# Cells- The building blocks of life

| **Modest progress**<br>**I can;** | | **Good progress**<br>**I can;** | | **Excellent progress**<br>**I can;** | |
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| Recognise and label normal and specialised animal and plant cells; use a microscope to make observations. | | Describe the functions of the nucleus, cell membrane, mitochondria, cytoplasm, cell wall, vacuole and chloroplast. | | Compare and contrast the similarities and differences between normal and specialised animal and plant cells. | |
| Describe unicellular organisms – including yeast, bacteria, euglena, paramecium and amoeba – as being either prokaryotes or eukaryotes. | | Describe the function of specialised parts of different unicellular organisms. | | Explain how different structures help organisms to survive. | |
| Recognise the role of diffusion in living organisms. | | Describe the process of diffusion, and name the materials needed by and those removed from the cell. | | Explain the factors that affect diffusion. | |
| Put the terms cell, tissue, organ and organ system in order of hierarchy, naming some common tissues, organs and organ systems in humans. | | Explain the terms cell, tissue, organ and organ system and the function of all the main organ systems in the body. | | Describe some benefits and disadvantages of multicellular organisms, compared to single-celled organisms. | |
| Describe the role of different parts of the flowering plant in reproduction. | | Explain the differences in insect-pollinated and insect-pollinated plants. | | Discuss the strengths and weaknesses of wind-pollinated and insect-pollinated plants. | |
| Recognise different seed-dispersal methods by the structures of the seeds. | | Identify key variables that need to be controlled when investigating the effect of seed design on seed dispersal. | | Explain the advantages and disadvantages of different seed-dispersal mechanisms. | |
| Name the main parts of the male<br>and female human reproductive systems. | | Describe the structures and functions of the main parts of the male and female human reproductive systems; describe how fertility problems may arise. | | Explain how the male and female reproductive structures are designed for fertilisation; describe methods to combat infertility. | |
| Recognise changes that occur during adolescence. | | Describe how the menstruation cycle works. | | Explain how and why some problems occur with menstruation. | |
| Identify substances passed on from a mother that will either help or harm her developing foetus. | | Describe the structures and functions of different parts of a pregnant uterus, describing how substances pass into and from a developing foetus. | | Explain how a pregnant uterus is different from a normal uterus, including the impact of different substances on the health and development of a foetus. | |

# Eating, Drinking and Breathing

| **Modest progress**<br>**I can;** | | **Good progress**<br>**I can;** | | **Excellent progress**<br>**I can;** | |
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| Describe the components of a healthy diet (food groups).<br>Recall the tests for starch and sugar.<br>Suggest some foods that contain starch and sugar. | | Explain the role of some of the<br>components of a healthy diet.<br>Recall the tests for protein and fats.<br>Suggest several foods that contain proteins and fats. | | Explain the role of all of the components of a healthy diet.<br>Predict the observations of food tests for several foods for starch, sugar, protein and fats. | |
| List groups of people who need different amounts of energy from food.<br>Describe some of the physical effects of obesity and starvation.<br>Describe the cause and symptoms of scurvy and suggest foods to treat it. | | Compare the energy requirements of different people such as men and women, teenagers and the elderly, pregnant and non-pregnant women.<br>Explain some of the physical effects of obesity and starvation. | | Explain why different groups of people have different energy requirements.<br>Use data on packaging to plan how individuals could meet their energy requirements. | |
| Name some of the organs of the digestive system.<br>Describe what is meant by physical digestion and chemical digestion. | | Locate the organs of the digestive system on a diagram.<br>Recall where physical digestion takes place and where chemical digestion takes place.<br>Explain how teeth and saliva are adapted to digest food. | | Name the organs of the digestive system in the order that food passes through them.<br>Explain the link between digestion and circulation. | |
| Describe the role of the stomach and small intestine in digestion.<br>Recall the names of some digestive enzymes. | | Describe the role of the oesophagus, pancreas and large intestine.<br>Describe some adaptations of the organs of the digestive system.<br>Explain the role of three digestive enzymes. | | Explain how the structure of each of the organs of the digestive system supports its function.<br>Explain how visking tubing can be used to model the digestive system. | |
| Describe the movements of the ribs and diaphragm during breathing in and out.<br>Describe what is meant by lung volume. | | Explain how changes in pressure in the chest bring about breathing in and out.<br>Describe two ways of measuring lung volume. | | Compare the pressure in the chest before breathing in and breathing out with atmospheric pressure. | |
| Describe which gas from the air is used in the body.<br>Describe where gases are exchanged between the lungs and the blood.<br>Describe examples of disease and lifestyle choices that affect the breathing system. | | Describe four features of the alveoli that help gas exchange.<br>Explain the effects of exercise, asthma and smoking on the breathing system. | | Explain the difference between breathing and respiration. | |

