



Science Biology Assessment Levels



I can do this		9=		8+	8=	8-	7+	7=	7-	6+	6=	6-	5+	5=	5-	4+	4=	4-	3+	3=	3-	2+	2=	2-	1+	1=	1-	F+	F=	F-
Cells and tissues		Explain the role of meiotic cell division in halving the chromosome number to form gametes. Explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, lipids and proteins. Calculate cross-sectional areas of bacterial cultures and clear agar jelly using πr^2 . 5c. Explain how substances are transported into and out of cells through diffusion, osmosis and active transport.		Compare the processes of aerobic and anaerobic respiration. Describe the processes of transpiration and translocation, including the structure and function of the stomata. Calculate with numbers written in standard form (1b).		Discuss potential benefits and risks associated with the use of stem cells in Medicine. Describe cellular respiration as an exothermic reaction which is continuously occurring in all living cells. Carry out rate calculations for chemical reactions (1a and 1c). Explain how substances are transported into and out of cells through diffusion. Describe some of the substances transported into and out of a range of organisms in terms of the requirements of those organisms, to include oxygen, carbon dioxide, water, dissolved food molecules, mineral ions and urea. Calculate surface area:volume ratios (1c). Use percentiles and calculate percentage gain and loss of mass (1c).		Explain how electron microscopy has increased our understanding of sub-cellular Structures. Explain the aseptic techniques used in culturing organisms. Describe the process of mitosis in growth, including the cell cycle. Describe cancer as the result of changes in cells that lead to uncontrolled growth and division. Describe the function of stem cells in embryonic and adult animals and meristems in plants. Explain the mechanism of enzyme action including the active site, enzyme specificity and factors affecting the rate of enzymatic reaction. Use estimations and explain when they should be used (1a). Explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area:volume ratio. Describe the human circulatory system, including the relationship with the gaseous exchange system, and explain how the structure of the heart and the blood vessels are adapted to their functions. Explain how water and mineral ions are taken up by plants, relating the structure of the		Explain how the main sub-cellular structures of eukaryotic cells (plants and animals) and prokaryotic cells are related to their functions, including the nucleus/genetic material, plasmids, mitochondria, chloroplasts and cell membranes explain the importance of cell differentiation. Demonstrate an understanding of number, size and scale and the quantitative relationship between units (2a and 2h). Explain how red blood cells, white blood cells, platelets and plasma are adapted to their functions in the blood. Explain how the structure of xylem and phloem are adapted to their functions in the plant. Use simple compound measures such as rate (1a, 1c). Plot, draw and interpret appropriate graphs (4a, 4b, 4c and 4d)		Produce clear drawings of cells viewed under the microscope showing a representation of scale. Describe how cell structure is link to function.		Prepare good microscope slides and use a microscope correctly to view them at different magnifications. Explain the function of different parts of plant and animal cells. Explain how different cells are specialised for their functions.		Prepare microscope slides and view them under the microscope. Draw and label cells of plants and animals.		Use a microscope to view prepared slides. Label the main parts of plant and animal cells.		Identify and describe the functions of different parts of flowering plants; roots, stem/trunk, leaves and flowers. Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.										
