Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.1 Changes in energy stores	Started (/) Completed (X)	Level Achieved
Grade 4	1	State some examples of energy stores.		1 2 3 4 5 6 7 8
	2	State the processes that can transfer energy from one store to another.		1 2 3 4 5 6 7 8
	3	Identify changes in some energy stores using simple examples.		1 2 3 4 5 6 7 8
Grade 6	4	Describe a wide range of energy stores in different contexts.		1 2 3 4 5 6 7 8
	5	Describe changes in energy stores in terms of the process that causes the change.		1 2 3 4 5 6 7 8
	6	Use quantitative descriptions of changes in energy stores.		1 2 3 4 5 6 7 8
Grade 8	7	Describe the nature of energy stores in detail including the relationship between objects.		1 2 3 4 5 6 7 8
	8	Explain factors that affect the size of changes in energy stores.		1 2 3 4 5 6 7 8
	9	Represent energy changes graphically, accounting for changes in all stores.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.2 Conservation of energy	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that energy is conserved in any transfer.		1 2 3 4 5 6 7 8
	2	State that energy is dissipated (is no longer useful) when it heats the environment.		1 2 3 4 5 6 7 8
	3	Investigate the energy transfers in a pendulum and a bungee.		1 2 3 4 5 6 7 8
Grade 6	4	Apply the law of conservation of energy in straightforward situations.		1 2 3 4 5 6 7 8
	5	Describe the changes in energy stores explaining why energy ceases to be useful.		1 2 3 4 5 6 7 8
	6	Describe the energy changes in a range of experiments and account for energy dissipation to the surroundings.		1 2 3 4 5 6 7 8
Grade 8	7	Apply the law of conservation of energy to explain why forces cause hating effects.		1 2 3 4 5 6 7 8
	8	Describe closed systems and the changes to energy stores within them using the principle of conservation energy.		1 2 3 4 5 6 7 8
	9	Evaluate in detail experiments to investigate energy changes.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.3 Energy and work	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that energy is measured in joules (J).		1 2 3 4 5 6 7 8
	2	Calculate the work done by a force.		1 2 3 4 5 6 7 8
	3	Measure the work done by a force experimentally.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the action of frictional forces on objects and the associated heating effect.		1 2 3 4 5 6 7 8
	5	Use the equation for work done to calculate distances or size of forces.		1 2 3 4 5 6 7 8
	6	Use repeat values to measure the work done by a force experimentally.		1 2 3 4 5 6 7 8
Grade 8	7	Use the principle of conservation of energy and forces to explain why objects become heated by frictional forces.		1 2 3 4 5 6 7 8
	8	Apply the equation for work done in a wide range of contexts.		1 2 3 4 5 6 7 8
	9	Evaluate in detail an experiment to measure work done, explaining why there is variation in the measurements.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.4 Gravitational potential stores	Started (/) Completed (X)	Level Achieved
Grade 4	1	State the factors that affect the change in the gravitational potential energy store of a system.		1 2 3 4 5 6 7 8
	2	Calculate the gravitational potential energy store of a system using the weight of an object and its height.		1 2 3 4 5 6 7 8
	3	Measure the gravitational potential energy store changes in a system with a simple practical activity.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the effect of a different gravitational field strength on the gravitational potential energy store changes of a system.		1 2 3 4 5 6 7 8
	5	Calculate the gravitational potential energy store of a system using the mass, gravitational field strength, and height.		1 2 3 4 5 6 7 8
	6	Describe energy changes that involve a heating effect as opposed to movement of an object.		1 2 3 4 5 6 7 8
Grade 8	7	Perform calculations using rearrangements of the gravitational potential energy store equations.		1 2 3 4 5 6 7 8
	8	Apply the gravitational potential energy store equations in a wide range of contexts.		1 2 3 4 5 6 7 8
	9	Account for all changes of energy during falls or increases in height, including heating effects.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.5 Kinetic energy and elastic energy stores	Started (/) Completed (X)	Level Achieved
Grade 4	1	State the factors that affect the size of a kinetic energy store of an object.		1 2 3 4 5 6 7 8
	2	State the factors that affect the elastic potential energy store of a spring.		1 2 3 4 5 6 7 8
	3	Describe energy changes involving elastic potential energy and kinetic energy stores.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the kinetic energy store of an object.		1 2 3 4 5 6 7 8
	5	Calculate the elastic potential energy store of a stretched spring.		1 2 3 4 5 6 7 8
	6	Investigate the relationship between the energy stored in a spring and the kinetic energy store of an object launched from it.		1 2 3 4 5 6 7 8
Grade 8	7	Perform calculations involving the rearrangement of the kinetic energy equation.		1 2 3 4 5 6 7 8
	8	Perform calculations involving the rearrangement of the elastic potential energy equation.		1 2 3 4 5 6 7 8
	9	Perform a wide range of calculations involving transfer of energy.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.6 Energy dissipation	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify useful and wasted energy in simple scenarios.		1 2 3 4 5 6 7 8
	2	Describe energy dissipation in terms of heating the surroundings.		1 2 3 4 5 6 7 8
	3	Measure the frictional force acting on an object.		1 2 3 4 5 6 7 8
Grade 6	4	Analyse energy changes to identify useful and less useful energy transfers.		1 2 3 4 5 6 7 8
	5	Describe energy dissipation and how this reduces the capacity of a system to do work.		1 2 3 4 5 6 7 8
	6	Investigate the factors that affect frictional forces.		1 2 3 4 5 6 7 8
Grade 8	7	Use a wide range of energy stores and physical processes to decide on wasted and useful energy transfers.		1 2 3 4 5 6 7 8
	8	Apply the concept of energy dissipation in a wide range of scenarios.		1 2 3 4 5 6 7 8
	9	Evaluate in detail an experiment to measure the frictional forces acting on an object.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.7 Energy and efficiency	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe an efficient transfer as one that transfers more energy by a useful process.		1 2 3 4 5 6 7 8
	2	State that the efficiency of an energy transfer is always less than 100%.		1 2 3 4 5 6 7 8
	3	Calculate the efficiency of a simple energy transfer.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the efficiency of a range of energy transfers.		1 2 3 4 5 6 7 8
	5	Use the law of conservation of energy to explain why efficiency can never be greater than 100%.		1 2 3 4 5 6 7 8
	6	Investigate the efficiency of a motor.		1 2 3 4 5 6 7 8
Grade 8	7	(H) Describe design features that can be used to improve the efficiency of an energy transfer.		1 2 3 4 5 6 7 8
	8	Rearrange the efficiency equation to find input or total output energy.		1 2 3 4 5 6 7 8
	9	Evaluate in detail an efficiency investigation to justify conclusions.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.8 Electrical appliances	Started (/) Completed (X)	Level Achieved
Grade 4	1	List some example electrical devices.		1 2 3 4 5 6 7 8
	2	Survey a range of electrical devices and their operation.		1 2 3 4 5 6 7 8
	3	Describe the energy transfers carried out by electrical devices.		1 2 3 4 5 6 7 8
Grade 6	4	Rank electrical devices in terms of their power.		1 2 3 4 5 6 7 8
	5	Compare mains-powered and battery-powered devices.		1 2 3 4 5 6 7 8
	6	Describe the processes that waste energy in electrical devices.		1 2 3 4 5 6 7 8
Grade 8	7	Compare electrical devices in terms of efficiency.		1 2 3 4 5 6 7 8
	8	Calculate the efficiency of an electrical device.		1 2 3 4 5 6 7 8
	9	Explain the operation of electrical devices in terms of forces and electric current.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P1 Conservation and dissipation of energy 1.9 Energy and power	Started (/) Completed (X)	Level Achieved
Grade 4	1	State the unit of power as the watt and kilowatt.		1 2 3 4 5 6 7 8
	2	With support, rank electrical appliances in order of power.		1 2 3 4 5 6 7 8
	3	Identify 'wasted' and 'useful' energy transfers in electrical devices.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the energy transferred by an electrical device.		1 2 3 4 5 6 7 8
	5	Calculate the efficiency of a device from power ratings.		1 2 3 4 5 6 7 8
	6	Find the wasted power of a device.		1 2 3 4 5 6 7 8
Grade 8	7	Compare the power ratings of devices using standard form.		1 2 3 4 5 6 7 8
	8	Apply the efficiency equation in a range of situations, including rearrangement of the equation.		1 2 3 4 5 6 7 8
	9	Combine the electrical power equation with other equations to solve complex problems.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P2 Energy transfer by heating 2.1 Energy transfer by particles	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe materials as good or poor thermal conductors.		1 2 3 4 5 6 7 8
	2	Compare the thermal conductivities of materials in simple terms.		1 2 3 4 5 6 7 8
	3	Relate the thermal conductivities of a material to the uses of that material in familiar contexts.		1 2 3 4 5 6 7 8
Grade 6	4	Analyse temperature change data to compare the thermal conductivity of materials.		1 2 3 4 5 6 7 8
	5	Describe the changes in the behaviour of the particles in a material as the temperature of the material increases.		1 2 3 4 5 6 7 8
	6	Apply understanding of thermal conductivity in reducing energy dissipation through the choice of appropriate insulating materials.		1 2 3 4 5 6 7 8
Grade 8	7	Explain the different thermal conductivities of materials using the free electron and lattice vibration explanations of conduction.		1 2 3 4 5 6 7 8
	8	Evaluate the results of an experiment into thermal conductivity in terms of repeatability and reproducibility of data, and the validity of		1 2 3 4 5 6 7 8
	9	conclusions drawn from the data.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P2 Energy transfer by heating 2.2 Energy transfer by radiation	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that infrared radiation is radiation of shorter wavelength than red light.		1 2 3 4 5 6 7 8
	2	State that an object cools by emitting infrared radiation and heats by absorbing infrared radiation.		1 2 3 4 5 6 7 8
	3	Describe how infrared radiation can be detected.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the cooling of objects in terms of the rate of emission of radiation.		1 2 3 4 5 6 7 8
	5	Describe how the rate of emission of radiation is related to the temperature of a body.		1 2 3 4 5 6 7 8
	6	Describe the visible changes in an object's emitted radiation as its temperature is increased.		1 2 3 4 5 6 7 8
Grade 8	7	Compare the black body spectra of two objects to identify which is at a higher temperature.		1 2 3 4 5 6 7 8
	8	Apply the concepts of absorption and emission of infrared radiation to explain why an object maintains a constant temperature.		1 2 3 4 5 6 7 8
	9	Describe the changes in the black body radiation curve as the temperature of an object changes in terms of change in the radiation emitted.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P2 Energy transfer by heating 2.3 Radiation and the greenhouse effect	Started (/) Completed (X)	Level Achieved
Grade 4	1	Compare the emission of infrared radiation from different surfaces (such as shiny and dark).		1 2 3 4 5 6 7 8
	2	Outline the evidence that changes in the concentration of atmospheric gases are the likely cause of global warming.		1 2 3 4 5 6 7 8
	3	Describe the greenhouse effect in terms of absorption and emission of radiation.		1 2 3 4 5 6 7 8
Grade 6	4	Compare the emission of infrared radiation from different surfaces (such as shiny and dark).		1 2 3 4 5 6 7 8
	5	Outline the evidence that changes in the concentration of atmospheric gases are the likely cause of global warming.		1 2 3 4 5 6 7 8
	6	Describe the greenhouse effect in terms of absorption and emission of radiation.		1 2 3 4 5 6 7 8
Grade 8	7	Describe factors that affect the rate of emission of infrared radiation, including surface colour.		1 2 3 4 5 6 7 8
	8	Apply the concepts of absorption and emission of IR radiation to explain why an object maintains a constant temperature.		1 2 3 4 5 6 7 8
