**Shell IGCSE Biology Unit 1 – ‘I can do’ sheet**

* I understand that living organisms share the following characteristics:
* they require nutrition
* they respire
* they excrete their waste
* they respond to their surroundings
* they move
* they control their internal conditions
* they reproduce
* they grow and develop
* I can describe cell structures, including the nucleus, cytoplasm, cell membrane, cell wall, chloroplast and vacuole
* I can describe the functions of the nucleus, cytoplasm, cell membrane, cell wall, chloroplast and vacuole
* I can compare the structure of plant and animal cells
* I know how to investigate plant and animal cells with a light microscope
* I can describe the levels of organisation within organisms: organelles, cells, tissues, organs and systems
* I can define diffusion, osmosis and active transport
* I understand that the movement of substances into and out of cells can be by diffusion, osmosis and active transport
* I understand the factors that affect the rate of movement of substances into and out of cells, to include the effect of surface area to volume ratio, temperature and concentration gradient
* I understand why simple, unicellular organisms can rely on diffusion for movement of substances in and out of the cell
* I understand the need for a transport system in multicellular organisms
* I know how to investigate the effect of concentration on the rate of diffusion
* I know how to investigate the effect of osmosis on onion epidermis cells
* I understand the role of enzymes as biological catalysts in metabolic reactions
* I understand how the functioning of enzymes can be affected by changes in temperature, including changes due to change in active site
* I understand how the functioning of enzymes can be affected by changes in active site caused by changes in pH
* I can describe experiments to investigate how enzyme activity can be affected by changes in temperature
* I understand that a balanced diet should include appropriate proportions of carbohydrate, protein, lipid, vitamins, minerals, water and dietary fibre
* I can identify sources and describe functions of carbohydrates, proteins, lipids (fats and oils), vitamins A, C and D, and the mineral ions calcium and iron, water and dietary fibre as components of the diet
* I can identify the chemical elements present in carbohydrates, proteins and lipids
* I can describe the structure of carbohydrates as large molecules made up from smaller basic units: starch and glycogen from simple sugar; protein from amino acid; lipid from fatty acids and glycerol
* I can describe the tests for glucose and starch
* I can describe the tests for lipid and protein
* I can describe an experiment to investigate the energy content in a food sample
* I understand that energy requirements vary with activity levels, age and pregnancy
* I can describe the structures of the human alimentary canal and describe the function of the mouth, oesophagus, stomach, small intestine, large intestine and pancreas
* I understand the processes of ingestion, digestion, absorption, assimilation and egestion
* I can explain how and why food is moved through the gut by peristalsis
* I understand the role of enzymes, to include the digestion of starch to glucose by amylase and maltase, the digestion of proteins to amino acids by proteases and the digestion of lipids to fatty acids and glycerol by lipases
* I can describe the model gut experiment
* I can describe an experiment to explain the effect of changing digestive enzyme concentration
* I understand that bile is produced by the liver and stored in the gall bladder, and understand the role of bile in neutralising stomach acid and emulsifying lipids
* I can describe the structure of a villus and explain how this helps absorption of products of digestion in the small intestine

**Unit 1 Textbook reading**

* Chapters 1 & 4

**Shell IGCSE Biology Unit 2 – ‘I can do’ sheet**

* I understand that the process of respiration releases energy in living organisms
* I can write the word equation and the balanced chemical symbol equation for aerobic respiration in living organisms
* I can describe experiments to investigate the evolution of carbon dioxide and heat from respiring seeds or other suitable living organisms
* I can write the word equation for anaerobic respiration in plants and in animals
* I can describe the differences between aerobic and anaerobic respiration
* I can describe the structure of the thorax, including the ribs, intercostals muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes
* I understand the role of the intercostals muscles and the diaphragm in ventilation
* I can describe experiments to investigate the effect of exercise on breathing in humans
* I understand the role of diffusion in gas exchange in humans
* I can explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries
* I understand the biological consequences of smoking in relation to the lungs and circulatory system, including coronary heart disease
* I can describe how to test leaves for starch
* I can describe the process of photosynthesis and understand its importance in the conversion of light energy to chemical energy
* I can write the word equation and the balanced chemical symbol equation for photosynthesis
* I can describe experiments to investigate photosynthesis, showing the evolution of oxygen from a water plant, the production of starch and the requirements of light, carbon dioxide and chlorophyll
* I can describe the structure of the leaf and explain how it is adapted for photosynthesis
* I can explain how the structure of the leaf is adapted for gas exchange
* I can describe the role of stomata in gas exchange
* I understand gas exchange (of carbon dioxide and oxygen) in relation to respiration and photosynthesis
* I understand the role of diffusion in gas exchange in plants
* I understand the origin of carbon dioxide and oxygen as waste products of metabolism and their loss from the stomata of a leaf
* I know how to investigate how the structure of the leaf is adapted for photosynthesis
* I can describe experiments to investigate the effect of light on net gas exchange from a leaf, using hydrogen-carbonate indicator
* I understand that respiration continues during the day and night, but that the net exchange of carbon dioxide and oxygen depends on the intensity of light
* I understand how varying carbon dioxide concentration, light intensity and temperature affect the rate of photosynthesis
* I can describe how to investigate factors, including light intensity, CO2 concentration or temperature, affect the rate of photosynthesis
* I can describe how plants make use of glucose
* I understand that plants require mineral ions for growth and that magnesium ions are needed for chlorophyll and nitrate ions are needed for amino acids
* I understand that plants are able to respond to changes in their environment
* I understand that plants respond to stimuli
* I can describe the geotropic responses of roots and stems
* I can describe positive phototropism of stems
* I can describe an experiment to investigate the effect of light on plant growth
* I can explain classic tropism experiments and how a clinostat works
* I can describe an experiment of the effect of auxin on the growth of coleoptiles

**Unit 2 Textbook reading**

* Chapters 3, 10 & 12

**IGCSE Biology Shell summer project – ‘I can do’ sheet**

* I understand the terms population, community, habitat and ecosystem
* I can explain how quadrats can be used to estimate the population size of an organism in two different areas
* I explain how quadrats can be used to sample the distribution of organisms in their habitat
* I can explain the names given to different trophic levels to include producers, primary, secondary and tertiary consumers and decomposers
* I understand the concepts of food chains, food webs, pyramids of numbers, pyramids of biomass and pyramids of energy transfer
* I understand the transfer of substances and of energy along a food chain
* I can explain why only about 10% of energy is transferred from on trophic level to the next
* I can describe the stages in the water cycle, including evaporation, transpiration, condensation and precipitation
* I can describe the stages in the carbon cycle, including respiration, photosynthesis, decomposition and combustion
* I can describe the stages in the nitrogen cycle, including the roles of nitrogen fixing bacteria, decomposers, nitrifying bacteria and denitrifying bacteria (specific names of bacteria are not required)

**Shell summer project textbook reading**

* Chapter 14