

Biology essay titles

This document contains the essay titles and mark schemes used in AQA A-level Biology examinations since 2007. The specifications these exam questions came from are no longer in use, but the marking method has largely remained unchanged. Further guidance on the marking method used with the essay can be found in *Paper 3 Essay marking guidance*.

Year	Question	Title
BIOL5		
2015R	10a	The importance of responses to changes in the internal and external environment of an organism.
2015R	10b	The importance to humans of the control of growth, reproduction and development of organisms, including themselves.
2015	10a	The importance of proteins in the control of processes and responses in organisms.
2015	10b	The causes and importance of variation and diversity in organisms.
2014	10 a	Cells and organisms carry out exchanges with their external environment to maintain their internal environment.
2014	10 b	How energy is transferred within and between organisms.
2013	10 a	The membranes of different types of cells are involved in many different functions.
2013	10 b	There are many different types of relationships and interactions between organisms.
2012	10 a	The importance of shapes fitting together in cells and organisms
2012	10 b	How bacteria can affect the lives of humans and other organisms
2011	10 a	Using DNA in science and technology
2011	10 b	A cycle is a biological pathway or process in which the end product of one cycle becomes the starting point for the next. Write an essay about cycles in biology
2010	10 a	Carbon dioxide may affect organisms directly or indirectly. Describe and explain these effects.

2010	10 b	The causes of disease in humans
SPEC B		
2010	A	The movement of substances within living organisms
2010	B	Cycles in Biology
2009	A	Ions and organisms
2009	B	DNA and the transfer of information.
2008	A	The part played by the movement of substances across cell membranes in the functioning of different organs and organ systems
2008	B	The part played by enzymes in the functioning of different cells, tissues and organs.
2007	A	Movements inside cells
2007	B	Transfers through ecosystems
SPEC A		
2010	A	Carbon dioxide in organisms and ecosystems.
2010	B	Why the offspring produced by the same parents are different in appearance
2009	A	The uses of water in living organisms.
2009	B	The transfer of energy within and between organisms
2008	A	Hydrogen bonds and their importance in living organisms.
2008	B	How nitrogen-containing substances are made available to and are used
2007	A	Carbon dioxide in organisms and ecosystems.
2007	B	Why the offspring produced by the same parents are different in appearance

BIOL5 Essay Instructions

You should write your essay in continuous prose.

Your essay will be marked for its scientific accuracy. It will also be marked for your selection of relevant material from different parts of the specification and for the quality of your written communication.

The maximum number of marks that can be awarded is:

- Scientific content 16
- Breadth of knowledge 3
- Relevance 3
- Quality of written communication 3.

Mark Schemes:

June 2015R

10 (a) The importance of responses to changes in the internal and external environment of an organism.

Question	Marking guidance	Mark	Comments
10 (a)	<p>T - 3.1.3 Transport in and out of cells (of specific substances)</p> <p>I - 3.1.6 Immune response</p> <p>Hb - 3.2.4 Haemoglobin</p> <p>Tr - 3.2.7 Transpiration – response to environmental factors – gas exchange in plants</p> <p>B - 3.2.9 Behaviour</p> <p>A - 3.2.10 Adaptation and selection</p> <p>P - 3.4.8 Changes in populations – selection pressures</p> <p>R - 3.5.1 Responses to stimuli – plants and tropisms – control of heart rate</p> <p>Tk - 3.5.1 Taxes and kinesis</p> <p>Rc - 3.5.1 Receptors</p> <p>H - 3.5.2 Control of Heart Rate</p> <p>Sn - 3.5.1 and 2 Simple reflexes and neurones and synapses</p> <p>Hr - 3.5.2 and 5.4 Hormones and responses</p> <p>C - 3.5.2 Chemical mediators</p> <p>Ho - 3.5.4 Homeostasis – response to changes in internal environment</p> <p>F - 3.5.5 Feedback</p> <p>G - 3.5.7 Gene</p>	25	<p>The topics listed contain material that could be made relevant to the title. Writing about these topics in a general sense may not address the question.</p> <p>Candidates may make correct use of material from other topics.</p> <p>A* includes where candidates use information about a topic in the specification but go beyond what is expected for our A-level.</p>

June 2015R

10 (b) The importance to humans of the control of growth, reproduction and development of organisms, including themselves.