	9	Fully explain the greenhouse effect in terms of absorption, emission, and wavelengths of electromagnetic radiation.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P2 Energy transfer by heating 2.4 Specific heat capacity	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe materials in terms of being difficult or easy to heat up (increase the temperature of).		1 2 3 4 5 6 7 8
	2	List the factors that affect the amount of energy required to increase the temperature of an object.		1 2 3 4 5 6 7 8
	3	With some support, measure the specific heat capacity of a material.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the effects of changing the factors involved in the equation.		1 2 3 4 5 6 7 8
	5	Calculate the energy required to change the temperature of an object.		1 2 3 4 5 6 7 8
	6	Measure the specific heat capacity of a material and find a mean value.		1 2 3 4 5 6 7 8
Grade 8	7	Evaluate materials used for transferring energy in terms of their specific heat capacity.		1 2 3 4 5 6 7 8
	8	Use the specific heat capacity equation to perform a wide range of calculations in unfamiliar contexts.		1 2 3 4 5 6 7 8
	9	Evaluate in detail the results of an experiment to measure specific heat capacity.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P2 Energy transfer by heating 2.5 Heating and insulating buildings	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe some design features used to prevent energy transfer to the surroundings in the home.		1 2 3 4 5 6 7 8
	2	Calculate the payback time of a simple home improvement feature.		1 2 3 4 5 6 7 8
Grade 6	3	Describe how some design features used to reduce energy dissipation from a home work.		1 2 3 4 5 6 7 8
	4	Compare home improvement features in terms of payback time.		1 2 3 4 5 6 7 8
Grade 8	5	Evaluate in detail design features used to reduce energy transferred from the home.		1 2 3 4 5 6 7 8
	6	Decide on home improvement features using payback time and savings beyond the payback time.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P3 Energy resources 3.1 Energy demands	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify which fuels are renewable and which are non-renewable.		1 2 3 4 5 6 7 8
	2	Identify activities that require large energy transfers.		1 2 3 4 5 6 7 8
	3	Describe biofuels as carbon neutral whereas fossil fuels are not.		1 2 3 4 5 6 7 8
Grade 6	4	Outline the operation of a fossil fuel burning power station.		1 2 3 4 5 6 7 8
	5	Outline the operation of a nuclear power station.		1 2 3 4 5 6 7 8
	6	Explain why biofuels are considered carbon neutral.		1 2 3 4 5 6 7 8
Grade 8	7	Compare energy use from different sources and different societies from available data.		1 2 3 4 5 6 7 8
	8	Compare fossil fuels and nuclear fuels in terms of energy provided, waste, and pollution.		1 2 3 4 5 6 7 8
	9	Discuss some of the problems associated with biofuel use and production.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P3 Energy resources 3.2 Energy from wind and water	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that wind turbines, wave generators, hydroelectric systems, and tidal systems are renewable energy resources.		1 2 3 4 5 6 7 8
	2	Describe some simple advantages or disadvantages of renewable energy systems.		1 2 3 4 5 6 7 8
	3	Outline the operation of a renewable energy source.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the operation of a wind farm.		1 2 3 4 5 6 7 8
	5	Describe the operation of a hydroelectric system.		1 2 3 4 5 6 7 8
	6	Suggest the most appropriate energy resource to use in a range of scenarios.		1 2 3 4 5 6 7 8
Grade 8	7	Compare the operation of hydroelectric, wave, and tidal systems in terms of reliability, potential power output, and costs.		1 2 3 4 5 6 7 8
	8	Explain in detail the purpose, operation, and advantages of a pumped storage system.		1 2 3 4 5 6 7 8
	9	Justify the choice of an energy resource by using numerical and other appropriate data.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P3 Energy resources 3.3 Power from the Sun and the Earth	Started (/) Completed (X)	Level Achieved
Grade 4	1	Explore the operation of a solar cell.		1 2 3 4 5 6 7 8
	2	Describe one difference between solar cells and solar heating systems.		1 2 3 4 5 6 7 8
	3	State that radioactive decay is the source of heating in geothermal systems.		1 2 3 4 5 6 7 8
Grade 6	4	Compare and contrast the operation of solar cells (photovoltaic cells) with solar heating panels.		1 2 3 4 5 6 7 8
	5	Describe the operation of a solar power tower.		1 2 3 4 5 6 7 8
	6	Describe the operation of a geothermal power plant.		1 2 3 4 5 6 7 8
Grade 8	7	Analyse the power output of a variety of energy resources.		1 2 3 4 5 6 7 8
	8	Calculate the energy provided by a solar heating system by using the increase in water temperature.		1 2 3 4 5 6 7 8
	9	Plan in detail an investigation into the factors that affect the power output of a solar cell.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P3 Energy resources 3.4 Energy and the environment	Started (/) Completed (X)	Level Achieved
Grade 4	1	List some environmental problems associated with burning fossil fuels.		1 2 3 4 5 6 7 8
	2	Identify the waste products of fossil fuels and nuclear fuel.		1 2 3 4 5 6 7 8
	3	Describe simple advantages and disadvantages of a variety of renewable energy resources.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the effects of acid rain and climate change.		1 2 3 4 5 6 7 8
	5	Describe techniques to reduce the harmful products of burning fossil fuels.		1 2 3 4 5 6 7 8
	6	Compare a wide range of energy resources in terms of advantages and disadvantages.		1 2 3 4 5 6 7 8
Grade 8	7	Evaluate methods of reducing damage caused by waste products of fossil fuels and nuclear fuels.		1 2 3 4 5 6 7 8
	8	Discuss in detail the problems associated with nuclear accidents and the public perception of nuclear safety.		1 2 3 4 5 6 7 8
	9	Evaluate the suitability of an energy resource for a range of scenarios, taking into account a wide range of factors.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P3 Energy resources 3.5 Big energy issues	Started (/) Completed (X)	Level Achieved
Grade 4	1	Rank the start-up times of various power stations.		1 2 3 4 5 6 7 8
	2	Compare some of the advantages and disadvantages of various energy resources.		1 2 3 4 5 6 7 8
	3	Discuss the construction of a power plant in the local area in simple terms by using information provided.		1 2 3 4 5 6 7 8
Grade 6	4	Use base load and start-up time data to explain why some power stations are in constant operation whereas others may be switched on and off.		1 2 3 4 5 6 7 8
	5	Compare energy resources in terms of capital and operational costs.		1 2 3 4 5 6 7 8
	6	Debate the construction of a power plant in the local area by using a wide range of information, much of which is provided.		1 2 3 4 5 6 7 8
Grade 8	7	Use the capital and operational costs of energy resources to evaluate their usefulness.		1 2 3 4 5 6 7 8
	8	Form persuasive arguments for and against a variety of energy resources.		1 2 3 4 5 6 7 8
	9	Debate the construction of a power plant in the local area by using a wide range of information, much of which is independently researched.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P4 Electric circuits 4.1 Electrical charges	Started (/) Completed (X)	Level Achieved
Grade 4	1	Label the constituents of an atom (proton, neutron, and electron) on a diagram.		1 2 3 4 5 6 7 8
	2	Describe the interactions between positively and negatively charged objects.		1 2 3 4 5 6 7 8
	3	State that objects can become electrically charged by the action o frictional forces.		1 2 3 4 5 6 7 8
Grade 6	4	Compare the electrical properties of protons, neutrons, electrons, and ions.		1 2 3 4 5 6 7 8
	5	Use the concept of electric fields to explain why charged objects interact.		1 2 3 4 5 6 7 8
	6	Describe how objects become charged in terms of electron transfer.		1 2 3 4 5 6 7 8
Grade 8	7	Describe the shape of the field and lines of force around a point charge or charged sphere.		1 2 3 4 5 6 7 8
	8	Apply the concept of electric fields to explain in detail why the force between charged objects decreases with increasing distance.		1 2 3 4 5 6 7 8
	9	Explain why sparks can be produced by charged materials in terms of charge build-up.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P4 Electric circuits 4.2 Electric circuits	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify circuit components from their symbols.		1 2 3 4 5 6 7 8
	2	Draw and interpret simple circuit diagrams.		1 2 3 4 5 6 7 8
	3	Construct a simple electrical circuit.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the operation of a variable resistor and a diode and their effects on current.		1 2 3 4 5 6 7 8
	5	Calculate the charge transferred by a steady current in a given time.		1 2 3 4 5 6 7 8
	6	Construct an electrical circuit and accurately measure the current.		1 2 3 4 5 6 7 8
Grade 8	7	Explain the nature of an electric current in wires in terms of electron behaviour.		1 2 3 4 5 6 7 8
	8	Perform a range of calculations, including rearrangement of the equation Q = It.		1 2 3 4 5 6 7 8
	9	Measure the current in a circuit accurately and use it to calculate the rate of flow of electrons.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P4 Electric circuits 4.3 Potential difference and resistance	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that resistance restricts the size of a current in a circuit.		1 2 3 4 5 6 7 8
	2	State Ohm's law and describe its conditions.		1 2 3 4 5 6 7 8
	3	Measure the current and potential difference in a circuit to determine the resistance.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the potential difference.		1 2 3 4 5 6 7 8
	5	Calculate the resistance of a component.		1 2 3 4 5 6 7 8
	6	Measure the effect of changing the length of a wire on its resistance in a controlled experiment.		1 2 3 4 5 6 7 8
Grade 8	7	Describe potential difference in terms of work done per unit charge.		1 2 3 4 5 6 7 8
	8	Rearrange equations for resistance and potential difference.		1 2 3 4 5 6 7 8
	9	Investigate a variety of factors that may affect the resistance of a metal wire, such as the current through it, length, cross-sectional area, and metal used.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P4 Electric circuits 4.4 Component characteristics	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the key characteristics of electrical devices.		1 2 3 4 5 6 7 8
	2	Identify components from simple I–V graphs.		1 2 3 4 5 6 7 8
	3	State the operation of a diode in simple terms.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the resistance characteristics of a filament lamp.		1 2 3 4 5 6 7 8
	5	Describe the characteristics of a diode and light-emitting diode.		1 2 3 4 5 6 7 8
	6	Investigate the resistance characteristics of a thermistor and a LDR.		1 2 3 4 5 6 7 8
Grade 8	7	Explain the resistance characteristics of a filament lamp in terms of electrons and ion collisions.		1 2 3 4 5 6 7 8
	8	Determine the resistance of a component based on information extracted from a I–V graph.		1 2 3 4 5 6 7 8
	9	Compare the characteristics of a variety of electrical components, describing how the components can be used.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P4 Electric circuits 4.5 Series circuits	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the current in any part of a series circuit is the same.		1 2 3 4 5 6 7 8
	2	Calculate the potential difference provided by cell combinations.		1 2 3 4 5 6 7 8
	3	Calculate the total resistance of two resistors placed in series.		1 2 3 4 5 6 7 8
Grade 6	4	Find the potential difference across a component in a circuit by using the p.d. rule.		1 2 3 4 5 6 7 8
	5	Calculate the current in a series circuit containing more than one resistor.		1 2 3 4 5 6 7 8
	6	Investigate the resistance of series circuits with several components.		1 2 3 4 5 6 7 8
Grade 8	7	Explain in detail why the current in a series circuit is the same at all points by using the concept of conservation of charge (electrons).		1 2 3 4 5 6 7 8
	8	Analyse a variety of series circuits to determine the current through, p.d. across, and resistance of combinations of components.		1 2 3 4 5 6 7 8
	9	Evaluate in detail the investigation of series circuits and explain discrepancies.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P4 Electric circuits 4.6 Parallel circuits	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify parallel sections in circuit diagrams.		1 2 3 4 5 6 7 8
