COLLINS NEW ENTRY LEVEL SCIENCE – Scheme of Work

The course consists of 39 'Items', 13 for each of Biology, Chemistry and Physics. The 'Items' are related to those aspects of science which feature in the life of candidates in the Twenty-First Century.

The subject content of each 'Item' can be delivered in approximately four hours, including the time required for practical work and assessment.

Biology Items	Title	Chemistry Items	Title
B.1	Dead or Alive	**C.1**	Acids and Alkalis
B.2	Babies	**C.2**	Cooking and Cleaning
B.3	Extinction	**C.3**	Colours and Smells
B.4	Casualty	**C.4**	Heavy Metal?
B.5	Healthy Eating	**C.5**	Fibres and Fabrics
B.6	Control Systems	**C.6**	Clean Air?
B.7	Gasping for Breath	**C.7**	Strong Stuff
B.8	Creepy Crawlies	**C.8**	Restless Earth
B.9	Fooling your Senses	**C.9**	How Fast? How Slow?
B.10	Food Factory	**C.10**	Sorting Out
B.11	Drugs in Society	**C.11**	CSI Plus
B.12	My Genes	**C.12**	Fuels
B.13	Body Wars	**C.13**	What's Added to Our Food?

Physics Items	Title
P.1	Getting the message
P.2	Our Electricity Supply
P.3	Attractive Forces
P.4	Pushes and Pulls
P.5	Let there be Light!
P.6	Final Frontier
P.7	Alternative Energy
P.8	Deep Impacts
P.9	Driving Along
P.10	Hot Stuff!
P.11	Nuclear Power
P.12	Full Spectrum
P.13	Medical Rays

Content statement	Lesson	Worksheet	CAN-DO Task	Practical Task	Student Book
B1: Dead or alive					
Know the life processes: growth, digestion, reproduction, movement, sensitivity, excretion, and respiration.	B1 Part 1				p8
Be able to name the body systems involved with these life processes: circulatory, respiratory and digestive.					
Be able to label the nucleus, cytoplasm and cell membrane of an animal cell.	B1 Part 3	b1_3_cells b1_3_practical		Investigate cheek cells under microscope	p9
Know that the nucleus controls the cell; the membrane allows some chemicals to pass in and out, and the cytoplasm is where useful chemical reactions take place.					
Know that new body cells are made when cells divide.					
Know that new body cells are needed for growth and repair.					
Recall that cells use oxygen to release energy from glucose (sugar), and this is called respiration.	B1 Part 4	b1_4_heart_rate b1_4_practical	(1) I can measure a person's breathing rate or pulse	Measure heart rate before and after exercise	p10
Recall that energy is needed for muscle contraction.					
Understand that during exercise muscles need to be supplied with more oxygen and be able to relate this to an increase in heart rate.					
Interpret simple data on breathing and pulse rates during exercise [no recall expected].					
Understand that general fitness can be indicated by recovery times in pulse and breathing rates.					
Know that warming up and down can help reduce muscle damage during exercise.					
Be able to name and locate: lungs, heart, kidneys, liver, brain, stomach.	B1 Part 1 Part 2	b1_1_organs b1_1_transplant b1_1 body cut out b1_2a_ body organs			p11
Know that some healthy organs can be removed from dead people and transplanted into hosts.					
Know that transplants can be rejected.					
Know that people can opt to donate their organs and can carry donor cards.					
Understand why transplant organs have to be kept cold during transport.					
B2: Babies					
Know the names of the main organs of the male reproductive system: penis, testis, sperm duct.	B2 Part 1	b2_1_reproductive organs			p14
Know the functions of testes (make sperm), ovary (make eggs).					
Know that fertilisation occurs by fusion of sperm and egg cells.					
Know that the fertilised egg develops into a foetus.					
Continued…					

Know that identical twins develop from the same fertilised egg.	B2 Part 2	b2_2_baby development			p15
Know that non - identical twins develop from two different fertilised eggs.					
Know some of the changes that occur in the female body after fertilisation: stopping periods and weight gain.					
Know that tests are carried out to monitor progress of mother and foetus during pregnancy: blood pressure, height, weight.					
Be able to name and locate the placenta, cord, foetus and bag of water and know the basic role of these structures.	B2 Part 3	b2_3a_placenta b2_3b_interpret data			p16 p17
Know the early stages of labour: water breaking, labour pain.					
Know the placenta is lost as the afterbirth.					
Interpret data from babies' growth.					
Know that periods start again after childbirth.					
Recall that the human population is increasing.	B2 Part 4	b2_4_human population b2_4b_wordsearch	(13) I can read data from a graph.		p17
Interpret data on human population size.					
Understand that increased population will put greater demand on resources: homes, food, clean water, fuel, more household waste and sewage.					
B3: Extinction					
Recall that fossils provide evidence of living organisms from long ago.	B3 Part 1	b3_1_Rocks b3_1_practical	(2) Given information I can match an animal to where it lives or when it lived.	Making plaster cast of fossils	p20
Know that some rocks are formed in layers.					
Know that the soft part of bodies rot but teeth and bones are preserved.					
Be able to sequence the main stages of fossil formation.					
Recall that animals and plants can also be preserved in ice, amber and tar pits.					
Know that life on Earth began about 3500 million years ago and that these were very simple living things.	B3 Part 2	b3_3_evolution			p21
Know that living things have been changing ever since because of evolution					
Know that some species have changed very little over thousands of years e.g. crocodiles.					
Be able to identify variations in animals or plants of the same species [no recall expected].	B3 Part 3	b3_3_dinosaurs variation b3_3_practical		Flying dinosaurs to show adaptations	p22
Understand that living things compete for shelter, food and mates, in order to survive.					
Know that the survivors can breed and pass on their features to the next generation.					
Understand the terms *habitat* and *species*.	B3 Part 4	b3_4_endangered and extinct species	(14) I can collect (scientific) information about an endangered or extinct animal		p23
Understand that a species may become extinct if their habitat changes or another species is better adapted to survive there.					
Understand how human beings have caused some species to become endangered or extinct: habitat destruction, hunting, pollution.					

Interpret data on population sizes of endangered species.					
Recall examples of endangered species: panda, gorilla, primroses.					
Recall examples of extinct species: dinosaurs, sabre-toothed tiger, dodo.					
B4: Casualty					
Understand the importance of maintaining the supply of oxygen to the body.	B4 Part 1	b4_1_accidents			p26
Know the steps to take in an emergency situation.					
Know how and when to call for help: 999, 112.					
Know the ABC code: airway, breathing, circulation.					
Know the RICE procedure for soft tissue damage.					
Know that the heart is made of muscle.	B4 Part 2	b4_2_heart b4_2_practical	(1) I can measure a person's breathing or pulse rate	Demonstration of heart dissection (this can be done as a class practical depending on ability of group)	p27
Know that the heart pumps to force blood out to the lungs or around the body.					
Know that the heart acts as a double pump.					
Know why the heart muscles need a good blood supply.					
Know that arteries carry blood away from the heart, and veins to the heart.	B4 Part 3	b4_3_blood vessels b4_3_practical		Using a microscope to look at blood vessels	p28
Be able to recognise the difference between an artery and a vein.					
Understand that a cut to a major blood vessel is more serious than a cut to a capillary.					
Know that the body can cope with a 10% blood loss.					
Know that 30% blood loss is serious and that the casualty may need a blood transfusion.					
Know that heart disease often happens when arteries supplying the heart with blood become blocked.	B4 Part 4	b4_4_heart disease			p29
Recall that the risk of heart disease is increased by some factors including high-fat diet and smoking and understand that these factors increase the risk of heart disease, but will not cause it in everyone.					
Understand that one case is not enough evidence to show a pattern between one change and another.					
Recall that regular exercise reduces the risk of heart disease.					
B5: Healthy Eating					
Know that a balanced diet must contain: water, carbohydrates, protein, fats, vitamins, minerals.	B5 Part 1	b5_1a_balanced diet b5_1b_different diets	(25) I can record my daily protein intake.		p32 p33
Know examples of foods that contain carbohydrates, protein, fats, vitamins, minerals.					
Interpret data on nutrient content of different foods.					
Know that a poor diet could lead to someone being overweight or underweight.					
Know that being overweight or underweight is linked to increased health risks.					
Understand that exercise is important for a healthy lifestyle.					