Question	Marking guidance	Mark	Comments
10 (b)	<p>A - 3.1.1 Pathogens (and invasion of human tissues) and 3.2.10 Antibiotic resistance – control of bacterial growth</p> <p>Ch - 3.1.3 Cholera</p> <p>I - 3.1.6 Immune response and vaccination (to control growth of pathogens)</p> <p>B - 3.2.11 Human influence on biodiversity</p> <p>Hp - 3.4.1 Human populations</p> <p>Hf - 3.4.5 Humans and farming practices – and 3.2.3 selective breeding</p> <p>F - 3.4.6 Use of fertilisers and pesticides</p> <p>S - 3.4.7 Succession – control of</p> <p>G - 3.4.8 Genetics – prediction of inherited conditions</p> <p>Ge - 3.5.7 Control of gene expression – stem cells</p> <p>C - 3.5.7 Regulation of gene expression – prevention, treatment and cure of cancer – and 3.2.5 Mitosis and cancer</p> <p>Gc - 3.5.8 Gene cloning and transfer</p> <p>Gt - 3.5.8 Gene therapy</p>	25	<p>The topics listed contain material that could be made relevant to the title. Writing about these topics in a general sense may not address the question.</p> <p>Candidates may make correct use of material from other topics.</p> <p>A* includes where candidates use information about a topic in the specification but go beyond what is expected for our A-level.</p>

June 2015

10 (a) The importance of proteins in the control of processes and responses in organisms.

Question	Marking guidance	Mark	Comments
10 (a)	<p>Cat. Enzymes as catalysts</p> <p>Met. Enzymes control metabolic pathways</p> <p>R. Proteins/enzymes in respiration</p> <p>P. Proteins/enzymes in photosynthesis</p> <p>Mb. Control of movement across Membranes</p> <p>IM. Immunology</p> <p>Hb. Haemoglobin</p> <p>DNA. DNA</p> <p>Pc. Pacinian corpuscles – stretch mediated sodium channels</p> <p>AP. Action potentials</p> <p>S. Synaptic transmission</p> <p>Hm. Protein/peptide hormones</p> <p>T. Enzymes in gene transcription and Translation</p> <p>TF. Transcription factors and receptors</p> <p>GT. Gene therapy involving proteins</p>	25	<p>The topics listed contain material that could be made relevant to the title. Writing about these topics in a general sense may not address the question.</p> <p>Candidates may make correct use of material from other topics.</p> <p>A* includes where candidates use information about a topic in the specification but go beyond what is expected for our A-level.</p>

June 2015

10 (b) The causes and importance of variation and diversity in organisms. (25 marks)

Question	Marking guidance	Mark	Comments
10 (b)	<p>A. Antigenic variation in pathogens – antigenic variation in e.g. viruses</p> <p>E. Evolution of antibiotic-resistance in Bacteria</p> <p>DNA. Genetic diversity because of differences in DNA – comparing base sequences</p> <p>G. Genes, alleles and proteins produced</p> <p>P. Comparing protein sequences</p> <p>AS. Selection – selective breeding, artificial selection</p> <p>FG. Founder effect/genetic bottlenecks</p> <p>Sp. Species diversity and index of Diversity</p> <p>C. Causes of variation in populations – Meiosis</p> <p>DV. Advantages of variation – disease, food chains, adaptation</p> <p>S. Succession</p> <p>GP. Gene pools and evolution, natural Selection</p> <p>Sp. Speciation, geographical isolation</p> <p>GMT. Gene mutation</p> <p>GE. Differences in gene expression</p> <p>GMT. Genetically modified organisms</p> <p>GF. Genetic fingerprinting</p>	25	<p>The topics listed contain material that could be made relevant to the title. Writing about these topics in a general sense may not address the question.</p> <p>Candidates may make correct use of material from other topics.</p> <p>A* includes where candidates use information about a topic in the specification but go beyond what is expected for our A-level.</p>

June 2014 Biol 5

10 (a) Cells and organisms carry out exchanges with their external environment to maintain their internal environment. (25 marks)

Question	Marking guidance	Mark	Comments
10(a)	<p>H - Homeostasis (concept of)</p> <p>D - Digestion and absorption</p> <p>C - Cells</p> <p>L - Lung function</p> <p>G - Gas exchange</p> <p>W - Passage of water through plant</p> <p>Nc - Nutrient cycles</p> <p>R - Response to stimuli</p> <p>N- Neurones</p> <p>T - Temperature control</p> <p>Tf - tissue fluid and its formation</p> <p>B - Control of blood glucose concentration</p> <p>Nf - Negative feedback</p> <p>Gn - Gene expression</p>		<p>The topics listed contain material that could be made relevant to the title. Writing about these topics in a general sense may not address the question.</p> <p>Candidates may make correct use of material from other topics.</p> <p>A* includes where candidates use information about a topic in the specification but go beyond what is expected for our A-level.</p>