Animal + Plant reproduction													Explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms.		Give reasons why some people are unable to have a baby. Describe some ways that infertility might be treated. Explain the differences in wind and insect pollinated flowers. Describe different methods of seed dispersal and why it is beneficial for seeds to be dispersed widely.		Describe the changes that occur from fertilisation to birth of a baby. Describe the effects of maternal lifestyle on the development of her baby. Describe the changes that occur in the menstrual cycle. Describe the differences between wind and insect pollinated flowers. Identify different types of fruits and seeds.		Describe sexual intercourse and fertilisation. Label the main structures in a flower and describe how fertilisation occurs.		Name the main organs of the male and female reproductive systems. Describe the functions of flowers and seeds.		Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Notice that animals (and humans) have offspring which grow into adults. Describe the life process of reproduction in some plants and animals							

<p style="text-align: center;">Environment and adaptation</p>		<p>Evaluate the evidence for the impact of environmental changes on the distribution of organisms, with reference to water and atmospheric gases.</p>	<p>Describe the importance of interdependence and competition in a community. Explain the effects of factors such as temperature and water content on rate of decomposition in aerobic and anaerobic environments. Calculate the efficiency of biomass transfers between trophic levels and explain how this affects the number of organisms at each trophic level. Explain some of the benefits and challenges of maintaining local and global biodiversity. Describe and explain some possible biotechnological and agricultural solutions, including genetic modification, to the demands of the growing human population.</p>	<p>Explain how some abiotic and biotic factors affect communities. Explain the importance of the carbon cycle and the water cycle to living organisms. Explain the role of microorganisms in the cycling of materials through an ecosystem. Describe pyramids of biomass and explain, with examples, how biomass is lost between the different trophic levels. Describe both positive and negative human interactions within ecosystems and explain their impact on biodiversity. Describe some of the biological factors affecting levels of food security including increasing human population, changing diets in wealthier populations, new pests and pathogens, environmental change, sustainability and cost of agricultural inputs. Calculate rate changes in the decay of biological material 1c. Calculate the percentage of mass 1c. Calculate arithmetic means 2b. Understand and use percentiles 1c. Extract and interpret information from charts, graphs and tables 2c and 4a.</p>	<p>Describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem. Recall that many different materials cycle through the abiotic and biotic components of an ecosystem. Describe the differences between the trophic levels of organisms within an ecosystem. Describe how to carry out a field investigation into the distribution and abundance of organisms in an ecosystem and explain how to determine their numbers in a given area. Plot and draw appropriate graphs selecting appropriate scales for the axes 4a and 4c.</p>	<p>Explain the interdependence of living organisms. Explain bioaccumulation in food chains and some effects of this.</p>	<p>Draw and interpret pyramids of numbers. Explain factors that affect population size. Use a quadrat to estimate plant populations. Describe the effects of modern food production techniques on the environment.</p>	<p>Can interpret food chains and webs. Can describe resources that organisms may compete for.</p>	<p>Name the main resources that plants and animals need to survive. Describe how organisms are adapted to survive in their habitat. Know that a quadrat can be used to estimate the population of plants.</p>	<p>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants and how they depend on each other. Identify and name a variety of plants and animals in their habitats, including micro-habitats. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things.</p>
<p style="text-align: center;">Variation and classification</p>	<p>Describe how genetic variants may influence phenotype: in coding DNA by altering the activity of a protein. Describe how genetic variants may influence phenotype in non-coding DNA by altering how genes are expressed.</p>	<p>Recall a simple description of protein synthesis. Explain simply how the structure of DNA affects the proteins made in protein synthesis and explain some of the possible benefits and risks, including practical and ethical considerations, of using gene technology in modern agriculture and medicine.</p>	<p>Describe DNA as a polymer 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. Describe the main steps in the process of genetic engineering.</p>	<p>Explain the following terms: gamete, chromosome, gene, allele/ variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype. Discuss the potential importance for medicine of our increasing understanding of the human genome. Recall that most phenotypic features are the result of multiple genes rather than single gene inheritance. 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. Describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics. Understand and use direct proportions and simple ratios in genetic crosses (1c) Understand and use the concept of probability in predicting the outcome of genetic crosses (2e).</p>	<p>Describe DNA as a polymer made up of two strands forming a double helix. Describe the genome as the entire genetic material of an organism. Explain single gene inheritance. Predict the results of single gene crosses. Describe sex determination in humans state that there is usually extensive genetic variation within a population of a species. Explain the impact of the selective breeding of food plants and domesticated animals. Extract and interpret information from charts, graphs and tables 2c and 4a.