AQA Physics GCSE

Student Checklist

P1 Conservation and dissipation of energy

Name .... Class .... Date ....

Conservation and dissipation of energy

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P 1.1 Changes in energy stores	I can state some examples of energy stores.	☐	I can describe a wide range of energy stores in different contexts.	☐	I can describe the nature of energy stores in detail including the relationship between objects.	☐
	I can state the processes that can transfer energy from one store to another.	☐	I can describe changes in energy stores in terms of the process that causes the change.	☐	I can explain factors that affect the size of changes in energy stores.	☐
	I can identify changes in some energy stores using simple systems.	☐	I can use quantitative descriptions of changes in energy stores.	☐	I can represent energy changes graphically, accounting for changes in all stores.	☐
P1.2 Conservation of energy	I can state that energy is conserved in any transfer.	☐	I can apply the law of conservation of energy in straightforward situations.	☐	I can apply the law of conservation of energy to explain why forces cause heating effects.	☐
	I can state that energy is dissipated (is no longer useful) when it heats the environment.	☐	I can describe changes in energy stores explaining why energy ceases to be useful.	☐	I can describe closed systems and the changes to energy stores within them using the principle of conservation of energy	☐
	I can investigate the energy transfers in a pendulum and bungee.	☐	I can describe the energy changes in a range of experiments and account for energy dissipation to the surroundings.	☐	I can evaluate in detail experiments to investigate energy changes.	☐

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P1 Conservation and dissipation of energy

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P1.3 Energy and work	I can state that energy is measured in joules (J).	☐	I can describe the action of frictional forces on objects and the associated heating effect.	☐	I can use the principle of conservation of energy and forces to explain why objects become heated by frictional forces.	☐
	I can calculate the work done by a force.	☐	I can use the equation for work done to calculate distances or size of forces.	☐	I can apply the equation for work done in a wide range of contexts.	☐
	I can measure the work done by a force experimentally.	☐	I can use repeat values to measure the work done by a force experimentally.	☐	I can evaluate in detail an experiment to measure work done, explaining why there is variation in the measurements.	☐
P1.4 Gravitational potential stores	I can state the factors that affect the change in the gravitational potential energy store of a system.	☐	I can describe the effect of different gravitational field strength on the gravitational potential energy store changes of a system.	☐	I can perform calculations using rearrangements of the gravitational potential energy store equations.	☐
	I can calculate the gravitational potential energy store of a system using the weight of an object and its height.	☐	I can calculate the gravitational potential energy store of a system using the mass gravitational field strength, and height.	☐	I can apply gravitational potential energy store equations in a wide range of contexts.	☐
	I can measure the gravitational potential energy store changes in a system with a simple practical activity.	☐	I can describe energy changes that involve a heating effect as opposed to movement of an object.	☐	I can account for all changes of energy during falls or increases in height, including health effects.	☐
P1.5 Kinetic and elastic stores	I can state the factors that affect the size of a kinetic energy store of an object.	☐	I can calculate the kinetic energy store of an object.	☐	I can perform calculations involving the rearrangement of the kinetic energy equation.	☐
	I can state the factors that affect the elastic potential energy store of a spring.	☐	I can calculate the elastic potential energy store of a stretched spring.	☐	I can perform calculations involving the rearrangement of the elastic potential energy equation.	☐
	I can describe energy transfers involving elastic potential energy and kinetic energy stores.	☐	I can investigate the relationship between the energy stored in a spring and the kinetic energy store of an object launched from	☐	I can perform a wide range of calculations involving transfer of energy.	☐

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P1 Conservation and dissipation of energy

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P1.6 Energy dissipation	I can identify useful and wasted energy in simple scenarios.	☐	I can analyse energy transfers to identify useful and less useful energy transfers.	☐	I can use a wide range of energy stores and physical processes to decide on wasted and useful energy transfers.	☐
	I can describe energy dissipation in terms of heating the surroundings.	☐	I can describe energy dissipation and how this reduces the capacity of a system.	☐	I can apply the concept of energy dissipation in a wide range of scenarios.	☐
	I can measure the frictional force acting on an object.	☐	I can investigate the factors that affect frictional forces.	☐	I can evaluate in detail an experiment to measure the frictional forces acting on an abject.	☐
P1.7 Energy and efficiency	I can describe an efficient transfer as one that transfers more energy by a useful process.	☐	I can calculate the efficiency of a range of energy transfers.	☐	I can describe design features that can be used to improve the efficiency of an energy transfer.	☐
	I can state that the efficiency of a simple energy transfer is always less that 100%.	☐	I can use the law of conservation of energy to explain why efficiency can never be greater than 100%.	☐	I can rearrange the efficiency equation to find input or total output energy.	☐
	I can describe the energy transfers carries out by electrical devices.	☐	I can describe the processes that waste energy in electrical devices.	☐	I can explain the operation of electrical devices in terms of forces and electric current.	☐
P1.8 Electrical appliances	I can list some electrical appliances.	☐	I can rank electrical devices in terms of their power.	☐	I can compare electrical devices in terms of efficiency.	☐
	I can survey a range of electrical devices and their operation.	☐	I can compare mains-powered and battery-powered devices.	☐	I can calculate the efficiency of an electrical device.	☐
	I can calculate the efficiency of a simple energy transfer.	☐	I can investigate the efficiency of a motor.	☐	I can evaluate in detail an efficiency investigation to justify conclusions.	☐

Name .... Class .... Date ....

