## Welcome to AQA GCSE Biology!

### B1 Unit 1

1 **Keeping healthy**  
   1.1 Diet and exercise  
   1.2 Weight problems  
   1.3 Inheritance, exercise and health  
   1.4 Pathogens and disease  
   1.5 Defence mechanisms  
   1.6 Using drugs to treat disease  
   1.7 Growing and investigating bacteria  
   1.8 Changing pathogens  
   1.9 Immunity  
   1.10 How do we deal with disease?  
   End of chapter questions

### B2 Unit 2

1 **Cells, tissues and organs**  
   1.1 Animal and plant cells  
   1.2 Bacteria and yeast  
   1.3 Specialised cells  
   1.4 Diffusion  
   1.5 Tissues and organs  
   1.6 Organ systems  
   End of chapter questions

2 **Organisms in the environment**  
   2.1 Photosynthesis  
   2.2 Limiting factors  
   2.3 How plants use glucose  
   2.4 Making the most of photosynthesis  
   2.5 Organisms in their environment  
   2.6 Measuring the distribution of organisms  
   2.7 How valid is the data?  
   End of chapter questions

3 **Enzymes**  
   3.1 Proteins, catalysts and enzymes  
   3.2 Factors affecting enzyme action  
   3.3 Enzymes in digestion  
   3.4 Speeding up digestion  
   3.5 Making use of enzymes  
   3.6 High-tech enzymes  
   End of chapter questions

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## 6 Variation, reproduction and new technology

6.1 Inheritance
6.2 Types of reproduction
6.3 Genetic and environmental differences
6.4 Cloning
6.5 Adult cell cloning
6.6 Genetic engineering
6.7 Making choices about technology
End of chapter questions

## 7 Evolution

7.1 Theories of evolution
7.2 Accepting Darwin’s ideas
7.3 Natural selection
7.4 Classification and evolution
End of chapter questions

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## Examination-style questions

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# Index

## 4 Energy from respiration
- 4.1 Aerobic respiration 54
- 4.2 The effect of exercise on the body 54
- 4.3 Anaerobic respiration 55
End of chapter questions 56

## 5 Simple inheritance in animals and plants
- 5.1 Cell division and growth 57
- 5.2 Cell division in sexual reproduction 58
- 5.3 Stem cells 59
- 5.4 From Mendel to DNA 59
- 5.5 Inheritance in action 60
- 5.6 Inherited conditions in humans 61
- 5.7 Stem cells and embryos – science and ethics 62
End of chapter questions 63

## 6 Old and new species
- 6.1 The origins of life on Earth 64
- 6.2 Exploring the fossil evidence 65
- 6.3 More about extinction 65
- 6.4 Isolation and the evolution of new species 66
End of chapter questions 67

# Examination-style questions

## B3 Unit 3

### 1 Exchange of materials
- 1.1 Osmosis 70
- 1.2 Active transport 70
- 1.3 The sports drink dilemma 71
- 1.4 Exchanging materials – the lungs 71
- 1.5 Ventilating the lungs 72
- 1.6 Artificial breathing aids 73
- 1.7 Exchange in the gut 74
- 1.8 Exchange in plants 74
- 1.9 Transpiration 75
End of chapter questions 76

### 2 Transporting materials
- 2.1 The circulatory system and the heart 77
- 2.2 Keeping the blood flowing 78
- 2.3 Transport in the blood 79
- 2.4 Artificial or real? 80
- 2.5 Transport systems in plants 80
End of chapter questions 81

### 3 Keeping internal conditions constant
- 3.1 Controlling internal conditions 82
- 3.2 The human kidney 82
- 3.3 Dialysis – an artificial kidney 83
- 3.4 Kidney transplants 84
- 3.5 Controlling body temperature 85
- 3.6 Treatment and temperature issues 86
- 3.7 Controlling blood glucose 86
- 3.8 Treating diabetes 87
End of chapter questions 88

### 4 How humans can affect the environment
- 4.1 The effects of the population explosion 89
- 4.2 Land and water pollution 90
- 4.3 Air pollution 90
- 4.4 Deforestation and peat destruction 91
- 4.5 Global warming 92
- 4.6 Biofuels 93
- 4.7 Biogas 94
- 4.8 Making food production efficient 94
- 4.9 Sustainable food production 95
- 4.10 Environmental issues 96
End of chapter questions 97

# Examination-style questions

### Answers

### Glossary
Welcome to AQA GCSE Biology!

This book has been written for you by the people who will be marking your exams, very experienced teachers and subject experts. It covers everything you need to revise for your exams and is packed full of features to help you achieve the very best that you can.