Know that different people have different lifestyles and therefore dietary requirements.					
Know that the diet in many parts of the world is deficient in protein.					
Know that a high protein diet is needed by teenagers for growth.					
Know that carbohydrates and fats provide energy, and protein is needed for growth and repair.	B5 Part 2	b5_2_food labels b5_2_practical	(4) I can safely carry out a food test for starch. (15) I can safely carry out a food test for sugar.	Testing food for starch, sugar, protein and fat.	p34
Know that food labels give nutritional information.					
Interpret simple data on food tests [no recall expected].	B5 Part 3	b5_3_practical		Energy in food	p34
Know the names and positions of the main organs of the human digestive system: mouth, stomach, small intestine, large intestine.	B5 Part 4	b5_4_gut b5_4_practical		Using enzymes to show digestion in the small intestine.	p35
Understand, in simple terms, the processes of digestion and absorption and where these events occur					
Know that enzymes speed up reactions in humans.					
Understand that enzymes speed up digestion to produce smaller soluble chemicals (which can pass into the blood).					
Know that there are different enzymes in the mouth, stomach and intestines, each of which digests a different type of food.					
B6: Control Systems					
Understand that changes in our surroundings can affect our body's internal environment.	B6 Part 1	b6_1_heat loss and gain	(16) I can produce a poster to warn old people about the risks of hypothermia		p38
Understand that the body's internal environment can change and that the body tries to control this change.					
Know that the body's temperature is about 37ºC.					
Know that the body loses heat in cold air.					
Know that working muscles generate heat.					
Know that shivering and moving produce heat.					
Know that raised hair, stored fat and clothing reduce heat loss.					
Understand that temperature extremes are dangerous to your body.					
Know that sweating and more blood flow near the skin helps to keep the body cool.	B6 Part 2	b6_2_practical	26) I can use a thermometer to accurately measure temperature	Investigate the effect of sweating on heat loss.	p39
Be able to interpret the results of simple cooling experiments.					
Know the ways the body gains or loses water.	B6 Part 3	b6_3_water balance			p40
Be able to name and locate the kidneys and the bladder.					
Know that kidneys remove excess water.					

Know that sugar levels need to be controlled. Know that the body controls sugar levels with insulin. Be able to name and locate the pancreas. Know that insulin is produced by the pancreas. Know that diabetes can be managed by controlling sugar levels in the diet and use of insulin.	B6 Part 4	b6_4_diabetes			p41
B7: Gasping for Breath					
Understand how the movement of the ribs brings about breathing. Be able to name and locate the windpipe, lungs and ribs on a diagram of the thorax.	B7 Part 1	b7_1_chest and lungs b7_1_practical		Measure lung volume	p44
Recall that air pollution may cause asthma and that asthma causes the airways to narrow. Understand that it is difficult to prove that air pollution causes asthma**.** Interpret data about asthma [no recall expected]. Know that an inhaler can relieve and prevent the symptoms of asthma. Understand that lung volumes vary and may be affected by smoking and asthma. Understand that the speed of exhalation varies and may be affected by smoking and asthma.	B7 Part 3	b7_3_asthma b7_3_practical		Making a peak flow meter	p46
Know that smoking can cause heart disease and cancer. Know that tobacco smoke contains carbon monoxide, nicotine, tars and solid particles. Know that carbon monoxide is odourless colourless and poisonous. Know that nicotine is addictive and that nicotine patches can be used to help someone give up smoking. Interpret data relating to health studies on smoking. Know that other people may be affected by passive smoking.	B7 Part 4	b7_4_smoking b7_4_practical		Smoking machine	p47
Recall that in all cells, glucose from food and oxygen breathed in, combine to release energy, and that this process is called respiration. Recall that carbon dioxide and water are the waste products of respiration. Know how to test for carbon dioxide using limewater, and for water vapour with a mirror or cobalt chloride paper. Recall that carbon dioxide is removed from our bodies via the lungs. Know that during exercise, more oxygen and glucose is needed by muscles, and water and carbon dioxide are removed more quickly.	B7 Part 2	b7_2_respirate b7_2_practical	(1) I can measure a person's breathing rate or pulse. (17) I can carry out a test to show the presence of carbon dioxide	Comparing inhaled and exhaled air	p45
B8: Creepy Crawlies					
Know that plants make their own food from carbon dioxide in the air and water. Know that this process is called photosynthesis.	B8 Part 1	b8_1_photosynthesis b8_1_practical			p50

Know that plants also need light to make their own food.					
Know that oxygen is a waste product of photosynthesis.					
B8Know that animals get their food from eating plants or other animals.	B8 Part 2	b8_2_predators and prey			p51
Know that some animals are adapted to survive being caught as prey.					
Understand how some animals are adapted as successful predators.					
Understand the terms *herbivore* and *carnivore*.	B8 Part 3	b8_3_food chains			p52
Be able to construct a simple food chain with a plant, a herbivore and a carnivore.					
Be able to interpret a simple food web (limited to 3 organisms at any level).					
Understand how a change affecting one species in a food web can affect another species in the same food web.					
Be able to describe and carry out simple sampling methods: limited to pooters, nets, pitfall traps and quadrat surveys.	B8 Part 4	b8_4a_practical b8_4b_practical	(28) I can measure length / distance accurately (2) Given information I can match an animal to where it lived. (27) I can carry out a simple survey of a habitat.	Sorting leaf litter Quadrat survey	p53
Be able to use simple keys to name plants and animals.					
Recall the meaning of the term *habitat*.					
Understand that organisms are adapted to live in their habitat.					
Recall that a variety of plants live in a 1m quadrat area.					
Be able to estimate the number of plants in an area using results of a quadrat survey.					
B9: Fooling Your Senses					
Be able to label a diagram of the eye (limited to cornea, iris, pupil, lens, retina, optic nerve).	B9 Part 1	b_1_eye structure			p56
Recall the job of the pupil, lens, retina, optic nerve and iris.					
Recall that humans have good binocular vision, but a limited field of view.					
Know the differences between monocular and binocular vision.					
Be able to use the position of eyes to state if an animal is a predator or prey.					
Know that 3D vision enables distances to be judged.					
Know that the nose is lined with nerves sensitive to chemicals in the air.	B9 Part 2	b9_2_taste b9_2_practical		Tasting food with and without the help of the nose	p57
Know that taste buds are located on the tongue and are sensitive to four tastes: salt, sweet, sour, bitter.					
Know that different areas of the tongue are more sensitive to different tastes.					
Understand that the flavour of food diminishes when we have a cold because we cannot smell.					
Recall that sensor (receptor) cells detect stimuli, and effector cells (muscles) produce a response.	B9 Part 3	b9_2_reflexes b9_3_practical		Testing reflexes by catching a ruler	p58

Understand the need for simple reflex actions, i.e. for protection.					
Recall examples of simple reflex actions limited to knee jerk, iris, touching a hot surface.					
Interpret simple data on reaction times.					
Know that the skin contains sensory nerves for touch, temperature, pain and pressure.	B9 Part 4	b9_4_practical	(6) I can add results to a bar chart (13) I can read data from a graph	Using points to find out how sensitive the skin is	p59
Know that pressure sensors are deeper than pain sensors.					
Know that some areas of skin contain more nerve endings than others.					
B10: Food Factory					
Know that plants make sugars and some is stored as starch.	B10 Part 1	b10_1_cloning plants b10_1_practical		Germinating seeds under different conditions	p62
Know how plants can be propagated limited to: - seeds - cuttings - runners - tubers.					
Know that cuttings, runners and tubers are examples of cloning.					
Know that cloning produces identical offspring.					
Know the conditions necessary for germination: warmth, air and water.					
Understand that there are different types of soil and that this can affect the type of plants that grow there.	B10 Part 2	b10_2_soil b10_2_practical	(18) I can use Universal Indicator solution to find pH.	Finding the pH of soil	p63
Know that some soils dry out easily and others get waterlogged.					
Know how to test the pH of soil.					
Interpret data to determine pH preferences of different plant species.					
Know that fertilisers supply the chemicals that plants need for growth.	B10 Part 3	b10_3_growing crops			p64
Know that fertilisers include nitrogen for improved growth, phosphorus for good root growth and potassium for flowers and fruit growth.					
Know that organic farmers use manure and crop rotation to improve soil fertility.					
Be able to distinguish between facts and opinions about organically grown food.					
Know that most of the milk we buy comes from cows (or sheep or goats) but is processed before being supplied to customers.	B10 Part 4	b10_4_milk b10_4_practical		Making cheese or yoghurt	p65
Know that cows can be selectively bred to produce higher milk yields.					
Know the stages in providing milk to people's homes.					
Know how milk is pasteurised and sterilised.					
Understand why it is important to test samples of milk before it is sold.					