# Mixing, Dissolving and Separating

| **Modest progress**<br>**I can;** | | **Good progress**<br>**I can;** | | **Excellent progress**<br>**I can;** | |
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| Name and draw equipment and explain obvious laboratory risks. | | Select and draw apparatus accurately; explain safety precautions. | | Justify equipment choice and measurements; explain how to reduce risks. | |
| Use 2D images to represent a range of laboratory equipment. | | Use laboratory equipment safely to gather evidence. | | Record evidence in an effective way. | |
| Describe how to separate mixtures. | | Select and explain appropriate<br>separation techniques. | | Explain the choice and method of separation using correct terms. | |
| Describe the process of dissolving and the effect of temperature. | | Describe methods for producing crystals of different sizes. | | Use data to draw conclusions about solubility. | |
| Understand that seawater is a mixture. | | Explain why most water is not pure, and why this is not necessarily a problem. | | Explain why contaminated water is a problem and identify what can be done about it. | |
| Identify sources and uses of salt. | | Describe how salt is extracted. | | Recognise advantages and disadvantages of salt extraction<br>methods. | |
| Describe the process of distillation. | | Explain the physical processes involved in distillation. | | Identify the uses and advantages of distillation. | |
| Describe the composition of air. | | Identify sources of air pollution<br>and their impact. | | Explain how distillation can be used to separate gases in air. | |
| Identify mixtures using chromatography. | | Explain how to separate a mixture using chromatography and interpret chromatograms. | | Use chromatograms to explain the composition of mixtures; compare chromatography and DNA analysis. | |
| Explain the idea of a solvent. | | Explain mass changes during dissolving; select solvents for different uses. | | Use a model to explain dissolving and separation; link the uses of solvents to their properties. | |

# Elements, Compounds and Reactions

| **Modest progress**<br>**I can;** | | **Good progress**<br>**I can;** | | **Excellent progress**<br>**I can;** | |
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| Give some examples of elements, locate them in the Periodic Table and use the table to identify metals and non-metals. | | Give examples of elements and explain how they are organised in the Periodic Table. | | Define elements, use symbols, link the organisation of the Periodic Table to element features and explain how scientists organised the Periodic Table. | |
| Describe where some elements are found on Earth and identify some of the oldest known elements. | | Explain why different elements are found in different places and why they were discovered at different times. | | Use ideas and evidence to explain where and why elements and compounds were found. | |
| Identify some common properties of metal elements and non-metal elements and their uses. | | Classify metals and non-metals using their properties. | | Identify similarities and differences between metals and how these relate to their uses; compare and contrast properties of metals and non-metals. | |
| Identify metals and non-metals using data and suggest a reason for particular applications. | | Explain the properties of elements using data and why they are used for different applications. | | Select and justify the use of elements for different purposes, based on their properties. | |
| Describe an example of a compound and represent a chemical reaction using a simple model. | | Explain how compounds can be formed and explain a chemical reaction using simple models. | | Make links between simple models of compounds and chemical symbols. | |
| Identify changes during a reaction, relate these to reactants and products, and identify a difference between melting and burning. | | Make accurate observations, explain them using a simple model and a word equation and explain differences between chemical and physical changes in terms of atoms. | | Explain observations using word equations, relate chemical symbols to a simple circle model and use the correct terms and simple models to explain the differences between chemical and physical changes. | |
| Make observations and identify reactants and products. | | Make accurate observations, identify differences, and with support, describe reactions using simple models or word equations. | | Suggest reasons for different observations, describe reactions using word equations and start to use symbols to model chemical reactions. | |
| Recognise where carbon and its compounds are used. | | Explain different ways in which carbon is important. | | Explain, using the correct terms, where carbon is found and why it is useful. | |
| Identify oxidation and decomposition reactions. | | Explain why oxidation is a reaction; explain the differences between oxidation and thermal decomposition. | | Use models and word equations to explain changes during oxidation and thermal decomposition reactions. | |