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

Where you see this icon, you will know that this topic involves How Science Works – a really important part of your GCSE.

These questions check that you understand what you’re learning as you go along. The answers are all at the back of the book.

Many diagrams are as important for you to learn as the text, so make sure you revise them carefully.

Anything in the Higher boxes must be learned by those sitting the Higher Tier exam. If you’re sitting the Foundation Tier, these boxes can be missed out.

The same is true for any other places that are marked [H].

AQA Examiner’s tips are hints from the examiners who will mark your exams, giving you important advice on things to remember and what to watch out for.

How you can improve your grade – this feature shows you where additional marks can be gained.

At the end of each chapter you will find:

**End of chapter questions**

These questions will test you on what you have learned throughout the whole chapter, helping you to work out what you have understood and where you need to go back and revise.

And at the end of each unit you will find:

**AQA Examination-style questions**

These questions are examples of the types of questions you will answer in your actual GCSE, so you can get lots of practice during your course.

You can find answers to the End of chapter and AQA Examination-style questions at the back of the book.
1.1 Diet and exercise

- A healthy diet has the right balance of food types. Carbohydrate, fat and protein are used by the body to release energy and to build cells.
- Mineral ions and vitamins are needed to keep the body healthy. If the diet is unbalanced a person can become malnourished.

1.2 Weight problems

- It is important for good health to get the energy balance correct.
- If the energy you take in equals the energy you use then your mass will stay the same. Eating too much food can lead to becoming overweight and obese.
- Long-term obesity can lead to severe health problems including Type 2 diabetes (high blood sugar).
- These problems can be reduced by eating less carbohydrate and increasing the amount of exercise.

Examiner’s tip

The term ‘metabolic rate’ is often used in exams – remember it refers to the chemical reactions in cells.

Key words: malnourished, metabolic rate, inherited

Use the eatwell plate to learn about proportion in balanced diets. The proportion of fruit and vegetables is $\frac{1}{3}$ of a balanced diet.

1. Why do people become obese?

- Some people are unhealthy because they have too little food (starvation). They find it difficult to walk about and may suffer from deficiency diseases due to lack of vitamins or minerals.

Key words: mass, overweight, obese
### 1.3 Inheritance, exercise and health

**Key points**

- Inherited factors affect our health. These include metabolic rate and cholesterol levels.
- People who exercise regularly are usually healthier than those who take little exercise.

- Your metabolic rate can be affected by the genes you inherit from your parents.
- There are two types of cholesterol. You need ‘good’ cholesterol for your cell membranes and to make vital substances.
- Small numbers of the population inherit high levels of ‘bad’ cholesterol, which can lead to heart disease.
- Foods rich in saturated fat can also increase blood cholesterol levels.
- By exercising regularly a person can increase their metabolic rate and lower high cholesterol levels.

1. **How can people change their lifestyle to help lower their blood cholesterol levels?**

**Bump up your grade**

You will ‘bump’ up your grade if, when you are asked to explain something, your answer contains more than a description. For example, to explain why eating too much makes you put on weight (mass) — you need to say:

‘The food contains energy, and any excess energy is stored in the body as fat.’

### 1.4 Pathogens and disease

**Key points**

- Pathogens are microorganisms that cause infectious disease.
- Most pathogens are either bacteria or viruses.
- Pathogens reproduce rapidly inside the body and may produce toxins.
- Viruses reproduce inside cells and damage them.
- Washing hands removes pathogens from them. Semmelweiss was the first doctor to realise this.

