# Switching AQA GCSE (9-1) Biology to OCR GCSE (9-1) Gateway Biology A

## Introduction

Are you currently teaching the AQA GCSE sciences? Are you thinking of switching? We are here to help.

We will provide you with all the support you could need to switch from the AQA GCSE Biology qualification to our OCR GCSE Biology A, including:

* mapping of AQA’s specification to OCR’s specification
* an overview of the differences in assessment
* mapping of the AQA textbook to OCR’s specification.

## Our offer

* Our GCSE (9-1) Gateway Biology A qualification has been created by our subject specialist team working with a number of stakeholders including: OCR Science Consultative Forum, teachers, assessors, Higher Education Institutions and learned societies. It has been created to be a qualification which engages students so they achieve their full potential.
* Our GCSE team are passionate about both science and education. With industry, teaching and assessment experience, they are fully committed to supporting centres’ delivery of our GCSE qualifications.
* We have produced a wide range of support materials, such as handbooks (including maths skills), delivery guides, practical activities and end of topic quizzes. We have a selection of practice papers which can be used as mock papers in preparation for the exams and we have a free and user-friendly tool - ExamBuilder - that you can use to create customised papers for students.
* Within this document as well as mapping the specifications, we also provide textbook mapping – illustrating how you can use your existing AQA textbooks to teach the OCR specification; making it easier for you to use the resources you already have.
* Join our conversations on the OCR Community and @ocr\_science on Twitter to discuss and share good practice.

## Key differences

|  |  |
| --- | --- |
| **OCR GCSE (9-1) Gateway Biology A** | **AQA GCSE (9-1) Biology** |
| **8 flexible practical** activities - select from our suggested activities or use your own preferred practical activities. | 8 required practical activities you have to deliver. |
| In each assessment students have 1 hour and 45 minutes to complete **90** marks worth of questions | In each assessment students have 1 hour and 45 minutes to complete **100** marks worth of questions. |
| 15 marks of multiple choice questions at the start of each paper. | Some multiple choice questions scattered throughout papers. |
| **One** 6 mark level of response question per paper. | Not a set number, but **more than one** 6 mark level of response question on all sample assessment material. |

## Content mapping

The content within the OCR GCSE (9-1) in Biology A (Gateway) covers the key concepts of biology and will be very familiar. We’ve laid it out in a logical progression to support teaching the GCSE in a linear way.

Below is a table to show where AQA biology content is covered in the OCR Gateway biology specification.

| **AQA Biology (8461)** | **OCR Biology A (Gateway Science)** | **Surplus Content In AQA Biology** |
| --- | --- | --- |
| 4.1.1 cell structure | 1.1 Cell structures  2.1 Supplying the cell  6.3 Monitoring & maintaining health |  |
| 4.1.2 cell division | 5.1 Inheritance  2.1 Supplying the cell  6.3 Monitoring & maintaining health |  |
| 4.1.3 transport in cells | 2.1 Supplying the cell  2.2 The challenges of size |  |
| 4.2.1 principles of organisation |  | Cells-tissues-organs-organisms |
| 4.2.2 animal tissues organs and organ systems | 1.2 What happens in cells (and what do they need)  1.3 Respiration  2.2 The challenges of size  6.3 Monitoring & maintaining health |  |
| 4.2.3 plant tissues organs and systems | 2.2 The challenges of size |  |
| 4.3.1 communicable diseases | 6.3 Monitoring & maintaining health |  |
| 4.3.2 monoclonal antibodies biology only HT only | 6.3 Monitoring & maintaining health |  |
| 4.3.3 plant disease biology only | 6.3 Monitoring & maintaining health |  |
| 4.4.1 photosynthesis | 1.4 Photosynthesis  1.3 Respiration |  |
| 4.4.2 respiration | 1.3 Respiration |  |
| 4.5.1 homeostasis | 3.3 Maintaining internal environments  3.1 Coordination & control – the nervous system |  |
| 4.5.2 the human nervous system | 3.1 Coordination & control – the nervous system  3.3 Maintaining internal environments |  |
| 4.5.3 hormonal coordination in humans | 3.3 Maintaining internal environments  3.2 Coordination & control – the endocrine system |  |
| 4.5.4 plant hormones biology only | 3.2 Coordination & control – the endocrine system |  |
| 4.6.1 reproduction | 5.1 Inheritance  1.2 What happens in cells (and what do they need) |  |
| 4.6.2 variation and evolution | 5.2 Natural selection & evolution  5.1 Inheritance  6.2 Feeding the human race |  |
| 4.6.3 the development of understanding of genetics and evolution | 5.2 Natural selection & evolution  5.1 Inheritance |  |
| 4.6.4 classification of living organisms | 5.2 Natural selection & evolution |  |
| 4.7.1 Adaptations interdependence and competition | 4.1 Ecosystems | 4.7.1.4 4.7.1.4 adaptations structural behavioural or functional adaptations. Adaptations to extreme environments. |
| 4.7.2 organisation of an ecosystem | 4.1 Ecosystems  6.1 Monitoring & maintaining the environment |  |
| 4.7.3 biodiversity and the effect of human interaction on ecosystems | 6.1 Monitoring & maintaining the environment  6.2 Feeding the human race  4.1 Ecosystems |  |
| 4.7.4 trophic levels of an ecosystem biology only | 4.1 Ecosystems |  |
| 4.7.5 food production biology only | 6.2 Feeding the human race  6.1 Monitoring & maintaining the environment |  |

## Assessment

A comparison of the differences in assessment models is below:

|  |  |
| --- | --- |
| **OCR GCSE (9-1) Gateway Biology A** | **AQA GCSE (9-1) Biology** |
| **Paper 1** (Foundation) or Paper 3 (Higher)  Assessed: Topic 1-3 and 7  Time allowed: 1 hour 45 minutes  Foundation and Higher tier available  Marks 90 marks  Weighting 50% of GCSE  Question types:  Section A: 15 x Multiple choice  Section B: structured, closed short answer and 1 x 6 mark level of response | **Paper 1**  Assessed: Topics 1-4  Time allowed: 1 hour 45 minutes  Foundation and Higher tier available  Marks: 100 marks  Weighting: 50% of GCSE  Question types: Multiple choice, structured, closed short answer and open response |
| **Paper 2** (Foundation) or Paper 4 (Higher)  Assessed: Topic 4-6 and 7 (may draw on knowledge from topics 1-3  Foundation and Higher tier available  Marks 90 marks  Weighting 50% of GCSE  Question types:  Section A: 15 x Multiple choice  Section B: structured, closed short answer and 1 x 6 mark level of response | **Paper 2**  Assessed: Topics 5-7 (may draw on knowledge from topics 1-4)  Time allowed: 1 hour 45 minutes  Foundation and Higher tier available  Marks: 100 marks  Weighting: 50% of GCSE  Question types: Multiple choice, structured, closed short answer and open response. |

## Using the AQA textbooks

Below you will find all the information you need to start teaching OCR GCSE (9-1) Gateway Biology A while still using the new AQA textbooks. We have mapped our specification to the AQA OUP, Hodder and Collins textbooks to save you having to buy another set of textbooks. We also have endorsed textbooks for use with our specification and details of these textbooks can be found on the qualification page on the OCR website.