	2	State the effect of adding resistors in parallel on the size of the current in a circuit.		1 2 3 4 5 6 7 8
	3	State that the p.d. across parallel sections of a circuit is the same.		1 2 3 4 5 6 7 8
Grade 6	4	Measure the p.d. across parallel circuits and explain any discrepancies.		1 2 3 4 5 6 7 8
	5	Describe the effect on the resistance in a circuit of adding a resistor in parallel.		1 2 3 4 5 6 7 8
	6	Investigate the effect of adding resistors in parallel on the size of the current in a circuit.		1 2 3 4 5 6 7 8
Grade 8	7	Analyse parallel circuits in terms of current loops.		1 2 3 4 5 6 7 8
	8	Calculate the current at any point in a circuit.		1 2 3 4 5 6 7 8
	9	Evaluate in detail an investigation into the effect of adding resistors in parallel on a circuit.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P5 Electricity in the home 5.1 Alternating current	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the UK mains supply is a high-voltage alternating current supply.		1 2 3 4 5 6 7 8
	2	State simple differences between a.c. and d.c. sources.		1 2 3 4 5 6 7 8
	3	Describe how the trace on an oscilloscope changes when the frequency or amplitude of the signal is changed.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the characteristics of the UK mains supply.		1 2 3 4 5 6 7 8
	5	Compare a.c. traces in terms of period and amplitude (voltage).		1 2 3 4 5 6 7 8
	6	Operate a cathode ray oscilloscope to display an a.c. trace.		1 2 3 4 5 6 7 8
Grade 8	7	Explain the process of half-wave rectification of an a.c. source.		1 2 3 4 5 6 7 8
	8	Analyse a.c. traces with an oscilloscope to determine the voltage and frequency.		1 2 3 4 5 6 7 8
	9	Compare and contrast the behaviour of electrons in a wire connected to d.c. and a.c. supplies.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P5 Electricity in the home 5.2 Cables and plugs	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the live, neutral, and earth wires in a three-pin plug.		1 2 3 4 5 6 7 8
	2	Identify the key components of a typical three-pin plug and socket.		1 2 3 4 5 6 7 8
	3	Identify simple and obvious hazards in electrical wiring.		1 2 3 4 5 6 7 8
Grade 6	4	Discuss the choices of materials used in cables and plugs in terms of their physical and electrical properties.		1 2 3 4 5 6 7 8
	5	Describe why a short circuit inside a device presents a hazard.		1 2 3 4 5 6 7 8
	6	Identify a variety of electrical hazards associated with plugs and sockets.		1 2 3 4 5 6 7 8
Grade 8	7	Explain when there will be a current in the live, neutral, and earth wires of an appliance.		1 2 3 4 5 6 7 8
	8	Discuss in detail the hazards associated with poor electrical wiring.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P5 Electricity in the home 5.3 Electrical power and potential difference	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the power of a device is the amount of energy transferred by it each second.		1 2 3 4 5 6 7 8
	2	Describe the factors that affect the rate of energy transfer by a current in a circuit.		1 2 3 4 5 6 7 8
	3	Explain why different fuses are required for different electrical devices in simple terms.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the power of systems.		1 2 3 4 5 6 7 8
	5	Calculate the power of electrical devices.		1 2 3 4 5 6 7 8
	6	Select an appropriate fuse for a device.		1 2 3 4 5 6 7 8
Grade 8	7	Measure and compare the power of electrical devices and explain variations in readings.		1 2 3 4 5 6 7 8
	8	Calculate the electrical heating caused by resistance.		1 2 3 4 5 6 7 8
	9	Combine a variety of calculations to analyse electrical systems.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P5 Electricity in the home 5.4 Electrical currents and energy transfer	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe how an electric current consists of a flow of charge (electrons in a wire).		1 2 3 4 5 6 7 8
	2	Identify the factors that affect the energy transfer in a circuit.		1 2 3 4 5 6 7 8
	3	State that a battery or power supply provides energy to a current whereas a resistor causes a transfer of energy to the surroundings.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the charge transferred by a current in a given time.		1 2 3 4 5 6 7 8
	5	Calculate the energy transferred by a charge passing through a potential difference.		1 2 3 4 5 6 7 8
	6	Apply the law of conservation of energy in a circuit.		1 2 3 4 5 6 7 8
Grade 8	7	Perform calculations involving rearrangement of the equations Q = It and E = VQ.		1 2 3 4 5 6 7 8
	8	Explain how energy is conserved in terms of current and p.d. during energy transfers by an electric current.		1 2 3 4 5 6 7 8
	9	Use algebra to combine the equations Q = It and E = VQ to form the		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P5 Electricity in the home 5.5 Appliances and efficiency	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe the factors that affect the cost of using various electrical devices.		1 2 3 4 5 6 7 8
	2	Calculate energy transfer in joules.		1 2 3 4 5 6 7 8
	3	State that energy transfer can be measured in kilowatt-hours.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate energy transfer in kilowatt-hours.		1 2 3 4 5 6 7 8
	5	Convert between efficiencies stated in percentages and those stated in decimal forms.		1 2 3 4 5 6 7 8
	6	Calculate the power rating of a device from the energy transferred and the time of operation.		1 2 3 4 5 6 7 8
Grade 8	7	Convert between relevant units during calculations of energy transfer.		1 2 3 4 5 6 7 8
	8	Analyse the use of a variety of electrical devices to determine their cost of operation.		1 2 3 4 5 6 7 8
	9	Compare a range of electrical devices in terms of efficiency using calculations to support any conclusions.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P6 Molecules and matter 6.1 Density	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe density as a property of a material and not a particular object.		1 2 3 4 5 6 7 8
	2	State that the density of a material is the mass per unit volume.		1 2 3 4 5 6 7 8
	3	Calculate the volume of some regular shapes and the density of materials, with support.		1 2 3 4 5 6 7 8
Grade 6	4	Explain why some materials will float on water.		1 2 3 4 5 6 7 8
	5	Calculate the density of materials.		1 2 3 4 5 6 7 8
	6	Measure the density of a solid and a liquid.		1 2 3 4 5 6 7 8
Grade 8	7	Use the density equation in a wide variety of calculations.		1 2 3 4 5 6 7 8
	8	Use appropriate significant figures in final answers when measuring density.		1 2 3 4 5 6 7 8
	9	Evaluate in detail the experimental measurement of density, accounting for errors in measurements.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P6 Molecules and matter 6.2 States of matter	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe the simple properties of solids, liquids, and gases.		1 2 3 4 5 6 7 8
	2	Name the changes of state.		1 2 3 4 5 6 7 8
	3	State that there are changes in stores of energy associated with a material when its temperature is increased.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the arrangement of the particles in a solid, liquid, and gas.		1 2 3 4 5 6 7 8
	5	Explain the behaviour of a material in terms of the arrangement of particles within it.		1 2 3 4 5 6 7 8
	6	Describe the changes in behaviour of the particles in a material during changes of state.		1 2 3 4 5 6 7 8
Grade 8	7	Describe the forces acting between particles in a solid, liquid, and gas.		1 2 3 4 5 6 7 8
	8	Describe the changes in the energy of individual particles during changes of state.		1 2 3 4 5 6 7 8
	9	Explain in detail why the density of a material changes during a change of state, using a particle model.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P6 Molecules and matter 6.3 Changes of state	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the melting point of a substance is the temperature at which it changes from a solid to a liquid and vice versa.		1 2 3 4 5 6 7 8
	2	State that the boiling point of a substance is the temperature at which it changes from a liquid to a gas and vice versa.		1 2 3 4 5 6 7 8
	3	Describe the process of melting and boiling.		1 2 3 4 5 6 7 8
Grade 6	4	State that the melting and boiling points of a pure substance are fixed.		1 2 3 4 5 6 7 8
	5	Use the term 'latent heat' to describe the energy gained by a substance during heating for which there is no change in temperature.		1 2 3 4 5 6 7 8
	6	Find the melting or boiling point of a substance by using a graphical technique.		1 2 3 4 5 6 7 8
Grade 8	7	Describe how the melting points and boiling points of a substance can be changed.		1 2 3 4 5 6 7 8
	8	Describe in detail the behaviour of the particles during changes of state.		1 2 3 4 5 6 7 8
	9	Evaluate data produced by a heating experiment to discuss the reproducibility of the measurement of a melting point.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P6 Molecules and matter 6.4 Internal energy	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the internal energy of a system increases as it is heated.		1 2 3 4 5 6 7 8
	2	Identify which changes of state are related to increases in internal energy and which are related to decreases.		1 2 3 4 5 6 7 8
	3	Outline the behaviour of particles in solids, liquids, and gases.		1 2 3 4 5 6 7 8
Grade 6	4	Describe how the internal energy of an object can be increased by heating.		1 2 3 4 5 6 7 8
	5	Describe how the behaviour of particles changes as the energy of a system increases.		1 2 3 4 5 6 7 8
	6	Describe the energy changes by heating between objects within the same system.		1 2 3 4 5 6 7 8
Grade 8	7	Use the concepts of kinetic and potential energy to explain changes in internal energy.		1 2 3 4 5 6 7 8
	8	Describe the changes in the size of intermolecular forces during changes of state.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P6 Molecules and matter 6.5 Specific latent heat	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that heating a material will increase its internal energy.		1 2 3 4 5 6 7 8
	2	Describe energy changes during melting and vaporisation.		1 2 3 4 5 6 7 8
	3	Measure the latent heat of vaporisation for water.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the changes in particle bonding during changes of state.		1 2 3 4 5 6 7 8
	5	Calculate the latent heat of fusion and latent heat of vaporisation for a substance.		1 2 3 4 5 6 7 8
	6	Measure the latent heat of fusion for water.		1 2 3 4 5 6 7 8
Grade 8	7	Perform a variety of calculations based on the latent heat equation.		1 2 3 4 5 6 7 8
	8	Combine a variety of equations to solve problems involving heating.		1 2 3 4 5 6 7 8
	9	Evaluate the reproducibility of a measurement of latent heat based on collated data.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P6 Molecules and matter 6.6 Gas pressure and temperature	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that as the temperature of a gas in a sealed container increases, the pressure of the gas increases.		1 2 3 4 5 6 7 8
	2	Describe a gas as consisting of a large number of rapidly moving particles.		1 2 3 4 5 6 7 8
	3	Describe pressure as being caused by collisions of gas particles with the walls of its container.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the behaviour of particles in a gas as the gas is heated.		1 2 3 4 5 6 7 8
	5	Outline Brownian motion and how this provides evidence for the particle nature of matter.		1 2 3 4 5 6 7 8
	6	Describe the relationship between an increase in the temperature of a fixed volume of a gas and the increase in pressure of the gas.		1 2 3 4 5 6 7 8
Grade 8	7	Describe the linear relationship between changes in temperature and pressure for a gas.		1 2 3 4 5 6 7 8
	8	Explain Brownian motion in terms of particle behaviour and collisions, relating the speeds of smoke particles and air molecules.		1 2 3 4 5 6 7 8
	9	Describe in detail how the relationship between the pressure of a gas and its temperature can be investigated.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P6 Molecules and matter 6.7 Gas pressure and volume	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the temperature of a gas is related to the kinetic energy of the gas particles.		1 2 3 4 5 6 7 8
	2	State that the pressure of a gas increases when it is compressed (at a constant temperature).		1 2 3 4 5 6 7 8
