OCR
RECOGNISING ACHIEVEMENT

**ADVANCED SUBSIDIARY GCE**

# BIOLOGY

# F211

Cells, Exchange and Transport

*OCE/25767*

Candidates answer on the question paper.

**OCR supplied materials:**
- Insert (inserted)

**Other materials required:**
- Electronic calculator
- Ruler (cm/mm)

**Tuesday 11 January 2011**
**Morning**

**Duration:** 1 hour

*F211*

| Candidate forename | | Candidate surname | |
|---|---|---|---|

| Centre number | | | | | | Candidate number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

## INSTRUCTIONS TO CANDIDATES

- The insert will be found in the centre of this document.
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.
- Answer **all** the questions.
- Do **not** write in the bar codes.

## 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 **60**.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

**1** **(a)** Name the type of nuclear division that produces two genetically identical nuclei.

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

**(b)** There are a number of stages during cell division.

The list, **J** to **N**, describes some processes that occur during the division of an animal cell.

| | |
|---|---|
| **J** | the cell surface membrane is constricted |
| **K** | the nuclear envelope reforms |
| **L** | sister chromatids are pulled apart |
| **M** | the chromosomes condense |
| **N** | the chromosomes move to the equator |

Match each letter, **J** to **N**, with a stage of cell division in the list below.

The first one has been completed for you.

prophase .....M.....

metaphase .....

anaphase .....

telophase .....

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

**(c)** During interphase the genetic material is copied.

State **two** other processes that occur during interphase.

.....

.....

.....

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

**(d)** Suggest **two** ways that cell division in plants differs from cell division in animals.

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

**[Total: 9]**

**2** Fig. 2.1 shows a drawing of a part of the lung.

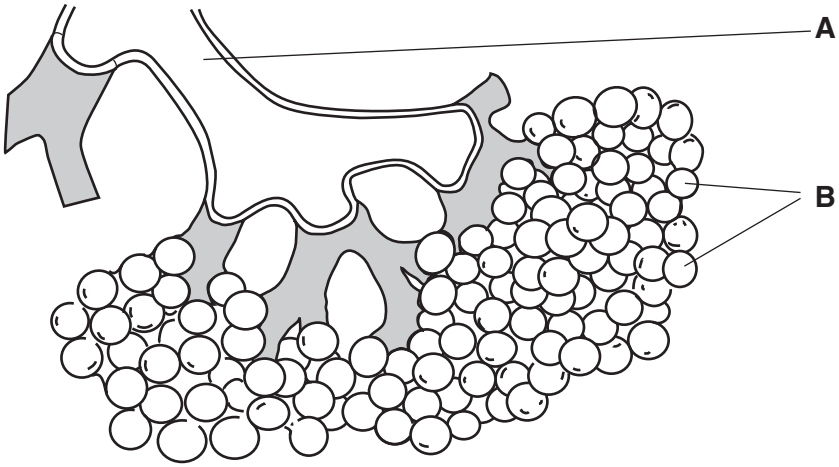


**Fig. 2.1**

**(a)** Name the structures labelled **A** and **B**.

**A** .....

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

**(b)** State **two** features of the structures labelled **B** that enable efficient gaseous exchange.

.....

.....

.....

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

**(c)** As part of an allergic response, certain cells in the lungs release histamine.

Histamine is a cell signalling molecule that stimulates smooth muscle in the wall of structure **A** to contract.

Suggest how histamine stimulates smooth muscle contraction.

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

**(d)** Another action of histamine is to make capillary walls more permeable.

Suggest **two** effects this increased permeability may have on the surrounding tissues.

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.....

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

**[Total: 8]**

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**3** Read the following passage and complete each sentence by writing the most appropriate **term or phrase** in the spaces provided.

Large, active organisms need a circulatory system because they have a small

..... .

Haemoglobin is a pigment found in red blood cells. These cells are also known as

..... . Haemoglobin has a high ..... for oxygen. In the lungs, the haemoglobin associates with oxygen to form ..... . In respiring tissues, the oxygen is released by dissociation. In very active tissues, the amount of oxygen released can be increased by the presence of more ..... . This is called the ..... effect. **[6]**

**[Total: 6]**

**4** **(a)** Fig. 4.1 is a diagram showing the position of the vascular bundles in a transverse section of the stem of a young dicotyledonous plant.

