Complete Biology for Cambridge IGCSE® Workbook

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For the updated syllabus

Oxford excellence for Cambridge IGCSE®
When using this workbook you will have the opportunity to develop the knowledge and skills that you need to do well in each of the papers in your IGCSE Biology examination.

The IGCSE syllabus explains that you will be tested in three different ways. These are called Assessment Objectives (AO for short). What these AOs mean to you in the examination is explained below:

<table>
<thead>
<tr>
<th>Assessment Objective</th>
<th>What the syllabus calls these objectives</th>
<th>What this means in the examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO1</td>
<td>Knowledge with understanding</td>
<td>Questions which mainly test your recall (and understanding) of what you have learned. About 50% of the marks in the examination are for AO1.</td>
</tr>
<tr>
<td>AO2</td>
<td>Handling information and problem solving</td>
<td>Using what you have learned in unfamiliar situations. These questions often ask you to examine data in tables or graphs, or to carry out calculations. About 30% of the marks are for AO2.</td>
</tr>
<tr>
<td>AO3</td>
<td>Experimental skills and investigations</td>
<td>These are tested on the Practical Paper or the Alternative to Practical (20% of the total marks). However, the skills you develop in practising for these papers may well be valuable in handling questions on the theory papers.</td>
</tr>
</tbody>
</table>

Notice that the recall questions (AO1) only account for 50% of the marks – you need to show your skill in using these facts for the remaining 50% of the marks.

This workbook contains many exercises to help you to check your recall and to practise these skills. They will be similar to many of the questions you will actually see in your examination, so you will also be helped to develop the skill of working in an examination. In particular, you will find that many of the exercises cover factual material from different parts of the syllabus – exactly like the more difficult questions in the examination. Each worksheet contains an extension exercise to extend your learning beyond the syllabus and the examination. These include research and project tasks that will develop your scientific skills and understanding.

The answers to the questions are provided, so that you can assess your own performance. Be honest with yourself when checking the marks – you must not be more generous than an examiner would be! Your teacher will probably be able to help you to compare your performance with the expected standards. (Answers to extension questions are not provided.)

Practice may not make perfect, but it will certainly make better.

Good luck!
Ron Pickering
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837464_WB_Complete_Contents.indd   5
18/07/2016   10:55
1. The seven characteristics of living organisms are **respiration, growth, sensitivity, nutrition, excretion, movement, and reproduction**.

Complete this table by choosing words from this list and writing them opposite their correct meanings.

<table>
<thead>
<tr>
<th></th>
<th>Meaning</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The ability to detect stimuli and make appropriate responses</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>A set of processes that makes more of the same kind of organism</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Removal from an organism of toxic materials, the waste products of metabolism, or substances in excess of requirements</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>A set of chemical reactions that breaks down nutrients to release energy in living cells</td>
<td></td>
</tr>
</tbody>
</table>

2. To biologists, classification means:

   - A giving organisms a name
   - B identifying organisms
   - C putting organisms into groups
   - D describing organisms

Underline your answer.

3. The following is a list of groups that biologists use to classify living organisms.

   - class
   - family
   - genus
   - kingdom
   - order
   - phylum
   - species

Rewrite the list in the correct hierarchy of classification.

4. Write out the complete hierarchical classification for a human.

5. Scientists in South Africa have recently discovered remains of an organism they have named **Homo naledi**.

   Suggest what this name tells you about the relationship of this organism to a modern day human.
1. The drawings show four common birds that came to feed in an English garden.

![Birds Illustrations](https://example.com/birds.png)

a. State which two birds scientists believe are most closely related and explain your answer.

b. i. Complete this table showing the external features of these birds. One example column has been completed.

<table>
<thead>
<tr>
<th>Species/feature</th>
<th>All feathers the same colour</th>
<th>Dark stripe along length of body</th>
<th>Large pale areas on sides of head</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Erithacus rubecula</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Parus caeruleus</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Parus major</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Turdus merula</em></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ii. Use the information in this table to complete the following key to identify the four birds.