## AQA OUP textbook mapping

 indicates content is for separate science biology only

| **Specification statement** | **Chapter covering specification statement** | **Page number** | **Comments** |
| --- | --- | --- | --- |
| **Topic B1 Cell level systems** | | | |
| **B1.1 Cell structures** | | | |
| B1.1a describe how light microscopes and staining can be used to view cells | B1.1 the world of the microscope | 4 |  |
| B1.1b explain how the main sub-cellular structures of eukaryotic cells (plants and animals) and prokaryotic cells are related to their functions | B1.2 animal and plant cells | 6 & 7 |  |
| B1.1c explain how electron microscopy has increased our understanding of sub-cellular structures | B1.1 the world of the microscope | 4 |  |
| BM1.1i demonstrate an understanding of number, size and scale and the quantitative relationship between units | B1.1 the world of the microscope | 4 |  |
| BM1.1ii use estimations and explain when they should be used | MS1 arithmetic and numerical computation | 324 |  |
| **BM1.1iii calculate with numbers written in standard form** | B1.1 the world of the microscope  MS1 arithmetic and numerical computation | 4, 320 |  |
| **B1.2 What happens in cells (and what do cells need)?** | | | |
| B1.2a describe DNA as a polymer | B13.5 DNA structure & protein synthesis | 204 |  |
| B1.2b describe DNA as being made up of two strands forming a double helix | B13.5 DNA structure & protein synthesis | 204 |  |
| B1.2c describe that DNA is made from four different nucleotides; each nucleotide consisting of a common sugar and phosphate group with one of four different bases attached to the sugar | B13.5 DNA structure & protein synthesis | 204 |  |
| **B1.2d  recall a simple description of protein synthesis** | B13.5 DNA structure & protein synthesis | 204, 205 |  |
| **B1.2e  explain simply how the structure of DNA affects the proteins made in protein synthesis** | B13.5 DNA structure & protein synthesis | 205 |  |
| B1.2f describe experiments that can be used to investigate enzymatic reactions | B3.6 how the digestive system works | 46, 47 | pH on rate of reaction |
| B1.2g explain the mechanism of enzyme action | B3.4 catalysts and enzymes  B3.5 factors affecting enzyme action | 42, 43, 44, 45 |  |
| BM1.2i carry out rate calculations for chemical reactions | B3.5 factors affecting enzyme action | 45 |  |
| BM1.2ii understand and use simple compound measures such as the rate of a reaction | MS4 data and graphs | 334 |  |
| **B1.3 Respiration** | | | |
| B1.3a describe cellular respiration as a universal chemical process, continuously occurring that supplies ATP in all living cells | B9.1 aerobic respiration | 134, 135 | ATP not mentioned specifically |
| B1.3b describe cellular respiration as an exothermic reaction | B9.1 aerobic respiration | 134 |  |
| B1.3c compare the processes of aerobic respiration and anaerobic respiration | B9.1 aerobic respiration  B9.3 anaerobic respiration | 134, 138, 139 |  |
| B1.3d explain the importance of sugars in the synthesis and breakdown of carbohydrates | B3.3 the chemistry of food | 40 | monomer and polymer not used |
| B1.3e explain the importance of amino acids in the synthesis and breakdown of proteins | B3.3 the chemistry of food | 41 | monomer and polymer not used |
| B1.3f explain the importance of fatty acids and glycerol in the synthesis and breakdown of lipids | B3.3 the chemistry of food | 40 |  |
| **B1.4 Photosynthesis** | | | |
| B1.4a describe photosynthetic organisms as the main producers of food and therefore biomass for life on Earth | B8.1 photosynthesis | 124 |  |
| B1.4b describe the process of photosynthesis | B8.1 photosynthesis | 124 |  |
| B1.4c describe photosynthesis as an endothermic reaction | B8.1 photosynthesis | 124 |  |
| B1.4d describe experiments to investigate photosynthesis | B8.1 photosynthesis B8.3 how plants use glucose | 124, 128, 129 | producing oxygen testing a leaf for starch |
| B1.4e explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis | B8.2 the rate of photosynthesis | 126, 127 |  |
| **B1.4f explain the interaction of these factors in limiting the rate of photosynthesis** | B8.4 making the most of photosynthesis | 130, 131 |  |
| BM1.4i understand and use simple compound measures such as the rate of a reaction | MS4 data and graphs | 334 |  |
| BM1.4ii translate information between graphical and numerical form | MS4 data and graphs | 333, 334 |  |
| BM1.4iii plot and draw appropriate graphs, selecting appropriate scales and axes | MS4 data and graphs | 333, 334 |  |
| BM1.4iv extract and interpret information from graphs, charts and tables | MS4 data and graphs | 333, 334 |  |
| **BM1.4v understand and use inverse proportion – the inverse square law and light intensity in the context of factors affecting photosynthesis** | B8.2 the rate of photosynthesis | 127 |  |
| **Topic B2 Scaling up** | | | |
| **B2.1 Supplying the cell** | | | |
| B2.1a explain how substances are transported into and out of cells through diffusion, osmosis and active transport | B1. diffusion B1.7 osmosis B1.9 active transport | 14, 15, 16, 17, 20, 21 |  |
| B2.1b describe the process of mitosis in growth, including the cell cycle | B2.1 cell division | 26, 27 |  |
| B2.1c explain the importance of cell differentiation | B2.2 cell differentiation | 28, 29 |  |
| B2.1d recall that stem cells are present in embryonic and adult animals and meristems in plants | B2.2 cell differentiation | 28, 29 |  |
| B2.1e describe the functions of stem cells | B2.3 stem cells | 30, 31 |  |
| B2.1f describe the difference between embryonic and adult stem cells in animals | B2.3 stem cells | 30, 31 |  |
| BM2.1i use percentiles and calculate percentage gain and loss of mass |  |  | not found |
| **B2.2 The challenges of size** | | | |
| B2.2a explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area : volume ratio | B1.10 exchanging material | 22, 23 |  |
| B2.2b describe some of the substances transported into and out of a range of organisms in terms of the requirements of those organisms | B1.10 exchanging material | 22, 23 |  |
| B2.2c describe the human circulatory system | B4.1 the blood | 52, 53 |  |
| B2.2d explain how the structure of the heart and the blood vessels are adapted to their functions | B4.2 blood vessels B4.3 the heart | 54, 55, 56, 57 |  |
| B2.2e explain how red blood cells and plasma are adapted to their transport functions in the blood | B4.1 the blood | 52, 53 |  |
| B2.2f explain how water and mineral ions are taken up by plants, relating the structure of the root hair cells to their function | B.9 active transport | 20, 21 |  |
| B2.2g describe the processes of transpiration and translocation | B4.7 transport systems in plants  B4.8 evaporation and transpiration | 64, 65, 66, 67 |  |
| B2.2h explain how the structure of the xylem and phloem are adapted to their functions in the plant | B4.6 tissues and organs in plants  B4.7 transport systems in plants | 62, 63, 64, 65 |  |
| B2.2i explain the effect of a variety of environmental factors on the rate of water uptake by a plant | B4.9 factors affecting transpiration | 68, 69 |  |
| B2.2j describe how a simple potometer can be used to investigate factors that affect the rate of water uptake | B4.9 factors affecting transpiration | 69 |  |
| BM2.2i calculate surface area : volume ratios | MS5 geometry and trigonometry | 335 |  |
| BM2.2ii use simple compound measures such as rate | MS4 data and graphs | 333, 334 |  |
| BM2.2iii carry out rate calculations | MS4 data and graphs | 333, 334 |  |
| BM2.2iv plot, draw and interpret appropriate graphs | B3.5 factors affecting enzyme action | 45 |  |
| **Topic B3 Organism level systems** | | | |
| **B3.1 Coordination and control - the nervous system** | | | |
| B3.1a describe the structure of the nervous system | B10.2 the structure and function of the human nervous system | 148, 149 |  |
| B3.1b explain how the components of the nervous system can produce a coordinated response | B10.2 the structure and function of the human nervous system | 148, 149 |  |
| B3.1c explain how the structure of a reflex arc is related to its function | B10.3 reflex actions |  |  |
| B3.1d  explain how the main structures of the eye are related to their functions | 10.5 the eye | 154, 155 |  |
| B3.1e  describe common defects of the eye and explain how some of these problems may be overcome | B10.6 common problems of the eye | 156, 157 |  |
| B3.1f  describe the structure and function of the brain | B10.4 the brain | 152, 153 |  |
| **B3.1g  explain some of the difficulties of investigating brain function** | B10.4 the brain | 152, 153 | (not specifically higher tier) |
| **B3.1h  explain some of the limitations in treating damage and disease in the brain and other parts of the nervous system** | B10.4 the brain | 152, 153 | (not specifically higher tier) |
| BM3.1i extract and interpret data from graphs, charts and tables | MS4 data and graphs | 333, 334 |  |
| **B3.2 Coordination and control - the endocrine system** | | | |
| B3.2a describe the principles of hormonal coordination and control by the human endocrine system | B11.1 principles of hormonal control | 160, 161 |  |
| **B3.2b explain the roles of thyroxine and adrenaline in the body** | B11.4 the role of negative feedback | 166, 167 |  |
| B3.2c describe the role of hormones in human reproduction including the control of the menstrual cycle | B11.1 principles of hormonal control B11.5 human reproduction | 160, 168, 169 | (mention of FSH, oestrogen) |
| **B3.2d explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle** | B11.6 hormones and the menstrual cycle | 170, 171 |  |
| B3.2e explain the use of hormones in contraception and evaluate hormonal and non-hormonal methods of contraception | B11.7 the artificial control of fertility | 172, 173 |  |
| **B3.2f explain the use of hormones in modern reproductive technologies to treat infertility** | B11.8 infertility treatments | 174, 175 |  |
| B3.2g  explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropisms and gravitropisms | B11.9 plant hormones and responses | 176, 177 |  |
| B3.2h  describe some of the variety of effects of plant hormones, relating to auxins, **gibberellins and ethene** | B11.10 using plant hormones | 178, 179 |  |
| **B3.2i  describe some of the different ways in which people use plant hormones to control plant growth** | B11.10 using plant hormones | 178, 179 |  |
| BM3.2i extract and interpret data from graphs, charts and tables | MS4 data and graphs | 333, 334 |  |
| BM3.2ii translate information between numerical and graphical forms | MS4 data and graphs | 333, 334 |  |
| **B3.3 Maintaining internal environment** | | | |
| B3.3a explain the importance of maintaining a constant internal environment in response to internal and external change | B12.1 controlling body temperature | 182, 183 |  |
| B3.3b  describe the function of the skin in the control of body temperature | B12.1 controlling body temperature | 182, 183 |  |
| B3.3c explain how insulin controls blood sugar levels in the body | B11.2 the control of blood glucose levels | 162, 163 |  |
| **B3.3d explain how glucagon interacts with insulin to control blood sugar levels in the body** | B11.2 The control of blood glucose levels | 162 |  |
| B3.3e compare type 1 and type 2 diabetes and explain how they can be treated | B11.3 treating diabetes | 164, 165 |  |
| B3.3f  explain the effect on cells of osmotic changes in body fluids | B12.2 removing waste products | 184, 185 |  |
| B3.3g  describe the function of the kidneys in maintaining the water balance of the body | B12.3 the human kidney | 186 |  |
| B3.3h describe the gross structure of the kidney and the structure of the kidney tubule | B12.3 the human kidney | 186, 187 |  |
| **B3.3i  describe the effect of ADH on the permeability of the kidney tubules** | B12.3 the human kidney | 187 | no detailed structure |
| **B3.3j  explain the response of the body to different temperature and osmotic challenges** | B12.1 controlling body temperature B12.3 the human kidney | 182, 183, 186, 187 | only vaguely |
| BM3.3i extract and interpret data from graphs, charts and tables | MS4 data and graphs | 333, 334 |  |
| **Topic B4 Community level systems** | | | |
| **B4.1 Ecosystems** | | | |
| B4.1a recall that many different materials cycle through the abiotic and biotic components of an ecosystem | B16.1 the importance of communities | 258 |  |