	3	Describe how forces are required to compress a gas.		1 2 3 4 5 6 7 8
Grade 6	4	Describe how the pressure of a gas can change when it is compressed or allowed to expand.		1 2 3 4 5 6 7 8
	5	Use the relationship pV = constant to calculate the constant.		1 2 3 4 5 6 7 8
	6	(H) Explain why the temperature of a gas increases when it is compressed.		1 2 3 4 5 6 7 8
Grade 8	7	Explain in terms of particle behaviour why the pressure of a gas increases when its volume decreases.		1 2 3 4 5 6 7 8
	8	Calculate the pressure or volume of a gas.		1 2 3 4 5 6 7 8
	9	Solve a variety of problems in which gas pressure or volume changes.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.1 Atoms and radiation	Started (/) Completed (X)	Level Achieved
Grade 4	1	Name the three types of nuclear radiation.		1 2 3 4 5 6 7 8
	2	Name the three sub-atomic particles found in an atom (proton, neutron, and electron).		1 2 3 4 5 6 7 8
	3	Identify some sources of background radiation.		1 2 3 4 5 6 7 8
Grade 6	4	Describe some safety precautions used when dealing with radioactive materials.		1 2 3 4 5 6 7 8
	5	Describe how a Geiger counter can be used to detect radiation.		1 2 3 4 5 6 7 8
	6	Identify natural and man-made sources of background radiation.		1 2 3 4 5 6 7 8
Grade 8	7	Describe in detail the decay of an unstable nucleus.		1 2 3 4 5 6 7 8
	8	Explain the similarities and differences between nuclear radiation and visible light.		1 2 3 4 5 6 7 8
	9	Describe the relative penetrating powers of the three types of nuclear radiation.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.2 The discovery of the nucleus	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the Rutherford (nuclear) model of an atom.		1 2 3 4 5 6 7 8
	2	Identify the locations of protons, neutrons, and electrons in the nuclear model.		1 2 3 4 5 6 7 8
	3	State that electrons can move between fixed energy levels within an atom.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the plum pudding model of the atom.		1 2 3 4 5 6 7 8
	5	Describe the evidence provided by the Rutherford scattering experiment.		1 2 3 4 5 6 7 8
	6	Describe the properties of protons, neutrons, and electrons.		1 2 3 4 5 6 7 8
Grade 8	7	Compare the plum pudding model, Rutherford model, and Bohr model of the atom in terms of the evidence for each model.		1 2 3 4 5 6 7 8
	8	Explain how Rutherford and Marsden's experiment caused a rejection of the plum pudding model.		1 2 3 4 5 6 7 8
	9	Describe how the initial evidence for the nuclear model was processed and how the model came to be accepted.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.3 Nuclear reactions	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the mass and atomic number by using nuclear notation.		1 2 3 4 5 6 7 8
	2	Identify the type of decay taking place from a nuclear equation.		1 2 3 4 5 6 7 8
	3	Describe how isotopes are atoms of the same element with different mass numbers.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the number of neutrons in an isotope by using nuclear notation.		1 2 3 4 5 6 7 8
	5	Describe the differences between isotopes.		1 2 3 4 5 6 7 8
	6	Complete decay equations for alpha and beta decay.		1 2 3 4 5 6 7 8
Grade 8	7	Explain why particles are ejected from the nucleus during nuclear decay.		1 2 3 4 5 6 7 8
	8	Describe the changes in the nucleus that occur during nuclear decay.		1 2 3 4 5 6 7 8
	9	Write full decay equations, for example, nuclear decays.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.4 More about alpha, beta, and gamma radiation	Started (/) Completed (X)	Level Achieved
Grade 4	1	Rank the three types of nuclear radiation in order of their penetrating power.		1 2 3 4 5 6 7 8
	2	Rank the three types of nuclear radiation in order of their range through air.		1 2 3 4 5 6 7 8
	3	State that all three types of nuclear radiation are ionising.		1 2 3 4 5 6 7 8
Grade 6	4	Describe how the penetrating powers of radiation can be measured.		1 2 3 4 5 6 7 8
	5	Describe the path of radiation types through a magnetic field.		1 2 3 4 5 6 7 8
	6	Describe the process of ionisation.		1 2 3 4 5 6 7 8
Grade 8	7	Describe in detail how the thickness of a material being manufactured can be monitored by using a beta source.		1 2 3 4 5 6 7 8
	8	Compare the ionisation caused by the different types of nuclear radiation.		1 2 3 4 5 6 7 8
	9	Evaluate in some detail the risks caused by alpha radiation inside and outside the human body.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.5 Activity and half-life	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the activity of a radioactive sample will fall over time.		1 2 3 4 5 6 7 8
	2	Define half-life in simple terms such as 'the time it takes for half of the material to decay'.		1 2 3 4 5 6 7 8
	3	Find the half-life of a substance from a graph of count rate (or nuclei remaining) against time with support.		1 2 3 4 5 6 7 8
Grade 6	4	(H) Find the ratio of a sample remaining after a given number of half-lives.		1 2 3 4 5 6 7 8
	5	State that all atoms of a particular isotope have an identical chance to decay in a fixed time.		1 2 3 4 5 6 7 8
	6	Plot a graph showing the decay of a sample and use it to determine half-life.		1 2 3 4 5 6 7 8
Grade 8	7	Compare a physical model of decay with the decay of nuclei, noting the limitations of the model.		1 2 3 4 5 6 7 8
	8	Outline how the age of organic material can be determined by using radioactive dating.		1 2 3 4 5 6 7 8
	9	Calculate the changes in count rate or nuclei remaining by using an exponential decay function.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.6 Nuclear radiation in medicine	Started (/) Completed (X)	Level Achieved
Grade 4	1	Name some medical applications for radioactive substances.		1 2 3 4 5 6 7 8
	2	State that the larger the dose of radiation, the more likely harm will be caused.		1 2 3 4 5 6 7 8
	3	Describe some precautions used during diagnoses or treatments involving radioactive substances.		1 2 3 4 5 6 7 8
Grade 6	4	Explain why alpha, beta, or gamma radiation is chosen for a particular medical application.		1 2 3 4 5 6 7 8
	5	Describe how gamma rays can be used to destroy cancerous cells and the damage they may cause to healthy tissue.		1 2 3 4 5 6 7 8
	6	Explain how precautions to reduce exposure to patients and medical staff work.		1 2 3 4 5 6 7 8
Grade 8	7	Describe the use of radioactive implants and the hazards associated with the technique.		1 2 3 4 5 6 7 8
	8	Discuss the factors that need to be taken into account when selecting a medical tracer for a diagnostic test.		1 2 3 4 5 6 7 8
	9	Explain how a medical tracer is used including the function of a gamma camera.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.7 Nuclear fission	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe how nuclear fission is the breaking of a large nucleus to form two smaller nuclei.		1 2 3 4 5 6 7 8
	2	Distinguish between induced fission and spontaneous fission.		1 2 3 4 5 6 7 8
	3	Label the key components of a nuclear reactor.		1 2 3 4 5 6 7 8
Grade 6	4	Describe induced nuclear fission in terms of neutron impacts and release.		1 2 3 4 5 6 7 8
	5	Explain how an escalating induced fission reaction occurs.		1 2 3 4 5 6 7 8
	6	Outline the function of the moderator, control rods, and coolant.		1 2 3 4 5 6 7 8
Grade 8	7	Explain how a steady-state induced fission reaction can be maintained.		1 2 3 4 5 6 7 8
	8	Explain the differences between naturally occurring isotopes and enriched nuclear fuels.		1 2 3 4 5 6 7 8
	9	Explain the operation of a nuclear fission reactor, including the choices of appropriate materials.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.8 Nuclear fusion	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that nuclear fusion is the energy releasing process in the Sun.		1 2 3 4 5 6 7 8
	2	State that the Sun fuses (joins together) hydrogen nuclei into helium nuclei.		1 2 3 4 5 6 7 8
	3	Describe how very high temperatures and pressures are required for fusion to take place.		1 2 3 4 5 6 7 8
Grade 6	4	Outline the process of nuclear fusion.		1 2 3 4 5 6 7 8
	5	Complete a nuclear equation showing simple fusion processes.		1 2 3 4 5 6 7 8
	6	Describe the key design features of a nuclear fusion reactor.		1 2 3 4 5 6 7 8
Grade 8	7	Explain why it is difficult to carry out controlled nuclear fusion on Earth.		1 2 3 4 5 6 7 8
	8	Construct a variety of nuclear equations showing nuclear fusion.		1 2 3 4 5 6 7 8
	9	Compare the operation of a nuclear fission reactor and a nuclear fusion reactor.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P7 Radioactivity 7.9 Nuclear issues	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify sources of radiation, including medical and background radiation.		1 2 3 4 5 6 7 8
	2	Describe the type of damage caused by large-scale nuclear accidents.		1 2 3 4 5 6 7 8
	3	Describe how nuclear waste is very dangerous and must be stored safely for very long periods of time.		1 2 3 4 5 6 7 8
Grade 6	4	Compare the risks and damage associated with alpha, beta, and gamma radiation.		1 2 3 4 5 6 7 8
	5	Describe how damage caused by radioactive material can be reduced.		1 2 3 4 5 6 7 8
	6	Discuss the difficulties associated with the handling and storage of nuclear waste.		1 2 3 4 5 6 7 8
Grade 8	7	Discuss the risks and benefits of nuclear power compared to other methods of electricity generation.		1 2 3 4 5 6 7 8
	8	Describe and explain the safety precautions that need to take place after a large nuclear accident.		1 2 3 4 5 6 7 8
	9	Evaluate in detail a variety of storage or disposal solutions for nuclear waste.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.1 Vectors and Scalars	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe how scalars have size (magnitude) without direction.		1 2 3 4 5 6 7 8
	2	Describe how vectors have both size (magnitude) and direction.		1 2 3 4 5 6 7 8
	3	List some common scalars and vectors.		1 2 3 4 5 6 7 8
Grade 6	4	Draw a scale diagram to represent a single vector.		1 2 3 4 5 6 7 8
	5	Categorise a wide range of quantities as either a vector or a scalar.		1 2 3 4 5 6 7 8
	6	Compare a scalar and a similar vector and explain how these quantities are different.		1 2 3 4 5 6 7 8
Grade 8	7	Interpret a scale diagram to determine the magnitude and direction of a vector.		1 2 3 4 5 6 7 8
	8	Translate between vector descriptions and vector diagrams and vice versa using a range of appropriate scales.		1 2 3 4 5 6 7 8
	9	Use a scale diagram to add two or more vectors.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.2 Forces between objects	Started (/) Completed (X)	Level Achieved
Grade 4	1	Use arrows to represent the directions of forces.		1 2 3 4 5 6 7 8
	2	Give examples of contact and non-contact forces.		1 2 3 4 5 6 7 8
	3	Compare the sizes of forces using the unit newton (N).		1 2 3 4 5 6 7 8
Grade 6	4	Use scale diagrams to represent the sizes of forces acting on an object.		1 2 3 4 5 6 7 8
	5	Describe the action of pairs of forces in a limited range of scenarios.		1 2 3 4 5 6 7 8
	6	Investigate the effect of different lubricants on the size of frictional forces.		1 2 3 4 5 6 7 8
Grade 8	7	Use appropriate SI prefixes and standard form to describe a wide range of forces.		1 2 3 4 5 6 7 8
	8	Explain the pairs of forces acting in a wide range of unfamiliar scenarios, including the nature (contact or non-contact), direction, and magnitude of the forces.		1 2 3 4 5 6 7 8
	9	Evaluate force measurement techniques in terms of precision and accuracy.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.3 Resultant forces	Started (/) Completed (X)	Level Achieved
Grade 4	1	Label a diagram showing several forces acting on an object.		1 2 3 4 5 6 7 8
	2	Calculate a resultant force from two parallel forces acting in opposite directions.		1 2 3 4 5 6 7 8
	3	State that a non-zero resultant force will cause a change in motion and a zero resultant force will not (Newton's First Law of motion).		1 2 3 4 5 6 7 8
Grade 6	4	Draw a scaled diagram of the forces acting in a range of situations usingarrows to represent the forces.		1 2 3 4 5 6 7 8
	5	(H) Calculate resultant force produced by several forces acting on an object in coplanar directions.		1 2 3 4 5 6 7 8
	6	Describe the effect of zero and non-zero resultant forces on the motion of mving and stationary objects.		1 2 3 4 5 6 7 8
Grade 8	7	Draw a scaled free-body force diagram showing forces as vectors and find the resultant force vector.		1 2 3 4 5 6 7 8
