

Ecosystems 2 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional
Know the difference between aerobic and anaerobic respiration	Know what is happening during aerobic respiration	Use a word equation to describe aerobic respiration	Explain why specific activities involve aerobic or anaerobic respiration
Know that plants make glucose	Explain how plants get the resources they need for photosynthesis	Use a word equation to describe anaerobic respiration	Explain how bread, beer and wine are made
Know what fertilizers are used for	Explain the structure and function of the main components of a leaf	Know the word equation for fermentation	Show graphically how different factors affect the rate of photosynthesis
	Know factors that affect the rate of photosynthesis	Use a word equation to explain photosynthesis	Explain the role of nitrates in plant growth
	Explain how a plant uses minerals for healthy growth	Explain how a leaf is adapted for photosynthesis	
		Explain how to test a leaf for starch	

Energy 1&2 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional
Compare energy values of food and fuels	Explain the energy resources used to generate electricity	Compare the energy in food <u>an</u> fuels with the energy needed for different activities	Explain how energy is transferred from an energy resource to an electrical device in the home
Know the unit of energy content for food	Explain what you pay for when <u>you</u> pay your electricity bill	Explain the advantages and disadvantages of different energy resources	Compare the energy usage and cost of running different home devices
Know what dissipation means	Use a model of energy transfer between stores to explain how jobs get done	Calculate the cost for home energy usage	Explain how the energy of an object depends on its speed, temperature, height or whether it is stretched or compressed
Explain what simple machines do	Calculate the useful energy and the amount dissipated given values of input and output energy	Show how energy is transferred between energy stores in a range of real-life examples	Use a diagram to show how a lever works
Know some sources of infrared radiation	Explain what work is	Explain how energy is dissipated in a range of situations	Explain how thermal insulators can reduce energy transfer
	Know the difference between energy and temperature	Compare the work needed to move objects different distances	
	Know what the thermal energy of an object depends on	Explain in terms of energy, why objects change temperature	
	Explain how energy is transferred by particles	Compare insulation methods in terms of conduction, convection and radiation	
	Explain how energy is transferred from the Sun to the Earth	Sketch diagrams to show convection currents	

Genes 1 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional
Know the causes of variation in a species	Explain whether characteristics are inherited or environmental	Explain the difference between continuous and discontinuous variation	Explain how organisms adapt to environmental changes
Know the changes that take place during puberty	Know the two types of variation	Represent variation within a species using graphs	Explain the causes of low fertility in male and female reproductive systems
Name the main structure in the male and female reproductive systems, including gametes	Explain how species are adapted to their environments	Explain how variation helps species to survive environmental changes	Explain how substances are passed between the mother and the foetus
Know what is meant by fertilisation	Know the difference between adolescence and puberty	Describe the main changes that take place during puberty	
Know what the menstrual cycle is	Describe the function of the main structures in the male and female reproductive systems	Explain the structure and function of the gametes	
	Explain the process of fertilisation	Explain what happens during gestation and birth	
	Know what is meant by gestation	Explain the main stages in the menstrual cycle	
	Know the length of the menstrual cycle		

Earth 1&2 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional
Know the three rock layers of the Earth	Compare the layers of the Earth	Explain why sedimentary, igneous and metamorphic rocks have particular properties based on how they were formed	Construct a labelled diagram to explain the process of rock formation
Describe the objects that you can see in the night sky	Explain how sedimentary, igneous and metamorphic rock are formed	List the processes that interconvert sedimentary, igneous, and metamorphic rocks	Explain why a substance has a particular property based on how it was formed
Know the structure of the universe	Know the model of the solar system	Describe the properties of ceramics	Explain the choice of particular units for measuring distance.
Name some phases of the moon	Explain the appearance of the Moon and planets from diagrams	Explain why we see objects in the solar system and why they appear to move as they do	State what phenomena the Solar System model can be used to explain
Know how an increase in greenhouse gases has increased the temperature on Earth	State the names and percentages of the gases that make up the Earth's atmosphere	Explain why places on the Earth experience different daylight hours and seasons	Explain processes that recycle carbon naturally
Name two greenhouse gasses	Explain how human activities affect the carbon cycle	Explain why we see phases of the Moon	Use the carbon cycle to show how carbon is recycled.
Know one cause of global warming that scientists have evidence for	Know methods for extracting metals	Describe and explain what is meant by global warming	Explain how global warming can impact on climate and local weather patterns
Know what an ore is	Describe how the Earth's resources are extracted	Suggest factors to consider when extracting metals	Justify the choice of extraction method for a metal, given data about reactivity
Know why certain natural resources will run out	Explain why recycling some materials is particularly important	Explain how the Earth's resources are recycled	