| B4.1b explain the role of microorganisms in the cycling of materials through an ecosystem | B17.2 materials cycling | 278, 279 |  |
| B4.1c explain the importance of the carbon cycle and the water cycle to living organisms | B17.2 materials cycling B17.3 the carbon cycle | 279, 280, 281 | water cycle carbon cycle |
| B4.1d  explain the effect of factors such as temperature, water content, and oxygen availability on rate of decomposition | B17.4 rates of decomposition | 282, 283 |  |
| B4.1e describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem | B16.1 the importance of communities | 258, 259 |  |
| B4.1f explain how abiotic and biotic factors can affect communities | B16.2 organisms and their environment | 260, 261 |  |
| B4.1g describe the importance of interdependence and competition in a community | B16.1 the importance of communities B16.4 competition in animals  B16.5 competition in plants | 259, 264, 265, 266, 267 | interdependence |
| B4.1h  describe the differences between the trophic levels of organisms within an ecosystem | B18.8 trophic levels and biomass | 300 |  |
| B4.1i describe pyramids of biomass and explain, with examples, how biomass is lost between the different trophic levels | B18.8 trophic levels and biomass B18.9 biomass transfers | 300, 301, 302, 303 |  |
| B4.1j  calculate the efficiency of biomass transfers between trophic levels and explain how this affects the number of trophic levels in a food chain | B18.9 biomass transfers | 302, 303 |  |
| BM4.1i  calculate rate changes in the decay of biological material | B17.4 rates of decomposition | 283 |  |
| BM4.1ii calculate the percentage of mass | MS1 arithmetic and numerical computations | 322, 323 |  |
| BM4.1iii Use fractions and percentages | MS1 arithmetic and numerical computations | 322, 323 |  |
| BM4.1iv plot and draw appropriate graphs selecting appropriate scales for the axes | MS4 data and graphs | 333, 334 |  |
| BM4.1v extract and interpret information from charts, graphs and tables | MS4 data and graphs B18.8 trophic levels and biomass | 333, 334, 301 |  |
| **Topic B5 Genes, inheritance and selection** | | | |
| **B5.1 Inheritance** | | | |
| B5.1a explain the following terms: gamete, chromosome, gene, allele/variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype | B13.7 inheritance in action  B13.2 cell division in sexual reproduction | 208, 209, 198, 199 |  |
| B5.1b describe the genome as the entire genetic material of an organism | B13.4 DNA and the genome | 202, 203 |  |
| B5.1c describe that the genome, and its interaction with the environment, influence the development of the phenotype of an organism | B13.4 DNA and the genome B14.1 variation | 202, 203, 218, 219 | continuous and discontinuous variation not mentioned |
| B5.1d Recall that all variants arise from mutations, and that most have no effect on the phenotype, some influence phenotype and a very few determine phenotype | B13.6 gene expression and mutation | 206, 207 | (in higher tier) |
| **B5.1e  describe how genetic variants may influence phenotype: • in coding DNA by altering the activity of a protein • in non-coding DNA by altering how genes are expressed** | B13.6 gene expression and mutation | 206, 207 |  |
| B5.1f  explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms | B13.1 types of reproduction | 196, 197 |  |
| B5.1g explain the terms haploid and diploid | B13.2 cell division in sexual reproduction | 198 |  |
| B5.1h explain the role of meiotic cell division in halving the chromosome number to form gametes | B13.2 cell division in sexual reproduction | 198 |  |
| B5.1i explain single gene inheritance | B13.7 inheritance in action | 208, 209 |  |
| B5.1j predict the results of single gene crosses | B13.8 more about genetics | 210, 211 |  |
| B5.1k describe sex determination in humans using a genetic cross | B13.8 more about genetics | 211 |  |
| B5.1l recall that most phenotypic features are the result of multiple genes rather than single gene inheritance | B13.7 inheritance in action | 209 |  |
| B5.1m  describe the development of our understanding of genetics | B15.1 the history of genetics | 234, 235 |  |
| BM5.1i understand and use direct proportions and simple ratios in genetic crosses | B13.8 more about genetics | 210 |  |
| BM5.1ii understand and use the concept of probability in predicting the outcome of genetic crosses | MS2 handling data | 328 |  |
| BM5.1iii extract and interpret information from charts, graphs and tables | MS4 data and graphs | 333, 334 |  |
| **B5.2 Natural selection and evolution** | | | |
| B5.2a state that there is usually extensive genetic variation within a population of a species | B14.1 variation | 218, 219 |  |
| B5.2b describe the impact of developments in biology on classification systems | B15.9 classification B15.10 new systems of classification | 250, 251, 252, 253 |  |
| B5.2c explain how evolution occurs through the natural selection of variants that have given rise to phenotypes best suited to their environment | B14.2 evolution by natural selection | 220, 221 |  |
| B5.2d describe evolution as a change in the inherited characteristics of a population over time, through a process of natural selection, which may result in the formation of new species | B14.2 evolution by natural selection | 220, 221 |  |
| B5.2e describe the evidence for evolution | B15.5 evidence for evolution  B15.6 fossils and extinction B15.8 antibiotic resistant bacteria | 242, 243, 244, 245, 248, 249 |  |
| B5.2f  describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and explain the impact of these ideas on modern biology | B15.2 theories of evolution B15.3 accepting Darwin’s ideas B15.4 evolution and speciation | 236, 237, 238, 239, 240, 241 |  |
| **Topic B6 Global challenges** | | | |
| **B6.1 Monitoring and maintaining the environment** | | | |
| B6.1a explain how to carry out a field investigation into the distribution and abundance of organisms in a habitat and how to determine their numbers in a given area | B16.3 distribution and abundance | 262, 263 |  |
| B6.1b describe both positive and negative human interactions within ecosystems and explain their impact on biodiversity | B18.1 the human population explosion B18.2 land and water pollution | 286, 287, 288, 289 |  |
| B6.1c explain some of the benefits and challenges of maintaining local and global biodiversity | B18.7 maintaining biodiversity | 298, 299 |  |
| **B6.1d  evaluate the evidence for the impact of environmental changes on the distribution of organisms, with reference to water and atmospheric gases** | B18.6 the impact of change | 296, 297 |  |
| BM6.1i construct and interpret frequency tables and diagrams, bar charts and histograms | MS2 handling data | 327 |  |
| BM6.1ii understand the principles of sampling as applied to scientific data | MS2 handling data | 328 |  |
| **B6.2 Feeding the human race** | | | |
| B6.2a  describe some of the biological factors affecting levels of food security | B18.10 factors affecting food security | 304, 305 |  |
| B6.2b  describe and explain some possible agricultural solutions to the demands of the growing human population | B18.10 factors affecting food security | 304, 305 | no mention of hydroponics |
| B6.2c explain the impact of the selective breeding of food plants and domesticated animals | B14.3 selective breeding | 222, 223 |  |
| B6.2d describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics | B18.12 sustainable food production | 308, 309 |  |
| **B6.2e describe the main steps in the process of genetic engineering** | B14.4 genetic engineering | 224 |  |
| B6.2f  explain some of the possible benefits and risks of using gene technology in modern agriculture | B14.4 genetic engineering B14.6 adult cell cloning | 224, 229 |  |
| B6.2g describe and explain some possible biotechnological solutions to the demands of the growing human population | B14.4 genetic engineering B14.7 ethics of genetic technology | 225, 230, 231 |  |
| BM6.2i use percentiles and calculate percentage gain and loss of mass |  |  | not found |
| BM6.2ii calculate arithmetic means | B16.3 distribution and abundance | 262, 263 |  |
| BM6.2iii use fractions and percentages | MS1 arithmetic and numerical computations | 322, 323 |  |
| BM6.2iv extract and interpret information from charts, graphs and tables | MS4 data and graphs | 333, 334 |  |
| **B6.3 Monitoring and maintaining health** | | | |
| B6.3a describe the relationship between health and disease | B5.1 health and disease | 74, 75 |  |
| B6.3b describe different types of diseases | B5.1 health and disease | 74, 75 |  |
| B6.3c describe the interactions between different types of disease | B5.1 health and disease | 74, 75 |  |
| B6.3d explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants | B5.2 pathogens and disease | 76, 77 |  |
| B6.3e explain how the spread of communicable diseases may be reduced or prevented in animals and plants | B5.5 preventing infections | 82, 83 |  |
| B6.3f describe a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS | B5.6 viral diseases B5.7 bacterial diseases B5.8 diseases caused by fungi and protists | 84, 85, 86, 87, 88, 89 |  |
| B6.3g  describe physical plant defence responses to disease | B5.11 plant defence responses | 94, 95 |  |
| B6.3h  describe chemical plant defence responses | B5.11 plant defence responses | 94, 95 |  |
| **B6.3i describe different ways plant diseases can be detected and identified, in the lab and in the field** | B5.10 more about plant diseases | 93 |  |
| B6.3j explain how white blood cells and platelets are adapted to their defence functions in the blood | B4.1 the blood | 52, 53 |  |
| B6.3k describe the non-specific defence systems of the human body against pathogens | B5.9 human defence responses | 90, 91 |  |
| B6.3l explain the role of the immune system of the human body in defence against disease | B5.9 human defence responses  B6.1 vaccination | 90, 91, 98, 99 |  |
| **B6.3m  describe how monoclonal antibodies are produced** | B6.5 making monoclonal antibodies | 106, 107 |  |
| **B6.3n  describe some of the ways in which monoclonal antibodies can be used** | B6.6 uses of monoclonal antibodies | 108, 109 |  |
| B6.3o explain the use of vaccines and medicines in the prevention and treatment of disease | B6.1 vaccination B6.2 antibiotics and painkillers | 98, 99, 100, 101 |  |
| B6.3p  explain the aseptic techniques used in culturing organisms | B5.3 growing bacteria in the lab | 78, 79 |  |
| B6.3q describe the processes of discovery and development of potential new medicines | B6.3 discovering drugs B6.4 developing drugs | 102, 103, 104, 105 |  |
| B6.3r recall that many non-communicable human diseases are caused by the interaction of a number of factors | B7.1 non communicable diseases | 112, 113 |  |
| B6.3s evaluate some different treatments for cardiovascular disease | B4.4 helping the heart B7.3 smoking and the risk of disease | 58, 59, 117 |  |
| B6.3t analyse the effect of lifestyle factors on the incidence of non-communicable diseases at local, national and global levels | B7.3 smoking and the risk of disease  B7.4 diet exercise and disease | 116, 117, 118, 119 |  |
| B6.3u describe cancer as the result of changes in cells that lead to uncontrolled growth and division | B7.2 cancer | 114, 115 |  |
| B6.3v discuss potential benefits and risks associated with the use of stem cells in medicine | B2.3 stem cells B14.6 adult cell cloning | 30, 31, 229 |  |
| B6.3w explain some of the possible benefits and risks of using gene technology in medicine | B14.7 ethics of genetic technologies | 230, 231 |  |
| B6.3x discuss the potential importance for medicine of our increasing understanding of the human genome | B14.7 ethics of genetic technologies | 230, 231 |  |
| BM6.3i translate information between graphical and numerical forms | MS4 data and graphs | 333, 334 |  |
| BM6.3ii construct and interpret frequency tables and diagrams, bar charts and histograms | MS4 data and graphs | 333, 334 |  |
| BM6.3iii understand the principles of sampling as applied to scientific data | MS2 handling data | 328, 330 |  |
| BM6.3iv use a scatter diagram to identify a correlation between two variables | MS2 handling data | 330 |  |
| BM6.3v  calculate cross-sectional areas of bacterial cultures and clear agar jelly using πr2 | B5.4 preventing bacterial growth | 81 |  |