June 2014 Biol 5

10 (b) How energy is transferred within and between organisms

Question	Marking guidance	Mark	Comments
10(b)	<p>P - Photosynthesis</p> <p>Ec - Energy transfer through ecosystems</p> <p>F - Food production</p> <p>D - Digestion (as in fuel)</p> <p>Ab - Absorption (by cells)</p> <p>Mt - Mass transport</p> <p>R - Respiration</p> <p>A - ATP</p> <p>Sr - Stimuli and responses</p> <p>Mc - Muscle contraction</p> <p>N - Nerve impulses</p>		<p>The topics listed contain material that could be made relevant to the title. Writing about these topics in a general sense may not address the question.</p> <p>Candidates may make correct use of material from other topics.</p> <p>A* includes where candidates use information about a topic in the specification but go beyond what is expected for our A-level.</p>

BIOL5 2013

10(a) The membranes of different types of cells are involved in many different functions (25 marks)

Question	Marking guidance	Mark	Comments
10(a)	<ul style="list-style-type: none"> 1. Membrane function as selectively permeable barrier 1. Transport mechanisms across membranes 1. Absorption and co-transport of sodium ions and glucose 2. Photosynthesis, chloroplast, thylakoids 2. Respiration, mitochondrion and cristae 2. Protein secretion, RER, SER and Golgi 3. Surface receptors/antigen and immune response 3. Cell division 3. Vertical and horizontal transmission – membranes and bacteria 3. Pacinian corpuscle 4. Tropisms – movement of IAA 4. Nerve impulses/action potentials 4. Synaptic transmission 4. Muscle contraction, calcium ion movement/storage 4. Hormones - eg Blood glucose regulation – insulin and glucagon 4. Osmosis, including water movement in plants 	25	<p>The emphasis in answers should be on the involvement of membranes in processes, not just the processes themselves</p> <p>Breadth, one mark for use of an example from each of the following approaches:</p> <ul style="list-style-type: none"> 1. Membranes – basic functions 2. Organelle membranes 3. Cell surface membranes 4. Processes – eg protein secretion, synaptic transmission, cell division

BIOL 5 2013**10 (b) There are many different types of relationships and interactions between organisms (25 marks)**

Question	Marking guidance	Mark	Comments
10(b)	<ol style="list-style-type: none">1. Pathogens and effects on host<ol style="list-style-type: none">1. Cholera1. TB2. Taxonomy2. Classification and evolution2. Inheritance and evolution2. Genetic code, universal2. Behaviour2. Populations and evolution, variation between individuals within a species3. Relationships within ecosystems – eg predator/prey3. Energy transfer in ecosystems3. Nutrient cycles, the organisms involved3. Succession, biodiversity, species and individuals in a community4. Human impacts on the environment and its effect on relationships between organisms – including farming4. Gene technology and GMO and selective breeding4. Antibiotic resistance	25	<p>The emphasis in answers should be on the relationships and interactions between organisms not just the topics themselves</p> <p>Breadth, one mark for use of an example from each of the following approaches – 3 max:</p> <ol style="list-style-type: none">1. Pathogen and host2. Evolution (related topics)3. Ecological4. Human intervention in relationships

BIOL5 June 2012

10 (a) The importance of shapes fitting together in cells and organisms

Question	Marking guidance	Mark	Comments
10 (a)	<p>Proteins and Enzymes</p> <p>3.1.2 Enzyme properties and digestion 3.1.2 Protein structure 3.1.3 Plasma membrane structure and cell transport 3.1.6 Antigens, antibodies, B cells & T cells 3.1.6 Vaccines</p> <p>Nucleic Acids</p> <p>3.2.2 Structure of DNA 3.2.5 DNA Replication (not PCR) 3.5.7 Transcription & translation 3.5.8 Transcriptional factors, oestrogen, siRNA 3.5.8 Restriction enzymes</p> <p>Physiology</p> <p>3.2.4 Haemoglobin 3.5.2 Action potentials & synaptic transmission 3.5.3 Muscle contraction 3.5.4 Control of blood glucose concentration 3.5.5 Control of mammalian oestrous cycle</p>	25	