Matter 2 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional
Know what an element is	Know the chemical symbols of 16 elements	Use observations from experiments to explain why a substance must be an element	Use particle diagrams to classify a substance as an element, <u>mixture</u> or compound and as molecules or atoms
Know what atoms are	Represent atoms using particle diagrams	Represent molecules, elements, <u>mixtures</u> and compounds using particle diagrams	Name compounds using their chemical formulae
Know what a compound is	Know the structure of a polymer	Use chemical formulae to name the elements present and determine their relative proportions	Explain how polymer properties depend on their molecules.
Know what the groups and periods of the Periodic Table tell you about the elements	Use data to describe a trend in physical properties	Represent atoms, molecules, elements, <u>mixtures</u> and compounds using the particle diagrams	Describe the reactions of any Group 0,1 and 7 elements
	Know the properties and reactivity of the Group 1 elements	Represent polymers using particle diagrams	
	Know the properties and reactivity of the Group 7 elements	Use patterns in data for physical properties to estimate a missing value for an element	
	Know the properties of reactivity of the Group 0 elements	Use data and observations to describe trends and predict properties of Group 0, 1 & 7 elements	

Organisms 2 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional
Know the function of the gas exchange system	Explain why your breathing rate and volume can change	Explain how parts of the gas exchange system are adapted to their function	Explain the process of inhaling and exhaling
Know the difference between medicinal and recreational drugs	Explain how exercise, smoking, and asthma affect the gas exchange system	Explain what happens during breathing using the bell jar model	Compare the nutritional content of different foods or diets
Know what kind of drug ethanol is	Explain the effects of alcohol on health and behaviour	Explain the effects of drugs on health and behaviour	Describe how to test foods for starch, lipids, sugar and protein and know the positive result for each test
Explain the components of a healthy diet and their functions in the body	Explain the effect alcohol has on conception and pregnancy	Explain the effects of tobacco smoke on health	Calculate the energy requirements of different people
Know how you get and use energy	Explain some health issues caused by an unbalanced diet	Describe the effects of deficiencies or excesses of different nutrients on a person's health	Explain how components of the digestive system are adapted to their function
	Know what happens during digestion	Describe the structure of the main parts of the digestive system	Explain all the events that take place in turning a meal into simple food molecules
	Know the role of enzymes in digestion	Explain the role of bacteria in digestion	

Electromagnets 1&2 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional
Make a circuit to make a bulb light up	Use an analogy or model to explain potential difference	Explain how potential difference affects the way components work	Use a model or analogy to explain resistance
Draw 6 circuit symbols	Draw circuit diagrams and make circuits that measure potential difference	Use formulae to calculate resistance	Explain the potential difference across components in series and parallel circuits
Know the properties of an electric field	Make circuits and describe what components with resistance do	Explain how resistance affects the way components work	Explain what happens to current in series and parallel circuits
Know how charged objects interact	Explain what is meant by current	Make series and parallel circuits from circuit diagrams	Explain what happens to current when you change components in a circuit
Know how magnets interact	Explain how magnetic field diagrams tell you about the direction and strength of a magnetic field	Explain what happens when charged objects are placed near to each other	Use a sketched diagram to explain how an object becomes charged up
	Explain how to make an electromagnet	Explain observations about navigation using the Earth's magnetic field	Describe how the strength of an electromagnet changes with distance.
		Explain how to change the strength of an electromagnet	

Reactions 2 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional
Know the energy transfers involved in combustion	Write word equations for combustion reactions	Use particle diagrams to show what happens in a chemical reaction	Write word equations from information about chemical reactions
Know what is meant by conservation of mass	Know what thermal decomposition is	Explain the model of chemical change and conservation of mass	Predict the products of the combustion of a given reactant
	Explain observations about mass in a chemical or physical change	Use particle diagrams to explain what happens in combustion reactions	Predict the products of the decomposition reaction of a given reactant.
Write word equations for decomposition reactions		Balance symbol equations	
Use particle diagrams to describe what happens in decomposition reactions		Use experimental observations to distinguish exothermic and endothermic reactions	
Calculate masses of reactants and products		Identify whether an energy level diagram is showing an exothermic or endothermic reaction	
	Explain endothermic and exothermic reactions	Use energy level diagrams to explain energy changes in changes of state and chemical reactions	

Genes 2 Knowledge Grid



Foundation	Intermediate	Higher	Exceptional	
Know some factors that may lead to extinction	Explain the process of peer review	Explain the theory of natural selection	Explain why species evolve over time	
Know what is meant by an endangered species	Describe the importance of biodiversity in maintaining plant and animal populations	Evaluate the evidence that Darwin used to develop his theory of natural selection	Explain how DNA mutation may affect an organism and its future offspring	
	Explain why a species has become extinct	Explain how a lack of biodiversity can affect an ecosystem	Describe how scientists worked together to discover the structure of DNA	
	Explain some techniques used to prevent extinction	Describe how preserving biodiversity benefits humans	Use a Punnett square to show how genes are inherited	
	Explain how characteristics are inherited	Explain the relationship between DNA genes and chromosomes	Explain how a product is produced using genetic modification	
	Explain why offspring are not identical to their parents	Explain the structure of DNA		
		Explain the difference between dominant and recessive alleles		
Describe some advantages of genetic modification				