	8	Calculate resultant forces from several forces acting in coplanar directions using a range of SI prefixes.		1 2 3 4 5 6 7 8
	9	Create a detailed plan to investigate the factors that affect the acceleration of objects acted on by a non-zero resultant force.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.4 Moments at work	Started (/) Completed (X)	Level Achieved
Grade 4	1	Give the factors that affect the size of a moment.		1 2 3 4 5 6 7 8
	2	Calculate the moment of a force using the appropriate equation and base units.		1 2 3 4 5 6 7 8
	3	Record experimental data clearly.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the action of levers being used as force multipliers.		1 2 3 4 5 6 7 8
	5	Describe the action of a pair of gears in terms of increasing or decreasing the size of forces.		1 2 3 4 5 6 7 8
	6	Investigate the action of a set of two gears.		1 2 3 4 5 6 7 8
Grade 8	7	Explain why a force multiplier requires the effort force to move through alarger distance than the load.		1 2 3 4 5 6 7 8
	8	Apply the equation for a moment in a range of novel contexts including rearrangement and changes to and from base units.		1 2 3 4 5 6 7 8
	9	Evaluate in detail the accuracy and precision of a set of data based on comparison of measurements and a ‘true value’.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.5 More about levers and gears	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify levers being used as force multipliers.		1 2 3 4 5 6 7 8
	2	Calculate the forces produced by force multipliers.		1 2 3 4 5 6 7 8
	3	State that gears can be used to increase or decrease the size of forces.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the action of levers being used as force multipliers.		1 2 3 4 5 6 7 8
	5	Describe the action of a pair of gears in terms of increasing or decreasing the size of forces.		1 2 3 4 5 6 7 8
	6	Investigate the action of a set of two gears.		1 2 3 4 5 6 7 8
Grade 8	7	Describe the action of gears relating changes in the size of forces to the speed of rotation and the number of teeth in the gear.		1 2 3 4 5 6 7 8
	8	Analyse systems of gears of different ratios.		1 2 3 4 5 6 7 8
	9	Evaluate the results of a gear experiment, explaining any discrepancies in terms of the uncontrolled forces acting on the system.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.6 Centre of mass	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the approximate centre of mass of a range of simple shapes.		1 2 3 4 5 6 7 8
	2	State that a suspended object will come to rest so that the centre of mass lies below the point of suspension.		1 2 3 4 5 6 7 8
	3	Use lines of symmetry to identify the location of the centre of mass.		1 2 3 4 5 6 7 8
Grade 6	4	Describe an experimental technique to determine the centre of mass of an object.		1 2 3 4 5 6 7 8
	5	Explain why a suspended object comes to rest with the centre of mass directly below the point of suspension in terms of balanced forces.		1 2 3 4 5 6 7 8
	6	Compare the stability of objects to the position of their centre of mass.		1 2 3 4 5 6 7 8
Grade 8	7	Evaluate an experimental technique to determine the centre of mass of an object, identifying the likely sources of error leading to inaccuracy.		1 2 3 4 5 6 7 8
	8	Apply understanding of the particle model and moments to explain why objects have a point at which the mass seems to act.		1 2 3 4 5 6 7 8
	9	Plan a detailed investigation into the stability of three-dimensional objects.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.7 Moments and equilibrium	Started (/) Completed (X)	Level Achieved
Grade 4	1	Calculate moments using the appropriate equation.		1 2 3 4 5 6 7 8
	2	Define the principle of moments.		1 2 3 4 5 6 7 8
	3	Find the weight of an object using a balanced beam...		1 2 3 4 5 6 7 8
Grade 6	4	Use calculation of moments to determine if a seesaw is in equilibrium.		1 2 3 4 5 6 7 8
	5	Apply the principle of moments to determine if an object is in equilibrium.		1 2 3 4 5 6 7 8
	6	Establish the possible range of uncertainty of a weight using repeat values.		1 2 3 4 5 6 7 8
Grade 8	7	Use calculations to determine if an object with three or more moments is in equilibrium.		1 2 3 4 5 6 7 8
	8	Describe the application of moments in balance (equilibrium) in a range of contexts.		1 2 3 4 5 6 7 8
	9	Evaluate an experiment to determine the weight of objects in terms of accuracy and precision		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.8 The parallelogram of forces	Started (/) Completed (X)	Level Achieved
Grade 6	1	Find the resultant of two forces at an acute angle by drawing a scale diagram.		1 2 3 4 5 6 7 8
	2	Describe a system in equilibrium in which non-parallel forces are acting.		1 2 3 4 5 6 7 8
	3	Calculate the component of a force using scale diagrams and ratios.		1 2 3 4 5 6 7 8
Grade 8	4	Find the resultant of two forces at an obtuse angle by drawing a scale diagram.		1 2 3 4 5 6 7 8
	5	Investigate non-parallel forces acting on a system in equilibrium to verify the parallelogram of forces.		1 2 3 4 5 6 7 8
	6	Analyse a wide range systems of non-parallel forces using a parallelogram technique.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P8 Forces in balance Lesson 8.9 Resolution of forces	Started (/) Completed (X)	Level Achieved
Grade 6	1	Resolve a single force into two perpendicular components.		1 2 3 4 5 6 7 8
	2	Determine if an object is in equilibrium by considering the horizontal and vertical forces.		1 2 3 4 5 6 7 8
	3	Investigate the effect of increasing the weight of an object on a slope on the component of the weight acting along the slope.		1 2 3 4 5 6 7 8
Grade 8	4	Resolve a pair of forces into the overall perpendicular components.		1 2 3 4 5 6 7 8
	5	Determine if an object is in equilibrium by considering the horizontal and vertical components of forces.		1 2 3 4 5 6 7 8
	6	Plan a detailed investigation into the effect of increasing the gradient of a slope on the component of the weight acting along the slope.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P9 Motion Lesson 9.1 Speed and distance-time graphs	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe how the gradient of a distance–time graph represents the speed.		1 2 3 4 5 6 7 8
	2	Estimate typical speeds for walking, running, and cycling.		1 2 3 4 5 6 7 8
	3	Calculate the distance an object at constant speed will travel in a given time.		1 2 3 4 5 6 7 8
Grade 6	4	Use the gradients of distance–time graphs to compare the speeds of objects.		1 2 3 4 5 6 7 8
	5	Describe the motion of an object by interpreting distance–time graphs.		1 2 3 4 5 6 7 8
	6	Calculate the speed of an object and the time taken to travel a given distance.		1 2 3 4 5 6 7 8
Grade 8	7	Calculate the speed of an object by extracting data from a distance–time graph.		1 2 3 4 5 6 7 8
	8	Extract data from a distance–time graph to calculate the speed of an object at various points in its motion.		1 2 3 4 5 6 7 8
	9	Perform calculations of speed, distance, and time which involve conversion to and from SI base units.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P9 Motion Lesson 9.2 Velocity and acceleration	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe the difference between speed and velocity using an appropriate example.		1 2 3 4 5 6 7 8
	2	Give the equation relating velocity, acceleration, and time.		1 2 3 4 5 6 7 8
	3	Calculate the acceleration of an object using the change in velocity and time.		1 2 3 4 5 6 7 8
Grade 6	4	Identify the features of a velocity–time graph.		1 2 3 4 5 6 7 8
	5	Rearrange the acceleration equation in calculations.		1 2 3 4 5 6 7 8
	6	Calculate the change in velocity for an object under constant acceleration for a given period of time.		1 2 3 4 5 6 7 8
Grade 8	7	Compare and contrast the features of a distance–time, displacement–time, and velocity–time graph.		1 2 3 4 5 6 7 8
	8	Combine equations relating to velocity and acceleration in multi-step calculations.		1 2 3 4 5 6 7 8
	9	Calculate a new velocity for a moving object that has accelerated for a given period of time.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P9 Motion Lesson 9.3 More about velocity-time graphs	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the feature of a velocity–time graph that represents the acceleration [the gradient], and compare these values.		1 2 3 4 5 6 7 8
	2	Identify the feature of a velocity–time graph that represents the distance travelled [the area beneath the line], and compare these values.		1 2 3 4 5 6 7 8
	3	Measure the acceleration of an object as it moves down a ramp.		1 2 3 4 5 6 7 8
Grade 6	4	Describe sections of velocity–time graphs, and compare the acceleration in these sections.		1 2 3 4 5 6 7 8
	5	Calculate the distance travelled using information taken from a velocity–time graph for one section of motion.		1 2 3 4 5 6 7 8
	6	Use a series of repeat measurements to find an accurate measurement of the acceleration of a moving object.		1 2 3 4 5 6 7 8
Grade 8	7	Calculate the acceleration of an object from values taken from a velocity–time graph.		1 2 3 4 5 6 7 8
	8	Calculate the total distance travelled from a multi-phase velocity–time graph.		1 2 3 4 5 6 7 8
	9	Evaluate an experiment into the acceleration of an object in terms of precision based on the spread of repeat measurements.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P9 Motion Lesson 9.4 Analysing motion graphs	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify a change in speed on a distance–time graph using change in gradient.		1 2 3 4 5 6 7 8
	2	Identify a change in acceleration on a velocity–time graph using change in gradient.		1 2 3 4 5 6 7 8
	3	Calculate the distance travelled by an object at constant velocity using data extracted from a graph.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the speed of an object by extracting data from a distance–time graph.		1 2 3 4 5 6 7 8
	5	(H) Use a tangent to determine the speed of an object from a distance–time graph.		1 2 3 4 5 6 7 8
	6	Use the equation v2 − u2 = 2as in calculations where the initial or final velocity is zero.		1 2 3 4 5 6 7 8
Grade 8	7	Calculate the acceleration of an object by extracting data from a velocity–time graph.		1 2 3 4 5 6 7 8
	8	Use the gradient of a velocity–time graph to determine the acceleration of an object.		1 2 3 4 5 6 7 8
	9	Apply transformations of the equation v2 − u2 = 2as in calculations involving change in velocity and acceleration where both velocities are non-zero.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P10 Forces and motion Lesson 10.1 Force and acceleration	Started (/) Completed (X)	Level Achieved
Grade 4	1	State the factors that will affect the acceleration of an object acted on by a resultant force.		1 2 3 4 5 6 7 8
	2	Calculate the force required to cause a specified acceleration on a given mass.		1 2 3 4 5 6 7 8
	3	Investigate a factor that affects the acceleration of a mass.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the effect of changing the mass or the force acting on an object on the acceleration of that object.		1 2 3 4 5 6 7 8
	5	Perform calculations involving the rearrangement of the F = ma equation.		1 2 3 4 5 6 7 8
	6	Combine separate experimental conclusions to form an overall conclusion.		1 2 3 4 5 6 7 8
Grade 8	7	(H) Define the inertial mass of an object in terms of force and acceleration.		1 2 3 4 5 6 7 8
	8	Calculate the acceleration of an object acted on by several forces.		1 2 3 4 5 6 7 8
	9	Evaluate an experiment by identifying sources of error and determining uncertainty in the resulting		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P10 Forces and motion Lesson 10.2 Weight and terminal velocity	Started (/) Completed (X)	Level Achieved
Grade 4	1	State the difference between the mass of an object and its weight.		1 2 3 4 5 6 7 8
	2	Describe the forces acting on an object falling through a fluid.		1 2 3 4 5 6 7 8
	3	Investigate the motion of an object when it falls.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the weight of objects using their mass and the gravitational		1 2 3 4 5 6 7 8
	5	Apply the concept of balanced forces to explain why an object falling through a fluid will reach a terminal velocity.		1 2 3 4 5 6 7 8
	6	Investigate the relationship between the mass of an object and the terminal velocity.		1 2 3 4 5 6 7 8
Grade 8	7	Apply the mathematical relationship between mass, weight, and gravitational field strength in a range of situations.		1 2 3 4 5 6 7 8