P1.9 Energy and power	I can state the unit of power as the watt and kilowatt.	☐	I can calculate the energy transferred by an electrical device.	☐	I can compare the power ratings of devices using standard form. ☐
	I can, with support, rank electrical appliances in order of power.	☐	I can calculate the efficiency of a device from power ratings.	☐	I can apply the efficiency equation in a range of situations, including rearrangement of the equation. ☐
	I can identify 'wasted' and 'useful' energy transfers in electrical devices.	☐	I can find the wasted power of a device.	☐	I can combine the electrical power equation with other equations to solve complex problems. ☐

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P2 Energy transfer by heating

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P2.1 Energy transfer by conduction	I can describe materials as good or poor thermal conductors.	☐	I can analyse temperature change data to compare the thermal conductivity of materials.	☐	I can explain the different thermal conductivities of materials using the free electron and lattice vibration explanations of conduction.	☐
	I can compare the thermal conductivities of materials in simple terms.	☐	I can describe the changes in the behaviour of the particles in a material as the temperature of the material increases.	☐	I can evaluate the results of an experiment into thermal conductivity in terms of repeatability and reproducibility of data, and the validity of conclusions drawn from the data.	☐
	I can relate the thermal conductivities of a material to the uses of that material in familiar contexts.	☐	I can apply understanding of thermal conductivity in reducing energy dissipation through the choice of appropriate insulating materials.	☐	I can justify the choices of material involved in insulation or conduction using the concept of thermal conductivity and other data.	☐
P2.2 Specific heat capacity	I can describe materials in terms of being difficult or easy to heat up (increase the temperature of).	☐	I can describe the effects of changing the factors involved in the equation.	☐	I can evaluate materials used for transferring energy in terms of their specific heat capacity.	☐
	I can state the factors that affect the amount of energy required to increase the temperature of an object.	☐	I can calculate the energy required to change the temperature of an object.	☐	I can use the specific heat capacity equation to perform a wide range of calculations in unfamiliar contexts.	☐
	I can, with some support, measure the specific heat capacity of a material.	☐	I can measure the specific heat capacity of a material and find a mean value.	☐	I can evaluate in detail the results of an experiment to measure specific heat capacity.	☐

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P2.3 Heating and insulating buildings	I can state some design features used to prevent energy transfer to the surroundings in the home.	☐	I can describe how some design features used to reduce energy dissipation from a home work.	☐	I can evaluate in detail design features used to reduce the rate of energy loss from the home.	☐
	I can calculate the payback time of a simple home improvement feature.	☐	I can compare home improvement features in terms of payback time.	☐	I can decide on home improvement features using payback time and savings beyond the payback time.	☐

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P3 Energy resources

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P3.1 Energy demands	I can identify which fuels are renewable and which are non-renewable.	☐	I can outline the operation of a fossil fuel burning power station.	☐	I can compare energy use from different sources and different societies from available data.	☐
	I can identify activities that require large energy transfers.	☐	I can outline the operation of a nuclear power station.	☐	I can compare fossil fuels and nuclear fuels in terms of energy provided, waste, and pollution.	☐
	I can state that biofuels are carbon neutral whereas fossil fuels are not.	☐	I can explain why biofuels are considered carbon neutral.	☐	I can discuss some of the problems associated with biofuel use and production.	☐
P3.2 Energy from wind and water	I can state that wind turbines, wave generators, hydroelectric systems, and tidal systems are renewable energy resources.	☐	I can describe the operation of a wind farm.	☐	I can compare the operation of hydroelectric, wave, and tidal systems in terms of reliability, potential power	☐
	I can state some simple advantages or disadvantages of renewable energy systems.	☐	I can describe the operation of a hydroelectric system.	☐	I can explain in detail the purpose, operation, and advantages of a pumped storage system.	☐
	I can outline the operation of a renewable energy source.	☐	I can suggest the most appropriate energy resource to use in a range of scenarios.	☐	I can justify the choice of an energy resource by using numerical and other appropriate data.	☐
P3.3 Power from the Sun and the Earth	I can explore the operation of a solar cell.	☐	I can compare and contrast the operation of solar cells (photovoltaic cells) with solar heating panels.	☐	I can analyse the power output of a variety of energy resources.	☐
	I can state one difference between solar cells and solar heating systems.	☐	I can describe the operation of a solar power tower.	☐	I can calculate the energy provided by a solar heating system by using the increase in water temperature.	☐
	I can state that radioactive decay is source of heating in geothermal systems.	☐	I can describe the operation of a geothermal power plant.	☐	I can plan in detail an investigation into the factors that affect the power output of a solar cell.	☐

Name.. Class.. Date..

