CCEA

GCSE

WORKBOOK

Biology

Higher tier

Suitable for GCSE Biology and GCSE Science Double Award

Answers online

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WORKBOOK

Contents

1 This workbook will help prepare you for the CCEA GCSE Biology and CCEA GCSE Double Award (Biology) exams.

2 Your exams will include a range of short, structured questions and longer questions requiring continuous prose, including 6-mark questions testing both biological knowledge and your quality of written communication. You need to be able to answer questions requiring biological knowledge and understanding, as well as being able to analyse and evaluate data set in familiar and unfamiliar scenarios. This workbook will help you develop the skills to answer all these question types.

All questions are suitable for Higher Tier students. Questions in the paler tints are for Science Double Award and GCSE Biology. Questions in the darker tints are for GCSE Biology only.

3 For each topic, there are:
- stimulus materials, including key terms and concepts
- short and longer exam-style questions
- space for you to write your answers

4 Answering the questions will help you develop your skills and meet the assessment objectives AO1 (knowledge and understanding), AO2 (application) and AO3 (analysis and evaluation).

5 You still need to read your textbook and refer to your revision guides and lesson notes.

6 Timings are given for the exam-style questions to make your practice as realistic as possible.

7 Marks available are indicated for all questions so that you can gauge the level of detail required in your answers.

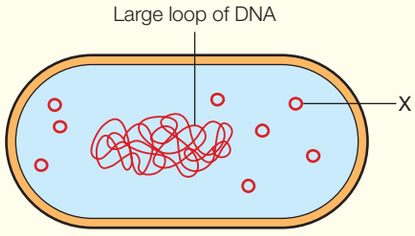
8 Answers are available at **www.hoddereducation.co.uk/workbookanswers**

Cells

Cells and microscopy

The cell is the basic unit in living organisms. Plants, animals and bacteria are formed of different types of cell. Stem cells are special cells that can divide to form other types of cell as an organism grows. In multicellular organisms, the cells can be arranged into tissues, organs and organ systems.

1 **The diagram below represents a bacterial cell.**



a i **Identify the structure labelled X in the diagram.** **1 mark**

.....

ii **State *one* structure in this cell that is also present in plant and animal cells.** **1 mark**

.....

iii **State *two* differences between the structure of this cell and the structures of plant and animal cells.** **2 marks**

1 .....

2 .....

b **Explain how the use of electron microscopes has increased our understanding of cell structures.** **2 marks**

.....

2 **a** **Complete the table below about some SI units that can be used in measuring biological structures.** **3 marks**

Unit	Symbol	Number per metre in standard form
		1×10^3
Micrometre	μm	

b **If the diagram of a bacterial cell at the start of this section represents a cell of 5 μm in length, calculate the magnification involved.** **3 marks**

Show your working.

.....

Stem cells, cell specialisation and diffusion

3 **a** **Define the term 'stem cell'.** **1 mark**

.....

b **Describe fully where stem cells occur in plants.** **2 marks**

.....

1 **1** **These questions are for GCSE Biology students only**

4 **a** **Complete the table below about levels of organisation in organisms.** **3 marks**

Level of organisation	Description
	Group of similar cells with same general structure and function
Organ system	
	Structure made of several types of tissue that carries out a particular function

b **i** **Describe the effect of increasing size in living organisms on their surface area to volume ratio.** **1 mark**

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ii **Explain the link between increasing size in living organisms and the need to have specialised exchange surfaces.** **3 marks**

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Exam-style questions

7

1 **Mitochondria are microscopic structures found in the cytoplasm.**

a **State the function of mitochondria.** **1 mark**

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Mitochondria produce carbon dioxide as a by-product. This carbon dioxide passes out of cells by diffusion.

b **Explain why carbon dioxide diffuses out of cells.** **2 marks**

.....

.....

c **Name *two* parts of a cell that carbon dioxide diffuses through before leaving the cell.** **2 marks**

1 .....

2 .....

d **Apart from surface area, name *two* factors that will increase the rate of diffusion.** **2 marks**

1 .....

2 .....

10

2 a Many patients who have leukaemia are given chemotherapy and/or radiotherapy as treatment. Once this treatment is complete they are often given a transfusion of stem cells. These stem cells often come from a close relative, such as a brother or sister, as their stem cells will be a good match.

i Explain why a transfusion of stem cells is often necessary in patients with leukaemia. **2 marks**

.....

.....

ii Name the type of cells these stem cells will produce. **1 mark**

.....

iii Suggest from which part of the body the stems cells are harvested in the donor individual. **1 mark**

.....

iv Suggest why it is important that the stem cells from the donor are a 'good match' to the tissue in the patient. **1 mark**

.....

b Explain how embryonic stem cells differ from the type of stem cells used to treat leukaemia. **2 marks**

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c A photograph of a stem cell in a textbook is 45 mm. It has been magnified 600 times. Calculate the actual length of the cell in µm. **3 marks**

Show your working.