	8	Explain the motion of an object falling through a fluid by considering the forces acting through all phases of motion.		1 2 3 4 5 6 7 8
	9	Evaluate the repeatability of an experiment by considering the spread of each set of repeat results.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P10 Forces and motion Lesson 10.3 Forces and braking	Started (/) Completed (X)	Level Achieved
Grade 4	1	List the factors which affect the stopping distance of a car.		1 2 3 4 5 6 7 8
	2	Calculate the thinking distance for a car from the initial speed and reaction time.		1 2 3 4 5 6 7 8
	3	Estimate the relative effects of changing factors which affect the stopping		1 2 3 4 5 6 7 8
Grade 6	4	Categorise factors which affect thinking distance, braking distance, and both.		1 2 3 4 5 6 7 8
	5	Calculate the braking distance of a car.		1 2 3 4 5 6 7 8
	6	Describe the relationship between speed and both thinking and braking distance.		1 2 3 4 5 6 7 8
Grade 8	7	Calculate acceleration, mass, and braking force of vehicles.		1 2 3 4 5 6 7 8
	8	Calculate total stopping distance, initial speed, reaction time, and acceleration.		1 2 3 4 5 6 7 8
	9	Explain the relative effects of changes of speed on thinking and stopping distance.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P10 Forces and motion Lesson 10.4 Momentum	Started (/) Completed (X)	Level Achieved
Grade 6	1	Apply the equation p = mv to find the momentum, velocity or mass of an object.		1 2 3 4 5 6 7 8
	2	Describe how the principle of conservation of momentum can be used to find the velocities of objects.		1 2 3 4 5 6 7 8
	3	Investigate the behaviour of objects during explosions to verify the conservation of momentum.		1 2 3 4 5 6 7 8
Grade 8	4	Fully describe the motion of objects after an explosion accounting for any frictional effects.		1 2 3 4 5 6 7 8
	5	Apply the principle of conservation of momentum to a range of calculations		1 2 3 4 5 6 7 8
	6	Evaluate the data produced from an investigation and compare this to a theoretical framework.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P10 Forces and motion Lesson 10.5 Using conservation of momentum	Started (/) Completed (X)	Level Achieved
Grade 6	1	Apply the law of conservation of momentum to find the momentum beforeand after impacts.		1 2 3 4 5 6 7 8
	2	Calculate the momentum of a combination of objects after an impact.		1 2 3 4 5 6 7 8
	3	Evaluate data used to verify the law of conservation of momentum.		1 2 3 4 5 6 7 8
Grade 8	4	Apply the law of conservation of momentum to find velocities of objects after impacts.		1 2 3 4 5 6 7 8
	5	Analyse the velocities of objects in a wide range of collisions.		1 2 3 4 5 6 7 8
	6	Evaluate an experimental technique and discuss in detail the factors which lead to differences between experimental data and an accepted law.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P10 Forces and motion Lesson 10.6 Impact forces	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe the operation of some safety features of a car in simple terms.		1 2 3 4 5 6 7 8
	2	Report on the differences in safety features between expensive and inexpensive cars.		1 2 3 4 5 6 7 8
Grade 8	3	Apply the concept of equal and opposite forces in collisions to explain why momentum is conserved in impacts.		1 2 3 4 5 6 7 8
	4	Calculate changes in velocity and momentum during impacts using the force involved in the impact and the impact time.		1 2 3 4 5 6 7 8
	5	Plan an investigation into the impact forces involved in a collision and how they can be reduced.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P10 Forces and motion Lesson 10.7 Safety first	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe the operation of some safety features of a car in simple terms.		1 2 3 4 5 6 7 8
	2	Report on the differences in safety features between expensive and inexpensive cars.		1 2 3 4 5 6 7 8
Grade 8	3	Use scientific principles such as rate of change of momentum to explain in detail the operation of a range of car safety features.		1 2 3 4 5 6 7 8
	4	Evaluate a range of optional safety features based on their costs and effectiveness.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P10 Forces and motion Lesson 10.8 Forces and elasticity	Started (/) Completed (X)	Level Achieved
Grade 4	1	State Hooke's law.		1 2 3 4 5 6 7 8
	2	Calculate the extension of a material using its length and original length.		1 2 3 4 5 6 7 8
	3	Compare materials in terms of elastic and non-elastic behaviour.		1 2 3 4 5 6 7 8
Grade 6	4	Explain the limitations of Hooke's law including the limit of proportionality.		1 2 3 4 5 6 7 8
	5	Calculate the force required to cause a given extension in a spring using the spring constant.		1 2 3 4 5 6 7 8
	6	Compare the behaviour of different materials under loads in terms of proportional and non-proportional behaviour.		1 2 3 4 5 6 7 8
Grade 8	7	Find the spring constant of a spring using a graphical technique.		1 2 3 4 5 6 7 8
	8	Apply the Hooke's law equation in a wide range of situations.		1 2 3 4 5 6 7 8
	9	Evaluate an investigation into the extension of materials in terms of the precision of the data.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P11 Force and pressure	Started (/) Completed (X)	Level Achieved
		11.1 Pressure and surfaces		
Grade 4	1	State the factors that affect the pressure acting on a surface.		1 2 3 4 5 6 7 8
	2	Calculate the pressure caused by an object resting on a surface, given the force and area of contact.		1 2 3 4 5 6 7 8
	3	Describe how pressure can be caused by the action of fluids (liquids and gases) on a surface.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the effect on the pressure of changing the area of contact or weight acting on a surface.		1 2 3 4 5 6 7 8
	5	Calculate forces or areas of contact.		1 2 3 4 5 6 7 8
	6	Use SI prefixes in expressions for pressure as appropriate.		1 2 3 4 5 6 7 8
Grade 8	7	Apply the concept of pressure in explaining the effect on a surface in a wide range of contexts.		1 2 3 4 5 6 7 8
	8	Perform pressure calculations including conversion of areas and forces with SI multiplier prefixes.		1 2 3 4 5 6 7 8
	9	Estimate uncertainty in values for pressure using experimental data.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P11 Force and pressure 11.2 Pressure in a liquid at rest	Started (/) Completed (X)	Level Achieved
Grade 6	1	Use the concept of force, mass, and volume to explain why the pressure increases with depth in a liquid.		1 2 3 4 5 6 7 8
	2	Calculate the pressure at a point in a liquid using $p = h \rho g$.		1 2 3 4 5 6 7 8
Grade 8	3	Use algebraic techniques to derive the equation $p = h \rho g$.		1 2 3 4 5 6 7 8
	4	Rearrange the equation $p = h \rho g$ to solve a range of questions involving the pressure in a liquid.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P11 Force and pressure 11.3 Atmospheric pressure	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe how the pressure of the atmosphere decreases with height above the Earth's surface.		1 2 3 4 5 6 7 8
	2	Describe how the density of the atmosphere decreases with height.		1 2 3 4 5 6 7 8
	3	Describe the cause of atmospheric pressure in simple terms.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the forces produced by pressure differences.		1 2 3 4 5 6 7 8
	5	Describe the change in pressure at different heights.		1 2 3 4 5 6 7 8
	6	(H) Use the equation p = hρg to determine pressure in a fluid.		1 2 3 4 5 6 7 8
Grade 8	7	Use the particle model to explain in detail the changes in atmospheric pressure.		1 2 3 4 5 6 7 8
	8	Explain a range of phenomena in terms of pressure difference.		1 2 3 4 5 6 7 8
	9	(H) Explain why the relationship p = hρg is not suitable for calculating changes in pressure in the atmosphere over a large change in height.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P11 Force and pressure 11.4 Upthrust and flotation	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe the relationship between upthrust and weight for floating and submerged objects.		1 2 3 4 5 6 7 8
	2	Compare the density of an object with the density of a liquid to determine whether or not the object will float.		1 2 3 4 5 6 7 8
	3	Plan an investigation into the relationship between the average density of an object and the distance it submerges.		1 2 3 4 5 6 7 8
Grade 8	4	Calculate the upthrust acting on a submerged object by using the pressure difference on the top and bottom surfaces.		1 2 3 4 5 6 7 8
	5	Use algebraic techniques to show that the weight of liquid displaced is equal to the upthrust provided.		1 2 3 4 5 6 7 8
	6	Carry out and evaluate in detail an investigation into the relationship between the average density of an object and the distance it submerges.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P12 Wave properties 12.1 The nature of waves	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that waves can transfer energy and information without the transfer of matter.		1 2 3 4 5 6 7 8
	2	Identify waves as either transverse or longitudinal.		1 2 3 4 5 6 7 8
	3	Identify waves as either mechanical or electromagnetic.		1 2 3 4 5 6 7 8
Grade 6	4	Investigate wave motion through a spring model.		1 2 3 4 5 6 7 8
	5	Compare transverse and longitudinal waves in terms of direction of vibration and propagation.		1 2 3 4 5 6 7 8
	6	Compare electromagnetic and mechanical waves in terms of the need for a medium.		1 2 3 4 5 6 7 8
Grade 8	7	Explain the features of a longitudinal wave in terms of compressions and rarefactions by using a particle model.		1 2 3 4 5 6 7 8
	8	Discuss the features of a transverse wave in terms of particle or field behaviour.		1 2 3 4 5 6 7 8
	9	Compare mechanical waves and their particulate nature with electromagnetic waves and their field oscillations.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P12 Wave properties 12.2 The properties of waves	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the wavelength and amplitude of a wave from a simple diagram.		1 2 3 4 5 6 7 8
	2	Describe how the frequency of a wave is the number of waves produced each		1 2 3 4 5 6 7 8
	3	Outline the derivation of the wave speed equation.		1 2 3 4 5 6 7 8
Grade 6	4	Calculate the period of a wave from its frequency.		1 2 3 4 5 6 7 8
	5	Calculate the wave speed from the frequency and wavelength.		1 2 3 4 5 6 7 8
	6	Explain how the wave speed equation can be derived from fundamental principles.		1 2 3 4 5 6 7 8
Grade 8	7	Perform calculations involving rearrangements of the period equation and the wave speed equation.		1 2 3 4 5 6 7 8
	8	Perform multi-stage calculations linking period, frequency, wave speed, and wavelength.		1 2 3 4 5 6 7 8
	9	Describe the features of neutron stars and black holes.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P12 Wave properties 12.3 Reflection and refraction	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe refraction at a boundary in terms of wavefronts.		1 2 3 4 5 6 7 8
	2	Describe refraction including the reflected rays.		1 2 3 4 5 6 7 8
	3	Explain partial absorption as a decrease in the amplitude of a wave and therefore the energy carried.		1 2 3 4 5 6 7 8
Grade 8	4	Use a wavefront model to explain refraction and reflection.		1 2 3 4 5 6 7 8
	5	Describe the relationship between the angle of incidence and angle of refraction.		1 2 3 4 5 6 7 8
	6	Explain refraction in terms of changes in the speed of waves when they move between one medium and another.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P12 Wave properties 12.4 Sound waves	Started (/) Completed (X)	Level Achieved
Grade 4	1	Measure the speed of a wave in water.		1 2 3 4 5 6 7 8
	2	Describe how sound waves travel more quickly in solid than they do in gases.		1 2 3 4 5 6 7 8
	3	State that sound waves require a medium to travel in.		1 2 3 4 5 6 7 8
Grade 6	4	Measure the speed of a wave in a solid (string).		1 2 3 4 5 6 7 8
	5	Describe the effect that changing the frequency of a wave has on its wavelength in a medium.		1 2 3 4 5 6 7 8
	6	Calculate the speed of waves using the wave speed equation.		1 2 3 4 5 6 7 8
Grade 8	7	Evaluate the suitability of apparatus for measuring the frequency, wavelength, and speed of waves.		1 2 3 4 5 6 7 8
	8	Explain why the wavelength of a wave in a particular medium changes as the frequency changes with reference to the wave equation.		1 2 3 4 5 6 7 8