- Pathogens cause infectious diseases.
- Pathogens are tiny microorganisms – usually bacteria or viruses.
- When bacteria or viruses enter the body they reproduce rapidly. They can make you feel ill by producing toxins (poisons).
- Viruses are much smaller than bacteria and reproduce inside cells. The damage to the cells also makes you ill.

1. **How do pathogens make you feel ill?**

**Examiner’s tip**

Remember that viruses damage cells when they reproduce inside them.

- Before bacteria and viruses had been discovered, a doctor called Semmelweis realised that infection could be transferred from person to person in a hospital.
- Semmelweiss told his staff to wash their hands between treating patients. However, other doctors did not take him seriously. We now know that he was right!

2. **Why did it take a long time for others to accept the ideas of Semmelweiss?**

**Key words:** pathogen, infectious disease, microorganism, bacteria, virus
2.4 Making the most of photosynthesis

**Key points**
- Plant growers try to give their plants the best conditions for growth by controlling the environment.
- They have to evaluate the benefits of increasing growth with the increased cost of heating and lighting or from providing carbon dioxide.
- Greenhouses and polytunnels can be constructed to grow plants in an enclosed space. If the greenhouse has heaters and lamps the rate of photosynthesis will increase but may stop if the temperature or light intensity is too high. By adding carbon dioxide to the air in the greenhouse the rate of photosynthesis will also increase. Nitrate ions can also be added to the soil to ensure that plants can make the proteins needed for healthy growth.
- It can be expensive to provide a suitable temperature, light and carbon dioxide. The grower has to compare the biomass of plants grown indoors and outdoors without these extra factors.

**1 What factors must be controlled in a greenhouse to improve plant growth?**

**Key word:** biomass

2.5 Organisms in their environment

**Key points**
- The distribution of organisms is affected by environmental factors.
- Animals as well as plants are affected by physical factors.

**AQA Examiner’s tip**

If you are given data about the distribution of organisms, look for reasons why plants might not be able to grow there. Plants supply food for animals so fewer plants results in fewer animals.

**1 Why are there so few animals living in very cold regions such as the Arctic?**

Living organisms form communities. It is important to understand the relationships within and between these communities. These relationships can be influenced by external factors. Physical factors that may affect the distribution of organisms are:

- **Temperature** – for example, arctic plants are small which limits the number of plant eaters which can survive in the area.
- **Availability of nutrients** – most plants struggle to grow when mineral ions are in short supply and again few animals will survive in that area.
- **Amount of light** – few plants live on a forest floor because the light is blocked out by the trees. Shaded plants often have broader leaves or more chlorophyll.
- **Availability of water** – water is important for all organisms so few will live in a desert. If it rains in the desert then plants grow, produce flowers and seeds very quickly. Then there will be food for animals.
- **Availability of oxygen** – water animals can be affected by lack of oxygen. Some invertebrates can live at very low oxygen levels, but most fish need high levels of oxygen dissolved in water.
- **Availability of carbon dioxide** – lack of carbon dioxide will affect plant growth and consequently the food available for animals.
2.6 Measuring the distribution of organisms

Quantitative data can be used to describe how physical factors might be affecting the distribution of organisms in a particular habitat. Quantitative data can be obtained by:
- random quantitative sampling using a quadrat
- sampling along a transect.

A quadrat is a square frame made of metal or wood which may be subdivided into a grid. If several quadrats are placed randomly in a field the investigator can count the number of a particular type of plant or animal in each quadrat. This can be used to estimate the number of, for example, daisies in the whole field.
- Sample size is important. In a large field enough random quadrats must be placed to be sure the sample is representative of the whole field.
- An estimate of the number of, for example, daisies is usually given as a mean per square metre.

A transect is not random. A line is marked between two points, e.g. from the top of a rocky shore down to the sea. A quadrat can be placed every five metres along the line and the organisms counted. Physical factors could also be measured at each quadrat point. This method supplies a lot of information about the habitat and the organisms in it.

What is a quadrat?

