# Cambridge O Level
# Biology

## Revision Guide

Second Edition

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# How to use this book

**Chemicals are moved around living organisms. Here there is a description of the movement of water, ions, sugars and amino acids within a plant (involving transpiration and translocation). This is followed by a description of the human circulatory system and of the constituents of blood.**

Introduction – sets the scene of each chapter, helps with navigation through the book and gives a reminder of what's important about each topic.

## Carbohydrates

These are organic chemicals containing the elements ***carbon, hydrogen*** and ***oxygen*** only. The ratio of atoms of hydrogen to atoms of oxygen in a carbohydrate molecule is always 2:1 (as in water – hence carbo***hydrate***).

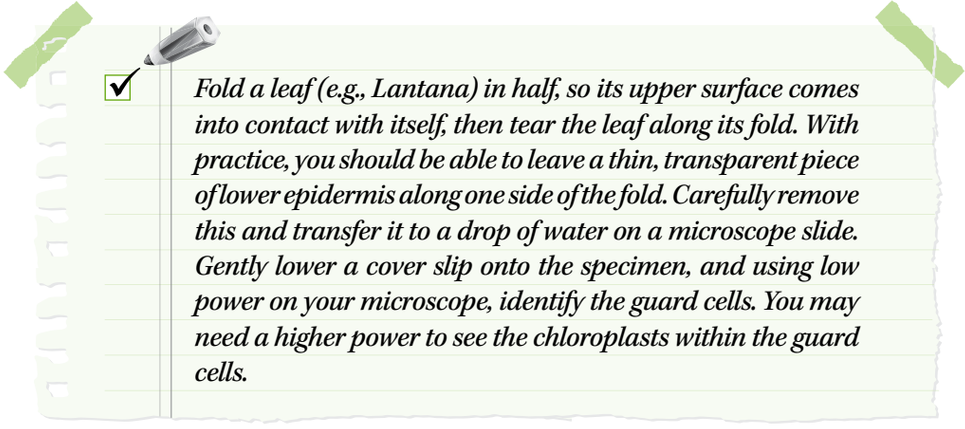
Carbohydrates with large molecules such as ***starch*** and ***glycogen*** are insoluble (a starch 'solution' is in fact a starch suspension).

Important terms – clear and straightforward explanations are provided for the most important words in each topic.

**NOTE**

The cytoplasm and the nucleus make up the *protoplasm*.

Notes – quick suggestions to remind you about key facts and highlight important points.



*Fold a leaf (e.g., Lantana) in half, so its upper surface comes into contact with itself, then tear the leaf along its fold. With practice, you should be able to leave a thin, transparent piece of lower epidermis along one side of the fold. Carefully remove this and transfer it to a drop of water on a microscope slide. Gently lower a cover slip onto the specimen, and using low power on your microscope, identify the guard cells. You may need a higher power to see the chloroplasts within the guard cells.*

Task boxes – check your own knowledge and see how well you're getting on by answering regular questions and doing activities.

**Aim:** **To show that light is necessary for photosynthesis**

**Apparatus:**
- a well-watered, de-starched, potted plant (for example, *Pelargonium* or *Coleus*)
- a cork cut into two pieces
- a pin

**Method:** The apparatus is set up as shown in Figure 2.2. The cork is fixed in the evening so that the leaf has time to destarch over night.

The experiment is left in sunlight for 8 hours. The cork is removed from the leaf, and the starch test is carried out on the leaf.

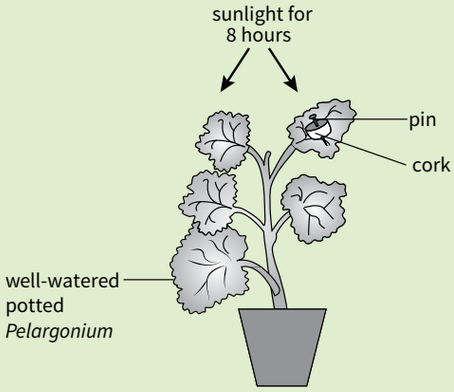



**Figure 2.2** Experiment to show that light is necessary for photosynthesis

**Results:** Where the cork covered the leaf, the leaf stained ***brown***. The rest of the leaf stained ***blue/black***.

**Conclusion:** Only where light had been able to reach the leaf had starch been made; thus, light is necessary for photosynthesis.

Practical skills – reinforce your practical knowledge and skills with clear explanations and diagrams.

**Points to remember**

- Know the similarities and differences between plant and animal cells.
- Know the difference between ***tissue, organ*** and ***organ system*** and be able to define each.
- Be able to define ***diffusion*** and ***osmosis***.
- Learn what is meant by ***active transport***.
- Be able to write down definitions of the following terms: ***plasmolysis, turgor, water potential, partially permeable membrane***.

Points to remember – at the end of each chapter so you can check off the topics as you revise them.

## Exam-style questions for you to try

1. What is meant by the term 'dual circulation'?
   - **A.** A blood cell passes through the heart twice in one complete circulation.
   - **B.** Blood travels twice round the body before being pumped to the lungs.

