Message from AQA

This textbook has been approved by AQA for use with our qualification. This means that we have checked that it broadly covers the specification and we are satisfied with the overall quality. Full details of our approval process can be found on our website.

We approve textbooks because we know how important it is for teachers and students to have the right resources to support their teaching and learning. However, the publisher is ultimately responsible for the editorial control and quality of this book.

Please note that when teaching the AQA Entry Level Certificate or AQA GCSE Combined Science: Trilogy course, you must refer to AQA’s specification as your definitive source of information. While this book has been written to match the specification, it cannot provide complete coverage of every aspect of the course.

A wide range of other useful resources can be found on the relevant subject pages of our website: www.aqa.org.uk.
How to use this book

Learning objectives
After this topic, you should know:

- Learning objectives at the start of each spread tell you what you will be learning about.

Key words are highlighted in the text. You can look them up in the glossary at the back of the book if you are not sure what they mean.

Diagrams are as important as the text for your understanding, so make sure you revise them carefully.

This book has been written by subject experts to match the specifications for AQA Entry Level Certificate Science and AQA GCSE Combined Science: Trilogy. It is has lots of features to help you prepare for your course and achieve the very best you can.

Core Entry Level Certificate topics cover shared topics from the AQA Entry Level Certificate and AQA Combined: Science Trilogy specifications.

Summary questions
There are summary questions at the end of each topic. These questions give you a chance to test whether you have learnt and understood everything in the topic. The questions start off easier and get harder, so that you can stretch yourself.
The food you eat is made up of large molecules that cannot dissolve in your blood. These molecules are insoluble. Your body cannot use these molecules. They need to be broken down (digested) to form smaller molecules that can dissolve in your blood.

These smaller molecules are soluble and therefore can be absorbed and used by your cells. The process of digestion takes place in your digestive system.

A: What happens during digestion?

Your digestive system starts with your mouth and finishes at your anus. In between, there are several different organs that help you to digest food.

B: Write down three of the organs in the digestive system.

Movement of food through the digestive system

Mouth – where food enters the body. Food is chewed to break it into smaller chunks.

Stomach – pieces of food are mixed with digestive juices and acids. The food breaks down more.

Small intestine – the useful small molecules (nutrients) pass through the intestine wall into the bloodstream. This is called absorption.

Large intestine – only food that cannot be digested gets this far. Water is absorbed back into the body. This leaves a solid waste of undigested food. This leaves the body through the anus.

C: What happens to food in your stomach?

Digestive juices

Your digestive system contains glands called the salivary glands and pancreas. These glands make and release enzymes. Enzymes break down large insoluble food molecules into smaller soluble molecules. Your stomach and small intestine makes enzymes too.

Your liver produces bile. Bile is then stored in the gall bladder. Bile makes the food in your small intestine less acidic and also helps to digest fats.

D: Where is bile stored in the digestive system?

1 Match each organ to its correct function.

<table>
<thead>
<tr>
<th>Organ</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>liver</td>
<td>Absorbs small soluble food molecules into the bloodstream.</td>
</tr>
<tr>
<td>stomach</td>
<td>Absorbs water from undigested food.</td>
</tr>
<tr>
<td>small intestine</td>
<td>Produces bile.</td>
</tr>
<tr>
<td>large intestine</td>
<td>Breaks down large insoluble molecules.</td>
</tr>
</tbody>
</table>

[3 marks]

2 Complete the sequence of organs below to correctly describe the passage of food through the digestive system:

mouth → _____ → _____ intestine → _____ intestine → anus

[3 marks]

3 What is the role of enzymes in digestion? (1 mark)
1 Choose the correct words from the box to complete the following sentences.