BIOL5 June 2012

10 (b) How bacteria can affect the lives of humans and other organisms

Question	Marking guidance	Mark	Comments
10 (b)	<p>Bacteria and Disease</p> <p>3.1.1 Pathogens 3.1.2 Lactose intolerance 3.1.3 Cholera 3.1.4 Tuberculosis 3.2.10 Resistance to antibiotics</p> <p>Ecological Importance</p> <p>3.4.6 Carbon cycle 3.4.6 Nitrogen cycle 3.4.6 Eutrophication</p> <p>Making Use of Bacteria</p> <p>3.5.8 Use of bacterial enzymes e.g. restriction endonuclease, DNA polymerase for PCR 3.5.8 Use of bacterial plasmids e.g. in vivo gene cloning, genetically-modified crops, gene therapy 3.5.8 Use of bacteria to produce useful chemicals</p>	25	

June 2011 Biol5

10 (a) Using DNA in science and technology

Question	Marking guidance	Mark	Comments
10 (a)	<p>DNA and classification</p> <p>Structure of DNA Differences in DNA lead to genetic diversity Comparison of DNA base sequences DNA hybridisation</p> <p>Genetic engineering and making useful substances</p> <p>Plasmids The use of recombinant DNA to produce transformed organisms that benefit humans</p> <p>Other uses of DNA</p> <p>Cell cycle and treatment of cancer Gene therapy; Medical diagnosis and the treatment of human disease; The use of DNA probes to screen patients for clinically important genes.</p>	25	

June 2011 Biol5

10 (b) A cycle is a biological pathway or process in which the end product of one cycle becomes the starting point for the next. Write an essay about cycles in biology

Question	Marking guidance	Mark	Comments
10 (b)	<p>Ecological cycles</p> <p>Nutrient cycles Carbon cycle Nitrogen cycle</p> <p>Biochemical cycles</p> <p>Enzyme action Synthesis of ATP from ADP Light-independent reaction The Krebs cycle</p> <p>Physiological and genetic cycles</p> <p>The mechanism of breathing The cardiac cycle The cell cycle Muscle contraction Oestrous cycle</p>	25	

2010 June Biol5

10 (a) Carbon dioxide may affect organisms directly or indirectly. Describe and explain these effects.

Question	Marking guidance	Mark	Comments
10 (a)	<p>Carbon dioxide affects the physiology of organisms</p> <p>Pulmonary ventilation and the mechanism of breathing Light-independent reaction of photosynthesis. Limiting factors Role of chemoreceptors in controlling heart rate</p> <p>The direct effects of increasing carbon dioxide concentration</p> <p>Respiration, photosynthesis and human activity giving rise to short-term fluctuations and long-term change. Yield of crop plants Carbon cycle</p> <p>Indirect effects of increasing carbon dioxide concentration</p> <p>Role of carbon dioxide in producing global warming; Life cycles and number of insect pests; Distribution of animals and plants; Effect of temperature on enzymes;</p>	25	

2010 June Biol5

10 (b) The causes of disease in humans

Question	Marking guidance	Mark	Comments
10 (b)	<p>Pathogens</p> <p>Pathogens include bacteria, viruses and fungi Pathogens cause disease by damaging cells and producing toxins Cholera bacteria produce toxins resulting in diarrhoea Symptoms and transmission of pulmonary tuberculosis Horizontal gene transmission and MRSA</p> <p>Lifestyle</p> <p>Risk factors associated with cancer and coronary heart disease The effects of fibrosis, asthma and emphysema on lung function The biological basis of heart disease</p> <p>Genetics</p> <p>Differences in bases may lead to non-functional enzymes Relationship between the cell cycle and cancer Proto-oncogenes and tumour suppressor genes Gene mutations</p>	25	

SPEC B Jan 2010 Unit 6/7/8

Essay A: The movement of substances within living organisms

Question	Marking guidance	Mark	Comments
	<ol style="list-style-type: none">1. Osmosis2. Across cell membranes3. Movement of water/mineral ions in plants4. Enzymes, kinetic energy and reactions5. Gut and absorption6. DNA Transcription and translation7. Mitosis and Meiosis8. Sperm and fertilisation9. Blood vessels and heart10. Exchange in capillaries11. Electron transport12. Nerve impulses/action potential13. Synapses14. Muscle contraction15. Alveolar gas exchange16. Translocation17. Photosynthesis18. Kidneys	25	