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P3.4 Energy and the environment	I can list some environmental problems associated with burning fossil fuels.	☐	I can describe the effects of acid rain and climate change.	☐	I can evaluate methods of reducing damage caused by waste products of fossil fuels and nuclear fuels.	☐
	I can identify the waste products of fossil fuels and nuclear fuel.	☐	I can describe techniques to reduce the harmful products of burning fossil fuels.	☐	I can discuss in detail the problems associated with nuclear accidents and the public perception of nuclear safety.	☐
	I can state simple advantages and disadvantages of a variety of renewable energy resources.	☐	I can compare a wide range of energy resources in terms of advantages and disadvantages.	☐	I can evaluate the suitability of an energy resource for a range of scenarios, taking into account a wide range of factors.	☐
P3.5 Big energy issues	I can rank the start-up times of various power stations.	☐	I can 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.	☐	I can use capital and operational costs of energy resources to evaluate their usefulness.	☐
	I can compare some of the advantages and disadvantages of various energy resources.	☐	I can compare energy resources in terms of capital and operational costs.	☐	I can form persuasive arguments for or against a variety of energy resources.	☐
	I can discuss the construction of a power plant in the local area in simple terms by using information provided.	☐	I can debate the construction of a power plant in the local area by using a wide range of information, much of which is provided.	☐	I can debate the construction of a power plant in local area by using a wide range of information, much of which is independently researched.	☐

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P4 Electric circuits

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P4.1 Current and charge	I can identify circuit components from their symbols.	☐	I can describe the operation of a variable resistor and a diode and their effects on current.	☐	I can explain the nature of an electric current in wires in terms of electron behaviour.	☐
	I can draw and interpret simple circuit diagrams.	☐	I can calculate the charge transferred by a steady current in a given time.	☐	I can perform a range of calculations, including rearrangement of the equation $Q=It$.	☐
	I can construct a simple electrical circuit.	☐	I can construct an electrical circuit and accurately measure the current.	☐	I can measure the current in a circuit accurately and use it to calculate the rate of flow of electrons.	☐
P4.2 Potential difference and resistance	I can state that resistance restricts the size of a current in a circuit.	☐	I can calculate the potential difference.	☐	I can describe potential difference in terms of work done per unit charge.	☐
	I can state Ohm's law and describe its conditions.	☐	I can calculate the resistance of a component.	☐	I can rearrange equations for resistance and potential difference.	☐
	I can measure the current and potential difference in a circuit to determined the resistance.	☐	I can measure the effect of changing the length of a wire on its resistance in a controlled experiment.	☐	I can 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.	☐

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P4.3 Component characteristics	I can identify the key characteristics of electrical devices.	☐	I can describe the resistance characteristics of a filament lamp.	☐	I can explain the resistance characteristics of a filament lamp in terms of electrons and ion collisions.	☐
	I can identify components from simple $I–V$ graphs.	☐	I can describe the characteristics of diode and light-emitting diode.	☐	I can determine the resistance of a component based on information extracted from an $I–V$ graph.	☐
	I can state the operation of a diode in simple terms.	☐	I can investigate the resistance characteristics of a thermistor and a LDR.	☐	I can compare the characteristics of a variety of electrical components, describing how the components can be used.	☐
P4.4 Series circuits	I can state that the current in any part of a series circuit is the same.	☐	I can find the potential difference across a component in a circuit by using the p.d. rule.	☐	I can 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).	☐
	I can calculate the potential difference provided by cell combinations.	☐	I can calculate the current in a series circuit containing more than one resistor.	☐	I can analyse a variety of series circuit to determine the current through, p.d. across, and resistance of combinations of components.	☐
	I can calculate the total resistance of two resistors placed in series.	☐	I can investigate the resistance of series circuits with several components.	☐	I can evaluate in detail the investigation of series circuits and explain discrepancies.	☐

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P4.5 Parallel circuits	I can identify parallel sections in circuit diagrams.	☐	I can measure the p.d. across parallel circuits and explain any discrepancies.	☐	I can analyse parallel circuits in terms of current loops.	☐
	I can state the effect of adding resistors in parallel on the size of the current in a circuit.	☐	I can describe the effect on the resistance in a circuit of adding a resistor in parallel.	☐	I can calculate the current at any point in a circuit.	☐
	I can state that the p.d. across parallel sections of a circuit is the same.	☐	I can investigate the effect of adding resistors in parallel on the size of the current in a circuit.	☐	I can evaluate in detail an investigation into the effect of adding resistors in parallel on a circuit.	☐