</p>	<p>Explain why organisms are classified into groups. Explain the basics of genetic engineering and why it can be useful.</p>	<p>Collect and graphically represent data for examples of continuous variation. Name the five kingdoms. Give examples of some invertebrate and plant groups. Describe how animals and plants can be bred to have useful characteristics. State that some diseases are inherited.</p>	<p>Explain variation caused by environmental factors. Collect and graphically represent data for examples of discontinuous variation. Name the five vertebrate groups and give examples of organisms.</p>	<p>Give examples of genetic and environmental variation in humans.</p>	<p>Explore and compare the differences between things that are living, dead and things that have never been alive. Recognise that living things can be grouped in a variety of ways. Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores. Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics.</p>

Photosynthesis			Explain the interaction of these factors in limiting the rate of photosynthesis. understand and use inverse proportion – the inverse square law and light intensity in the context of factors affecting photosynthesis.	Explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis. Understand and use simple compound measures such as the rate of a reaction (1a and 1c). Translate information between graphical and numerical form (4a).	Describe the process of photosynthesis and describe photosynthesis as an endothermic reaction. Describe photosynthetic organisms as the main producers of food and therefore biomass for life on Earth. Plot and draw appropriate graphs, selecting appropriate scales for axes (4a and 4c). extract and interpret information from graphs, charts and tables (2c and 4a)	Explain the importance of plants. Describe the main differences between photosynthesis and chemosynthesis. Explain how a leaf is adapted for photosynthesis.	Give examples of different uses of plants. Interpret the results of starch tests. Label a diagram showing a cross section of a leaf. Explain the effects of different elements on plant growth.	Explain why most food chains begin with a plant. Write the word equation for photosynthesis. Explain how a plant gets all the raw materials needed for photosynthesis. Give some ways in which a leaf is adapted for photosynthesis. State that plants also need mineral salts.	Draw some food chains. Name the raw materials needed for photosynthesis. Test a leaf for starch.	Explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how they vary from plant to plant
Food and digestion						Evaluate methods used to calculate the amount of energy in foods. Explain why foods need to be digested. Explain how enzymes work.	Carry out an investigation and calculate the amount of energy in different foods. Describe how food is digested both physically and chemically using enzymes. Describe how the small intestine is adapted for the absorption of food.	Describe what a balanced diet is and sources of the main food groups. Interpret the results of food tests. State that the energy content of different foods can be compared by burning them. Describe some factors that affect how much energy a person needs. Describe the functions of the main organs in the digestive system.	Name the food groups in a balanced diet. Carry out food tests. Label the main organs in the digestive system.	Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions. Identify that animals, including humans, need the right types and amount of nutrition and that they cannot make their own food; they get nutrition from what they eat. Recognise the impact of diet and lifestyle on the way their bodies function.
Lungs and gas exchange						Explain how the lungs are adapted for efficient gas exchange. Describe gas exchange surfaces in fish and insects. Explain the changes that occur during breathing.	Explain the functions of cilia and mucus lining the trachea. Describe the impact of asthma on the breathing system. Relate a model of the lungs to breathing. Describe the action of the heart as a double pump. Describe the main function of the blood.	State that gas exchange occurs across the walls of the alveoli. Describe how gases enter and leave leaves. Name the main components of blood.	Label the main organs in the breathing system. Measure lung volume. Name the main organs in the circulatory system.	Recognise the impact of exercise and lifestyle on the way their bodies function.
Respiration						Explain the effects of anaerobic respiration on the body during and after exercise. Explain how a biogas generator works	State the word equation for anaerobic respiration in animals and in yeast. Describe the differences between aerobic and anaerobic respiration in animals. Describe the uses of biogas generators.	State the word equation for aerobic respiration. Explain the differences between inhaled and exhaled air. State why yeast is used to make bread, wine and beer.	State some uses of energy in living organisms. Carry out experiments to show the differences between inhaled and exhaled air. State some benefits of regular exercise.	Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.
Muscles and bones						Explain antagonistic muscle action.	Describe the different types of muscle cells. State that muscles work in pairs. Describe the structure of a synovial joint.	Describe the functions of the skeleton. State that muscles contract to bring about movement. Name the different types of joints.	Identify the main structures in the skeletal system. Measure muscle strength.	Identify that humans and some other animals have skeletons and muscles for support, protection and movement. Describe the changes as humans develop to old age.