## AQA Collins textbook mapping

| **Specification Statement** | **Chapter covering specification statement** | **Page Number** | **Comments** |
| --- | --- | --- | --- |
| **Topic B1 Cell level systems** | | | |
| **B1.1 Cell structures** | | | |
| B1.1a describe how light microscopes and staining can be used to view cells | 1.2 the light microscope | 16, 17 | staining not mentioned |
| B1.1b explain how the main sub-cellular structures of eukaryotic cells (plants and animals) and prokaryotic cells are related to their functions | 1.3 looking at cells in more detail  1.5 primitive cells | 18, 19, 22, 23 |  |
| B1.1c explain how electron microscopy has increased our understanding of sub-cellular structures | 1.3 looking at cells in more detail | 18, 19 |  |
| BM1.1i demonstrate an understanding of number, size and scale and the quantitative relationship between units | 1.1 looking at cells | 14, 15 |  |
| BM1.1ii use estimations and explain when they should be used | 1.17 maths skills size and number | 46 |  |
| **BM1.1iii calculate with numbers written in standard form** | 1.17 maths skills size and number | 47 |  |
| **B1.2 What happens in cells (and what do cells need)?** | | | |
| B1.2a describe DNA as a polymer | 6.1 DNA and genes | 238 |  |
| B1.2b describe DNA as being made up of two strands forming a double helix | 6.4 structure of DNA | 244, 245 |  |
| B1.2c describe that DNA is made from four different nucleotides; each nucleotide consisting of a common sugar and phosphate group with one of four different bases attached to the sugar | 6.4 structure of DNA | 244, 245 |  |
| **B1.2d  recall a simple description of protein synthesis** | 6.5 proteins | 246, 247 |  |
| **B1.2e  explain simply how the structure of DNA affects the proteins made in protein synthesis** | 6.5 proteins | 246, 247 |  |
| B1.2f describe experiments that can be used to investigate enzymatic reactions | 3.6 required practical | 98 |  |
| B1.2g explain the mechanism of enzyme action | 3.5 explaining enzymes | 96, 97 |  |
| BM1.2i carry out rate calculations for chemical reactions | 3.6 required practical | 98 | no worked example or explanation |
| BM1.2ii understand and use simple compound measures such as the rate of a reaction | 3.6 required practical | 98 | no worked example or explanation |
| **B1.3 Respiration** | | | |
| B1.3a describe cellular respiration as a universal chemical process, continuously occurring that supplies ATP in all living cells | 1.12 cells at work | 36, 37 |  |
| B1.3b describe cellular respiration as an exothermic reaction | 1.12 cells at work | 37 |  |
| B1.3c compare the processes of aerobic respiration and anaerobic respiration | 1.12 cells at work 1.13 living without oxygen | 36, 37, 38, 39 |  |
| B1.3d explain the importance of sugars in the synthesis and breakdown of carbohydrates | 3.8 explaining digestion | 103 |  |
| B1.3e explain the importance of amino acids in the synthesis and breakdown of proteins | 3.8 explaining digestion | 103 |  |
| B1.3f explain the importance of fatty acids and glycerol in the synthesis and breakdown of lipids | 3.8 explaining digestion | 103 |  |
| **B1.4 Photosynthesis** | | | |
| B1.4a describe photosynthetic organisms as the main producers of food and therefore biomass for life on Earth | 2.1 explaining photosynthesis | 56 |  |
| B1.4b describe the process of photosynthesis | 2.1 explaining photosynthesis | 56 |  |
| B1.4c describe photosynthesis as an endothermic reaction | 2.1 explaining photosynthesis | 56 |  |
| B1.4d describe experiments to investigate photosynthesis | 2.1 explaining photosynthesis | 56, 57 |  |
| B1.4e explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis | 2.5 increasing photosynthesis 2.4 required practical | 64, 65, 62, 63 |  |
| **B1.4f explain the interaction of these factors in limiting the rate of photosynthesis** | 2.5 increasing photosynthesis | 64, 65 | not specified as higher |
| BM1.4i understand and use simple compound measures such as the rate of a reaction | 2.5 increasing photosynthesis | 64 |  |
| BM1.4ii translate information between graphical and numerical form | 3.18 maths skills extracting and interpreting information | 122, 123 |  |
| BM1.4iii plot and draw appropriate graphs, selecting appropriate scales and axes | 7.21 maths skills - using charts and graphs to display data | 314, 315 |  |
| BM1.4iv extract and interpret information from graphs, charts and tables | 3.18 maths skills extracting and interpreting information | 122, 123 |  |
| **BM1.4v understand and use inverse proportion – the inverse square law and light intensity in the context of factors affecting photosynthesis** |  |  | not found |
| **Topic B2 Scaling up** | | | |
| **B2.1 Supplying the cell** | | | |
| B2.1a explain how substances are transported into and out of cells through diffusion, osmosis and active transport | 3.1 explaining water movement 3.3 learning about active transport | 88, 89, 92, 93 | also 3.2 required practical p90 91 |
| B2.1b describe the process of mitosis in growth, including the cell cycle | 1.6 cell division | 24, 25 |  |
| B2.1c explain the importance of cell differentiation | 1.7 cell differentiation | 26, 27 |  |
| B2.1d recall that stem cells are present in embryonic and adult animals and meristems in plants | 1.9 stem cells | 30, 31 |  |
| B2.1e describe the functions of stem cells | 1.9 stem cells | 30, 31 |  |
| B2.1f describe the difference between embryonic and adult stem cells in animals | 1.9 stem cells | 30, 31 |  |
| BM2.1i use percentiles and calculate percentage gain and loss of mass |  |  | not found |
| **B2.2 The challenges of size** | | | |
| B2.2a explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area : volume ratio | 3.4 key concept 2.12 maths skills | 94, 95, 78, 79 |  |
| B2.2b describe some of the substances transported into and out of a range of organisms in terms of the requirements of those organisms | 3.10 looking more at exchange surfaces | 106, 107 |  |
| B2.2c describe the human circulatory system | 3.13 learning about the circulatory system | 112, 113 |  |
| B2.2d explain how the structure of the heart and the blood vessels are adapted to their functions | 3.14 exploring the heart | 114, 115 |  |
| B2.2e explain how red blood cells and plasma are adapted to their transport functions in the blood | 3.15 studying blood | 116, 117 |  |
| B2.2f explain how water and mineral ions are taken up by plants, relating the structure of the root hair cells to their function | 3.11 learning about plants and minerals | 108, 109 |  |
| B2.2g describe the processes of transpiration and translocation | 2.8 looking at stomata 2.9 moving water | 70, 71, 72, 73 |  |
| B2.2h explain how the structure of the xylem and phloem are adapted to their functions in the plant | 2.9 moving water | 72, 73 |  |
| B2.2i explain the effect of a variety of environmental factors on the rate of water uptake by a plant | 2.10 investigating transpiration | 74, 75 |  |
| B2.2j describe how a simple potometer can be used to investigate factors that affect the rate of water uptake | 2.10 investigating transpiration | 75 |  |
| BM2.2i calculate surface area : volume ratios | 2.12 maths skills | 78, 79 |  |
| BM2.2ii use simple compound measures such as rate | 8.24 maths skills using graphs to show relationships | 370, 371 |  |
| BM2.2iii carry out rate calculations | 8.24 maths skills using graphs to show relationships | 370, 371 |  |
| BM2.2iv plot, draw and interpret appropriate graphs | 2.10 investigating transpiration | 75 | questions |
| **Topic B3 Organism level systems** | | | |
| **B3.1 Coordination and control - the nervous system** | | | |
| B3.1a describe the structure of the nervous system | 5.2 the nervous system | 174, 175 |  |
| B3.1b explain how the components of the nervous system can produce a coordinated response | 5.2 the nervous system | 174, 175 |  |
| B3.1c explain how the structure of a reflex arc is related to its function | 5.3 reflex actions | 176, 177 |  |
| B3.1d  explain how the main structures of the eye are related to their functions | 5.6 the eye | 182, 183 |  |
| B3.1e  describe common defects of the eye and explain how some of these problems may be overcome | 5.8 eye defects | 186, 187 |  |
| B3.1f  describe the structure and function of the brain | 5.4 the brain | 178, 179 |  |
| **B3.1g  explain some of the difficulties of investigating brain function** | 5.4 the brain | 178, 179 |  |
| **B3.1h  explain some of the limitations in treating damage and disease in the brain and other parts of the nervous system** | 5.4 the brain | 178, 179 |  |
| BM3.1i extract and interpret data from graphs, charts and tables | 3.18 maths skills extracting and interpreting information | 122, 123 |  |
| **B3.2 Coordination and control - the endocrine system** | | | |
| B3.2a describe the principles of hormonal coordination and control by the human endocrine system | 5.10 the endocrine system | 190, 191 |  |
| **B3.2b explain the roles of thyroxine and adrenaline in the body** | 5.16 negative feedback | 202, 203 |  |
| B3.2c describe the role of hormones in human reproduction including the control of the menstrual cycle | 5.19 human reproduction | 208 |  |
| **B3.2d explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle** | 5.19 human reproduction | 209 |  |
| B3.2e explain the use of hormones in contraception and evaluate hormonal and non-hormonal methods of contraception | 5.23 contraception 5.24 which contraceptive? | 216, 217, 218, 219 |  |
| **B3.2f explain the use of hormones in modern reproductive technologies to treat infertility** | 5.20 IVF | 211 |  |
| B3.2g  explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropisms and gravitropisms | 5.25 Auxins | 220, 221 |  |
| B3.2h  describe some of the variety of effects of plant hormones, relating to auxins, **gibberellins and ethene** | 5.25 auxins 5.26 applications of auxins  5.28 other plant hormones | 220, 221, 222, 223, 226, 227 |  |
| **B3.2i  describe some of the different ways in which people use plant hormones to control plant growth** | 5.26 applications of auxins  5.28 other plant hormones | 222, 223, 226, 227 |  |
| BM3.2i extract and interpret data from graphs, charts and tables | 3.18 maths skills extracting and interpreting information | 122, 123 |  |
| BM3.2ii translate information between numerical and graphical forms | 5.27 required practical | 224, 225 |  |
| **B3.3 Maintaining internal environment** | | | |
| B3.3a explain the importance of maintaining a constant internal environment in response to internal and external change | 5.1 homeostasis | 172, 173 |  |
| B3.3b  describe the function of the skin in the control of body temperature | 5.9 controlling body temperature | 188, 189 |  |
| B3.3c explain how insulin controls blood sugar levels in the body | 5.11 controlling blood glucose | 192, 193 |  |
| **B3.3d explain how glucagon interacts with insulin to control blood sugar levels in the body** | 5.11 controlling blood glucose | 193 |  |
| B3.3e compare type 1 and type 2 diabetes and explain how they can be treated | 5.12 diabetes 5.13 diabetes recommendations | 194, 195, 196, 197 |  |
| B3.3f  explain the effect on cells of osmotic changes in body fluids | 5.14 water balance | 198, 199 |  |
| B3.3g  describe the function of the kidneys in maintaining the water balance of the body | 5.15 the kidneys | 200, 201 |  |
| B3.3h describe the gross structure of the kidney and the structure of the kidney tubule | 5.15 the kidneys | 200 | no detailed structure |
| **B3.3i  describe the effect of ADH on the permeability of the kidney tubules** | 5.15 the kidneys | 201 |  |
| **B3.3j  explain the response of the body to different temperature and osmotic challenges** | 5.14 water balance | 198, 199 |  |
| BM3.3i extract and interpret data from graphs, charts and tables | 3.18 maths skills extracting and interpreting information | 122, 123 |  |
| **Topic B4 Community level systems** | | | |
| **B4.1 Ecosystems** | | | |
| B4.1a recall that many different materials cycle through the abiotic and biotic components of an ecosystem | 8.2 changing abiotic factors 8.10 cycling materials | 326, 327, 342, 343 |  |
| B4.1b explain the role of microorganisms in the cycling of materials through an ecosystem | 8.10 cycling materials | 343 |  |
| B4.1c explain the importance of the carbon cycle and the water cycle to living organisms | 8.10 cycling materials 8.11 carbon cycling | 342, 343, 344, 345 |  |