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P5 Electricity in the home

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P5.1 Alternating current	I can state that the UK mains supply is a high-voltage alternating current supply.	☐	I can describe the characteristics of the UK mains supply.	☐	I can explain the process of half-wave rectification of an a.c. source.	☐
	I can state simple differences between a.c. and d.c. sources.	☐	I can compare a.c. traces in terms of period and amplitude (voltage).	☐	I can analyse a.c. traces with an oscilloscope to determine the voltage and frequency.	☐
	I can describe how the trace on an oscilloscope changes when the frequency or amplitude of the signal is changed.	☐	I can operate a cathode ray oscilloscope to display an a.c. trace.	☐	I can compare and contrast the behaviour of electrons in a wire connected to d.c. and a.c. supplies.	☐
P5.2 Cables and plugs	I can identify the live, neutral, and earth wires in a three-pin plug.	☐	I can discuss the choices of materials used in cables and plugs in terms of their physical and electrical properties.	☐	I can explain why it is not necessary for some appliances to be earthed.	☐
	I can identify the key components of a typical three-pin plug and socket.	☐	I can describe why a short circuit inside a device presents a hazard.	☐	I can explain when there will be a current in the live, neutral, and earth wires of an appliance.	☐
	I can identify simple and obvious hazards in electrical wiring.	☐	I can identify a variety of electrical hazards associated with plugs and sockets.	☐	I can discuss in detail the hazards associated with poor electrical wiring.	☐
P5.3 Electrical power and potential difference	I can state that the power of a device is the amount of energy transferred by it each second.	☐	I can calculate the power of systems.	☐	I can measure and compare the power of electrical devices and explain variations in readings.	☐
	I can describe the factors that affect the rate of energy transfer by a current in a circuit.	☐	I can calculate the power of electrical devices.	☐	I can calculate the electrical heating caused by resistance.	☐
	I can explain why different fuses are required electrical devices in simple terms.	☐	I can select an appropriate fuse for a device.	☐	I can combine a variety of calculations to analyse electrical systems.	☐

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P5 Electricity in the home

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P5.4 Electrical currents and energy transfer	I can state that an electric current consists of a flow of charge (electrons in a wire).	☐	I can calculate the charge transferred by a current in a given time.	☐	I can perform calculations involving rearrangement of the equations $Q = It$ and $E = VQ$.	☐
	I can identify the factors that affect the energy transfers in a circuit.	☐	I can calculate the energy transferred by a charge passing through a potential difference.	☐	I can explain how energy is conserved in terms of current and p.d. during energy transfers by an electric current.	☐
	I can state that a battery or power supply provides energy to a current whereas a resistor causes a transfer of energy to the surroundings.	☐	I can apply the law of conservation of energy in a circuit.	☐	I can use algebra to combine the equations $Q = It$ and $E = VQ$ to form the relationships $E = VIt$ and $P = IV$.	☐
P5.5 Appliances and efficiency	I can describe the factors that affect the cost of using various electrical devices.	☐	I can calculate energy transfer in kilowatt-hours.	☐	I can convert between relevant units during calculations of energy transfer.	☐
	I can calculate energy transfer in joule.	☐	I can convert between efficiencies stated in percentages and those stated in decimal forms.	☐	I can analyse the use of a variety of electrical devices to determine their costs of operation.	☐
	I can state that energy transfer can be measured in kilowatt-hours.	☐	I can calculate the power rating of a device from the energy transferred and the time of operation.	☐	I can compare a range of electrical devices in terms of efficiency using calculations to support any conclusions.	☐

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P6 Molecules and matter

Name _____ Class _____ Date _____

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P6.1 Density	I can describe density as a property of a material and not a particular object.	☐	I can explain why some materials will float on water.	☐	I can use the density equation in a wide variety of calculations.	☐
	I can state that the density of a material is the mass per unit volume.	☐	I can calculate the density of materials.	☐	I can use appropriate significant figures in final answers when measuring density.	☐
	I can calculate the volume of some regular shapes and the density of materials, with support.	☐	I can measure the density of a solid and a liquid.	☐	I can evaluate in detail the experimental measurement of density, accounting for errors in measurements.	☐
P6.2 States of matter	I can describe the simple properties of solids, liquids and gases.	☐	I can describe the arrangement of the particles in a solid, liquid, and gas.	☐	I can describe the forces acting between particles in a solid, liquid, and gas.	☐
	I can name the changes of state.	☐	I can explain the behaviour of a material in terms of the arrangement of particles within it.	☐	I can describe the changes in the energy of individual particles during changes of state.	☐
	I can state that there are changes in stores of energy associated with a material when its temperature is increased.	☐	I can describe the changes in behaviour of the particles in a material during changes of state.	☐	I can explain in detail why the density of a material changes during a change of state, using a particle model.	☐
P6.3 Changes of state	I can state that the melting point of a substance is a temperature at which it changes from a solid to a liquid and vice versa.	☐	I can state that the melting and boiling points of a pure substance are fixed.	☐	I can describe how the melting and boiling points of a substance can be changed.	☐
	I can state that the boiling point of a substance is the temperature at which it changes from a liquid to a gas and vice versa.	☐	I can use the term 'latent heat' to describe the energy gained by a substance during heating for which there is no change in temperature.	☐	I can describe in detail the behaviour of the particles during changes of state.	☐
	I can describe the process of melting and boiling.	☐	I can find the melting or boiling point of a substance by using a graphical technique.	☐	I can evaluate data produced by a heating experiment to discuss the reproducibility of the measurement of a melting point.	☐

