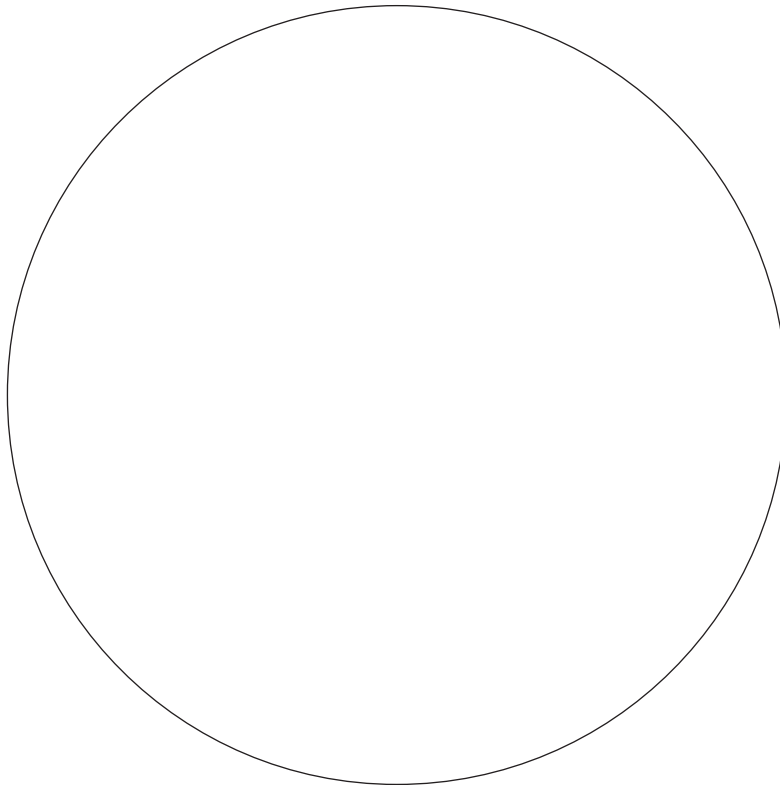
(iii) as a component of ribosomes.

(Total 16 marks)

3. (a) (i) In the outline of the animal cell drawn below, draw a diagram to show the appearance of a cell with the diploid number of 6 chromosomes at metaphase of **mitosis**. Label your diagram fully using the following labels where appropriate.

Chromatids, centrioles, centromere, spindle fibres,
homologous chromosomes/bivalents.

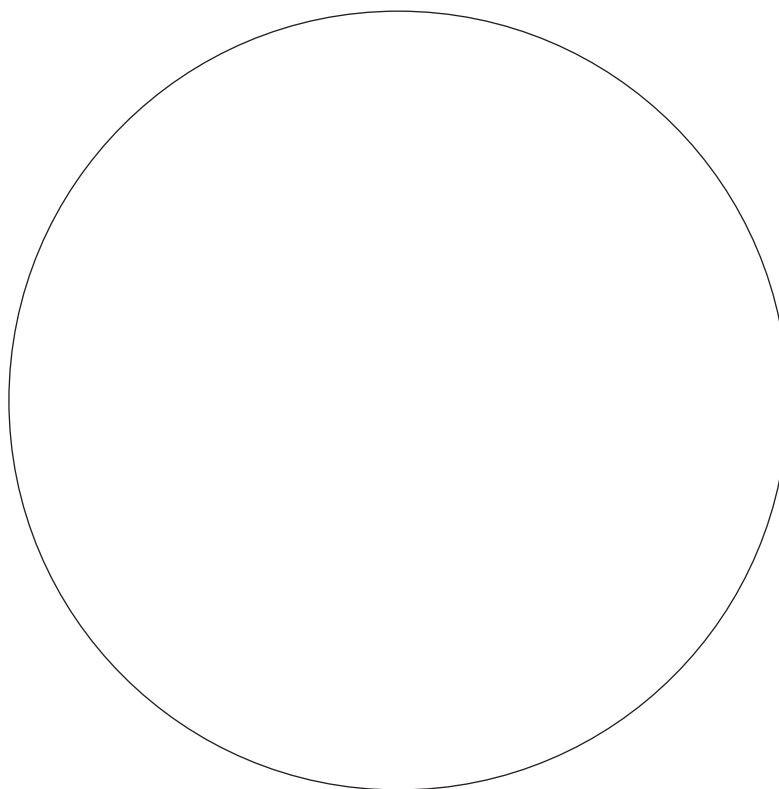
[3]



- (ii) In the outline of the animal cell drawn below, draw a diagram to show the appearance of a cell with the diploid number of 6 chromosomes at the first metaphase division of **meiosis**. Label your diagram fully using the following labels where appropriate.