B11: Drugs in Society					
Recall that drugs can be beneficial or harmful.	B11 Part 1	b11_1_practical		The solubility of different types of aspirin	p68
Understand that some drugs are only available on prescription because they can be harmful if not used properly.					
Know how to test for solubility of soluble tablets e.g. aspirin.					
Know that a drug is a chemical that has an effect on the mind or the body.					
Recall the names of legal drugs limited to: - caffeine (found in coffee, tea and some soft drinks) - aspirin / paracetamol - alcohol - nicotine (found in cigarettes and tobacco).	B11 Part 2	b11_2_practical b11_2_should cannabis be legal?	(3) I can measure the effect of alcohol on heart rate.	The effect of caffeine on heart rate	p69
Know that some people want to make some recreational drugs legal e.g. cannabis.					
Know that some drugs are addictive.	B11 Part 3	b11_3_classifying drugs			p70
Know the effects of different categories of drugs and be able to name one example in each category limited to: - depressant: slows down the brain e.g. alcohol, solvents - pain killer: blocks nerve impulses e.g. aspirin, paracetamol - stimulant: increases brain activity e.g. nicotine, caffeine, ecstasy - hallucinogen: distorts what is seen and heard e.g. LSD - performance enhancer: muscle development e.g. anabolic steroids.					
Know how the effect of caffeine on heart rate can be measured.					
Recall that alcohol abuse accounts for more deaths and crime than any other drug.	B11 Part 4	b11_4_alcohol			p71
Know the short term effects of alcohol (limited to blurred vision, slurred speech and poor balance).					
Know the dangers of drink driving.					
Know the long term effects of alcohol (limited to liver damage).					
Recall that illegal drugs are classified as Class A (most dangerous), Class B and Class C.	B11 Part 3	b11_3_classifying drugs			p70
Understand why the penalty for using or supplying Class A drugs is much more severe than for using or supplying Class C.					
Understand why the penalty for supplying drugs is greater than the penalty for possession for personal use.					
Know the dangers of driving after taking some drugs.					
B12: My Genes					
Know that all human cells contain a nucleus.	B12 Part 1	b12_1_chromosomes			p74
Know that the nucleus contains chromosomes.					
Know that chromosomes are made of DNA.					

Know that the chromosomes contain genes.					
Recall that genes carry our unique genetic code.					
Know that most human features are determined by a person's genes.	B12 Part 2	b12_2_everyones different b12_2_practical	(6) I can add results to a bar chart (13) I can read data from a graph	Comparing height and foot size	p75
Understand that environment also affects many features.					
Understand that most features are affected by several genes, e.g. height.					
Be able to classify a range of human features as genetic: e.g. tongue rolling, ear lobes, environmental e.g. scars, accent, and both e.g. hair colour, good at sport.					
Interpret data on human variation.					
That normal body cells have 46 chromosomes: – females have 23 pairs (including XX) – males have 22 pairs and **one** odd pair (XY).	B12 Part 3	b12_3a_boy or girl b12_4a_genetic crosses			p76
Know that some genes are dominant and some are recessive.					
Know how to use simple Punnett squares to show genotype ratios.					
Recall that some diseases are caused by faulty genes.	B12 Part 4	b12_4_inherited diseases			p77
Know that embryos can be tested for certain genes.					
Understand that people have different viewpoints about such testing.					
B13: Body Wars					
Know that microbes are bacteria, fungi and viruses.	B13 Part 1	b13_1_microbes	(13) I can read data from a graph		p80
Understand that our bodies provide good conditions for microbes to reproduce rapidly.					
Interpret data on microbial population size.					
Know that white blood cells are part of the immune system.					
Recall that the immune system fights infections.					
Know that a few types of microbes can make people ill.					
Know that the skin, chemicals in tears, sweat, and stomach acid stop microbes getting in.					
Know that microbes can enter the body through natural openings, or cuts in the skin.					
Recall ways of reducing the risk of catching infections, e.g. washing hands after going to the toilet, before preparing or eating food.	B13 Part 2	b13_2_hygiene rules			p81
Know that food should be stored carefully in a fridge, e.g. salad covered, raw meat below cooked meat.					
Know that knives and chopping boards should be washed thoroughly after preparing meat, and that the food should be cooked thoroughly, in order to kill any microbes.					
Recall that antibiotics are chemicals that kill bacteria and fungi, but not viruses.	B13 Part 3	b13_3_practical		Testing antibiotics	p82
Know that some bacteria have evolved which are not killed by some antibiotics.					
Know that there are some ways that people can reduce the risk of 'superbugs' developing:					

– only use antibiotics when needed – always finish a course of antibiotics.					
Know that vaccines can make people immune to a disease.	B13 Part 4	b13_4_vaccinations			p83
Know that a vaccine usually contains a safe form of a disease-causing microorganism.					
Know that once you are immune you are protected from a particular disease.					
Understand different viewpoints that parents may have about giving their child a vaccination.					
Understand that media reports of health studies are not always accurate.					

Content statement	Lesson	Worksheet	CAN-DO Task	Practical Task	Student Book	Interactive resource
C1: Acids and Alkalis						
Be able to label simple laboratory apparatus used to obtain a dye from a plant (limited to beaker, stirring rod, heating apparatus, filter funnel, filter paper and mortar and pestle).	C1 Part 1	W Extracting and using dye P Extracting and testing dyes	(5) I can measure volume using a measuring cylinder		p88	
Know that lemons, limes and vinegar contain naturally occurring acids.						
Know that the colour of some dyes can be changed by adding acids and alkalis.						
Recall that alkalis are used to make oils and soap, chemicals for dyes, and glass.	C1 Part 2	W More about acids and alkalis			p89	
Understand safety precautions when using acids or alkalis.						
Interpret simple information about the use of indicators to classify solutions as acid, neutral or alkali.	C1 Part 3	W Indicators and pH Testing indicators P Measuring pH P Rainbow fizz	(18) I can use universal indicator to find pH	What pH do different solutions have and how can be classify them?	p90	
Know how to use the pH scale.						
Know that the colours of Universal Indicator show pH values.						
Know that pH can be measured electronically.						
Know that acids fizz with carbonates to make carbon dioxide gas.	C1 Part 4	W Keyword search W Acid reactions P Acid and metals P Acids and carbonates	(17) I can carry out a test to show the presence of carbon dioxide		p91	
Know that magnesium, zinc and iron react with acids to make hydrogen gas.						
Recall the tests for hydrogen and carbon dioxide.						
Know that neutralisation occurs when acids and alkalis are mixed.						
Understand the uses of neutralisation, limited to curing indigestion and reducing the acidity of soils.						
Know that excess acid in the stomach is a cause of indigestion.						
Interpret simple information comparing the effectiveness of different indigestion remedies [no recall expected].						