With plants partly covered by the quadrat, decide whether they are in or out and stick to it. In this quadrat, you have six or seven plants per 0.25 m² (that’s 24 or 28 plants per square metre), depending on the way you count.

Examiner’s tip

Remember that quadrats can be placed randomly or along a line transect. Think about which method should be used in different situations.

You need to understand the terms range, mean, median and mode when recording quantitative data.

The following readings are the numbers of daisies counted in eleven 1 m² quadrats:

10 11 20 15 11 10 18 20 10 13 5

The range is the difference between the minimum and maximum readings: in this case the range of the daisies is 20 – 5 = 15 per m².

The mean is the sum of the readings divided by the number of readings taken: in this case the mean is 143/11 = 13 per m².

The median is the middle value of the readings when written in order:

5 10 10 10 11 11 13 15 18 20 20

In this case it is the sixth value out of the eleven readings, so the median is 11 per m².

The mode is the reading which appears the most frequently: in this case the mode is 10 per m².

Key words: quantitative sampling, transect, quadrat, sample size, range, mean, median, mode
1. Biological washing powders contain enzymes:
   a. Why are enzymes called biological catalysts? (2 marks)
   b. Most powders contain lipases and proteases. Name the types of foods these enzymes digest and give the products.
      i. Lipases (3 marks)
      ii. Proteases (2 marks)
   c. Non-biological powders can be used to wash clothes at high temperatures. Manufacturers suggest biological powders should be used between 30°C and 40°C. Explain why. (2 marks)

2. Stem cells can be obtained from bone marrow or from embryos.
   Bone marrow contains stem cells which produce blood cells. Bone marrow transplants have been used for many years to treat leukaemia, a blood cancer. Most people do not have any concerns about using stem cells from bone marrow.

   Embryos can also provide stem cells. It is hoped that many disorders such as paralysis could be treated by using embryo stem cells. Many people think that it is unethical to use embryos in this way.

   Use the information and your own knowledge to answer the questions.
   a. What are stem cells? (2 marks)
   b. Why might embryos be a better source of stem cells than bone marrow? (2 marks)
   c. How could embryo stem cells be used to treat paralysis? (1 mark)
   d. Give one ethical reason why people object to the use of embryos as a source of stem cells. (1 mark)

3. Many organisms have become extinct while others have evolved into new forms.
   a. Dinosaurs became extinct millions of years ago. How do we know dinosaurs existed? (1 mark)
   b. Many scientists think that the dinosaurs became extinct in a mass extinction when a giant asteroid collided with Earth. A dust cloud rose as a result of the collision. Explain why this event might have caused the extinction of the dinosaurs. (3 marks)
   c. Mass extinctions are relatively rare. Give two reasons why a single species may become extinct. (2 marks)
   d. In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate. Describe how a new species may develop as a result of geographic isolation. [H] (6 marks)
4. The diagram below is a genetic diagram that shows a cross between a plant which produces red flowers and one of the same species which produces white flowers.

Use the diagram to answer the questions.

a. Write the correct number for each of the following:
   i. the dominant characteristic (1 mark)
   ii. a gamete with a recessive allele (1 mark)
   iii. an embryo (1 mark)

b. Write the correct letter to identify the process:
   i. mitosis (1 mark)
   ii. meiosis (1 mark)
   iii. fertilisation (1 mark)

c. Select the correct word from the list below to copy and complete the sentence:
   alleles chromosomes genes
   The letters R and r are symbols to represent .... (1 mark)

d. The diagram below shows another process.

Use the correct words from the lists to copy and complete the sentences:
   i. The process shown in the second diagram is: ....
      asexual reproduction fertilisation sexual reproduction (1 mark)
   ii. The flowers produced by these plants will be: ....
      red pink white (1 mark)
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In this Revision Guide, you will find everything that you will need to know to prepare you for your exam. Following the specification, this guide uses an accessible and concise approach to recap the essential knowledge you need to succeed in your course.

**Essential knowledge**
Key points show you what you should know about a topic and key words are highlighted. If you are studying for the Higher Tier exam, the extra content you will need to know is also clearly marked.

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