..... µm

1 1 These questions are for GCSE Biology students only

Photosynthesis and plants

Photosynthesis

Photosynthesis is a process in plants in which sugars and starches are built up from inorganic raw materials. The process requires light energy that is trapped by chlorophyll. Most photosynthesis takes place in the leaves of plants. Photosynthesis investigations often involve testing a leaf for starch to show that photosynthesis will only take place in the presence of chlorophyll, carbon dioxide and light.

1 **a** **i** **State the word equation for photosynthesis.** **2 marks**

.....

ii **Complete the balanced chemical equation for photosynthesis below.** **2 marks**

$$6CO_2 + \text{.....} \xrightarrow[\text{chlorophyll}]{\text{light}} \text{.....} + 6O_2$$

b **Photosynthesis is an endothermic process. In terms of photosynthesis, explain fully what is meant by the term 'endothermic'?** **2 marks**

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Investigating photosynthesis

The starch test can be used to show that photosynthesis has taken place in a plant.

2 **a** **Explain fully why plants are destarched in photosynthesis investigations.** **2 marks**

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b **Complete the sentences below.**

When carrying out a starch test, leaves are boiled in ..... to remove the chlorophyll. This is done so that colour changes can be more easily seen when ..... is added to the leaf. **2 marks**

3 **a** **In what way are variegated leaves different from typical plant leaves?** **1 mark**

.....

b **Suggest why variegated leaves are not common in nature.** **1 mark**

.....

1 **1** **These questions are for Science Double Award and GCSE Biology students**

Gas exchange and limiting factors

4 a i Name the process involving gas exchange that takes place in both light and darkness. **1 mark**

.....

ii Photosynthesis also involves gas exchange. Name the gas taken into plant leaves during the process of photosynthesis. **1 mark**

.....

iii Name the structures in plant leaves in which photosynthesis takes place. Circle the correct answer. **1 mark**

mitochondria chloroplasts nucleus chlorophyll

b The table below shows how light intensity affects the rate of photosynthesis.

Light intensity arbitrary units	0	1	2	3	4	5	6	7	8	9	10
Rate of photosynthesis arbitrary units	0	1.5	3.1	4.5	6.1	7.6	7.6	7.5	7.6	7.7	7.6

i At which light intensity did light cease to become a limiting factor? **1 mark**

.....

ii At a light intensity of 9 arbitrary units, state *two* environmental factors that could be limiting the rate of photosynthesis. **2 marks**

1 .....

2 .....

Leaf structure

5 a i Describe the function of guard cells and stomata. **2 marks**

.....

.....

ii In most plants, the stomata are mainly found on the lower surface of plant leaves. Suggest *two* reasons for this. **2 marks**

1 .....

.....

2 .....

.....

b Describe fully the function of the intercellular spaces in a leaf. **2 marks**

.....

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1 1 These questions are for GCSE Biology students only

Exam-style questions

6

1 a Name a chemical used to absorb carbon dioxide. **1 mark**

.....

b Describe how you could carry out an investigation to show that carbon dioxide is necessary for photosynthesis to take place. **5 marks**

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7

2 The table below shows how hydrogencarbonate indicator changes colour in different carbon dioxide concentrations.

Carbon dioxide level	Low	Normal atmospheric level	High
Colour of bicarbonate indicator	Purple	Red	Yellow

a Describe what is meant by the term 'compensation point'. **1 mark**

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b i You are provided with pondweed and normal laboratory apparatus. Describe how you could carry out an investigation to find the light intensity at the compensation point for the pondweed. **4 marks**

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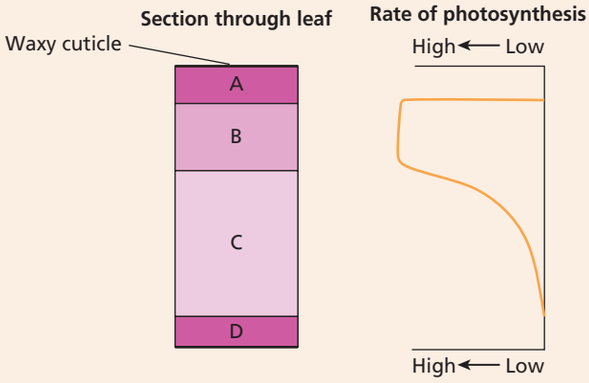
ii State *two* variables that you would need to control in this investigation. **2 marks**

1 .....

2 .....

11

3 The diagram below summarises how the rate of photosynthesis changes from the top to the bottom of a typical leaf.



The letters A–D refer to the different layers in a typical leaf.

a i Give *two* properties of the waxy cuticle in leaves. **2 marks**

1 .....

2 .....

ii State *three* ways in which the palisade mesophyll cells are adapted for photosynthesis. **3 marks**

1 .....

2 .....

3 .....

iii Identify the layers labelled A, B and C in the diagram. **2 marks**

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b Describe and explain the changes in rate of photosynthesis across layers A, B and C. **4 marks**

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1 1 These questions are for GCSE Biology students only