C2: Cooking and Cleaning						
Know two examples of foods that can be eaten raw. Know examples of different ways to cook food (limited to boiling, frying, grilling, steaming, microwave and use of conventional oven). Understand why food is cooked limited to improving texture, taste, flavour, making it easier to digest and killing microbes.	C2 Part 1	W Food and cooking P Cooking potato / pasta			p94	
Know that the cooking food is an example of a chemical change. Understand that a chemical change takes place if a new substance is formed and the process is not reversible. Know that carbon dioxide is made when baking powder is heated. Know that baking powder is a rising agent used in making cakes. Be able to make a plan to compare different types of baking powder. Know that yeast reacts with sugar to make carbon dioxide, and this is called fermentation. Know that fermentation produces alcohol used in making beer and wine.	C2 Part 2	W Baking powder P Making Bread P Making wine	(17) I can carry out a test to show the presence of carbon dioxide	Investigating how much gas is released when baking powder is heated	p95	Using material is available on the RSC website
Know that soap is made from animal fat or plant oils. Know that synthetic detergents are made from chemicals found in crude oil. Interpret simple diagrammatic representations showing how detergents can aid the removal of grease from a surface. Interpret simple data relating to the effect of different cleaning agents [no recall expected].	C2 Part 3	W How detergents work W Hard water			p96	
Understand why enzymes are added to washing powders. Recall that biological washing powder contains enzymes. Recall that some people are sensitive to biological washing powders. Interpret information on biological and non-biological wash powders [no recall expected]. Be able to interpret simple wash labels	C2 Part 4	W Wash labels P Which detergent is best?	(26) I can use a thermometer to measure temperature accurately		p97	
C3: Colours and Smells						
Know that a pigment is a coloured substance used in paint. Recall that paints contain a solvent, binding medium and pigment. Know that paints are used to decorate or protect surfaces.	C3 Part 1	W What is paint? P Cleaning paint brushes			p100	
Know that some paints can change colour when heated or cooled. Recall one use of a paint that changes colour with temperature. Know that oil paint has a pigment dispersed in oil and a solvent to dissolve the oil.	C3 Part 2	W Paint Bingo P Making paint activity	(19) I can make a paint sample and prove it works		p101	

Know that water paint has a pigment dissolved in a mixture of water and a binder such as glue.						
Interpret simple information on the content of paints [no recall expected].						
Understand the terms *solvent, soluble* and *insoluble*.	C3 Part 3	W Explaining dissolving P Testing solvents	(26) I can use as thermometer to measure temperature accurately	Investigate how temperature effects how much dissolves	p102	RSC Site – Dissolving plastic
Know that different solids need different solvents.						
Know that when a solid dissolves a solution is formed.						
Interpret simple information on the effectiveness of solvents [no recall expected].						
Understand that the amount of solid that dissolves depends on the temperature of the solvent.						
Know that many perfumes are made from natural sources.	C3 Part 4	W More about perfumes P Making a perfume			p103	
Recall one example of a perfume made from a natural source.						
Know that some perfumes are made synthetically using weak acids.						
Know that perfumes have a pleasant smell.						
Know that perfumes must evaporate easily.						
Understand that all perfumes must be tested to ensure they are safe to use but there are different views on how they should be tested.						
C4: Heavy Metal						
Know that gold, silver and platinum can be found as metals in the Earth.	C4 Part 1	W Precious metals P Panning for gold			p106	
Know that panning can be used to obtain gold from rock.						
Know that gold, silver and platinum are expensive, shiny and are heavy metals.						
Understand that their lack of reactivity makes gold, silver and platinum suitable for jewellery.						
Know that some jewellery is coated in gold to avoid allergic reaction to the metal that is coated.	C4 Part 2				p107	
Know that copper can be extracted by heating its ore with carbon.	C4 Part 4	P Extracting copper	(29) I can extract copper from its ore		p109	
Know that recycling copper is cheaper than making copper and that it saves resources and energy						
Understand that electroplating some metals with silver, gold or platinum enables cheaper jewellery to be made.	C4 Part 2	W Electrolysis P Electroplating		Investigate how the current effects the mass deposited during electrolysis	p107	
Know uses of electroplating, limited to silver plated cutlery and chromium plated steel.						
Be able to describe similarities and differences between the properties of iron and aluminium, limited to: – iron is more dense than aluminium – iron is magnetic; aluminium is not – iron corrodes (rusts) easily and aluminium does not.	C4 Part 3	W What metals are used in cars P Rusting	(7) I can identify common metals		p108	

Know that rusting needs iron, water and oxygen. Know that salt water speeds up rusting. Know one advantage and one disadvantage of making cars from aluminium. Interpret simple information about metals used to make cars [no recall expected].						
Know that metals are a finite resource. Understand why metals are worth recycling. Interpret information on the recycling of materials [no recall expected].	C4 Part 4	W Recycling			p109	
C5: Fibres and Fabrics						
Know that some fibres are natural to include cotton from cotton plants and wool from sheep. Know that some fibres are artificial to include nylon, polythene and polyester are made by chemical reactions. Be able to give examples of where artificial fibres have replaced natural fibres e.g. tents, sails and outdoor clothing. Know that garment labels provide information on composition and care. Interpret information from garment labels [no recall expected].	C5 Part 1	W Where do fibres come from? P Looking at fibres			p112	
Be able to relate given properties of fibres or fabrics to their uses in clothing [no recall expected]. Interpret simple data on testing the stretchiness of fibres or fabrics. Know one advantage and one disadvantage of waterproof clothing. Know that fabrics such as Gore-Tex® are waterproof and breathable. Understand that using Gore-Tex® type materials is an advantage in outdoor activities. Interpret data about waterproof fabrics [no recall expected].	C5 Part 2	W Waterproof clothing P Stretching it	(6) I can add results to a bar chart (20) I can take measurements to test the property of a fibre	Comparing the stretch of strength of different fibres	p113	
Know that certain chemicals can help make clothes more fireproof. Understand why flameproof fabrics are used. Interpret simple data relating the properties of materials to their use as waterproof or fireproof clothing [no recall expected].	C5 Part 3	W Fighting fires P Waterproof? P Fireproof			p114	
Know that a fibre or fabric used in, or on, a patient must not harm the body. Interpret simple data about the use of fibres or fabrics in heath care [no recall expected].	C5 Part 4	W Dressing wounds			p115	
C6: Clean Air						
Know that the Earth is surrounded by a mixture of gases called the atmosphere. Know that the atmosphere contains about 80% nitrogen and 20% oxygen. Know that there are smaller amounts of water vapour, carbon dioxide and other	C6 Part 1	W Something in the air	(13) I can read data from a graph		p118	

gases in the air.						
Know that fuels contain carbon, which forms carbon dioxide when the fuel burns.	C6 Part 2	W Burning fuels P What is made when a fuel burns?	(17) I can test for the presence of carbon dioxide gas		p119	
Know how to test for the presence of carbon dioxide.						
Know that the amount of carbon dioxide in the atmosphere is slowly increasing.						
Know that the increasing levels of carbon dioxide is linked to global warming.						
Know that burning fuels may add harmful chemicals into the atmosphere.	C6 Part 3	W Gas attack P Pollutants from fuels			p120	
Know that these harmful chemicals are called pollutants.						
Interpret simple public information about air quality [no recall expected].						
Understand some of the problems these pollutants cause limited to nitrogen oxides (breathing problems and acid rain) and carbon particles (lung damage).						
Know that fossil fuels contain small amounts of sulfur which are released as sulfur dioxide when the fuel is burnt.						
Recall that sulfur dioxide is a cause of acid rain.						
Know that nitrogen and oxygen from the air can make nitrogen oxides in a car engine.	C6 Part 4	W Car exhausts		Does the amount of carbon particles decease with distance from a road?	p121	
Recall that a catalytic converter gets rid of pollutants like nitrogen oxides.						
Interpret simple data on the removal of pollutants from car exhausts.						
Be able to state the benefits and drawbacks of using catalytic converters.						
Know that exhaust gas emissions are part of an MOT vehicle test.						
C7: Strong Stuff						
Understand the physical properties which distinguish metals from non-metals limited to conductivity (heat and electricity), hardness, strength, flexibility and ductility.	C7 Part 1	W Metals and non metals W Alloys P Making an alloy			p124	
Know that an alloy is a mixture of two or more elements, at least one of which is a metal.						
Know the names and one use of the alloys: steel, solder, aluminium alloy and brass.						
Understand the term ‘smart’ alloy.						
Know that the properties of alloys are different from the properties of the metals from which they are made.						
Interpret information linking the properties of materials to their uses [no recall expected].	C7 Part 2	W Using rocks P Ranking hardness			p125	
Be able to use a key to rank materials in order of hardness.						
Know that some hard minerals are used for making jewellery.						
Know that granite, limestone and marble are raw materials extracted from the Earth.	C7 Part 3	W Concrete P Making bricks	(9) I can use a measuring cylinder to measure volume	How does changing the amount of cement alter the strength of	p126	
Understand that granite, limestone and marble are used as building materials because they are strong and hard.						