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P6 Molecules and matter

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P6.4 Internal energy	I can state that the internal energy of a system increases as it is heated.	☐	I can describe how the internal energy of an object can be increased by heating.	☐	I can use the concepts of kinetic and potential energy to explain changes in internal energy.	☐
	I can identify which changes of state are related to increases in internal energy and which are related to decreases.	☐	I can describe how the behaviour of particles changes as the energy of a system increases.	☐	I can describe the changes in the size of intermolecular forces during changes of state.	☐
	I can outline the behaviour of particles in solids, liquids, and gases.	☐	I can describe the energy changes by heating between objects within the same system.	☐	I can explain in detail why the pressure of a gas increases as it is heated.	☐
P6.5 Specific latent heat	I can state that heating a material will increase its internal energy.	☐	I can describe the changes in particle bonding during changes of state.	☐	I can perform a variety of calculations based on the latent heat equation.	☐
	I can describe energy changes during melting and vaporisation.	☐	I can calculate the latent heat of fusion and latent heat of vaporisation for a substance.	☐	I can combine variety of equations to solve problems involving heating.	☐
	I can measure the latent heat of vaporisation for water.	☐	I can measure the latent heat of fusion for water.	☐	I can evaluate the reproducibility of a measurement of latent heat based on collated data.	☐
P6.6 Gas pressure and temperature	I can state that as the temperature of a gas in a sealed container increases, the pressure of the gas increases.	☐	I can describe the behaviour of particles in a gas as the gas is heated.	☐	I can describe the linear relationship between changes in temperatures and pressure for a gas.	☐
	I can describe a gas as consisting of a large number of rapidly moving particles.	☐	I can outline Brownian motion and how this provides evidence for the particle nature of matter.	☐	I can explain Brownian motion in terms of particle behaviour and collisions, relating the speeds of smoke particles and air molecules.	☐
	I can describe pressure as being caused by collisions of gas particles with the walls of its container.	☐	I can describe the relationship between an increase in the temperature of a fixed volume of a gas and the increase in pressure of the gas.	☐	I can describe in detail how the relationship between the pressure of a gas and its temperature can be investigated.	☐

Name .... Class .... Date ....

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P7 Radioactivity

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P7.1 Atoms and radiation	I can name the three types of nuclear radiation.	☐	I can describe some safety precautions used when dealing with radioactive materials.	☐	I can describe in detail the decay of an unstable nucleus.	☐
	I can name the three sub-atomic particles found in an atom (proton, neutron, and electron).	☐	I can describe how a Geiger counter can be used to detect radiation.	☐	I can explain the similarities and differences between nuclear radiation and visible light.	☐
	I can identify some sources of background radiation.	☐	I can identify natural and man-made sources of background radiation.	☐	I can describe the relative penetrating powers of the three types of nuclear radiation.	☐
P7.2 The discovery of the nucleus	I can identify the Rutherford (nuclear) model of an atom.	☐	I can describe he plum pudding model of the atom.	☐	I can compare the plum pudding model, Rutherford model, and Bohr model of the atom in terms of the evidence for	☐
	I can identify the locations of protons, neutrons, and electrons in the nuclear model.	☐	I can describe the evidence provided by the Rutherford scattering experiment.	☐	I can explain how Rutherford and Marsden's experiment caused a rejection of the plum pudding model.	☐
	I can state that electrons can move between fixed energy levels within an atom.	☐	I can describe the properties of protons, neutrons, and electrons.	☐	I can describe how the initial evidence for the nuclear model was processed and how the model came to be	☐
P7.3 Changes in the nucleus	I can identify the mass and atomic number by using nuclear notation.	☐	I can calculate the number of neutrons in an isotope by using nuclear notation.	☐	I can explain why particles are ejected from the nucleus during nuclear decay.	☐
	I can identify the type of decay taking place from a nuclear equation.	☐	I can describe the differences between isotopes.	☐	I can describe the changes in the nucleus that occur during nuclear decay.	☐
	I can describe how isotopes are atoms of the same element with different mass numbers.	☐	I can complete decay equations for alpha and beta decay.	☐	I can write full decay equations for example nuclear decays.	☐

Name.. Class.. Date..