| B4.1d  explain the effect of factors such as temperature, water content, and oxygen availability on rate of decomposition | 8.12 investigating decay | 346, 347 | terms aerobic and anaerobic not used |
| B4.1e describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem | 8.1 key concept learning about ecosystems | 324, 325 |  |
| B4.1f explain how abiotic and biotic factors can affect communities | 8.2 changing abiotic factors | 326, 327 |  |
| B4.1g describe the importance of interdependence and competition in a community | 8.3 investigating predator-prey relationships | 328, 329 | mutualism not mentioned |
| B4.1h  describe the differences between the trophic levels of organisms within an ecosystem | 8.4 looking at trophic levels | 330, 331 |  |
| B4.1i describe pyramids of biomass and explain, with examples, how biomass is lost between the different trophic levels | 8.4 looking at trophic levels  8.5 transferring biomass | 330, 331, 332, 333 |  |
| B4.1j  calculate the efficiency of biomass transfers between trophic levels and explain how this affects the number of trophic levels in a food chain | 8.5 transferring biomass | 333 |  |
| BM4.1i  calculate rate changes in the decay of biological material | 8.24 maths skills using graphs to show relationships | 370, 371 | but not in relation to decay |
| BM4.1ii calculate the percentage of mass | 6.14 maths skills - fractions ratio proportion and probability | 264, 265 |  |
| BM4.1iii Use fractions and percentages | 6.14 maths skills - fractions ratio proportion and probability | 264, 265 |  |
| BM4.1iv plot and draw appropriate graphs selecting appropriate scales for the axes | 8.24 maths skills using graphs to show relationships | 370, 371 |  |
| BM4.1v extract and interpret information from charts, graphs and tables | 3.18 maths skills extracting and interpreting information | 122, 123 |  |
| **Topic B5 Genes, inheritance and selection** | | | |
| **B5.1 Inheritance** | | | |
| B5.1a explain the following terms: gamete, chromosome, gene, allele/variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype | 6.1 DNA and genes 6.7 Meiosis 6.9 genetics | 238, 239, 250, 251, 254, 255 |  |
| B5.1b describe the genome as the entire genetic material of an organism | 6.1 DNA and genes | 238, 239 |  |
| B5.1c describe that the genome, and its interaction with the environment, influence the development of the phenotype of an organism | 6.1 DNA and genes 6.9 genetics | 238, 239, 254, 255 |  |
| B5.1d Recall that all variants arise from mutations, and that most have no effect on the phenotype, some influence phenotype and a very few determine phenotype | 6.6 mutations | 248, 249 |  |
| **B5.1e  describe how genetic variants may influence phenotype: • in coding DNA by altering the activity of a protein • in non-coding DNA by altering how genes are expressed** | 6.6 mutations | 248, 249 |  |
| B5.1f  explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms | 6.8 asexual and sexual reproduction | 252, 253 |  |
| B5.1g explain the terms haploid and diploid | 6.7 meiosis | 250, 251 | terms haploid and diploid not found |
| B5.1h explain the role of meiotic cell division in halving the chromosome number to form gametes | 6.7 meiosis | 250, 251 |  |
| B5.1i explain single gene inheritance | 6.10 genetic crosses | 256, 257 |  |
| B5.1j predict the results of single gene crosses | 6.10 genetic crosses | 256, 257 |  |
| B5.1k describe sex determination in humans using a genetic cross | 6.7 meiosis | 251 |  |
| B5.1l recall that most phenotypic features are the result of multiple genes rather than single gene inheritance | 6.13 key concept genetics is simple - or is it? | 262, 263 |  |
| B5.1m  describe the development of our understanding of genetics | 6.12 Gregor Mendel | 260, 261 |  |
| BM5.1i understand and use direct proportions and simple ratios in genetic crosses | 6.14 maths skills - fractions ratio proportion and probability | 264, 265 |  |
| BM5.1ii understand and use the concept of probability in predicting the outcome of genetic crosses | 6.14 maths skills - fractions ratio proportion and probability | 264, 265 |  |
| BM5.1iii extract and interpret information from charts, graphs and tables | 6.14 maths skills - fractions ratio proportion and probability | 264, 265 |  |
| **B5.2 Natural selection and evolution** | | | |
| B5.2a state that there is usually extensive genetic variation within a population of a species | 7.1 variation | 274, 275 |  |
| B5.2b describe the impact of developments in biology on classification systems | 7.19 the tree of life | 310, 311 |  |
| B5.2c explain how evolution occurs through the natural selection of variants that have given rise to phenotypes best suited to their environment | 7.1 variation 7.2 the theory of evolution | 274, 275, 276, 277 |  |
| B5.2d describe evolution as a change in the inherited characteristics of a population over time, through a process of natural selection, which may result in the formation of new species | 7.2 the theory of evolution 7.7 a new species | 276, 277, 286, 287 |  |
| B5.2e describe the evidence for evolution | 7.4 fossil evidence 7.5 how much have organisms changed 7.10 antimicrobial resistance | 280, 281, 282, 283, 292, 293 |  |
| B5.2f  describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and explain the impact of these ideas on modern biology | 7.6 Darwin and Wallace | 284, 285 |  |
| **Topic B6 Global challenges** | | | |
| **B6.1 Monitoring and maintaining the environment** | | | |
| B6.1a explain how to carry out a field investigation into the distribution and abundance of organisms in a habitat and how to determine their numbers in a given area | 8.7 required practical - measure the population size of a common species in a habitat | 336, 337 | Transect, capture-recapture not mentioned |
| B6.1b describe both positive and negative human interactions within ecosystems and explain their impact on biodiversity | 8.15 learning about land use 8.16 changing the landscape 8.19 investigating pollution 8.20 maintaining biodiversity | 352, 353, 354, 355, 360, 361, 362, 363 |  |
| B6.1c explain some of the benefits and challenges of maintaining local and global biodiversity | 8.20 maintaining biodiversity | 362, 363 |  |
| **B6.1d  evaluate the evidence for the impact of environmental changes on the distribution of organisms, with reference to water and atmospheric gases** | 8.14 changing the environment | 350, 351 | not higher tier |
| BM6.1i construct and interpret frequency tables and diagrams, bar charts and histograms | 7.21 maths skills - using charts and graphs to display data | 314, 315 |  |
| BM6.1ii understand the principles of sampling as applied to scientific data | 4.18 maths skills - sampling & scientific data | 164, 165 |  |
| **B6.2 Feeding the human race** | | | |
| B6.2a  describe some of the biological factors affecting levels of food security | 8.21 learning about food security | 364, 365 |  |
| B6.2b  describe and explain some possible agricultural solutions to the demands of the growing human population | 8.22 maintaining food security | 366, 367 |  |
| B6.2c explain the impact of the selective breeding of food plants and domesticated animals | 7.12 selective breeding 7.13 producing new plant varieties | 296, 297, 298, 299 |  |
| B6.2d describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics | 7.14 genetic engineering | 300, 301 |  |
| **B6.2e describe the main steps in the process of genetic engineering** | 7.14 genetic engineering | 301 |  |
| B6.2f  explain some of the possible benefits and risks of using gene technology in modern agriculture | 7.15 genetically modified crops: the science 7.16 is genetic modification safe | 302, 303, 304, 305 |  |
| B6.2g describe and explain some possible biotechnological solutions to the demands of the growing human population | 7.14 genetic engineering | 301 |  |
| BM6.2i use percentiles and calculate percentage gain and loss of mass |  |  | percentiles not found |
| BM6.2ii calculate arithmetic means | 5.29 maths skills the spread of scientific data | 228 |  |
| BM6.2iii use fractions and percentages | 6.14 maths skills - fractions ratio proportion and probability | 264, 265 |  |
| BM6.2iv extract and interpret information from charts, graphs and tables | 7.21 maths skills - using charts and graphs to display data | 314, 315 |  |
| **B6.3 Monitoring and maintaining health** | | | |
| B6.3a describe the relationship between health and disease | 4.1 learning about health | 130, 131 |  |
| B6.3b describe different types of diseases | 4.1 learning about health | 130, 131 |  |
| B6.3c describe the interactions between different types of disease | 4.1 learning about health | 130, 131 | HPV & cervical cancer |
| B6.3d explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants | 4.6 learning about viral diseases  4.7 studying bacterial diseases  4.8 looking at fungal diseases | 140, 141, 142, 143, 144, 145 |  |
| B6.3e explain how the spread of communicable diseases may be reduced or prevented in animals and plants | 4.13 building immunity | 154, 155 |  |
| B6.3f describe a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS | 4.6 learning about viral diseases  4.7 studying bacterial diseases  4.8 looking at fungal diseases  4.16 looking at plant diseases | 140, 141, 142, 143, 144, 145, 160, 161 |  |
| B6.3g  describe physical plant defence responses to disease | 4.17 learning about plant defences | 162, 163 |  |
| B6.3h  describe chemical plant defence responses | 4.17 learning about plant defences | 162, 163 |  |
| **B6.3i describe different ways plant diseases can be detected and identified, in the lab and in the field** | 4.16 looking at plant diseases | 161 |  |
| B6.3j explain how white blood cells and platelets are adapted to their defence functions in the blood | 4.10 protecting the body  4.11 exploring white blood cells | 148, 149, 150, 151 |  |
| B6.3k describe the non-specific defence systems of the human body against pathogens | 4.10 protecting the body | 148, 149 |  |
| B6.3l explain the role of the immune system of the human body in defence against disease | 4.13 building immunity | 154, 155 |  |
| **B6.3m  describe how monoclonal antibodies are produced** | 4.15 investigating monoclonal antibodies | 158, 159 |  |
| **B6.3n  describe some of the ways in which monoclonal antibodies can be used** | 4.15 investigating monoclonal antibodies | 158, 159 |  |
| B6.3o explain the use of vaccines and medicines in the prevention and treatment of disease | 4.13 building immunity | 154, 155 |  |
| B6.3p  explain the aseptic techniques used in culturing organisms | 1.14 growing microorganisms | 40, 41 |  |
| B6.3q describe the processes of discovery and development of potential new medicines | 4.14 making new drugs | 156, 157 |  |
| B6.3r recall that many non-communicable human diseases are caused by the interaction of a number of factors | 4.3 exploring non communicable diseases | 134, 135 |  |
| B6.3s evaluate some different treatments for cardiovascular disease | 4.2 key concept looking at risk factors | 132, 133 |  |
| B6.3t analyse the effect of lifestyle factors on the incidence of non-communicable diseases at local, national and global levels | 4.2 key concept looking at risk factors | 132, 133 |  |
| B6.3u describe cancer as the result of changes in cells that lead to uncontrolled growth and division | 4.3 exploring non communicable diseases | 134, 135 |  |
| B6.3v discuss potential benefits and risks associated with the use of stem cells in medicine | 1.9 stem cells | 30, 31 |  |
| B6.3w explain some of the possible benefits and risks of using gene technology in medicine | 7.17 ethically wrong, or essential? | 306, 307 |  |
| B6.3x discuss the potential importance for medicine of our increasing understanding of the human genome | 1.10 stem cell banks | 32, 33 |  |
| BM6.3i translate information between graphical and numerical forms | 3.18 maths skills extracting and interpreting information | 122, 123 |  |
| BM6.3ii construct and interpret frequency tables and diagrams, bar charts and histograms | 7.21 maths skills - using charts and graphs to display data | 314, 315 |  |
| BM6.3iii understand the principles of sampling as applied to scientific data | 4.18 maths skills - sampling & scientific data | 164, 165 |  |
| BM6.3iv use a scatter diagram to identify a correlation between two variables | 4.4 analysing and evaluating data | 136, 137 |  |
| BM6.3v  calculate cross-sectional areas of bacterial cultures and clear agar jelly using πr2 |  |  | not found |