Know that bricks are made from clay. Know that concrete is made from cement, sand and small stones. Be able to compare the strength of different types of concrete.			(30) I can make and test a sample of concrete for its strength	concrete?		
Know that wood, metals and carbon fibre are used in sports equipment. Be able to give an advantage and disadvantage of using wood, metal and carbon fibre for sports equipment. Know that a composite material contains at least two different materials. Know one use for each of the composite materials: GRP, reinforced concrete and plywood. Interpret simple data comparing the properties of different materials [no recall expected].	C7 Part 4	W What's the best material?			p127	
C8: Restless Earth						
Know that the Earth is a sphere with a core, mantle and thin rocky crust. Know that the rocky crust and upper mantle together is split into sections called tectonic plates. Know that volcanic activity and earthquakes are linked to the movement of tectonic plates. Interpret simple data linking the position of earthquakes and volcanoes to the edges of tectonic plates.	C8 Part 1	W Tectonic plates P Making a model of the Earth	(26) I can use a thermometer to measure temperature accurately.	How does the temperature of water affect the time taken for wax to dissolve?	p130	
Know that large amounts of energy can be released in an earthquake. Recall that underwater earthquakes may create tsunamis. Recall possible effects of earthquakes on people and wildlife. Understand some actions that public authorities can take to reduce damage caused by earthquakes. Know that it is not possible to predict when earthquakes might happen.	C8 Part 2	W Earthquakes W Tsunami	(31) I can find the location of ten earthquakes or volcanoes and put them on a map.		p131	
Know that molten rock under the surface of the Earth is called magma. Know that molten rock erupts from volcanoes and is called lava. Know that igneous rocks form when molten rock cools down. Understand that igneous rocks, which have formed slowly, have large crystals (and vice-versa). Know the risks and benefits of living near an active volcano.	C8 Part 3	W What is inside a volcano? P Crystals and cooling P Making a volcano	(31) I can find the location of ten earthquakes or volcanoes and put them on a map.		p132	
Understand some of the evidence for continental drift (limited to jigsaw fit of continents, matching rocks and fossils). Know that Wegener's the idea of moving continents was not immediately accepted by scientists. Recall that lots of new evidence later showed Wegener was right.	C8 Part 4	W Plates jigsaw			p133	

C9: How fast? How slow?						
Know that the rates of chemical reactions can vary greatly. Interpret simple visual images showing different rates of chemical reactions. Know that a reaction stops when one of the reacting substances is used up. Know ways of monitoring the progress of a reaction. Know that the rate slows as a reaction proceeds.	C9 Part 1	W What is reaction rate? P Measuring rate	(8) I can measure reaction time (9) I can use a measuring cylinder to measure volume (32) I can measure time accurately		p136	
Interpret information from charts and graphs about rates of reaction. Know that increasing temperature usually speeds up chemical reactions. Know that lowering the temperature (in a refrigerator or freezer) slows down the changes that make food go bad.	C9 Part 2	W Interpreting graphs W Temperature and food P Warming up P More concentrated	(9) I can use a measuring cylinder to measure volume (26) I can use a thermometer to measure temperature accurately	How does temperature or concentration affect reaction time?	p137	
Know that increasing the concentration increases the speed of a chemical reaction. Be able to label simple laboratory apparatus used to find out about rates of reaction: limited to beaker, flask, measuring cylinder, thermometer, stirring rod, test tube, gas syringe, top pan balance, stop clock/digital watch. Know that the rate of reaction is increased when small particles are used rather than large lumps. Understand that a difference in the rate of reaction can be explained by a difference in the surface area.	C9 Part 3	W Labelling equipment P Lumps or powder?	(32) I can measure time accurately (9) I can use a measuring cylinder to measure volume	How does surface area affect reaction time?	p137 p138	
Know that catalysts can alter the rate of a reaction but are not used up in the reaction. Interpret simple information on the use of different catalysts [no recall expected]. Understand how particle collisions can be used to explain reaction rates.	C9 Part 4	W Explaining reaction rate P Adding catalysts			p139	
C10: Sorting out						
Know that a mixture contains two or more uncombined substances. Know that mixtures contain substances that can be separated from each other. Be able to plan how to separate a soluble substance (e.g. salt, copper sulfate or sugar) from an insoluble substance e.g. sand by dissolving and filtration. Know that filtering can be used to separate a solid from a solution.	C10 Part 1	W Separating methods P Separating mixtures	(5) I can separate a simple mixture		p142	
Know how chromatography is used to separate mixtures into their constituents. Interpret simple chromatograms. Know that magnetism can be used to separate iron from a mixture of iron and aluminium. Know iron and steel are magnetic and give some uses: limited to motors, compasses,	C10 Part 2	W Reading chromatograms P Sweet colours P What will magnets separate?	(21) I can make a chromatogram		p143	

credit card strips, and fridge doors.						
Know that decanting can be used to separate a solid in a suspension. Know how to use centrifuging to separate mixtures. Know one medical application for each of centrifuging and dialysis. Know that dialysis is used to remove salts from blood. Interpret simple information about the use of dialysis in the population [no recall expected].	C10 Part 3	W Decanting and centrifuging P Separating solids			p144	
Know that pure water freezes and melts at 0^{o}C. Know that pure water boils and condenses at 100^{o}C. Interpret information about melting points and boiling points [no recall expected]. Know that distillation can be used to obtain fresh water from sea water. Understand that distillation is used to separate liquids with different boiling points. Know that distillation is used to produce some alcoholic drinks, e.g. whisky.	C10 Part 4	W Distillation P Fresh water		How does adding salt affect the boiling point of water?	p145	
C11: CSI Plus						
Know that anyone present at a crime scene will leave some evidence behind. Understand why crime scene investigators wear special clothing to avoid leaving evidence at a crime scene. Know how an investigator collects evidence at a crime scene – in precisely labelled evidence bags.	C11 Part 1	W Crime Scene P Collecting evidence		I can plan how to collect and analyse evidence to decide it a suspect is guilty.	p148	
Know fingerprints are left on a surface because oils from the skin are deposited. Recall how dusting a surface with a special powder can make fingerprints show up. Recall how fingerprints can be removed from a surface. Know how to make a record of a person's fingerprints.	C11 Part 2	P Taking fingerprints on different surfaces	(10) I can take a set of fingerprints		p149	
Understand that innocent people have their fingerprints taken for elimination. Recognise loop, arch and whorl as features of fingerprints. Know that no two people have identical fingerprints – not even identical twins. Know that blood contains red blood cells, white blood cells, platelets and plasma. Recall that the main blood groups are A, B, AB and O. Know how chromatography can be used to separate colours in ink and blood. Understand how the results of separating colours can identify a particular ink as being used e.g. to write a forged cheque.	C11 Part 3	W Types of fingerprints W Blood and blood groups P Separating colours in inks	(21) I can make a chromatogram		p149 p150	
Recall that DNA is inherited from parents. Know that identical twins have identical DNA but otherwise DNA is unique.	C11 Part 4	W DNA P Extracting DNA			p151	