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P7.4 More about alpha, beta, and gamma radiation	I can rank the three types of nuclear radiation in order of their penetrating power.	☐	I can describe how the penetrating powers of radiation can be measured.	☐	I can describe in detail how the thickness of a material being manufactured can be monitored by	☐
	I can rank the three types of nuclear radiation in order of their range through air.	☐	I can describe the path of radiation types through a magnetic field.	☐	I can compare the ionisation caused by different types of nuclear radiation.	☐
	I can state that all three types of nuclear radiation are ionising.	☐	I can describe the process of ionisation.	☐	I can evaluate in some detail the risks caused by alpha radiation inside and outside the human body.	☐
P7.5 Activity and half-life	I can state that the activity of a radioactive sample will fall over time.	☐	I can find the ratio of a sample remaining after a given number of half-lives.	☐	I can compare a physical model of decay with the decay of nuclei, noting the limitations of the model.	☐
	I can define half-life in simple terms such as 'the time it takes for half of the material to decay'.	☐	I can state that all atoms of a particular isotope have an identical chance to decay in a fixed time.	☐	I can outline how the age of organic material can be determined by using radioactive dating.	☐
	I can find the half-life of a substance from a graph of count rate (or nuclei remaining) against time with support.	☐	I can plot a graph showing the decay of a sample and use it to determine half-life.	☐	I can calculate the changes in count rate or nuclei remaining by using an exponential decay function.	☐

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P8 Forces in balance

Name _____ Class _____ Date _____

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P8.1 Vectors and Scalars	I can state that scalars have size (magnitude) without direction.	☐	I can draw a scale diagram to represent a single vector.	☐	I can interpret a scale diagram to determine the magnitude and direction of a vector.	☐
	I can state that vectors have both size (magnitude) and direction.	☐	I can categorise a wide range of quantities as either a vector or a scalar.	☐	I can translate between vector descriptions and vector diagrams and vice versa using a range of appropriate scales.	☐
	I can list some common scalars and vectors.	☐	I can compare a scalar and a similar vector and explain how these quantities are different.	☐	I can use a scale diagram to add two or more vectors.	☐
P8.2 Forces between objects	I can use arrows to represent the directions of forces.	☐	I can use scale diagrams to represent the sizes of forces acting on an object.	☐	I can use appropriate SI prefixes and standard form to describe a wide range of forces.	☐
	I can give examples of contact and non-contact forces.	☐	I can describe the action of pairs of forces in a limited range of scenarios.	☐	I can 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.	☐
	I can compare the sizes of forces using the unit newton (N).	☐	I can investigate the effect of different lubricants on the size of frictional forces.	☐	I can evaluate force measurement techniques in terms of precision and accuracy.	☐
P8.3 Resultant forces	I can label a diagram showing several forces acting on an object.	☐	I can draw a scaled diagram of the forces acting in a range of situations using arrows to represent the forces.	☐	I can draw a scaled free-body force diagram showing forces as vectors and find the resultant force vector.	☐
	I can calculate a resultant force from two parallel forces acting in opposite directions.	☐	I can calculate resultant force produced by several forces acting on an object in coplanar directions.	☐	I can calculate resultant forces from several forces acting in coplanar directions using a range of SI prefixes.	☐
	I can state that a non-zero resultant force will cause a change in motion and a zero resultant force will not.	☐	I can describe the effect of zero and non-zero resultant forces on the motion of moving and stationary objects.	☐	I can create a detailed plan to investigate the factors that affect the acceleration of objects acted on by non-zero resultant force.	☐

Student Checklist

P8 Forces in balance

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P8.4 Centre of mass	I can identify the approximate centre of mass of a range of simple shapes.	☐	I can describe an experimental technique to determine the centre of mass of an object.	☐	I can evaluate an experimental technique to determine the centre of mass of an object, identifying the likely	☐
	I can state that a suspended object will come to rest so that the centre of mass lies below the point of suspension.	☐	I can explain why a suspended object comes to rest with the centre of mass directly below the point of suspension in terms of balanced forces.	☐	I can apply understanding of the particle model and moments to explain why objects have a point at which the mass seems to act.	☐
	I can use lines of symmetry to identify the location of the centre of mass.	☐	I can compare the stability of objects to the position of their centre of mass of an object, identifying the likely sources of error leading to inaccuracy.	☐	I can plan a detailed investigation into the stability of three-dimensional objects.	☐
P8.5 The parallelogram of forces			I can find the resultant of two forces at an acute angle by drawing a scale diagram.	☐	I can find the resultant of two forces at an obtuse angle by drawing a scale diagram.	☐
			I can describe a system in equilibrium in which non-parallel forces are acting.	☐	I can investigate non-parallel forces acting on a system in equilibrium to verify the parallelogram of forces.	☐
			I can calculate the component of a force using scale diagrams and ratios.	☐	I can analyse a wide range of systems of non-parallel forces using a parallelogram technique.	☐
P8.6 Resolution of forces			I can resolve a single force into wo perpendicular components.	☐	I can resolve a pair of forces into the overall perpendicular components.	☐
			I can determine if an object is in equilibrium by considering the horizontal and vertical forces.	☐	I can determine if an object is in equilibrium by considering the horizontal and vertical components of	☐
			I can investigate the effect of increasing the weight of an object on a slope on the component of the weight acting along the	☐	I can plan a detailed investigation into the effect of increasing the gradient of a slope on the component of the	☐

This resource sheet may have been changed from the original.