Inheritance and evolution			Describe simply how the genome, and its interaction with the environment, influence the development of the phenotype of an organism. Explain how evolution occurs through natural selection of variants that give rise to phenotypes best suited to their environment.	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. Describe the evidence for evolution, including fossils and antibiotic resistance in bacteria. Describe the impact of developments in biology on classification systems.	Describe the development of our understanding of genetics including the work of Mendel. 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.	Explain why organisms are given a scientific name. Explain the importance of biodiversity. Describe the basic history of genetic developments. Apply Darwin's theory of evolution to explain how tigers evolved to have stripes. Explain the importance of gene banks	Define what a species is. Describe the important stages in evolution by natural selection. Give examples of selective breeding of plants and animals. Describe changes that can lead to extinction.	State that all organisms are given a scientific name. State where genes are found inside a cell. Explain who Darwin was. State what extinction is.	Give examples of genetic and environmental variation. State that the gene is the unit of inheritance.	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Drugs and health		Evaluate some different treatments for cardiovascular disease.	Recall that many non-communicable human diseases are caused by the interaction of a number of factors. To include cardiovascular diseases, many forms of cancer, some lung and liver diseases and diseases influenced by nutrition, including type 2 diabetes. Understand the principles of sampling as applied to scientific data (2d).	Describe different types of diseases (including communicable and noncommunicable diseases).	Describe the relationship between health and disease. Explain how communicable diseases (caused by viruses, bacteria, protozoa and fungi) are spread in animals and plants. Describe a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS. Describe the process of discovery and development of potential new medicines, including preclinical and clinical testing. Explain the effect of lifestyle factors, including exercise, diet, alcohol and smoking, on the incidence of non-communicable diseases at local, national and global levels.	Describe the main stages in drug testing. Suggest reasons why some people misuse drugs and describe some effects of drug misuse on society.	Describe the effects of the different drug types on the body, and give examples. Describe the effects of some illegal drugs on the body.	Describe the effects of smoking and alcohol on the body. State that drugs are tested before they can be prescribed.	State that alcohol and nicotine are legal recreational drugs. Calculate the number of units of alcohol in different drinks. Name some illegal recreational drugs.	Recognise the impact of drugs on the way their bodies function.
Microbes	Describe the interactions between different types of disease. Describe some of the ways in which monoclonal antibodies can be used.		Explain the role of the immune system of the human body in defence against disease. Describe chemical plant defence responses (including antimicrobial substances). Explain how the spread of communicable diseases may be reduced or prevented in animals and plants, to include a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS.	Describe the non-specific defence systems of the human body against pathogens. Describe physical plant defence responses (including leaf cuticle, cell wall). Explain the use of vaccines and medicines in the prevention and treatment of Disease. Construct and interpret frequency tables and diagrams, bar charts and histograms (2c). Use a scatter diagram to identify a correlation between two variables (2g).	Translate information between graphical and numerical forms (4a)	Describe how a vaccine works. Explain why new antibiotics need to be developed.	Give examples of diseases caused by fungi, bacteria and viruses. State some mechanisms the body has to reduce the chance of pathogens entering the body. State that antibiotics are used to treat bacterial infections.	Give examples of diseases caused by fungi, bacteria and viruses. State some mechanisms the body has to reduce the chance of pathogens entering the body. State that antibiotics are used to treat bacterial infections.	Name the three groups of pathogens. Suggest what people can do to reduce the spread of infection. State that white blood cells defend the body against micro-organisms.	
Coordination and control	Explain some of the limitations in treating damage and disease in the brain and other parts of the nervous system. Explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle. Describe some of the effects of plant hormones, relating to gibberellins and ethane. Explain the response of the body to different temperature and osmotic challenges.	Explain some of the difficulties of investigating brain function. Explain the roles of thyroxine and adrenaline in the body as examples of negative feedback systems. Explain the use of hormones in modern reproductive technologies to treat infertility. Describe some of the different ways in which people use plant hormones to control plant growth. Describe the effect of ADH on the permeability of the kidney tubules.	Describe common defects of the eye and explain how some of these problems may be overcome. Describe the structure and function of the brain. Explain the use of hormones in contraception and evaluate hormonal and nonhormonal methods of contraception. Explain how glucagon interacts with insulin to control blood sugar levels in the body. Explain the effect on cells of osmotic changes in body fluids. Describe the function of the kidneys in maintaining the water balance of the body.	Explain how the structure of a reflex arc is related to its function. Explain how the main structures of the eye are related to their functions. Describe the roles of hormones in human reproduction, including the menstrual cycle. Describe the principles of hormonal coordination and control by the human endocrine system. 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. Describe some of the effects of plant hormones, relating to auxins. Explain how insulin controls blood sugar levels in the body. Describe the function of the skin in the control of body temperature. Translate information between numerical and graphical forms (4a).	Explain how the structure of the nervous system (including CNS, sensory and motor neurones and sensory receptors) is adapted to its functions. Explain the importance of maintaining a constant internal environment in response to internal and external change. Compare type 1 and type 2 diabetes and explain how they can be treated. Extract and interpret data from graphs, charts and tables (2c).					