# Forces and their effects

| **Modest progress**<br>**I can;** | | **Good progress**<br>**I can;** | | **Excellent progress**<br>**I can;** | |
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| List types of force and represent forces using force diagrams; use newtonmeters. | | Describe the size and direction of forces using force diagrams. | | Explain the how the size and direction of forces determines their effects. | |
| Identify gravity as a pulling force and distinguish between mass and weight. | | Describe what is meant by mass, explain how gravity forces affect weight, explain why weight varies from planet to planet and explain the term 'weightless'. | | Explain weight as a gravitational attraction between masses which decreases with distance; use scientific concepts to explain the difference between mass and weight. | |
| Know that forces can lead to changes in shape and investigate the change of shape of a spring. | | Explain the relationship between the amount of change in shape and the size of the force, and use data to state Hooke's Law. | | Collect accurate data about forces changing the shape of an object, recognise when shape changes regularly with force size, and explain behaviour when the elastic limit is exceeded. | |
| Identify some situations where forces are balanced and recognise that unbalanced forces are needed for a change to take place. | | Identify forces acting in pairs, and apply an understanding of forces to explain how a force can cause a change in speed and direction. | | Identify different examples of forces and reaction forces, and predict the changes of speed and direction that different forces can cause. | |
| Recognise that friction is a force that slows objects down or stops them from moving. | | Explain that friction is a contact force opposing the direction of movement. | | Provide a detailed explanation of friction between surfaces. | |
| List examples where friction is useful and when it is unwanted, recognise that drag forces slow things down, and recognise that streamlining helps objects move through air or water. | | Compare contrasting situations involving friction, explain how friction can be increased or reduced, explain air and water resistance, and explain how streamlining reduces such resistance. | | Explain air and water resistance in terms of frictional drag, explain the forces on flying or falling objects, and explain streamlining using scientific vocabulary. | |
| Explain how to find the speed of an object. | | Explain the concept of speed and use understanding of speed to explain how the equation for speed is derived. | | Independently derive the equation for speed and use understanding of the speed equation to explain how speed cameras work. | |
| Describe the balancing of a see-saw with different loads, recognise situations where balance is important, and describe the effect of increasing the length of a lever. | | Explain how a fulcrum allows a turning motion, explain the effect of changing the size of a force or its distance from the fulcrum, and use and apply the law of moments. | | Explain moments using force diagrams and the law of moments, explain how levers can act as force multipliers, and explain and demonstrate the design principles of a crane. | |

# Energy transfers and Sound

| **Modest progress**<br>**I can;** | | **Good progress**<br>**I can;** | | **Excellent progress**<br>**I can;** | |
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| Recognise that energy is transferred by a range of different processes. | | Interpret and draw energy transfer diagrams for a range of different energy transfers, including gravitational potential energy, elastic potential energy, chemical energy and electrical energy. | | Use Sankey diagrams to explain a range of energy changes and demonstrate that all energy is always accounted for. | |
| Identify simple energy transfers which involve gravitational potential energy, elastic potential energy and chemical energy. | | Explain how energy is transferred using elastic, gravitational and chemical potential energy. | | Analyse changes in gravitational potential energy in different situations, and compare the energy per gram of different fuels. | |
| Recognise that work can be done by a force, and that the work done is equal to the energy transferred. | | Calculate the work done in different situations, given the size of the force and the distance moved. | | Explain how simple machines transfer energy in a way that offers an advantage. | |
| Recognise what is meant by temperature and how it is measured. | | Explain and make predictions about the direction of heat flow in different situations. | | Explain the difference between temperature and heat. | |
| Recognise that sound energy is transferred by waves and describe how sound waves are made in different situations. | | Explain how longitudinal waves carry sound. Relate the terms frequency and amplitude to sounds. | | Interpret and devise wave diagrams to represent sounds of different wavelength and amplitude. | |
| Recognise an echo as a reflection of sound. | | Describe how to measure the speed of sound, and how the speed of sound can be used in different applications to measure distances. | | Use calculations to measure the speed of sound and the distance of objects in different applications, applying ideas about echoes. | |
| Recognise that some materials are good at reflecting sound and others can absorb it. | | Use the particle model to explain why sound cannot travel through a vacuum. Explain what is meant by reflection and absorption of sound. | | Use the particle model to explain why the speed of sound is different in solids, liquids and gases, and how energy is transferred in the reflection and absorption of sound. | |
| Recognise that different organisms hear differently. Name different parts of the human ear. | | Explain how parts of the ear are adapted to enable us to hear. Describe what is meant by the term hearing range. | | Compare and contrast the detection of sound by an ear and a microphone. | |
| Describe what is meant by infrasound and ultrasound. | | Describe a wide range of applications for ultrasound and infrasound. | | Explain why these waves are suitable for their applications. | |