Interpret data from a crime scene and decide whether or not it confirms a suspect's presence.						
C12: Fuels						
Know that crude oil is a toxic, dark, sticky liquid.	C12 Part 1	W Distilling oil			p154	
Know that crude oil is a mixture that is separated into more useful parts at an oil refinery.						
Know that petroleum gases, petrol, kerosene and diesel come from crude oil.						
Know that hydrocarbons are only composed of hydrogen and carbon.						
Recall that crude oil is made mainly of hydrocarbons in chains of varying length.						
Understand that some fuels ignite more easily than others do and that this is important for their uses.	C12 Part 2	W What are fuels used for? P Comparing energy in fuels	(32) I can measure time accurately (e.g. time for a fuel to burn)	What fuel gives the most energy?	p155	
Know the uses of these fuels: – petroleum gases, such as propane, in portable gas cylinders – petrol in cars – kerosene in airplanes – diesel in lorries, buses, trains and cars.						
Know that burning fuels produces energy for heating, transport and making electricity in power stations.						
Be able to label the apparatus used to find out how much energy a flame gives out.	C12 Part 3	W Labelling apparatus W/P Modelling burning	(22) I can make a poster to warn about the dangers of carbon monoxide poisoning		p156	
Interpret data to decide which fuel gives out most energy when the same amount burns.						
Know that carbon monoxide forms when fuels from crude oil burn in a limited supply of air.						
Know that carbon monoxide is a poisonous, colourless gas with no smell.						
Interpret information about carbon monoxide poisoning.						
Give one advantage and one disadvantage of petrol and diesel for transport.	C12 Part 4	W Using fuels in cars			p157	
Interpret simple information about the use of different fuels [no recall expected].						
Understand that people can make choices about which fuels to use.						
Know that plastics are made from small molecules called monomers.	C12 Part 1	W/P Making polymer models			p154	
Know that lots of monomers join together to form a long chain polymer.						
C13: What's added to our food?						
Know that some foods contain chemicals put there by people and that these are called additives.	C13 Part 1	W Food types W E numbers			p160	
Know that there are different types of food additives: limited to antioxidants, flavour enhancers and food colours.						
Know that food additives have to be tested and are given E numbers before they can be used.						

Know that some additives may be harmful to some people. Interpret information about food additives [no recall expected].						
Know that oxygen from the air can affect food. Understand that antioxidants preserve food by stopping the effects of oxygen. Interpret information on simple experiments to show the effect of oxygen (or its absence) on foods [no recall expected].	C13 Part 2	W Preserving food P Testing preservatives			p161	
Know that vitamins are added to certain foods to supplement the diet. Be able to compare information about a person's diet with the recommended daily intake of a vitamin [no recall expected]. Know how to test the vitamin C content in different foods. Know that sugar is a natural sweetener. Understand that too much sugar in the diet can be harmful to health. Know that diet drinks and some slimming foods contain artificial sweeteners.	C13 Part 3	P Testing for vitamin C W Sugar in our diet	(33) I can do a test to compare the vitamin C in fruit juice (22) I can make a poster to warn about the dangers of excess sugar	How does vitamin C change during cooking in different foods?	p162	
Know that salt (sodium chloride) is used in the food industry for flavouring and as a preservative. Recall that salt can be obtained from the sea or from underground salt deposits. Understand that the methods of obtaining salt can have an impact on the environment. Recall the health implications of eating too much salt.	C13 Part 4	W Salt in our diet	(22) I can make a poster to warn about the dangers of excess salt		p163	

Content statement	Lesson	Worksheet	CAN-DO Task	Practical Task	Student Book	Interactive resource
P1: Getting the message?						
Know that coding a message increases its security. Know that errors can happen when messages are sent. Recall that light travels through space at a speed of 300 000 km/s. Understand how using light allows messages to be transmitted quickly. Know that household remote control devices use infrared radiation. Know that wireless communication devices use radio waves. Understand the advantages of wireless technology for radio, mobile telephones and laptop computers.	P1 part 1	p1_1_sending messages p1_1_practical		Chinese whispers	p168	
Recall that mobile phones use microwave signals. Know that there is some concern amongst scientists about children using mobile phones.	P1 part 2	p1_2_texting	(12) I can produce a poster on the safe use of mobile phones.		p169	

Know ways of reducing the risk of using mobile phones: limited to shorter time of use, hands free kit, texting.						
Understand that microwave aerials need to be sited close together or high up because they must be in 'line of sight'.						
Understand reasons for and against the siting of mobile phone masts.						
Interpret information about siting of mobile phone masts [no recall expected].						
Know that a wave transfers energy without transferring matter.	P1 part 3	p1_3_wave motion			p170	
Know that analogue signals have a continuously variable value.						
Know the main features of a transverse wave: - wavelength - frequency - amplitude						
Know that digital signals are either on (1) or off (0).	P1 part 4	p1_4_Morse code p1_4_practical		Sending a Morse Code message	p171	
Know that Morse code uses a digital code.						
Recall that sound and images can be transmitted digitally.						
Know that the main reason for switching to digital television and radio is the improved quality of picture and sound.						
Recall that modern IT equipment relies on digital signals.						
P2: Our electricity supply						
Know that electricity is 'made' by chemical reactions in a battery.	P2 part 1	p2_1_choosing batteries p2_1_practical		Making batteries	p174	
Know that two different metals are needed for the terminals of a battery.						
Be able to choose suitable batteries for different situations.						
Recall that crude oil, coal and natural gas are fossil fuels used in power stations.	P2 part 2	p2_2_power station			p175	
Understand that every power station needs an energy source.						
Know the main stages in the production of electricity: - heat from the energy source changes water into steam - the steam is used to rotate turbines - turbines turn a generator - the generator produces electricity.						
Understand that energy is wasted at each stage.						
Recall that burning fossil fuels produces carbon dioxide which is a greenhouse gas.						
Know that greenhouse gases contribute to global warming.						
Know that electricity is transferred from a power station through a grid of high voltage transmission lines.	P2 part 3	p2_3_electricity supply p2_3_practical		Making transformers	p174 p176	
Understand that transformers are required at either end of the transmission lines to increase or decrease voltage.						

Know that a transformer is two coils of wire wound onto a core of iron.						
Know that we pay for electricity by the unit. Know that some appliances use more electricity than others. Be able to read a digital electricity meter. Interpret data on an electricity bill: how many units have been used. Know ways of reducing energy loss from the home. Interpret data for different energy saving strategies [no recall expected].	P2 part 4	p2_4_cost of electricity	(23) I can read a domestic electricity meter.		p176 p177	
P3: Attractive forces						
Know that iron and steel are magnetic. Know how to induce magnetism in a pin. Know that magnets attract magnetic materials: limited to iron and steel. Know that like poles repel and unlike poles attract. Know how iron filings or a compass can be used to show up a magnetic field.	P3 part 1	p3_1_attraction and repulsion p3_1_practical	(34) I can use a compass to map a magnetic field.	Making magnets	p180	
Know that a freely swinging magnet comes to rest in a N–S direction. Recall that the Earth has a magnetic field around it. Understand how a compass works and why it is so useful. Know that the Earth's magnetic field protects us from cosmic rays. Interpret information about the effects of cosmic rays on the Earth [no recall expected]. Know that the 'Northern Lights' are caused by the interaction between cosmic rays and the Earth's magnetic field.	P3 part 2	p3_1_magnetic fields p3_2_practical		Plotting magnetic fields	p181	
Know that a current-carrying wire behaves like a magnet. Know that increasing the current or number of turns wrapped onto a coil increases the strength of a magnet. Be able to label the magnet, core and cone in a loudspeaker. Be able to plan how to compare how the number of turns on the coil (or strength of magnet) affects how well a loudspeaker works.	P3 part 3	p3_3_ loudspeaker p3_3_practical		Making a loudspeaker	p182	
Know how to construct an electromagnet. Understand how the strength of an electromagnet depends on: - the number of turns on the coil - the current in the coil. Understand that the core of an electromagnet is made of iron because iron is a temporary magnet. Recall uses of electromagnets limited to: MRI scan, sorting scrap metals, lifting iron/steel/cars.	P3 part 4	p3_4_strength of electromagnet p3_4_practical		Testing electromagnets	p180 p183	