1. No large pale areas on head
   Large pale areas on head
   go to 2

   2. All feathers the same colour
      *Turdus merula*

   3. Feathers of different colours
      *Erithacus rubecula*

2. a. Search the internet for images of orang-utan, chimpanzee, ring-tailed lemur, siamang, grass monkey, purple langur, and aye-aye.

   b. Using only external features make a key to distinguish between these animals. (Hint: try to begin with a question that divides this group of seven animals into two approximately equal-sized groups.)

   c. These animals are all primates. Humans are also primates. Suggest the most important difference between humans and other primates.

   d. Living organisms can also be classified using evidence from DNA. Use the internet to find how much DNA humans have in common with the other seven primates. Suggest which of these animals is most closely related to humans.
1. a. Match up the following parts of a plant with the function performed by each of them.

<table>
<thead>
<tr>
<th>Part of plant</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem</td>
<td>Absorb water and mineral ions</td>
</tr>
<tr>
<td>Root</td>
<td>Usually help dispersal of seed, a reproductive structure</td>
</tr>
<tr>
<td>Leaves</td>
<td>Hold leaves in the best position</td>
</tr>
<tr>
<td>Flowers</td>
<td>May be attractive to pollinating insects or birds</td>
</tr>
<tr>
<td>Fruit</td>
<td>Trap light energy for photosynthesis</td>
</tr>
</tbody>
</table>

b. Complete the following paragraphs about the lives of plants. Use words from this list – each word may be used once, more than once, or not at all.

- algae
- angiosperms
- autotrophic
- cellulose
- chlorophyll
- chloroplast
- dicotyledons
- ferns
- herbivorous
- monocotyledons
- photosynthesis
- respiration
- starch

All plants contain the light-absorbing pigment called .......................................................... This means that plants can be .......................................................... – they can make their own food molecules from simple inorganic sources by the process of .......................................................... All the members of the Plant Kingdom are made of cells surrounded by a cell wall made of ..........................................................

The Plant Kingdom can be divided into four phyla, .........................................................., mosses, .........................................................., and seed plants. Many of the seed plants have the seed enclosed inside a fruit – they are called .......................................................... (which have leaves with parallel veins) and .......................................................... (leaves have branched veins).

Extension

c. Plants absorb light energy through their leaves.

Suggest how you could calculate the leaf surface area of a tree close to your school.
Characteristics and classification of living organisms

1.4 Invertebrates in woodland

1. These four animals were among a group of organisms collected from leaf litter lying on the floor of a deciduous woodland.

![Images of Ant, Earthworm, Centipede, Mite]

a. Complete the table below to compare the four animals.

<table>
<thead>
<tr>
<th>Number of pairs of jointed legs present</th>
<th>Ant</th>
<th>Earthworm</th>
<th>Centipede</th>
<th>Mite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are antennae present? (Yes or No)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Use this key to place each of the animals in its correct group.

1. Jointed legs present
   - No jointed legs: Annelid

2. More than four pairs of legs
   - Four pairs of legs or fewer: go to question 4

3. Body in two main parts, legs not all alike
   - Body made up of many similar segments, with legs alike one another: Myriapod

4. 3 pairs of legs present
   - 4 pairs of legs present: Arachnid

Write your answers in the table below.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Classification group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ant</td>
<td></td>
</tr>
<tr>
<td>Earthworm</td>
<td></td>
</tr>
<tr>
<td>Centipede</td>
<td></td>
</tr>
<tr>
<td>Mite</td>
<td></td>
</tr>
</tbody>
</table>

Extension

c. Insects are members of the phylum Arthropoda. Humans have never been able to completely exterminate any insect species, although they have tried to eliminate some species which are pests.

Complete this table to list some species that are harmful and some that are beneficial to humans.

<table>
<thead>
<tr>
<th>Name of insect</th>
<th>Reason why it is directly harmful to humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of insect</th>
<th>Reason why it is beneficial to humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
1. This table compares some features of chordate (vertebrate) animals.

a. Define the term chordate (vertebrate).

b. Complete this table.

<table>
<thead>
<tr>
<th>Chordate</th>
<th>Body covering</th>
<th>Constant body temperature</th>
<th>Parental care of young</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>Moist skin</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Frog</td>
<td>Scales</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Turtle</td>
<td>Feathers</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Rabbit</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

c. Humans are vertebrates. State how many vertebrae are found in a human backbone. Draw a picture of a single vertebra from the lower back of a human.

d. State two functions of vertebrae.