AQA Physics GCSE
Student Checklist

P9 Motion

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P9.1 Speed and distance-time graphs	I can state that the gradient of a distance-time graph represents the speed.	☐	I can use the gradients of distance-time graphs to compare the speeds of objects.	☐	I can calculate the speed of an object by extracting data from a distance-time graph.	☐
	I can estimate typical speeds for walking, running, and cycling.	☐	I can describe the motion of an object by interpreting distance-time graphs.	☐	I can extract data from a distance-time graph to calculate the speed of an object at various points in its motion.	☐
	I can calculate the distance an object at constant speed will travel in a given time.	☐	I can calculate the speed of an object and the time taken to travel a given distance,	☐	I can perform calculations of speed, distance, and time which involve conversion to and from SI base units.	☐
P9.2 Velocity and acceleration	I can describe the difference between speed and velocity using an appropriate example.	☐	I can identify the features of a velocity-time graph.	☐	I can compare and contrast the features of a distance-time, displacement-time, and velocity-time graph.	☐
	I can recall he equation relating velocity, acceleration, and time.	☐	I can rearrange the acceleration equations in calculations.	☐	I can combine equations relating to velocity and acceleration in multi-step calculations.	☐
	I can calculate the acceleration of an object using the change in velocity and time.	☐	I can calculate the change in velocity for an object under constant acceleration for a given period of time.	☐	I can calculate a new velocity for a moving object that has accelerated for a given period of time.	☐
P9.3 More about velocity-time graphs	I can identify the feature of a velocity-time graph which represents the acceleration (the gradient), and compare these values.	☐	I can describe sections of velocity-time graphs, and compare the acceleration in these sections.	☐	I can calculate the acceleration of an object from values taken from a velocity-time graph.	☐
	I can identify the feature of a velocity-time graph which represents the distance travelled (the area beneath the line), and compare these values.	☐	I can calculate the distance travelled using information taken from a velocity-time graph for one section of motion.	☐	I can calculate the total distance travelled from a multi-phase velocity-time graph.	☐
	I can measure the acceleration of an object as it moves down a ramp.	☐	I can use a series of repeat measurements to find an accurate measurement of the acceleration of a moving object.	☐	I can evaluate an experiment into the acceleration of an object in term of precision based on the spread of repeat measurements.	☐

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P9.4 Analysing motion graphs	I can identify speed on a distance-time graph using change in gradient.	☐	I can calculate the speed of an object by extracting data from a distance-time graph.	☐	I can calculate the acceleration of an object by extracting data from a velocity-time graph.	☐
	I can identify acceleration on a velocity-time graph using change in gradient.	☐	I can use a tangent to determine the speed of an object from a distance-time graph.	☐	I can use the gradient of a velocity-time graph to determine the acceleration of an object.	☐
	I can calculate the distance travelled by an object at constant velocity using data extracted from a graph.	☐	I can use the equation $v^2 - u^2 = 2as$ in calculations where the initial or final velocity is zero.	☐	I can apply transformations of the equation $v^2 - u^2 = 2as$ in calculations involving change in velocity and acceleration where both velocities are	☐

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Student Checklist

P10 Forces and motion

Name.. Class.. Date..

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P10.1 Force and acceleration	I can state the factors that will affect the acceleration of an object acted on by a resultant force.	☐	I can describe the effect of changing the mass or the force acting on an object on the acceleration of that object.	☐	I can define the inertial mass of an object in terms of force and acceleration.	☐
	I can calculate the force required to cause a specified acceleration on a given mass.	☐	I can perform calculations involving the rearrangement of the $F = ma$ equation.	☐	I can calculate the acceleration of an object acted on by several forces.	☐
	I can investigate a factor that affects the acceleration of a mass.	☐	I can combine separate experimental conclusions to form an overall conclusion.	☐	I can evaluate an experiment by identifying sources of error and determining uncertainty in the resulting data.	☐
P10.2 Weight and terminal velocity	I can state the difference between the mass of an object and its weight.	☐	I can calculate the weight of objects using their mass and the gravitational field strength.	☐	I can apply the mathematical relationship between mass, weight, and gravitational field strength in a range of situations.	☐
	I can describe the forces acting on an object falling through a fluid.	☐	I can apply the concept of balanced forces to explain why an object falling through a fluid will reach a terminal velocity.	☐	I can explain the motion of an object falling through a fluid by considering the forces acting through all phases of motions.	☐
	I can investigate the motion of an object when it falls.	☐	I can investigate the relationship between the mass of an object and the terminal velocity.	☐	I can evaluate the repeatability of an experiment by considering the spread of the results.	☐
P10.3 Forces and braking	I can state factors which affect the stopping distance of a car.	☐	I can categorise factors which affect thinking distance, braking distance and both.	☐	I can calculate acceleration, mass, and braking force of vehicles.	☐
	I can calculate the thinking distance for a car from the initial speed and reaction time.	☐	I can calculate the braking distance of a car.	☐	I can calculate total stopping distance, initial speed, reaction time, and acceleration.	☐
	I can estimate the relative effects of changing factors which affect the stopping distance of cars.	☐	I can describe the relationship between speed and both thinking and braking distance.	☐	I can explain the relative effects of changes of speed on thinking and stopping distance.	☐

Name.. Class.. Date..