	9	Evaluate data from speed of sound experiments to discuss the range of possible speeds for sound.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P12 Wave properties 12.5 More about sound	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe the properties of a sound in terms of amplitude and frequency.		1 2 3 4 5 6 7 8
	2	Identify the range of frequencies that humans can hear.		1 2 3 4 5 6 7 8
	3	Measure the frequency of a sound wave using an oscilloscope and the relationship frequency = 1 / period		1 2 3 4 5 6 7 8
Grade 8	4	Outline the structure of the human ear in terms of transfer of waves and vibrations.		1 2 3 4 5 6 7 8
	5	Explain why the human ear has a limited range of frequencies it can detect.		1 2 3 4 5 6 7 8
	6	Compare the propagation of a sound wave in a solid and a gas.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P12 Wave properties 12.6 The uses of ultrasound	Started (/) Completed (X)	Level Achieved
Grade 6	1	Compare ultrasound and audible sound waves in terms of frequency.		1 2 3 4 5 6 7 8
	2	Outline some uses of ultrasound in distance measurement.		1 2 3 4 5 6 7 8
	3	Describe the operation of an ultrasound transducer in terms of partial reflection.		1 2 3 4 5 6 7 8
Grade 8	4	Investigate the reflection and absorption of ultrasound waves.		1 2 3 4 5 6 7 8
	5	Calculate the positions of objects or flaws in metal objects using data from		1 2 3 4 5 6 7 8
	6	Use an oscilloscope to obtain timing information for an ultrasound pulse.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P12 Wave properties 12.7 Seismic waves	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe the internal structure of the Earth.		1 2 3 4 5 6 7 8
	2	Compare the three types of seismic waves (P, S, L) in terms of the speed they travel and whether they are transverse or longitudinal.		1 2 3 4 5 6 7 8
	3	Describe the operation of a seismometer.		1 2 3 4 5 6 7 8
Grade 8	4	Explain in detail how the internal structure of the Earth can be determined by waves passing through it.		1 2 3 4 5 6 7 8
	5	Calculate the speed of different types of seismic waves.		1 2 3 4 5 6 7 8
	6	Interpret seismographs to determine the difference in speeds of seismic waves.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P13 The electromagnetic spectrum 13.1 The electromagnetic	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that electromagnetic (EM) waves transfer energy without transferring matter.		1 2 3 4 5 6 7 8
	2	Identify the position of EM waves in the spectrum in order of wavelength and frequency.		1 2 3 4 5 6 7 8
	3	State that all EM waves travel at the same speed in a vacuum.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the relationship between the energy being transferred by an electromagnetic wave and the frequency of the wave.		1 2 3 4 5 6 7 8
	5	Calculate the frequency and the wavelength of an electromagnetic wave.		1 2 3 4 5 6 7 8
	6	Explain why the range of wavelengths detected by the human eye is limited.		1 2 3 4 5 6 7 8
Grade 8	7	Apply the wave model of electromagnetic radiation as a pair of electric and magnetic disturbances that do not require a medium for travel.		1 2 3 4 5 6 7 8
	8	Use standard form in calculations of wavelength, frequency, and wave speed.		1 2 3 4 5 6 7 8
	9	Explain the interactions between an electromagnetic wave and matter.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P13 The electromagnetic spectrum 13.2 Light, infrared, microwaves, and radio waves	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe how white light is a part of the electromagnetic spectrum and is composed of a range of frequencies.		1 2 3 4 5 6 7 8
	2	List some simple examples of the uses of light, microwaves, and radio waves.		1 2 3 4 5 6 7 8
	3	Measure the rate of cooling due to emission of infrared radiation.		1 2 3 4 5 6 7 8
Grade 6	4	Describe how a range of electromagnetic waves are used in a variety of scenarios.		1 2 3 4 5 6 7 8
	5	(H) Explain why a particular wave is suited to its application.		1 2 3 4 5 6 7 8
	6	Plan an investigation into the rate of cooling of infrared radiation.		1 2 3 4 5 6 7 8
Grade 8	7	Determine the wavelength of radio waves in air.		1 2 3 4 5 6 7 8
	8	Describe the interactions between a range of waves and matter, including the effect of absorption.		1 2 3 4 5 6 7 8
	9	Evaluate an investigation into the rate of cooling of infrared radiation		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P13 The electromagnetic spectrum 13.3 Communications	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe how white light is a part of the electromagnetic spectrum and is composed of a range of frequencies.		1 2 3 4 5 6 7 8
	2	List some simple examples of the uses of light, microwaves, and radio waves.		1 2 3 4 5 6 7 8
	3	Measure the rate of cooling due to emission of infrared radiation.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the penetrating powers of gamma rays, X-rays, and ultraviolet rays.		1 2 3 4 5 6 7 8
	5	Compare X-rays and gamma radiation in terms of their origin.		1 2 3 4 5 6 7 8
	6	Describe the ionisation of atoms in simple terms.		1 2 3 4 5 6 7 8
Grade 8	7	(H) Describe in detail how carrier waves are used in the transfer of information.		1 2 3 4 5 6 7 8
	8	(H) Describe the structure of a radio communication system, including theeffect of a radio wave on the current in the receiver.		1 2 3 4 5 6 7 8
	9	Discuss the relationship between wavelength, data transmission, and range toexplain why particular frequencies are chosen for particular transmissions.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P13 The electromagnetic spectrum 13.4 ltraviolet waves, X-rays, and gamma rays	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that high-frequency electromagnetic radiation is ionising.		1 2 3 4 5 6 7 8
	2	Describe the uses and dangers of ultraviolet (UV) radiation.		1 2 3 4 5 6 7 8
	3	Describe the uses and dangers of X-rays and gamma radiation.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the penetrating powers of gamma rays, X-rays, and ultraviolet rays.		1 2 3 4 5 6 7 8
	5	Compare X-rays and gamma radiation in terms of their origin.		1 2 3 4 5 6 7 8
	6	Describe the ionisation of atoms in simple terms.		1 2 3 4 5 6 7 8
Grade 8	7	Describe in detail the interaction between ionising radiation and inorganic materials.		1 2 3 4 5 6 7 8
	8	Compare different regions of the electromagnetic spectrum in terms of their potential harmfulness.		1 2 3 4 5 6 7 8
	9	Explain how the process of ionisation can lead to cell death or cancer through damage to DNA.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P13 The electromagnetic spectrum 13.5 X-rays in medicine	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe some safety procedures that take place during the operation of devices that produce ionising radiation.		1 2 3 4 5 6 7 8
	2	Describe the formation of an X-ray photograph in terms of absorption or transmission.		1 2 3 4 5 6 7 8
	3	State that X-ray therapy can be used to kill cancerous cells in the body.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the operation of an X-ray machine.		1 2 3 4 5 6 7 8
	5	Explain why contrast media can be used during X-rays.		1 2 3 4 5 6 7 8
	6	Describe the factors that affect the radiation doses received by people.		1 2 3 4 5 6 7 8
Grade 8	7	Compare the operation of a CT-scanner and that of a simple X-ray device.		1 2 3 4 5 6 7 8
	8	Evaluate the doses of ionising radiation received in a variety of occupations or medical treatments.		1 2 3 4 5 6 7 8
	9	Explain in detail how various safety features reduce exposure to ionising radiation.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P14 Light 14.1 Reflection of light	Started (/) Completed (X)	Level Achieved
Grade 4	1	State the law of reflection.		1 2 3 4 5 6 7 8
	2	Describe the properties of an image in a mirror in simple terms and investigate reflection with guidance.		1 2 3 4 5 6 7 8
	3	Describe how a real image can be formed on a screen but a virtual image cannot.		1 2 3 4 5 6 7 8
Grade 6	4	Construct accurate ray diagrams showing the reflection of light rays.		1 2 3 4 5 6 7 8
	5	Explain why some surfaces form images during reflection but others do not.		1 2 3 4 5 6 7 8
	6	Investigate the formation of images in mirrors.		1 2 3 4 5 6 7 8
Grade 8	7	Draw a ray diagram showing the position of an image in a plane mirror.		1 2 3 4 5 6 7 8
	8	Use ray diagrams to discuss why some surfaces form images during reflection but others do not.		1 2 3 4 5 6 7 8
	9	Evaluate the data from an investigation to discuss the precision and accuracy of any results.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P14 Light 14.2 Refraction of light	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe how the path of a ray of light will change at a boundary between two transparent materials.		1 2 3 4 5 6 7 8
	2	Identify the angle of incidence and angle of refraction in a ray diagram.		1 2 3 4 5 6 7 8
	3	Measure the angle of incidence and angle of refraction for a simple refraction.		1 2 3 4 5 6 7 8
Grade 6	4	Construct a ray diagram showing the refraction of a ray of light at a boundary between two different media.		1 2 3 4 5 6 7 8
	5	Describe the dispersion of white light as it passes through a prism.		1 2 3 4 5 6 7 8
	6	Investigate the refraction of light through a glass or Perspex block.		1 2 3 4 5 6 7 8
Grade 8	7	Explain how the refraction of light can cause the depth of a material to appear less than it actually is.		1 2 3 4 5 6 7 8
	8	Explain the dispersion of light as it passes through a prism in terms of different changes of speed for different wavelengths of light.		1 2 3 4 5 6 7 8
	9	Analyse the data from a refraction investigation to test different substances to determine whether it fits a suggested relationship.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P14 Light 14.3 Light and colour	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe the visible spectrum as a continuous series of colours or wavelengths.		1 2 3 4 5 6 7 8
	2	Explain the colour of objects in white light in terms of reflection of parts of the spectrum.		1 2 3 4 5 6 7 8
	3	Use the terms transparent and translucent accurately.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the colours of objects in different colours of light.		1 2 3 4 5 6 7 8
	5	Describe the reflection of a ray of light from a smooth or rough surface.		1 2 3 4 5 6 7 8
	6	Determine the appearance of a white object when illuminated by combinations of primary coloured light.		1 2 3 4 5 6 7 8
Grade 8	7	Explain the apparent colour of surfaces using the concept of reflection and absorption when illuminated by white light or combinations of primary colours.		1 2 3 4 5 6 7 8
	8	Describe the effects of combinations of coloured light and filters on the appearance of a variety of coloured objects.		1 2 3 4 5 6 7 8
	9	Determine the apparent colour of a coloured surface when illuminated by different combinations of red, green, and blue light.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P14 Light 14.4 Lenses	Started (/) Completed (X)	Level Achieved
Grade 4	1	Distinguish whether a lens is converging or diverging based on a simple ray diagram.		1 2 3 4 5 6 7 8
	2	Identify convex (converging) and concave (diverging) lenses from their shapes.		1 2 3 4 5 6 7 8
	3	Form images by using a range of lenses.		1 2 3 4 5 6 7 8
Grade 6	4	Identify real and virtual images by using ray diagrams.		1 2 3 4 5 6 7 8
	5	Calculate the magnification of a lens based on object and image size.		1 2 3 4 5 6 7 8
	6	Investigate the image-forming properties of a converging lens.		1 2 3 4 5 6 7 8
Grade 8	7	Explain ray paths through a lens in terms of refraction and the focal point.		1 2 3 4 5 6 7 8
	8	Perform calculations involving the rearrangement of the magnification equation.		1 2 3 4 5 6 7 8
	9	Construct complete ray diagrams showing image formation by a convex lens with a variety of object positions.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P14 Light 14.5 Using lenses	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the optical axis and focal point for a diagram showing image formation.		1 2 3 4 5 6 7 8
	2	Identify the position of the image formed by a lens using pre-existing rays on a diagram.		1 2 3 4 5 6 7 8
	3	Describe how a focused image can be formed by a camera lens.		1 2 3 4 5 6 7 8
Grade 6	4	With support, construct ray diagrams showing the formation of images by a convex lens and a concave lens.		1 2 3 4 5 6 7 8
	5	Describe the image formed by a magnifying glass.		1 2 3 4 5 6 7 8