<table>
<thead>
<tr>
<th>cells</th>
<th>membrane</th>
<th>microscope</th>
<th>nucleus</th>
<th>reactions</th>
</tr>
</thead>
</table>

All living organisms are made up of ____. They are so small that they can only be seen using a ____. Animal cells have three important parts:
- a ____ that controls the cell and contains the genetic material
- cytoplasm, where chemical ____ take place
- a cell ____ that controls what comes in and out of the cell. [4 marks]

2 The diagram shows some of the main organs in the human body.

a What is the name of organ X?
- brain
- lung
- stomach [1 mark]

b What is the name of organ Y?
- brain
- lung
- stomach [1 mark]

c What is the name of organ Z?
- brain
- lung
- stomach [1 mark]

3 Put these structures in increasing size order from smallest to biggest.

reproductive system
sperm
kidney
glandular tissue
[3 marks]

4 a What is the function of a nerve cell?
- can change shape
- chemicals in head section
- lots of projections [1 mark]

b Which of the following is an adaptation of a nerve cell that helps it carry out its function?
A
B
C [1 mark]

5 a What is the function of the circulatory system?

b Which of the following is an organ that is found in the circulatory system?
- liver
- lung
- ovary [1 mark]

6 Complete this sentence.

In the digestive system, ____ convert food into small soluble molecules. [1 mark]

7 a Which part of the blood carries oxygen?
- platelets
- white blood cell
- red blood cell [1 mark]

b A student accidentally cuts her finger. What would happen if she did not have any platelets?
- carries oxygen around the body
- fights disease
- involved in blood clotting [2 marks]

b What is the name of the part of the blood that the cells float in? [1 mark]

4 Use the correct words from the box to complete the following diagram that shows the levels of organisation in an organism.

<table>
<thead>
<tr>
<th>cell</th>
<th>organ</th>
<th>organism</th>
<th>organ system</th>
<th>tissue</th>
</tr>
</thead>
</table>

_____ – smallest unit in an organism

_____ – group of cells working together

_____ – collection of tissues working together

_____ – group of organs working together

_____ – group of organ systems working together [5 marks]
Learning objectives
After this topic, you should know:
● the main parts of plant and animal cells
● the similarities and differences between plant and animal cells
● examples of specialised plant cells.

1.6 Plant and animal cells

Your body is made up of animal cells. These contain a nucleus, cell membrane, and cytoplasm.

Parts of animal cells
Animal cells also contain two other structures:
● mitochondria – where the chemical reaction respiration takes place, this transfers energy for the cell to use
● ribosomes – where proteins are made. Proteins are used for growth and repair.

Parts of a plant cell
Plant cells have all the structures that an animal cell has. However, plants and animals are very different. Plants make their own food. They also cannot move their whole body from place to place. This means they need extra cell parts. Many plant cells also contain:
● chloroplasts – contain the chemical chlorophyll. Chlorophyll absorbs light, which is needed for the chemical reaction photosynthesis. This is how plants produce their food. All plant cells contain
● permanent vacuole – full of cell sap. Cell sap is made up of water, sugars, and salts. It keeps the cell rigid (stiff) which helps support the plant
● cell wall – surrounds the cell. The cell wall is made of cellulose, which makes the wall rigid. This helps support the cell.

Specialised plant cells
Like animal cells, plant cells can also be specialised for specific functions.

Root hair cell
Root hair cells absorb water and nutrients from the soil. They have two main adaptations:
● root hair – creates a large surface area for absorbing water
● lots of mitochondria – transfer energy needed to move minerals into the cell

Xylem cell
Xylem is the transport tissue in plants. It carries water and minerals from the roots to the rest of the plant.
A special chemical called lignin builds up in spirals in the cell walls of xylem cells. The cells then die forming long hollow tubes. This means water can move through easily. The lignin also makes the tubes very strong, which helps support the plant stem.

C: Name two examples of specialised plant cells.

1 From the following list, choose the cell components that are found in both plant and animal cells.
cell membrane cell wall cytoplasm nucleus chloroplasts [3 marks]
2 a Which cell component is only found in plant cells? chloroplasts mitochondria ribosomes [1 mark]
b Describe the function of this cell component. [3 marks]
3 Explain why a root hair cell does not need chloroplasts. [3 marks]
1 Practice questions

01 Use the correct words from the box to complete each sentence.

[1 mark] Use the correct words from the box to complete each sentence.

a cell an organ an organism
an organ system a tissue

The basic building block of living organisms is called ______.
A group of cells with similar structures and functions is called ______.
The brain is an example of ______.