## AQA Hodder textbook mapping

| **Specification statement** | **Chapter covering specification statement** | **Page number** | **Comments** |
| --- | --- | --- | --- |
| **Topic B1 Cell level systems** | | | |
| **B1.1 Cell structures** | | | |
| B1.1a describe how light microscopes and staining can be used to view cells | 1: cell structure | 11, 6 | Pg 6 is drawing specimen using light microscope. No mention of staining. |
| B1.1b explain how the main sub-cellular structures of eukaryotic cells (plants and animals) and prokaryotic cells are related to their functions | 1: cell structure | 3, 5 |  |
| B1.1c explain how electron microscopy has increased our understanding of sub-cellular structures | 1: cell structure | 12 | no comparison images of light microscope and electron microscope |
| BM1.1i demonstrate an understanding of number, size and scale and the quantitative relationship between units | 1: cell structure | 16 | only found in extension material |
| BM1.1ii use estimations and explain when they should be used |  |  | not found |
| **BM1.1iii calculate with numbers written in standard form** | 1: cell structure | 16 | only found in extension material (no calculation found) |
| **B1.2 What happens in cells (and what do cells need)?** | | | |
| B1.2a describe DNA as a polymer | 14: reproduction | 185 | not specifically called a polymer |
| B1.2b describe DNA as being made up of two strands forming a double helix | 14: reproduction | 185 | "2 sets of base pairs coiled together to form double helix" |
| B1.2c describe that DNA is made from four different nucleotides; each nucleotide consisting of a common sugar and phosphate group with one of four different bases attached to the sugar | 14: reproduction | 185 |  |
| **B1.2d  recall a simple description of protein synthesis** | 14: reproduction | 186-187 |  |
| **B1.2e  explain simply how the structure of DNA affects the proteins made in protein synthesis** | 14: reproduction | 187 |  |
| B1.2f describe experiments that can be used to investigate enzymatic reactions | 4: animal tissues organs and organ systems (Human digestive enzymes) | 49 |  |
| B1.2g explain the mechanism of enzyme action | 4: animal tissues organs and organ systems (Human digestive enzymes) | 48 |  |
| BM1.2i carry out rate calculations for chemical reactions | 4: animal tissues organs and organ systems ( required practical 5) | 49 |  |
| BM1.2ii understand and use simple compound measures such as the rate of a reaction | 4: animal tissues organs and organ systems (Human digestive enzymes) | 49 | not satisfactory |
| **B1.3 Respiration** | | | |
| B1.3a describe cellular respiration as a universal chemical process, continuously occurring that supplies ATP in all living cells | 10: respiration (aerobic respiration) | 120, 121 |  |
| B1.3b describe cellular respiration as an exothermic reaction | 10: respiration (aerobic respiration) | 121 |  |
| B1.3c compare the processes of aerobic respiration and anaerobic respiration | 10 respiration | 120, 125 |  |
| B1.3d explain the importance of sugars in the synthesis and breakdown of carbohydrates | 4: animal tissues organs and organ systems (Human digestive enzymes) | 46 | breakdown only, (diagram). Monomer and polymer not used |
| B1.3e explain the importance of amino acids in the synthesis and breakdown of proteins | 4: animal tissues organs and organ systems (Human digestive enzymes) 10: respiration | 46 126 | Monomer and polymer not used |
| B1.3f explain the importance of fatty acids and glycerol in the synthesis and breakdown of lipids | 4: animal tissues organs and organ systems (Human digestive enzymes) 10: respiration | 46 126 |  |
| **B1.4 Photosynthesis** | | | |
| B1.4a describe photosynthetic organisms as the main producers of food and therefore biomass for life on Earth | 9: photosynthesis | 110 |  |
| B1.4b describe the process of photosynthesis | 9: photosynthesis (photosynthetic reaction) | 111 |  |
| B1.4c describe photosynthesis as an endothermic reaction | 9: photosynthesis (photosynthetic reaction) | 111 |  |
| B1.4d describe experiments to investigate photosynthesis | 9: photosynthesis (rate of photosynthesis) | 113, 114 | light intensity (nothing for starch in leaves) |
| B1.4e explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis | 9: photosynthesis (rate of photosynthesis) | 112, 113 |  |
| **B1.4f explain the interaction of these factors in limiting the rate of photosynthesis** | 9: photosynthesis (rate of photosynthesis) | 113 |  |
| BM1.4i understand and use simple compound measures such as the rate of a reaction | 9: photosynthesis (rate of photosynthesis) | 113 |  |
| BM1.4ii translate information between graphical and numerical form | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| BM1.4iii plot and draw appropriate graphs, selecting appropriate scales and axes | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| BM1.4iv extract and interpret information from graphs, charts and tables | 5: plant tissues organs and organ systems - working scientifically: dealing with data | 77 |  |
| **BM1.4v understand and use inverse proportion – the inverse square law and light intensity in the context of factors affecting photosynthesis** | 9: photosynthesis (rate of photosynthesis) | 113 | in 'tips' |
| **Topic B2 Scaling up** | | | |
| **B2.1 Supplying the cell** | | | |
| B2.1a explain how substances are transported into and out of cells through diffusion, osmosis and active transport | 3: transport in cells | 28-36 |  |
| B2.1b describe the process of mitosis in growth, including the cell cycle | 2: cell division (mitosis and the cell cycle) | 20, 21 |  |
| B2.1c explain the importance of cell differentiation | 1: cell structure | 10 |  |
| B2.1d recall that stem cells are present in embryonic and adult animals and meristems in plants | 2: cell division (stem cells) | 22, 23 |  |
| B2.1e describe the functions of stem cells | 2: cell division (stem cells) | 22 |  |
| B2.1f describe the difference between embryonic and adult stem cells in animals | 2: cell division (stem cells) | 22-24 |  |
| BM2.1i use percentiles and calculate percentage gain and loss of mass |  |  | not found |
| **B2.2 The challenges of size** | | | |
| B2.2a explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area : volume ratio | 3: transport in cells | 29-32 |  |
| B2.2b describe some of the substances transported into and out of a range of organisms in terms of the requirements of those organisms | 3: transport in cells | 29-32 |  |
| B2.2c describe the human circulatory system | 4: animal tissues organs and organ systems (the heart and blood vessels) | 51-52, 54 | p54 = diagram showing exchange |
| B2.2d explain how the structure of the heart and the blood vessels are adapted to their functions | 4: animal tissues organs and organ systems (the heart and blood vessels) | 51-54 |  |
| B2.2e explain how red blood cells and plasma are adapted to their transport functions in the blood | 4: animal tissues organs and organ systems (blood) | 55-56 |  |
| B2.2f explain how water and mineral ions are taken up by plants, relating the structure of the root hair cells to their function | 5: plant tissues organs and organ systems | 69, 70 |  |
| B2.2g describe the processes of transpiration and translocation | 5: plant tissues organs and organ systems | 71, 72 |  |
| B2.2h explain how the structure of the xylem and phloem are adapted to their functions in the plant | 5: plant tissues organs and organ systems | 69 |  |
| B2.2i explain the effect of a variety of environmental factors on the rate of water uptake by a plant | 5: plant tissues organs and organ systems | 71, 72 |  |
| B2.2j describe how a simple potometer can be used to investigate factors that affect the rate of water uptake | 5: plant tissues organs and organ systems - working scientifically: dealing with data | 76, 77 |  |
| BM2.2i calculate surface area : volume ratios | 3: transport in cells (diffusion) | 32 | Activity |
| BM2.2ii use simple compound measures such as rate | 4: animal tissues organs and organ systems ( required practical 5) | 49 |  |
| BM2.2iii carry out rate calculations | 4: animal tissues organs and organ systems (Human digestive enzymes) | 49 |  |
| BM2.2iv plot, draw and interpret appropriate graphs | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| **Topic B3 Organism level systems** | | | |
| **B3.1 Coordination and control - the nervous system** | | | |
| B3.1a describe the structure of the nervous system | 11: the human nervous system (structure and function) | 133-137 |  |
| B3.1b explain how the components of the nervous system can produce a coordinated response | 11: the human nervous system (structure and function) | 134 |  |
| B3.1c explain how the structure of a reflex arc is related to its function | 11: the human nervous system (structure and function) | 135, 136 |  |
| B3.1d  explain how the main structures of the eye are related to their functions | 11: the human nervous system (the eye) | 140, 141 |  |
| B3.1e  describe common defects of the eye and explain how some of these problems may be overcome | 11: the human nervous system (the eye) | 142 |  |
| B3.1f  describe the structure and function of the brain | 11: the human nervous system (the brain) | 138, 139 |  |
| **B3.1g  explain some of the difficulties of investigating brain function** | 11: the human nervous system (the brain) | 139 | more about history rather than difficulties |
| **B3.1h  explain some of the limitations in treating damage and disease in the brain and other parts of the nervous system** |  |  | not found |
| BM3.1i extract and interpret data from graphs, charts and tables | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| **B3.2 Coordination and control - the endocrine system** | | | |
| B3.2a describe the principles of hormonal coordination and control by the human endocrine system | 12:hormonal coordination in humans | 149, 150 |  |
| **B3.2b explain the roles of thyroxine and adrenaline in the body** | 12:hormonal coordination in humans | 150 | mentioned in a table of hormones. Not used as eg of negative feedback (Negative feedback p156 (ADH) and 163) |
| B3.2c describe the role of hormones in human reproduction including the control of the menstrual cycle | 12:hormonal coordination in humans (hormones in human reproduction) | 158, 159 |  |
| **B3.2d explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle** | 12:hormonal coordination in humans (the menstrual cycle) | 159, 160 |  |
| B3.2e explain the use of hormones in contraception and evaluate hormonal and non-hormonal methods of contraception | 12:hormonal coordination in humans (contraception) | 160, 161 |  |
| **B3.2f explain the use of hormones in modern reproductive technologies to treat infertility** | 12:hormonal coordination in humans (use of hormones to treat fertility) | 162-164 |  |
| B3.2g  explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropisms and gravitropisms | 13:plant hormones (control & coordination. Auxins) | 169, 170 |  |
| B3.2h  describe some of the variety of effects of plant hormones, relating to auxins, **gibberellins and ethene** | 13:plant hormones (other hormones) | 171, 172 |  |
| **B3.2i  describe some of the different ways in which people use plant hormones to control plant growth** | 13:plant hormones (use of plant hormones) | 172, 173 |  |
| BM3.2i extract and interpret data from graphs, charts and tables | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| BM3.2ii translate information between numerical and graphical forms | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| **B3.3 Maintaining internal environment** | | | |
| B3.3a explain the importance of maintaining a constant internal environment in response to internal and external change | 11: the human nervous system (homeostasis) | 132, 133 |  |
| B3.3b  describe the function of the skin in the control of body temperature | 11: the human nervous system (control of body temperature) | 143-145 |  |
| B3.3c explain how insulin controls blood sugar levels in the body | 12:hormonal coordination in humans (control of blood glucose concentration) | 152 |  |
| **B3.3d explain how glucagon interacts with insulin to control blood sugar levels in the body** | 12:hormonal coordination in humans (control of blood glucose concentration) | 152 |  |
| B3.3e compare type 1 and type 2 diabetes and explain how they can be treated | 12:hormonal coordination in humans (control of blood glucose concentration) | 152, 154 |  |
| B3.3f  explain the effect on cells of osmotic changes in body fluids | 3: transport in cells (comparing water concentrations) | 34 |  |
| B3.3g  describe the function of the kidneys in maintaining the water balance of the body | 12:hormonal coordination in humans (maintaining water and nitrogen balance in the body) | 155-157 |  |
| B3.3h describe the gross structure of the kidney and the structure of the kidney tubule | 12: hormonal coordination in humans (the kidney) | 157 | (marked as higher only) |
| **B3.3i  describe the effect of ADH on the permeability of the kidney tubules** | 12: hormonal coordination in humans (maintaining water and nitrogen balance in the body) | 156 |  |
| **B3.3j  explain the response of the body to different temperature and osmotic challenges** | 11: the human nervous system (control of body temperature) 12:hormonal coordination in humans (maintaining water and nitrogen balance in the body) | 144, 145 155-157 |  |
| BM3.3i extract and interpret data from graphs, charts and tables | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| **Topic B4 Community level systems** | | | |
| **B4.1 Ecosystems** | | | |
| B4.1a recall that many different materials cycle through the abiotic and biotic components of an ecosystem | 19: organisation of an ecosystem (materials cycling) | 258-261 |  |
| B4.1b explain the role of microorganisms in the cycling of materials through an ecosystem | 19: organisation of an ecosystem (producers consumers and decomposers), 19: organisation of an ecosystem (decomposition) | 257, 260, 261 |  |