Exam-style questions – thoroughly prepare for examinations by completing the exam-style questions and checking your answers which are provided at the back of the book.

## Revision Guidelines

Understanding Biology at Cambridge O Level is not usually a problem, but committing facts to memory can often be a major obstacle to success. Many students are at a loss to know exactly how to set about what seems to them to be a task of immense proportions. I offer the following method, one which I devised myself when, as a student, I was faced with the same problem. It has the advantage, if followed carefully, of improving one's factual knowledge as a result of time spent, rather than of any specific effort to learn.

All important words, terms and phrases in the text of this book have been written in bold and italics. The greater the amount of material thus presented in the text that is committed to memory, then the greater the chances of success in examination. The method which I offer for learning it is as follows:

1. Take a sheet of file paper and divide it with a vertical line such that three quarters of the sheet is on the left of the line.
2. Read a page of the Revision Text, and each time you come to a word or phrase which appears in bold and italics, then construct a simple question to which that word or phrase is the answer.
3. Write these simple questions on the left-hand side of your sheet of file paper, leaving a space between each, and number them. Continue on further sheets of paper if necessary.
4. If there is a diagram in the text, then draw a quick sketch of the diagram on the left-hand side of your sheet with numbered label lines above each other extended towards the right-hand side of your sheet.
5. When you have reached the bottom of the page of text, close the book and see how many of the answers you can write down on the right-hand side of your sheet. When you have attempted all answers, check them against the text. You will probably be surprised at how well you do, but since you wrote the questions, carefully phrased around the required answer, perhaps it is not so surprising after all.
6. Continue until you have a list of questions and answers to the section you are trying to learn.
7. Take a second sheet of paper (folded if writing would otherwise show through it), and use this to cover the answers. Test yourself again, writing your answers on the folded sheet, and continue this until you are able to score over 80%. (You can, of course, set your own target. Some will not be content until they can score 100%.)
8. File away your Question/Answer sheet for further revision at a later date.
9. Continue this process systematically, until you have, effectively, a full set of revision notes for later use.
10. In the last few weeks before an examination, it is better to revise by reading the text of this book carefully, a chapter at a time. Concentrate on every sentence, making sure you understand what you have read. It is so easy to get to the bottom of a page in a book, and realise that your mind was elsewhere as you were reading it, and as a result, nothing registered at all. If that happens, be honest with yourself. Go back to the top of the page and start again.
11. In the last few days before examination, your Question/Answer sheets should now prove invaluable for last-minute consolidation of your facts.

It cannot be stressed too strongly that examination results depend on knowledge. It is important that you have a very good grasp of simple knowledge to do well and interpretation questions often rely heavily on a sound knowledge of the subject matter.

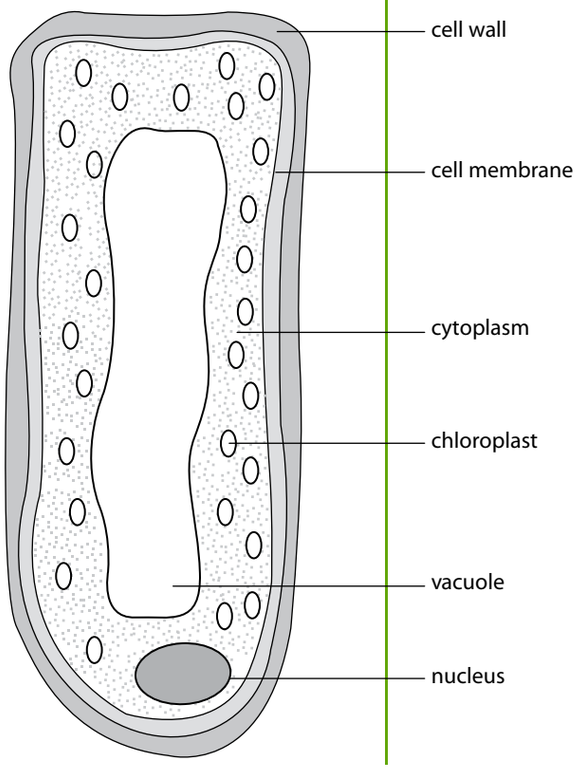
The advantage of this revision method is based so firmly on the student phrasing the questions to which he or she will already know the answer that it would defeat the object if more than a short example of the technique were given. The success of the method relies only on the student following the technique carefully. It does work, but you must be prepared to spend the necessary time. You may even enjoy the experience!