02 Figure 1 shows some organs of the male human body.

A: brain  eye  mouth
B: liver  lungs  stomach
C: kidney  small intestine  stomach
D: bladder  ovaries  testes

03 Look at Figure 2 of an animal cell.

03.1 Choose the correct name for structure A. cytoplasm haemoglobin nucleus

[1 mark] cytoplasm haemoglobin nucleus

03.2 Choose the correct function of the cell membrane.

A contains genetic material  B controls the activities of the cell  
C controls which substances can pass into and out of a cell  D where chemical reactions take place

[1 mark] where chemical reactions take place

04 Complete the table showing a number of specialised cells and their function.

<table>
<thead>
<tr>
<th>Name of cell</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>sperm</td>
<td>change shape to cause movement</td>
</tr>
<tr>
<td>nerve</td>
<td></td>
</tr>
</tbody>
</table>

[3 marks] change shape to cause movement

05 Figure 3 shows the components of the blood.

05.1 Name components A and B. red blood cell  B

[2 marks] red blood cell  B

05.2 Describe two ways that red blood cells are adapted to transport oxygen from the lungs to cells of the body.

[2 marks] Describe two ways that red blood cells are adapted to transport oxygen from the lungs to cells of the body.

06 Which list of cell components can be found in both plant and animal cells?

A cell membrane, cytoplasm, nucleus, vacuole
B cell wall, chloroplasts nucleus, vacuole
C cytoplasm, mitochondria, nucleus, ribosomes
D chloroplasts, cytoplasm, mitochondria, nucleus

[1 mark] chloroplasts, cytoplasm, mitochondria, nucleus

07.1 Complete the table using a tick (✓) to summarise the differences between diffusion and active transport.

<table>
<thead>
<tr>
<th></th>
<th>Diffusion</th>
<th>Active transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>substances move</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>against the</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>concentration</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>gradient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>energy is needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>oxygen moved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>into the blood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>from the air sacs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>due to this process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mineral uptake into</td>
<td></td>
<td></td>
</tr>
<tr>
<td>plant roots occurs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>due to this process</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[4 marks] mineral uptake into plant roots occurs due to this process

07.2 Give two ways you can speed up diffusion.

[2 marks] Give two ways you can speed up diffusion.

07.3 The coronary arteries carry blood to the heart muscle cells. In coronary heart disease, layers of fatty material build up inside the coronary arteries. Explain why this could be dangerous.

[3 marks] Explain why this could be dangerous.

07.4 Name one way to treat a blocked coronary artery.

[1 mark] Name one way to treat a blocked coronary artery.

08.1 Choose the name of the blood vessel that carries blood away from the heart.

artery capillary vein

[1 mark] artery capillary vein

08.2 Give the function of a valve in a vein.

[1 mark] Give the function of a valve in a vein.

08.3 Figure 4 shows an enzyme and three possible substrate molecules, A, B, and C.

Select which one substrate would bind to the active site.

[1 mark]

08.4 Amylase is an enzyme that breaks down large carbohydrate molecules. Explain why it is unable to break down lipids.

[2 marks] Amylase is an enzyme that breaks down large carbohydrate molecules. Explain why it is unable to break down lipids.

08.5 Name the type of enzyme that can break down lipids.

[1 mark] Name the type of enzyme that can break down lipids.

10 A student wanted to observe some cheek cells under a light microscope.

10.1 Name of the part of the microscope that the slide sits on.

[1 mark] Name of the part of the microscope that the slide sits on.

10.2 The microscope has an objective lens with magnification x40 and an eyepiece lens with a magnification of x10. Calculate the total magnification of the microscope.

[2 marks] Calculate the total magnification of the microscope.