Essay B: Cycles in Biology

Question	Marking guidance	Mark	Comments
Essay B	<ol style="list-style-type: none">1. Large and small biological molecules, condensation and hydrolysis2. Enzymes3. Cell cycle – Mitosis and meiosis4. PCR5. Mammalian blood circulation6. Calvin cycle7. Krebs cycle8. ATP and ADP9. Negative feedback10. Nitrogen cycle11. Carbon cycle12. Menstrual cycle13. Muscle contraction14. Nerve impulses15. Predator prey16. Electron transport chain	25	

SPEC B June 2009 Unit 6/7/8

Essay A: Ions and organisms

Question	Marking guidance	Mark	Comments
Essay A	<ol style="list-style-type: none">1. Osmosis and turgor2. Haemoglobin dissociation, pH and carbon dioxide3. Uptake/movement of water/mineral ions by/in plants4. Ions in biological molecules5. Hydrogen, photosynthesis and respiration6. Anaerobic respiration and lactate7. Nerve impulses and synaptic transmission8. Regulation of blood water potential/kidney function9. Muscle contraction10. Nitrogen cycle11. Eutrophication12. Movement across membranes13. Cystic fibrosis	25	

Essay B: DNA and the transfer of information

Question	Marking guidance	Mark	Comments
Essay B	<ol style="list-style-type: none">1. Genes/how information is carried on2. DNA3. Replication of DNA4. Cell division - Mitosis and meiosis5. Transcription and translation6. Mutation7. Genetic engineering8. Gene therapy9. Genetically modified organisms10. Variation (in populations)11. Evolution12. Inheritance	25	Any other sensible example of the transfer of information involving DNA should be credited.

SPEC B June 2008 Unit 6/7/8 (25 marks)

Essay A: The part played by the movement of substances across cell membranes in the functioning of different organs and organ systems

Question	Marking guidance	Mark	Comments
Essay A	<ol style="list-style-type: none">1. Plasma membranes and movement across2. Gaseous exchange system/ lungs3. Digestive system/small intestine4. Blood vascular system5. Transpiration/root/stem6. Mass flow/leaf/stem7. Nervous system/eye8. Excretory system/ kidney9. Muscle systems10. Liver, blood glucose11. Root mineral ions12. Lungs cystic fibrosis	25	Any other sensible example of the movement of substances across cell membranes in the functioning of different organs and organ systems should be credited

Essay B: The part played by enzymes in the functioning of different cells, tissues and organs

Question	Marking guidance	Mark	Comments
Essay B	<ol style="list-style-type: none">1. Action of enzymes2. Enzyme properties3. Extracellular digestion4. Nutrient cycles5. Digestion in humans6. Replication of DNA7. Protein and enzyme synthesis8. Metabolic pathways9. Mutations10. Coenzymes and enzyme action11. Homeostasis12. Neurone/synapse13. Muscle contraction14. Pesticide toxicity	25	Any other sensible example of the part played by enzymes in the functioning of different cells, tissues and organs should be credited.

SPEC B 2007 June series Unit 6/7/8

ESSAY A: Movements inside cells

Question	Marking guidance	Mark	Comments
Essay A	<ol style="list-style-type: none">1. Plasma membranes and movement across2. Protein synthesis3. Movement through ER and Golgi4. Cell division and chromosome movement5. Water movement in plants/xylem6. Translocation7. Neurones and synaptic vesicles8. Actin and myosin9. DNA replication and mutation10. Electron transport chains11. Molecular/atomic/ionic movement	25	

Essay B: Transfers through ecosystems

Question	Marking guidance	Mark	Comments
Essay B	<ol style="list-style-type: none">1. Photosynthesis – energy transfer2. Respiration – energy transfer3. Carbon cycle4. Nitrogen cycle5. Food chains6. Ecological pyramids7. Pesticide toxicity/bioaccumulation8. Eutrophication9. Digestion and absorption10. Transfer of genetic material11. Water cycle	25	

SPEC A Jan 2010 Unit 8

Essay A: Carbon dioxide in organisms and ecosystems

Question	Marking guidance	Mark	Comments
Essay A	Biochemistry 14.6 The biochemistry of photosynthesis 14.8 The biochemistry of respiration 11.6 C4 photosynthesis in maize Physiology 15.4 Gas exchange surfaces 10.8 Changes in cardiac output and pulmonary ventilation with exercise 15.5 The transport of respiratory gases Ecology 11.6 The effect of carbon dioxide on productivity 14.9 Decomposition and recycling maintain the balance of nutrients in an ecosystem The greenhouse effect is not specifically mentioned but should be credited here if discussed.	25	