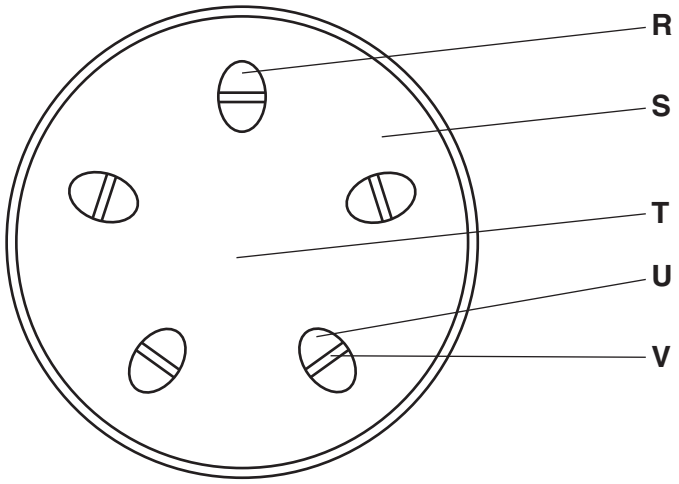


**Fig. 4.1**

Select the correct letter from Fig. 4.1 to identify each of the following tissues in the stem.

xylem .....

phloem .....

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

**(b)** Fig. 4.2, **on the insert**, shows the cut end of a stem from a woody plant. The other end of the stem is being heated in a fire. Steam can be seen coming from the vascular tissue at the cut end of the stem.

Describe the features of the xylem that enable the steam to pass from the heated end of the stem to the cut end.

.....

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.....

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

**(c) (i)** Define the term *transpiration*.

.....

.....

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

**(ii)** Describe **and** explain how transpiration contributes to the mechanism of water transport up the stem.

*In your answer, you should use appropriate technical terms, spelt correctly.*

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..... **[5]**

**(iii)** Suggest why a bunch of flowers may survive longer if the ends of the stems are removed immediately before the flowers are placed in water.

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.....

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

**[Total: 14]**

**5** **(a)** Fig. 5.1 is provided for you **on the insert**.

**(i)** State **two** features of the cell shown in Fig. 5.1 that indicate it is eukaryotic.

.....

.....

.....

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

**(ii)** The line **A**–**B** on Fig. 5.1 represents 20 μm.

Calculate the magnification of the cell shown in Fig. 5.1.

Show your working.

Answer = ..... x **[2]**

**(iii)** Microtubules and microfilaments are part of the cytoskeleton.

Suggest **two** roles of the cytoskeleton in the type of cell shown in Fig. 5.1.

.....

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

**(b)** The cells of a multicellular organism are usually specialised to perform a particular function.

**(i)** Name the process in which a cell becomes specialised.

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

**(ii)** Neutrophils are phagocytic blood cells that can engulf and digest foreign cells found in the blood.

Describe how the **ultrastructure** of a neutrophil is specialised to enable it to perform this function.

*In your answer, you should use appropriate technical terms, spelt correctly.*

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

**[Total: 11]**

**6 (a) (i)** Name the process by which water leaves a cell.

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

**(ii)** Describe the routes that water molecules take through the **cell surface membrane**.

.....

.....

.....

.....

.....

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

A student carried out an investigation to determine the effects of different sucrose concentrations on cells from pieces of onion epidermis.

- Strips of epidermis were taken from an onion.
- Separate pieces of epidermis were placed into water and a range of sucrose solutions.
- The pieces of epidermis were left for 30 minutes before being removed.
- The pieces of epidermis were then viewed at high power under the microscope.

The student counted 100 cells from each piece of epidermis. The student noted how many cells had become plasmolysed.

The results are shown in Table 6.1.

**Table 6.1**

| concentration of sucrose solution ($mol\,dm^{-3}$) | water potential of sucrose solution (kPa) | percentage of cells plasmolysed (%) |
|---|---|---|
| 0.0 | 0 | 0 |
| 0.1 | –260 | 0 |
| 0.3 | –860 | 3 |
| 0.4 | –1120 | 7 |
| 0.5 | –1450 | 39 |
| 0.6 | –1800 | 57 |
| 0.7 | –2180 | 83 |
| 0.8 | –2580 | 94 |
| 1.0 | –3500 | 100 |

**(b)** None of the onion epidermis cells this student observed had burst when left in pure water.

Explain why plant cells do not burst when they are left in pure water.

.....

.....

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

**(c)** **(i)** The water potential of the onion epidermis cells can be assumed to be the same as the water potential of a solution that causes 50% plasmolysis.

Use the information in Table 6.1 to **estimate the water potential** inside these onion epidermis cells.

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

**(ii)** Suggest how the student could construct and use a graph to obtain a better estimate of the water potential.

.....

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

**(d)** Suggest how the student could modify the procedure to make the results more reliable and accurate.

reliable .....

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accurate .....

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

**[Total: 12]**

**END OF QUESTION PAPER**

## ADDITIONAL PAGE

**If additional space is required, you should use the lined pages below. The question number(s) must be clearly shown.**

## ADDITIONAL PAGE

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