P4: Pushes and Pulls						
Recall that forces can be pulls, pushes, twists or bends. Recall that forces are measured in newtons. Understand that unbalanced forces make things move. Know that gravity is a force pulling things towards the Earth. Understand that weight is due to the force of gravity. Know that falling objects are acted on by gravity and drag. Understand the effect of air resistance on falling objects. Know that falling objects reach a maximum speed.	P4 part1	p4_1_identifying forces p4_1_practical	(24) I can use a newtonmeter to measure force.	Measuring forces Parachutes	p186	
Know that an increased force increases the length of an elastic material. Know that a stretched elastic band exerts a force. Know that elastic materials return to their original shape unless the force becomes too big.	P4 part 2	p4_2_stretching graph p4_2_practical		Stretching springs	p187	
Know that crumple zones in vehicles reduce the impact force. Know that air bags and seatbelts reduce impact forces for occupants. Know traffic speed can be reduced e.g. speed humps, chicanes, speed cameras. Interpret information about the relative effects of traffic calming measures [no recall expected]. Recall and be able to use speed = distance ÷ time.	P4 part 3	p4_3_road safety	(32) I can measure time accurately. (35) I can measure the speed of a moving object.		p188	
Know that large rockets are needed to put things in space. Know that some parts of some rockets/shuttles return to Earth and can be reused. Know that many objects burn up in the atmosphere.	P4 part 4	p4_4_rockets			p189	
P5: Let there be light!						
Recall that luminous objects produce their own light. Understand that non-luminous objects are only seen because they reflect light from other sources. Interpret information about the link between the temperature of stars and their colour [no recall expected]. Know that you can see things when light from them reaches the eye.	P5 part 2	p5_2_luminous and non-luminous			p193	
Know that rays of light travel in straight lines. Be able to complete a diagram to show how light reflects from a mirror. Know that smooth shiny surfaces reflect light to give a clear reflection. Know that the image in a mirror is the same way up and the same size as the object but is the other way around.	P5 part 3	p5_3_reflection ray diagrams p5_3_practical	(11) I can write a message in mirror writing.	Law of reflection ray tracing through glass block	p194	

Recall that light changes direction when it passes from one material into another.	P5 part 4	p5_4_ray diagrams for lenses p5_4_practical p5_4_internal reflection		Using lenses	p194 p195	
Be able to complete a diagram to show how a convex (converging) lens forms an image on a screen.						
Recall uses of convex lenses limited to: spectacles for long sight, camera, projector, magnifying glass, telescope.						
Know that light can be totally reflected from a transparent surface.						
Understand how light travels along an optical fibre from one end to the other by reflection.						
Know that optical fibres transmit data very quickly.						
Understand that using light for communication requires the use of digital code.						
Recall the primary and secondary colours for light.	P5 part 1	p5_1_coloured lights p5_1_practical		Mixing coloured light	p192	
Know how two primary colours are combined to form a secondary colour: - red + blue = magenta - blue + green = cyan - green + red = yellow.						
Know that all three primary colours add to form white light.						
P6: Final Frontier						
Know that Space contains many stars of which the Sun is one.	P6 part 2	p6_2_solar system	(28) I can measure length/distance accurately.		p199	
Know that the Sun is at the centre of our Solar System.						
Know that the Sun is a source of light.						
Know that it is dangerous to look at the Sun.						
Know the order of the eight planets in the Solar System.						
Know that the Earth orbits the Sun.						
Understand that other planets take longer/shorter times to orbit the Sun if they are further/nearer to the Sun.						
Recall that the Earth moves in its orbit through space at an enormous speed.						
Interpret information about the planets and other bodies in the Universe [no recall expected].						
Know that the Moon orbits the Earth.	P6 part 3	p6_3_Moon			p200 p201	
Know that other (artificial) satellites orbit the Earth and are used for communication, mapping, spying and tracking.						
Know that planets and moons reflect light which enable them to be seen.						
Know that some planets have moons.						
Recall that the Sun is a star in the Milky Way galaxy.	P6 part 4	p6_4_model Universe			p201	
Recall that there are billions of stars in the Milky Way.						

Recall that there are billions of galaxies in the Universe.						
Be able to compare the sizes of the Moon, the Earth, the Sun, the Milky Way and the Universe.						
Know that astronomers use astronomical telescopes to study the sky.	P6 part 1	p6_1_living in space			p198	
Understand that light pollution and dust in the atmosphere interferes with observations by astronomers.						
Recall that astronomers have discovered planets around other stars.						
Understand that manned spacecraft need resources that unmanned spacecraft do not e.g. oxygen, food, water.						
P7: Alternative energy						
Recall that the Sun is a stable source of energy.	P7 part 1	p7_1_alternative energy supplies	(13) I can read data from a graph.		p204	
Understand that fossil fuels are a limited energy source.						
Understand that the demand for energy is increasing and this means that renewable sources will become more important.						
Know that some energy sources are renewable: wind, sunlight, waves, tide, geothermal, hydro-electric, biomass.						
Interpret information about the demand for energy and the availability of energy sources [no recall expected]						
Know that wind turbines use energy from the wind to generate electricity.	P7 part 3	p7_3_wind turbines			p206	
Be able to evaluate windmill design in terms of blade size and use of a rudder.						
Recall advantages and disadvantages of using wind turbines to generate electricity.						
Know that photocells transform light into electrical energy.	P7 part 1	p7_1_practical	(28) I can measure length/distance accurately. (36) I can plot a line graph.	Photocell efficiency	p204	
Know that photocells produce direct current.						
Understand that photocells are useful sources of electricity for remote locations.						
Recall advantages and disadvantages of using photocells to generate electricity.						
Recall that radiation from the Sun can be absorbed by a surface and transferred into heat.	P7 part 2	p7_2_solar heating			p205	
Be able to describe an experiment to show that black matt surfaces absorb more energy than white shiny surfaces.						
Recall that solar panels have circulating water which is heated by radiation from the Sun.						
Recall that biomass can be burned to generate heat or fermented to produce methane.	P7 part 4	p7_4_energy from water p7_4_practical		Bobbing duck	p207	
Understand that tidal barrages should be sited where there is a large tidal range to obtain the most energy.						
Recall that the up and down movement of water in a wave can be used to turn a						

turbine and so generate electricity.						
P8: Deep Impacts						
Know that the Moon may be the remains of a planet which collided with Earth billions of years ago.	P8 part 4	p8_4_origin of Moon			p214	
Know that asteroids are rocks left over from the formation of the Solar System.						
Recall that large asteroids have collided with the Earth in the past.						
Know that comets are lumps of dust and ice.	P8 part 3	p8_3_comets			p213	
Know that a comet has a tail formed from trail debris which is formed as the ice melts on its approach to the Sun.						
Know that the orbit of a comet is elliptical, passing inside the orbit of Mercury and beyond the orbits of Neptune and Pluto.						
Know that meteors are rocks that burn as they move through the Earth's atmosphere.	P8 part 1	p8_1_metoerites			p210	
Know that meteorites are rocks from space that have landed on Earth.						
Know that asteroids, comets and meteors, move through space and may hit the Earth/Moon or other planets.						
Know that astronomers monitor the paths of asteroids with large telescopes.						
Know that a Near Earth Object (NEO) is an asteroid or comet on a possible collision course with Earth.						
Understand how scientists know that an object may be on a collision course with the Earth, and why uncertainty gets smaller as the object gets closer.						
Understand the consequences of a collision between Earth and a large NEO: ejection of hot rocks, fires, sunlight blocked by dust, climate change, species extinction.	P8 part 2	p8_2_effects of collision p8_2_practical	(7) I can add results to a bar chart. (28) I can measure length/distance accurately.	Craters	p211	
Understand that speed and 'weight' affect the damage caused by objects.						
Know that bombardment causes craters.						
Interpret data showing the risk associated with possible NEO collisions [no recall expected].						
P9: Driving along						
Know the action of a four stroke engine.	P9 part 2	p9_2_engines			p217	
Recall that petrol, diesel, LPG, biofuel are used as fuels for transport.						
Recall that a spark plug provides the source of ignition in a petrol engine.						
Recall that when diesel vapour is compressed, it ignites.						
Recall examples of machines and where they are used in a car limited to: pulley for fan belt, gears in gear box, wheel and axle on steering column.	P9 part 3	p9_3_machines p9_3_practical		Gear ratios	p218	
Understand that machines allow a greater load to be moved for less effort.						
Know that gear ratio is a measure of how much easier a machine makes the task.						