Essay B: Why the offspring produced by the same parents are different in appearance

Question	Marking guidance	Mark	Comments
Essay B	Genes 11.3 Genes incorporate coded information which influence phenotype 14.2 Gene mutation Environment 14.2 Environment variation 15.7 Dietary requirements of insects Chromosomes and cells 11.2 and 14.1 Meiosis 14.1 Principles of Mendelian inheritance 14.2 Polygenetic inheritance 16.1 Gametes and gamete formation. Fertilisation	25	

SPEC A Biology and Human Biology June 2009 Paper 8/9

Essay A: The uses of water in living organisms

Question	Marking guidance	Mark	Comments
Essay A	Water in chemical reactions 10.4 Condensation and hydrolysis 14.6 Photolysis 16.4 Digestion and absorption Water and physiology 10.7 Circulation Tissue fluid and its circulation 16.11 Temperature control 16.2 The fetus in its uterine environment Water and Osmosis 10.3 Water potential and osmosis 10.2 Cell walls and support in plants 16.11 Urine formation (Biology only)	25	

Essay B: The transfer of energy within and between organisms

Question	Marking guidance	Mark	Comments
Essay B	Autotrophic nutrition 14.6 Photosynthesis 11.6 Factors that limit the rate of photosynthesis Energy transfer 14.9 Carbon cycle 14.10 The influence of deforestation of carbon cycling 14.7 Ecological pyramids and the transfer of energy 16.4 Digestion and absorption Energy loss 14.8 Respiration and ATP 10.3 Active transport 15.9 Receptors convert stimuli into nerve impulses	25	

SPEC A Biology and Human Biology June 2008 Paper 8/9

Essay A: Hydrogen bonds and their importance in living organisms

Question	Marking guidance	Mark	Comments
Essay A	<p>Hydrogen bonds associated with the properties of water</p> <p>15.1 The passage of water through a plant and cohesion tension</p> <p>Hydrogen bonds associated with secondary and tertiary structure</p> <p>10.4 The structure of proteins, starch and cellulose</p> <p>10.5 Enzymes</p> <p>Hydrogen bonds associated with nucleic acids</p> <p>11.3 DNA as genetic material, structure of nucleic acids</p> <p>11.4 Gene technology</p>	25	

Essay B: How nitrogen-containing substances are made available to and are used

Question	Marking guidance	Mark	Comments
Essay B	<p>Nutrient cycling</p> <p>Nitrogen cycle</p> <p>The influence of deforestation of nitrogen cycling</p> <p>The uses of proteins</p> <p>Proteins as biological molecules</p> <p>Enzymes and enzyme action</p> <p>Haemoglobin and the exchange of respiratory gases</p> <p>The use of membrane proteins in the nervous system</p> <p>The uses of nucleic acids and other nitrogen-containing substances</p> <p>DNA and protein synthesis</p> <p>Chlorophyll, NADP and photosynthesis</p> <p>ATP and respiration</p>	25	

SPEC A Biology and Human Biology June 2007 Paper 8/9

Write an essay on one of the following topics. You should select and use information from different parts of the specification. Credit will be given not only for the biological content, but also for the selection and use of relevant information and for the organisation and presentation of the essay.

Essay A: Carbon dioxide in organisms and ecosystems

Question	Marking guidance	Mark	Comments
Essay A	Biochemistry The biochemistry of photosynthesis 14.6 The biochemistry of respiration 14.8 C4 photosynthesis in maize 11.6 Physiology Gas exchange surfaces 15.4 Changes in cardiac output and pulmonary ventilation with exercise 10.8 The transport of respiratory gases 15.5 Ecology The effect of carbon dioxide on productivity; 11.6 Decomposition and recycling maintain the balance of nutrients in an ecosystem 14.9 The greenhouse effect is not specifically mentioned but should be credited here if discussed	25	

Essay B: Why the offspring produced by the same parents are different in appearance

Question	Marking guidance	Mark	Comments
Essay B	Genes Genes incorporate coded information which influences phenotype 11.3 Gene mutation 14.2 Environment Environment variation 14.2 Dietary requirements of insects 15.7 Chromosomes and cells Meiosis 11.2 and 14.1 Principles of Mendelian inheritance 14.1 Polygenetic inheritance 14.2 Gametes and gamete formation. Fertilisation 16.1	25	