| B4.1c explain the importance of the carbon cycle and the water cycle to living organisms | 19: organisation of an ecosystem (materials cycling) | 258-260 |  |
| B4.1d  explain the effect of factors such as temperature, water content, and oxygen availability on rate of decomposition | 19: organisation of an ecosystem (decomposition) | 260, 261 | terms aerobic and anaerobic not used here |
| B4.1e describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem | 19: organisation of an ecosystem (levels of organisation) | 251 |  |
| B4.1f explain how abiotic and biotic factors can affect communities | 18: adaptations, interdependence and competition | 239 -242 |  |
| B4.1g describe the importance of interdependence and competition in a community | 18: adaptations, interdependence and competition | 236-238 |  |
| B4.1h  describe the differences between the trophic levels of organisms within an ecosystem | 19: organisation of an ecosystem (producers consumers and decomposers)  21: trophic levels in an ecosystem (trophic levels) | 256, 257, 288 |  |
| B4.1i describe pyramids of biomass and explain, with examples, how biomass is lost between the different trophic levels | 21: trophic levels in an ecosystem (pyramids of biomass) | 288, 289 |  |
| B4.1j  calculate the efficiency of biomass transfers between trophic levels and explain how this affects the number of trophic levels in a food chain | 21: trophic levels in an ecosystem (transfer of biomass) | 290 |  |
| BM4.1i  calculate rate changes in the decay of biological material | 19: organisation of an ecosystem (required practical 10) | 261, 262 |  |
| BM4.1ii calculate the percentage of mass | working scientifically: dealing with data (energy calculations) | 294 | percentages |
| BM4.1iii Use fractions and percentages | working scientifically: dealing with data (energy calculations) | 294 |  |
| BM4.1iv plot and draw appropriate graphs selecting appropriate scales for the axes | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| BM4.1v extract and interpret information from charts, graphs and tables | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| **Topic B5 Genes, inheritance and selection** | | | |
| **B5.1 Inheritance** | | | |
| B5.1a explain the following terms: gamete, chromosome, gene, allele/variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype | 2: cell division (chromosomes) 14: reproduction (genetic inheritance) | 19, 188, 189 |  |
| B5.1b describe the genome as the entire genetic material of an organism | 14: reproduction (DNA and the genome) | 183 |  |
| B5.1c describe that the genome, and its interaction with the environment, influence the development of the phenotype of an organism | 15: variation (causes of variation, types of variation) | 198, 199 |  |
| B5.1d Recall that all variants arise from mutations, and that most have no effect on the phenotype, some influence phenotype and a very few determine phenotype | 15: variation (mutations) | 200 |  |
| **B5.1e  describe how genetic variants may influence phenotype: • in coding DNA by altering the activity of a protein • in non-coding DNA by altering how genes are expressed** | 14: reproduction (protein synthesis, mutations) | 186, 187 |  |
| B5.1f  explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms | 14: reproduction (advantages of sexual and asexual reproduction) | 182 |  |
| B5.1g explain the terms haploid and diploid | 2: cell division (chromosomes) | 19 |  |
| B5.1h explain the role of meiotic cell division in halving the chromosome number to form gametes | 14: reproduction (meiosis) | 180, 181 |  |
| B5.1i explain single gene inheritance | 14:reproduction (genetic inheritance) | 188-191 |  |
| B5.1j predict the results of single gene crosses | 14:reproduction (genetic inheritance) | 189, 190 |  |
| B5.1k describe sex determination in humans using a genetic cross | 14:reproduction (sex determination) | 192-193 |  |
| B5.1l recall that most phenotypic features are the result of multiple genes rather than single gene inheritance | 14: reproduction (genetic inheritance, eye colour) | 190 | in 'tips' |
| B5.1m  describe the development of our understanding of genetics | 16: the development of understanding of genetics and evolution (understanding of genetics) | 217, 218 |  |
| BM5.1i understand and use direct proportions and simple ratios in genetic crosses | 14 reproduction | 190 | fig 14.18 not very satisfactory |
| BM5.1ii understand and use the concept of probability in predicting the outcome of genetic crosses | 14 reproduction | 189, 190 | not very satisfactory |
| BM5.1iii extract and interpret information from charts, graphs and tables | working scientifically: dealing with data (presenting data in tables) | 39, 40 |  |
| **B5.2 Natural selection and evolution** | | | |
| B5.2a state that there is usually extensive genetic variation within a population of a species | 15: variation (causes of variation) | 198 | not very satisfactory |
| B5.2b describe the impact of developments in biology on classification systems | 17: classification of living organisms | 227-231 |  |
| B5.2c explain how evolution occurs through the natural selection of variants that have given rise to phenotypes best suited to their environment | 16: the development of understanding of genetics and evolution (the theory of evolution) | 212 |  |
| B5.2d describe evolution as a change in the inherited characteristics of a population over time, through a process of natural selection, which may result in the formation of new species | 16: the development of understanding of genetics and evolution (the theory of evolution by natural selection) | 214 |  |
| B5.2e describe the evidence for evolution | 16: the development of understanding of genetics and evolution (evidence for evolution) | 218-222 |  |
| B5.2f  describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and explain the impact of these ideas on modern biology | 16: the development of understanding of genetics and evolution (Charles Darwin) | 212, 213 |  |
| **Topic B6 Global challenges** | | | |
| **B6.1 Monitoring and maintaining the environment** | | | |
| B6.1a explain how to carry out a field investigation into the distribution and abundance of organisms in a habitat and how to determine their numbers in a given area | 19: organisation of an ecosystem (levels of organisation) | 251-253 |  |
| B6.1b describe both positive and negative human interactions within ecosystems and explain their impact on biodiversity | 20: biodiversity and the effect of human interaction on ecosystems (land use) |  |  |
| B6.1c explain some of the benefits and challenges of maintaining local and global biodiversity | 20: biodiversity and the effect of human interaction on ecosystems (maintaining biodiversity) | 280-282 |  |
| **B6.1d  evaluate the evidence for the impact of environmental changes on the distribution of organisms, with reference to water and atmospheric gases** | 19: organisation of an ecosystem (impact of environmental change on distribution of organisms) | 262-264 |  |
| BM6.1i construct and interpret frequency tables and diagrams, bar charts and histograms | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| BM6.1ii understand the principles of sampling as applied to scientific data | working scientifically: experimental skills (sampling and bias) | 267, 268 |  |
| **B6.2 Feeding the human race** | | | |
| B6.2a  describe some of the biological factors affecting levels of food security | 22: food production (factors affecting food security) | 296 |  |
| B6.2b  describe and explain some possible agricultural solutions to the demands of the growing human population | 22: food production (farming techniques, sustainable fisheries, role of biotechnology) | 297-302 |  |
| B6.2c explain the impact of the selective breeding of food plants and domesticated animals | 15: variation (selective breeding) | 200, 201 |  |
| B6.2d describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics | 15: variation (genetic engineering) | 201 |  |
| **B6.2e describe the main steps in the process of genetic engineering** | 15: variation (genetically engineering insulin) | 203 |  |
| B6.2f  explain some of the possible benefits and risks of using gene technology in modern agriculture | 15: variation (genetically engineered crops, genetically modified animals) | 202-203 |  |
| B6.2g describe and explain some possible biotechnological solutions to the demands of the growing human population | 22: food production (role of biotechnology) | 300-302 |  |
| BM6.2i use percentiles and calculate percentage gain and loss of mass | working scientifically: dealing with data (energy calculations) | 294 | just mass loss no percentiles |
| BM6.2ii calculate arithmetic means | working scientifically: dealing with data (means and ranges) | 129, 130 |  |
| BM6.2iii use fractions and percentages | working scientifically: dealing with data (energy calculations) | 294 |  |
| BM6.2iv extract and interpret information from charts, graphs and tables | working scientifically: experimental skills (drawing conclusions from data) | 109, 110 |  |
| **B6.3 Monitoring and maintaining health** | | | |
| B6.3a describe the relationship between health and disease | 4: animal tissues, organs and organ systems (health issues) | 58 | relationship to disease not made |
| B6.3b describe different types of diseases | 4: animal tissues, organs and organ systems (health issues) 6: infection and response (communicable diseases) | 59-62 79-85 |  |
| B6.3c describe the interactions between different types of disease |  |  | not found |
| B6.3d explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants | 6: infection and response (spread of pathogens) | 80, 81 |  |
| B6.3e explain how the spread of communicable diseases may be reduced or prevented in animals and plants | 6: infection and response (human defence systems) | 85-88 |  |
| B6.3f describe a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS | 6: infection and response (Measles; HIV/AIDS) 8: plant diseases (detection and identification of plant diseases) | 81, 82, 103, 104 |  |
| B6.3g  describe physical plant defence responses to disease | 8: plant diseases (plant defence responses) | 106 |  |
| B6.3h  describe chemical plant defence responses | 8: plant diseases (plant defence responses) | 106 |  |
| **B6.3i describe different ways plant diseases can be detected and identified, in the lab and in the field** | 8: plant diseases (other diseases) | 105 |  |
| B6.3j explain how white blood cells and platelets are adapted to their defence functions in the blood | 4: animal tissues, organs and organ systems (components of blood) | 55, 56 |  |
| B6.3k describe the non-specific defence systems of the human body against pathogens | 6: infection and response (human defence systems) | 85-88 |  |
| B6.3l explain the role of the immune system of the human body in defence against disease | 6: infection and response (human defence systems) | 87, 88 |  |
| **B6.3m  describe how monoclonal antibodies are produced** | 7: monoclonal antibodies (producing monoclonal antibodies) | 97-99 |  |
| **B6.3n  describe some of the ways in which monoclonal antibodies can be used** | 7: monoclonal antibodies (using monoclonal antibodies) | 99, 100 |  |
| B6.3o explain the use of vaccines and medicines in the prevention and treatment of disease | 6: infection and response (vaccination) | 89, 90 |  |
| B6.3p  explain the aseptic techniques used in culturing organisms | 6: infection and response (higher practical culturing microorganisms) | 80 | no explanation of aseptic technique, just practical description |
| B6.3q describe the processes of discovery and development of potential new medicines | 6: infection and response (discovery and development of drugs) | 92, 93 |  |
| B6.3r recall that many non-communicable human diseases are caused by the interaction of a number of factors | 4: animal tissues, organs and organ systems (the effect of lifestyle on some non- communicable diseases) | 62 | paragraph under table 4.5 |
| B6.3s evaluate some different treatments for cardiovascular disease | 4: animal tissues, organs and organ systems (coronary heart disease: a non- communicable disease) | 56, 57 |  |
| B6.3t analyse the effect of lifestyle factors on the incidence of non-communicable diseases at local, national and global levels | 4: animal tissues, organs and organ systems (the effect of lifestyle on some non- communicable diseases) | 61, 62 | global levels not found |
| B6.3u describe cancer as the result of changes in cells that lead to uncontrolled growth and division | 4: animal tissues, organs and organ systems (cancer) | 60 |  |
| B6.3v discuss potential benefits and risks associated with the use of stem cells in medicine | 2: cell division (stem cell research) | 23, 24 |  |
| B6.3w explain some of the possible benefits and risks of using gene technology in medicine | 14: reproduction (the human genome project) | 186 |  |
| B6.3x discuss the potential importance for medicine of our increasing understanding of the human genome | 14: reproduction (the human genome project) | 186 | in 'tips' |
| BM6.3i translate information between graphical and numerical forms | working scientifically: dealing with data (data types and graphs) | 209, 210 | not satisfactory |
| BM6.3ii construct and interpret frequency tables and diagrams, bar charts and histograms | working scientifically: dealing with data (data types and graphs) | 209, 210 |  |
| BM6.3iii understand the principles of sampling as applied to scientific data | working scientifically: experimental skills (sampling and bias) | 267, 268 |  |
| BM6.3iv use a scatter diagram to identify a correlation between two variables | working scientifically: dealing with data( correlation and causation) | 285, 286 |  |
| BM6.3v  calculate cross-sectional areas of bacterial cultures and clear agar jelly using πr2 | 6: infection and response (higher practical culturing microorganisms) |  | in 'tips' but no explanation of how to do it |