Be able to calculate the gear ratio using number of teeth on driving wheel / number of teeth on driven wheel for simple ratios.						
Be able to label a DC motor to show magnets, coil, brushes, commutator.	P9 part 4	p9_4_motor p9_4_practical		Model motor	p219	
Recall where motors are used in cars limited to: starter, windscreen wiper.						
Recall that electric cars need charging from the mains.						
Know that solar powered cars have both advantages and disadvantages.						
Recall and be able to use: speed = distance ÷ time.	P9 part 1	p9_1_highway code p9_1_practical	(8) I can measure reaction time.	Vehicle speeds	p216	
Understand that speed limits were introduced to save fuel and improve road safety.						
Know that the national speed limit is 60mph on most roads, 70mph on motorways and dual carriageways.						
Understand why speed limits are less than the national limits in towns, outside schools and other areas.						
Know that thinking distance is the distance travelled between seeing danger and starting to brake.						
Know that braking distance is the distance travelled whilst braking.						
Know that: stopping distance = thinking distance + braking distance.						
Interpret data from table of thinking, braking and stopping distances [no recall expected].						
Know that speed cameras, sleeping policemen and hazard warning signs are used to reduce speed of traffic						
P10: Hot stuff						
Recall that energy can be transferred as heat.	P10 Part 2	p10_2_energy transfer	(26) I can use a thermometer to accurately measure temperature.		p223	
Know that the main uses of heat: generating electricity, heating, cooking.						
Know that heat energy flows from a hot to a cooler body.						
Know that temperature is measured in ºC and that heat is measured in J.						
Understand that the energy to change the temperature of a body depends on: - its mass - the material it is made from - the temperature change.	P10 Part 3	p10_3_factors affecting energy transfer p10_3_practical		Change of state	p224	
Interpret simple data on heating/cooling experiments [no recall expected].						
Recall and use the words: melting, boiling, freezing, condensing, evaporating.						
Know that light from the Sun is reflected to a focus by a curved mirror.	P10 Part 4	p10_4_solar furnace			p225	
Understand that when light is absorbed by a material the energy of the material increases and it becomes hotter.						
Recall that a solar furnace uses radiation from the Sun focussed by a curved mirror.						
Know that a solar furnace is used for heating water which can be used for cooking or						

electricity generation.						
Know that hot air rises and is replaced by colder air.	P10 Part 1	p10_1_insulation p10_1_practical	(36) I can plot line graph.	Effective insulation	p222	
Know that metals are good conductors of heat and that trapped air and plastics are good insulators.						
Know that insulation reduces heat loss.						
Understand the terms insulator and conductor.						
Be able to design and carry out a test to evaluate the effectiveness of takeaway food packaging.						
Interpret simple data on home insulation [no recall expected].						
P11: Nuclear Power						
Know that electricity is made by changing the magnetic field through a coil of wire.	P11 Part 3	p11_3_generator			p230	
Understand that the amount of electricity can be increased by spinning the magnet faster, using a stronger magnet, using more turns of wire.						
Be able to label a diagram of a generator to show magnet, coil and meter.						
Know that generators in power stations use electromagnets.						
Understand how radioactive materials are handled safely: - keeping at a distance by handling with tongs - using shielding - using labelled storage - monitoring time of exposure - using protective clothing.	P11 part 1	p11_1_handling radioactivity safely	(36) I can plot a line graph.		p228	
Know that exposure to radioactivity is monitored with a film badge.						
Know that uranium is a non-renewable resource.	P11 Part 2	p11_2_nuclear power p11_2_nuclear waste			p229	
Know that in a nuclear power station, the uranium provides the source of energy.						
Know that a lot of energy is released by the splitting of uranium atoms.						
Know that a nuclear power station produces harmful radioactive waste.						
Know that waste from nuclear power is: - harmful - radioactive - not a cause of global warming.						
Know that nuclear waste can be disposed of: - low level waste in land fill sites (low level waste).						
Know that nuclear waste can be disposed of: - low level waste in land fill sites (low level waste) - by burying deep underground - by reprocessing.						
Know that plutonium is a waste product from the nuclear power industry.						

Know that plutonium can be used to make nuclear bombs.						
Understand why there is a need for a government agency responsible for nuclear safety.	P11 Part 4	p11_4_nuclear safety			p231	
In the context of nuclear power, understand that people can make choices about the best use of science and technology.						
Recall one risk and one benefit of nuclear power.						
P12: Full spectrum						
Know that visible light is part of a group of waves called the electromagnetic spectrum.	P12 Part 1	p12_1_rainbows p12_1_lasers			p234	
Know that all waves from the electromagnetic spectrum travel at the speed of light.						
Be able to list the colours of the visible spectrum in order from red to violet.						
Know that a rainbow is a naturally occurring example of the visible spectrum.						
Recall that a visible spectrum can be produced when white light passes through a prism.						
Know that a laser produces a narrow, intense beam of light.						
Recall uses of lasers limited to: read CDs, light shows, pointers, weapon guidance, cutting tools.						
Recall that warm and hot objects emit infrared radiation.	P12 Part 2	p12_2_infrared			p235	
Know that passive infrared sensors and thermal imaging cameras work by detecting body heat.						
Know that infrared is useful for: - remote control for TV etc. - short distance data links for computer or mobile phone - night photography - burglar alarms - heating things, e.g. electric fire, toaster grill.						
Recall two examples of uses of microwave radiation from: - cooking - mobile phones - radar - communication with satellites.	P12 Part 3	p12_3_microwaves	(20) I can produce a poster on the safe use of mobile phones.		p236	
Recall that microwaves cause heating when absorbed by water or fat and this is the basis of microwave cooking.						
Recall some concerns about children using mobile phones.						
Interpret information from different studies into the effects of mobile phone usage [no recall expected].						
Know that radio waves produce electrical signals in metal aerials.	P12 Part 4	p12_4_radio			p237	
Recall two examples of uses of radio waves: - radio						

- wireless links for laptop computers.						
Understand the advantages of wireless technology for global communications.						
P13: Medical rays						
Understand the difference between the diagnosis of an illness and its treatment.	P13 Part 1	p13_1_diagnosis and treatment			p240	
Recall some benefits of a doctor being able to see inside a patient's body.						
Know that all surgical procedures have risk						
Recall some medical uses of UV radiation.	P13 Part 2	p13_2_sun screen protection			p241	
Know that exposure to UV radiation can cause suntan, sunburn and skin cancer.						
Understand that the use of UV radiation involves balancing benefits against risk.						
Recall some ways of reducing the risk of exposure to UV radiation.						
Interpret data on the use of sunscreens [no recall expected].						
Understand that bone absorbs X-rays and so produces shadow pictures.	P13 Part 3	p13_3_X-rays			p242	
Know that too much exposure to X-rays is dangerous.						
Understand that the use of X-rays involves balancing benefits against risk.						
Know that gamma radiation is very penetrating.	P13 Part 4	p13_4_gamma camera	(36) I can plot a line graph.		p243	
Know that a gamma camera detects gamma radiation and that a computer linked to it can make pictures.						
Know that exposure to gamma rays is dangerous.						
Understand that the use of gamma rays involves balancing benefits against risk.						
Recall that UV radiation, X-rays and gamma rays are part of a family called the electromagnetic spectrum.						
Recall that UV radiation, X-rays and gamma rays can damage living cells.						
Know that some radiation is natural, and this is called background radiation.						
Interpret simple data on radiation doses and possible harmful effects [no recall expected].						