Chromatids, centrioles, centromere, spindle fibres, homologous chromosomes/bivalents.

[3]



- (b) Independent assortment of chromosomes during meiosis leads to considerable variation. It can be calculated that in the production of gametes in humans (diploid number 46) 2^{23} different gametes can be produced by independent assortment alone. Calculate the number of different gametes which could be produced by the cell above as the result of independent assortment. Show your workings and give your answer in the form of a whole number. [2]

.....
.....

Answer

(Total 8 marks)

4. (a) (i) By means of a simple labelled diagram indicate the structure of a triglyceride (fat) molecule. (Detailed biochemical structure is not expected). [2]

(ii) Name the bonding involved in the formation of a triglyceride. [1]

.....

(iii) Give **two** differences between the structure you have drawn and a phospholipid. [2]

.....
.....
.....
.....

(b) Suggest **one** reason why animals tend to store energy in the form of fat rather than carbohydrate. [1]

.....
.....

(c) What is the difference between a saturated and an unsaturated fat? [1]

.....
.....
.....

- (d) An experiment was carried out to find the effect of the enzyme lipase on the fat in milk. 10 cm^3 of full cream milk was mixed with 0.5 cm^3 of sodium carbonate solution and three drops of universal (pH) indicator. Universal indicator changes colour as shown below.



1 cm^3 of unboiled enzyme was added to one tube (A), 1 cm^3 of lipase was boiled, cooled and added to a second tube (B). The milk, sodium carbonate and indicator solution was divided between the two test tubes. The tubes A and B were then incubated at 35°C for 3 hours.

- (i) Suggest why sodium carbonate was added to the tubes? [1]

.....

- (ii) What colour would you expect in tube A after 3 hours incubation? [1]

.....

- (iii) Briefly explain your answer to (ii). [2]

.....

- (iv) Explain why no appreciable change in colour was observed in tube B. [2]

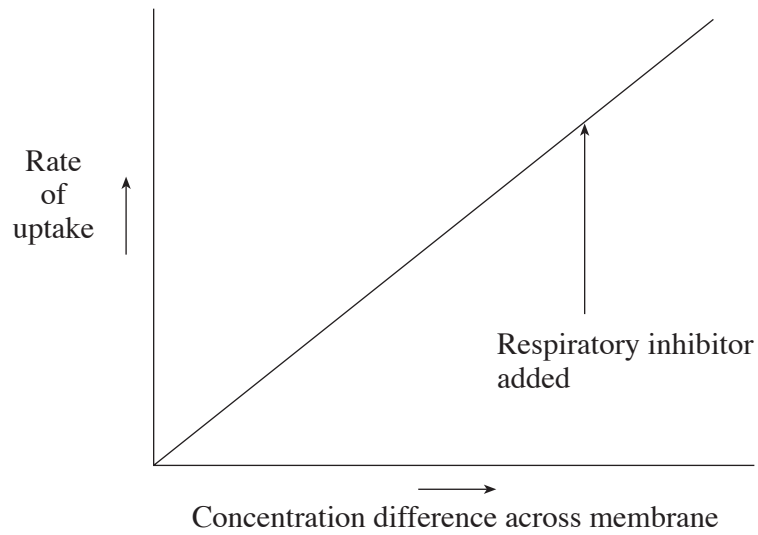
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(Total 13 marks)

5. The following graphs show the effect of an increasing concentration gradient on the rate of uptake of substances across a cell membrane. The effect of adding a respiratory inhibitor on the rate of uptake is also shown.