**Example**

Example of a Revision Sheet, based on the beginning of Chapter 1 in this Revision Guide (Cell Biology), is shown here.

| | |
|---|---|
| 1. What word is used for organisms containing only one cell? | unicellular |
| 2. Give an example of a one-celled organism. | a bacterium |
| 3. What word is used for organisms made of many cells? | multicellular |
| 4. What structure controls the passage of substances into and out of a cell? | cell membrane |
| 5. In what state must all chemicals be before they can enter or leave a cell? | in solution |
| 6. What is the jelly-like substance where chemical reactions occur in a cell? | cytoplasm |
| 7. What is the correct term for the chemical reactions in a cell? | metabolic reactions |
| 8. Whereabouts in a cell are chromosomes found? | the nucleus |
| 9. What do chromosomes contain? | genes |
| 10. Of what chemical are chromosomes made? | DNA |
| 11. What makes up protoplasm? | cytoplasm + nucleus |
| 12. What is the space in the centre of a plant cell? | vacuole |
| 13. What does this space contain? | cell sap |
| 14. What is the name of the box in which a plant cell is contained? | cell wall |
| 15. What chemical is this box made of? | cellulose |
| 16. Name the green structures in photosynthesising cells. | chloroplasts |
| 17. What pigment do they contain? | chlorophyll |

18–23. Add the labels to the diagram.




In addition to producing a revision sheet, it will help to commit facts and concepts to memory if, while studying a topic, you stop occasionally to discuss or to solve a related problem. Biology is a subject that encourages a student to conduct investigations to supplement their knowledge and understanding. Throughout this text, there are 'task boxes' indicated by a tick (✓) to the left of a pencil point. The tasks fall into three categories: category 1 is a simple mental task that will allow you to see whether you understand the topic under consideration. If you are unable to answer any question asked in the task box, you may consider discussing it in a small group, arriving at an answer and then checking, either with a text book or teacher, to see whether you are correct. Categories 2 and 3 will help to supplement you knowledge of a topic. Category 2 is in the form of a simple practical exercise that can be carried out on your own, while category 3 may be more suited to a practical investigation that might be carried out as a class exercise or demonstration.

## Some hints on how to draw biological specimens

Drawing specimens is not an exercise in artistic ability; it is an exercise in ***observation***. Your drawings should therefore show the features that you have observed.

- Your drawings should be as large as the paper you are drawing on will allow.
- They should be made using a ***sharp***, preferably HB, pencil.

- They should have ***sharp outlines*** (not 'sketchy' ones).
- They should have the same ***proportions as the specimen*** you are drawing. If the anther is, say, three times wider than but only one-sixth as long as the filament, it should be drawn as such. Measure the specimen before you begin and make very faint marks on your paper to guide you. (They can be carefully erased afterwards.)
- If there is a clear point of structural detail in the specimen – e.g., nectar guides on the petal – the same points should be shown on your drawing, in the correct place. (If they are a large number of similar such points, only a few need be drawn.)
- Avoid shading. If an area is darker than the rest of the specimen, draw an outline of the area and label it.
- ***Rule*** label lines in pencil and label in pencil preferably in capital letters (pencil can be rubbed out and corrected, and capitals are usually easier to read). Label lines should terminate ***exactly at the point being labelled.***
- Avoid arrowheads on your labels – they can obscure an important feature beneath them.
- Always give a ***magnification*** to your drawing. It is a ***linear*** magnification, i.e. calculated by measuring the length or width of the specimen, and the length or width of your drawing measured across the same structural feature.

$$\frac{\text{length of drawing}}{\text{length of specimen}} = \text{magnification (expressed as, e.g., '} \times 4.5\text{')}$$

**NOTE**

When drawing from a photograph, there is sometimes a magnification given for the photograph. In such cases, you must multiply the magnification of your drawing by this figure.

It would not normally be the case that your drawing or measurements would be accurate enough to give a magnification to more than one decimal place. Do not 'round off' too much. × 4.6 is not × 5.

As an examination approaches and a greater amount of time is spent on revision, it is usually more productive to set aside a certain time each day for revision. Do not allow yourself to be persuaded to do anything else during that time.

Work on your own with ***no distractions around you***. Some people say they can work better listening to music. If that really is so in your case, then keep the music quiet, and, at least, it may shut out other distractions!

You may find it helpful to make a calendar by dividing a piece of paper into a space for each day during your revision period before any examination. Then you can divide the syllabus into the same number of parts as there are days for revision, and enter one such part per day on your calendar. In this way you will know exactly what you are going to revise on each day. Your day's revision will not be complete until you have revised everything on your calendar for that day.

People vary as to how long they can work at a stretch. It is important to have a break from time to time (again, preferably, the same time each day). When you stop, set yourself a time to resume your revision, ***and stick to it***.

Finally, good luck with your revision. This method can work. I know, because it did so for me!

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# Acknowledgements

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| Syllabus Name & Code | Paper & Question Number | Month/Year | Chapter/Page in Book |
|---|---|---|---|
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| Cambridge O Level Biology 5090 | Paper 21, Q8 | November 2010 | Chapter 1, P 26 |
| Cambridge O Level Biology 5090 | Paper 22, Q2 | June 2011 | Chapter 2, P 57 |
| Cambridge O Level Biology 5090 | Paper 22, Q6 | November 2011 | Chapter 2, P 58 |
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| Cambridge O Level Biology 5090 | Paper 22, Q8 | June 2011 | Chapter 5, P 126 |
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