## Want to switch to OCR?

If you’re an OCR-approved centre, all you need to do is download the specification and start teaching. Your exams officer can complete an intention to teach form which enables us to provide appropriate support. When you’re ready to enter your students, you just need to speak to your exams officer to:

1. Make estimated entries by 10 October so we can prepare the question papers and ensure we’ve got enough examiners.
2. Make final entries by 21 February. If you are not already an OCR-approved centre please refer your exams officer to the centre approval section of our admin guide.

## Next steps

1. Familiarise yourself with the specification, sample assessment materials and teaching resources on the OCR Biology A qualification page of the OCR website.

<http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-biology-a-j247-from-2016/>

1. Get a login for our secure extranet: Interchange – this allows you to access the latest past/practice papers and use our results analysis service: Active Results.

<https://interchange.ocr.org.uk>

1. Sign up to receive subject updates by email.   
   <http://www.ocr.org.uk/i-want-to/email-updates>
2. Sign up to attend a training event or take part in webinars on specific topics running throughout the year and our Q&A webinar sessions every half term.   
   <https://www.cpdhub.ocr.org.uk>
3. Attend one of our free teacher network events that are run in each region every term. These are hosted at the end of the school day in a school or college near you, with teachers sharing best practice and subject specialists on hand to lead discussion and answer questions.  
   <http://ocr.org.uk/qualifications/professional-development/teacher-networks/>