For **each** graph name the type of uptake involved and give reasons for your choice.

(i) Process A



Type of uptake [3]

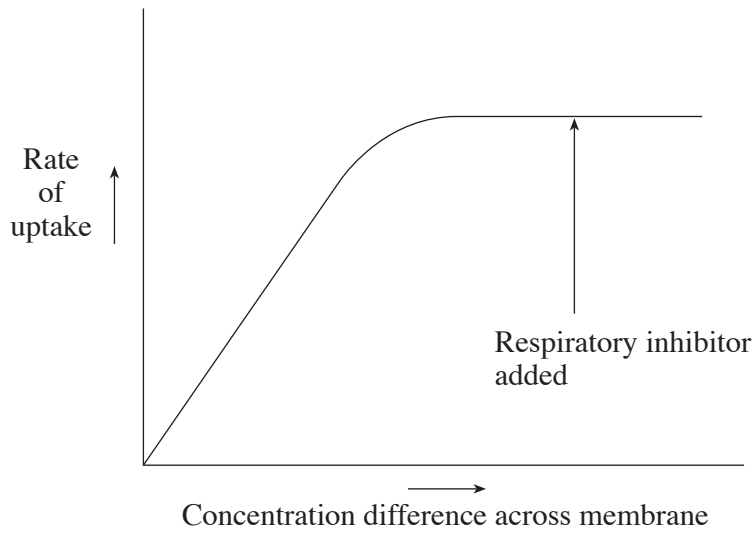
Reasons for choice

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.....

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(ii) Process B



Type of uptake [3]

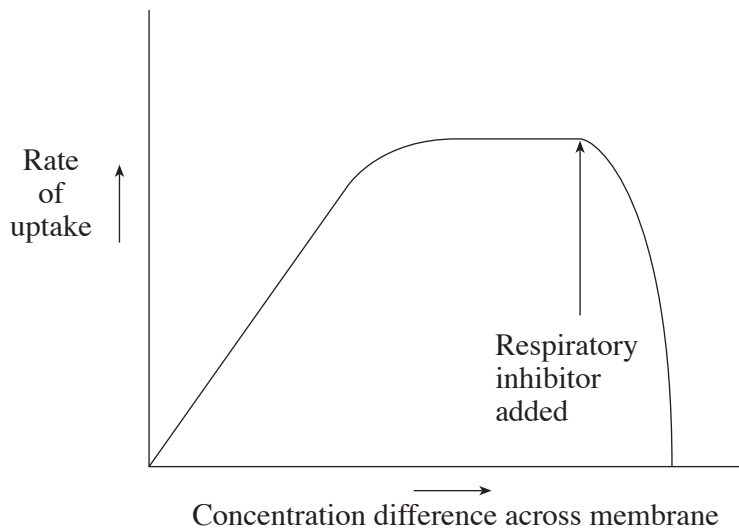
Reasons for choice

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.....

.....

(iii) Process C



Type of uptake [3]

Reasons for choice

.....

.....

.....

(Total 9 marks)

Turn over.

6. Until recently it was believed that there were three different types of RNA found within cells. Ten years ago a fourth type of RNA was discovered in the cytoplasm, small interfering RNA or guide RNA.

These RNA molecules are between 20-25 nucleotides long and they are double stranded.

There is considerable excitement about this in the scientific world as this type of RNA interferes with protein synthesis and synthetic small interfering RNA molecules could in the future be used to treat viral diseases such as HIV and hepatitis.

- (a) (i) Complete the following list of the types of RNA found within cells. [2]
 Messenger RNA.
 Small interfering RNA (guide RNA)

.....

- (ii) Give **one similarity** and **three differences** between small interfering RNA and DNA. [4]

Similarity

Differences

- 1
- 2
- 3

- (b) (i) If a sample of **DNA** contains 50% purine bases what would be the percentage of pyrimidine bases in the sample? [1]

.....

- (ii) Of the 50% purine bases, 10% was Adenine. Complete the table showing the percentage of the other nucleotides. [3]

<i>Nucleotide</i>	<i>Percentage (%)</i>
Adenine	10

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