	6	Describe the image formed by a camera lens.		1 2 3 4 5 6 7 8
Grade 8	7	From first principles, construct ray diagrams showing the formation of images by a convex lens and a concave lens.		1 2 3 4 5 6 7 8
	8	Fully describe the properties of an image (real, virtual, magnified, diminished, upright, and inverted) based on a ray diagram.		1 2 3 4 5 6 7 8
	9	Use scale diagrams to determine the size of an image produced by a lens.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P15 Electromagnetism 15.1 Magnetic fields	Started (/) Completed (X)	Level Achieved
Grade 4	1	State the names of the poles of a magnet.		1 2 3 4 5 6 7 8
	2	Describe the interaction of magnetic poles (attraction and repulsion).		1 2 3 4 5 6 7 8
	3	List some magnetic and non-magnetic metals.		1 2 3 4 5 6 7 8
Grade 6	4	Sketch the shape of a magnetic field around a bar magnet.		1 2 3 4 5 6 7 8
	5	Describe how the shape of a magnetic field can be investigated.		1 2 3 4 5 6 7 8
	6	Compare the Earth's magnetic field to that of a bar magnet.		1 2 3 4 5 6 7 8
Grade 8	7	Describe the regions in a magnetic field where magnetic forces are greatest using the idea of field lines.		1 2 3 4 5 6 7 8
	8	Explain in detail how magnetism can be induced in some materials.		1 2 3 4 5 6 7 8
	9	Plan in detail how the strength of a magnetic field can be investigated.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P15 Electromagnetism 15.2 Magnetic fields of electric current	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the magnetic field produced by a current-carrying wire is circular.		1 2 3 4 5 6 7 8
	2	Describe the effect of increasing the current on the magnetic field around a wire.		1 2 3 4 5 6 7 8
	3	Describe the effect of reversing the direction of the current in the wire.		1 2 3 4 5 6 7 8
Grade 6	4	Use the corkscrew rule to determine the direction of the field around a current-carrying wire.		1 2 3 4 5 6 7 8
	5	Describe the shape of the field produced by a solenoid.		1 2 3 4 5 6 7 8
	6	Describe the factors that affect the strength or direction of the magnetic field around a wire and solenoid.		1 2 3 4 5 6 7 8
Grade 8	7	Determine the polarity of the ends of a solenoid from the direction of the current.		1 2 3 4 5 6 7 8
	8	Sketch the shape of the field surrounding a solenoid relating this to the direction of the current through the coil.		1 2 3 4 5 6 7 8
	9	Plan a detailed investigation into the factors that affect the strength of the magnetic field around a solenoid.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P15 Electromagnetism 15.3 Electromagnets	Started (/) Completed (X)	Level Achieved
Grade 4	1	List some electromagnet devices.		1 2 3 4 5 6 7 8
	2	State some uses of electromagnets.		1 2 3 4 5 6 7 8
	3	State the factors which increase the strength of an electromagnet.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the structure of an electromagnet in simple terms.		1 2 3 4 5 6 7 8
	5	Describe the operation of simple devices that use electromagnets.		1 2 3 4 5 6 7 8
	6	Investigate the factors that affect the strength of an electromagnet.		1 2 3 4 5 6 7 8
Grade 8	7	Explain the effect of an iron core on the strength of an electromagnet in terms of the magnetic field.		1 2 3 4 5 6 7 8
	8	Describe in detail the operation of an electric bell.		1 2 3 4 5 6 7 8
	9	Evaluate in detail an experiment into the factors which affect the strength of an electromagnet.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P15 Electromagnetism 15.4 The motor effect	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe how the force acting on a wire due to the motor effect can be increased.		1 2 3 4 5 6 7 8
	2	Apply Fleming's left-hand rule to determine the direction of the force acting on a conductor.		1 2 3 4 5 6 7 8
	3	Calculate the force acting on a conductor when it is placed in a magnetic field.		1 2 3 4 5 6 7 8
Grade 8	4	Describe and explain in detail the operation of a motor.		1 2 3 4 5 6 7 8
	5	Perform calculations involving rearrangements of the equation F = BIl.		1 2 3 4 5 6 7 8
	6	Investigate the factors that affect the rotation of an electric motor.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P15 Electromagnetism 15.5 The generator effect	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe electromagnetic induction in a wire.		1 2 3 4 5 6 7 8
	2	Identify the factors that affect the size of an induced current in a wire.		1 2 3 4 5 6 7 8
	3	Identify the direction of current induced in a solenoid.		1 2 3 4 5 6 7 8
Grade 8	4	Explain why relative movement of a wire through a magnetic field is required to cause induction.		1 2 3 4 5 6 7 8
	5	Independently investigate the magnitude and polarity of a current induced in a solenoid when a magnet is moved in it.		1 2 3 4 5 6 7 8
	6	Describe how a changing current in one coil can be used to induce a current in another.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P15 Electromagnetism 15.6 The alternating current generator	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe the operation of an alternator, moving-coil microphone and loudspeaker in simple terms.		1 2 3 4 5 6 7 8
	2	Describe the operation of a d.c. generator.		1 2 3 4 5 6 7 8
	3	Identify the period and peak output voltage for generators from an oscilloscope trace.		1 2 3 4 5 6 7 8
Grade 8	4	Describe the output of an alternator, linking this to the position of the coil to the magnetic field and the speed of rotation.		1 2 3 4 5 6 7 8
	5	Explain the operation of a d.c. generator and its output.		1 2 3 4 5 6 7 8
	6	Explain why the peak voltage of an a.c. generator is produced when the plane of the coil is parallel to the magnetic field lines.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P15 Electromagnetism 15.7 Transformers	Started (/) Completed (X)	Level Achieved
Grade 6	1	Describe the structure of a transformer.		1 2 3 4 5 6 7 8
	2	Describe the operation of a transformer in simple terms.		1 2 3 4 5 6 7 8
	3	Explain why transformers only operate with alternating currents.		1 2 3 4 5 6 7 8
Grade 8	4	Justify the choice of materials used to construct a transformer.		1 2 3 4 5 6 7 8
	5	Describe and explain the operation of a transformer in terms of induction and changes in magnetic fields.		1 2 3 4 5 6 7 8
	6	Investigate the effect that changing the ratio of the input and output loops on atransformer has on the change in voltage.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P15 Electromagnetism 15.8 Transformers in action	Started (/) Completed (X)	Level Achieved
Grade 6	1	Use the transformer equation to calculate input or output voltages for a transformer.		1 2 3 4 5 6 7 8
	2	Calculate the secondary current in a transformer.		1 2 3 4 5 6 7 8
	3	Measure the efficiency of a transformer.		1 2 3 4 5 6 7 8
Grade 8	4	Apply the transformer equation in a wide variety of situations.		1 2 3 4 5 6 7 8
	5	Use the relationship V P × I P = V S × I S to calculate all variables.		1 2 3 4 5 6 7 8
	6	Measure the efficiency of a transformer and explain why this may not be 100%..		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P16 Space 16.1 Formation of the Solar System	Started (/) Completed (X)	Level Achieved
Grade 4	1	Describe a variety of objects within the Solar System.		1 2 3 4 5 6 7 8
	2	Use simple data to compare objects in the Solar System.		1 2 3 4 5 6 7 8
	3	State that the material in a star is pulled together by gravitational forces.		1 2 3 4 5 6 7 8
Grade 6	4	Describe the formation of a protostar and planets.		1 2 3 4 5 6 7 8
	5	Explain why a star radiates light in terms of nuclear fusion.		1 2 3 4 5 6 7 8
	6	Describe how evidence for the early Solar System is gathered.		1 2 3 4 5 6 7 8
Grade 8	7	Analyse data about the planets to compare them in terms of composition.		1 2 3 4 5 6 7 8
	8	Explain why a star in its main sequence maintains a constant radius.		1 2 3 4 5 6 7 8
	9	Discuss the methods used to gather evidence for the early Solar System and formation of stars.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P16 Space 16.2 The life history of a star	Started (/) Completed (X)	Level Achieved
Grade 4	1	Identify the sequence of development for a small star such as the Sun from a diagram.		1 2 3 4 5 6 7 8
	2	State that changes in the fusion processes in a star result in changes in its appearance.		1 2 3 4 5 6 7 8
	3	State that the Sun is in its main sequence and is stable.		1 2 3 4 5 6 7 8
Grade 6	4	Compare the life cycle of small and large stars, identifying the names of the stages.		1 2 3 4 5 6 7 8
	5	Describe the formation of 'light' elements by stars in their main sequence.		1 2 3 4 5 6 7 8
	6	Describe the forces that are acting when a star is in its main sequence.		1 2 3 4 5 6 7 8
Grade 8	7	Describe changes in the wavelength (colour) and quantity (brightness) of light emitted by stars during various stages of their life cycle.		1 2 3 4 5 6 7 8
	8	Explain, in terms of energy requirements, why elements heavier than iron are produced only in supernovae.		1 2 3 4 5 6 7 8
	9	Describe the features of neutron stars and black holes.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P16 Space 16.3 Planets, satellites, and orbits	Started (/) Completed (X)	Level Achieved
Grade 4	1	Compare the orbits of planets, moons, and artificial satellites.		1 2 3 4 5 6 7 8
	2	Describe how, for an object to be moving in an orbit, there must be a gravitational force acting directed at the centre of the orbit.		1 2 3 4 5 6 7 8
	3	List some uses of artificial satellites.		1 2 3 4 5 6 7 8
Grade 6	4	(H) State that, for a greater radius of orbit, the object must travel at a slower speed and orbit in a longer period.		1 2 3 4 5 6 7 8
	5	Describe the forces acting on an object that cause it to travel in a circular path.		1 2 3 4 5 6 7 8
	6	Describe the different orbits of a variety of satellites.		1 2 3 4 5 6 7 8
Grade 8	7	(H) Explain why a centripetal force can change the velocity of an object without changing its speed.		1 2 3 4 5 6 7 8
	8	(H) Explain why the force acting on an object travelling in a circle must be at right angles to the direction of motion and directed towards the centre of the circle.		1 2 3 4 5 6 7 8
	9	Explain why a geostationary satellite must be a specific distance from the centre of the Earth.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P16 Space 16.4 The expanding universe	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the wavelength of a wave is changed by the movement of the source.		1 2 3 4 5 6 7 8
	2	State that a galaxy showing red-shift is moving away from us.		1 2 3 4 5 6 7 8
	3	Describe the structure of a galaxy as a collection of billions of stars many light years in diameter.		1 2 3 4 5 6 7 8
Grade 6	4	Describe how the frequency or wavelength of a wave can be altered by the movement of the source through the Doppler effect.		1 2 3 4 5 6 7 8
	5	Compare galaxies in terms of their red-shift and distance from us.		1 2 3 4 5 6 7 8
	6	State that all galaxies are moving away from each other and that this shows the universe is expanding.		1 2 3 4 5 6 7 8
Grade 8	7	Identify red-shift or blue-shift by comparing emission spectra of objects with those of a non-moving source.		1 2 3 4 5 6 7 8
	8	Identify the relationship between the red-shift of a galaxy and its speed of recession from a data set or graph.		1 2 3 4 5 6 7 8
	9	Explain how red-shift data is used to show that the universe is expanding.		1 2 3 4 5 6 7 8

Level	Obj No	Physics - P16 Space 16.5 The beginning and future of the universe	Started (/) Completed (X)	Level Achieved
Grade 4	1	State that the currently accepted model for the early universe is the Big Bang model.		1 2 3 4 5 6 7 8
	2	Describe how red-shift provides evidence for expansion of the universe and the Big Bang model.		1 2 3 4 5 6 7 8
	3	Identify the cosmic microwave background radiation (CMBR) as evidence for the Big Bang model.		1 2 3 4 5 6 7 8
Grade 6	4	Discuss why scientists were initially reluctant to accept the Big Bang model.		1 2 3 4 5 6 7 8
	5	Describe the origin of the CMBR.		1 2 3 4 5 6 7 8
	6	Describe changes in the universe from the time of the Big Bang to the present day.		1 2 3 4 5 6 7 8
Grade 8	7	Outline recent discoveries that have led to changes in the theories of how the universe will develop.		1 2 3 4 5 6 7 8
	8	Explain in detail how the CMBR supports the Big Bang model.		1 2 3 4 5 6 7 8
	9	Discuss how scientists using new evidence have changed their theories about how the universe has evolved over time and how it will change in the future.		1 2 3 4 5 6 7 8