Lesson	Aiming for 4	Aiming for 6	Aiming for 8
P10.4 Momentum		I can apply the equation p = *mv* to find the momentum, velocity or mass of an object.	I can fully describe the motion of objects after an explosion accounting for any frictional effects.
		I can describe how the principle of conservation of momentum can be used to find the velocities of objects.	I can apply principle of conservation of momentum to a range of calculations involving the velocities of objects.
		I can investigate the behaviour of objects during explosions to verify the conservation of momentum.	I can evaluate the data produced from an investigation and compare this to a theoretical framework.
P10.5 Forces and elasticity	I can state Hooke's law.	I can explain the limitations of Hooke's law including the limit of proportionally.	I can find the spring constant of a spring using a graphical technique.
	I can calculate the extension of a material using its length and original length.	I can calculate the force required to cause a given extension in a spring using the spring constant.	I can Hooke's law equation in a wide of situations.
	I can compare materials in terms of elastic and non-elastic behaviour.	I can compare the behaviour of different materials under loads in terms of proportional and non-proportional behaviour.	I can evaluate an investigation into the extension of materials in terms of the precision of the data.

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Student Checklist

P11 Wave properties

Name.. Class.. Date..

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P11.1 The nature of waves	I can state that waves can transfer energy and information without the transfer of matter.	☐	I can investigate wave motion through a spring model.	☐	I can explain the features of a longitudinal wave in terms of compressions and rarefactions by using a particle model.	☐
	I can identify waves as either transverse or longitudinal.	☐	I can compare transverse and longitudinal waves in terms of direction of vibration and propagation.	☐	I can discuss the features of a transverse wave in terms of particle or field behaviour.	☐
	I can identify waves as either mechanical or electromagnetic.	☐	I can compare electromagnetic and mechanical waves in terms of the need for a medium.	☐	I can compare mechanical waves and their particulate nature with electromagnetic waves and their field	☐
P11.2 The properties of waves	I can outline the derivation of the wave speed equation.	☐	I can outline the derivation of the wave speed equation.	☐	I can explain how the wave speed equation can be derived from fundamental principles.	☐
	I can calculate the period of a wave from its frequency.	☐	I can calculate the period of a wave from its frequency.	☐	I can perform calculations involving rearrangements of the period equation and the wave speed equation.	☐
	I can measure the speed of a water wave.	☐	I can calculate the wave speed from the frequency and wavelength.	☐	I can perform multi-stage calculations linking period, frequency, wave speed, and wavelength.	☐
P11.3 Reflection and refraction			I can describe refraction at a boundary in terms of wavefronts.	☐	I can use a wavefront model to explain refraction and reflection.	☐
			I can describe refraction including the reflected rays.	☐	I can describe the relationship between the angle of incidence and angle of refraction.	☐
			I can explain partial absorption as a decrease in the amplitude of a wave and therefore the energy carried.	☐	I can explain refraction in terms of changes in the speed of waves when they move between one medium and another.	☐

Name..   Class..   Date..

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P11.4 More about waves	I can measure the speed of a wave in water.	☐	I can measure the speed of a wave in a solid (string)..	☐	I can evaluate the sustainability of apparatus for measuring the frequency, wavelength and speed of waves.	☐
	I can describe how sound waves travel more quickly in solids than they do in gases.	☐	I can describe the effect that changing the frequency of a wave has on its wavelength in a medium.	☐	I can explain why the wavelength of a wave in a particular medium changes as the frequency changes with reference to the wave equation.	☐
	I can describe how the sound waves require a medium to travel in.	☐	I can calculate the speed of waves using the wave speed equation.	☐	I can evaluate data from speed of sound experiments to discuss the range of uncertainty.	☐

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Student Checklist

P12 Electromagnetic waves

Name_____ Class_____ Date_____

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P12.1 The electromagnetic spectrum	I can state that electromagnetic waves transfer energy without transferring matter.	☐	I can describe the relationship between the energy being transferred by an electromagnetic wave and the frequency of the wave.	☐	I can apply the wave model of electromagnetic radiation as a pair of electric and magnetic disturbances that do not require a medium for travel.	☐
	I can identify the position of EM waves in the spectrum in order of wavelength and frequency.	☐	I can calculate the frequency and the wavelength of an electromagnetic wave.	☐	I can use standard form in calculations of wavelength, frequency, and wave speed.	☐
	I can state that all EM waves travel at the same speed in a vacuum.	☐	I can explain why the range of wavelengths detected by the human eye is limited.	☐	I can explain the interactions between an electromagnetic wave and matter.	☐
P12.2 Light, infrared, microwaves, and radio waves	I can state that white light is a part of the EM spectrum and composed of a range of frequencies.	☐	I can describe how a range of electromagnetic waves are used in a variety of scenarios.	☐	I can determine the wavelength of radio waves in air.	☐
	I can list some simple examples of the uses of light, microwaves, and radio waves.	☐	I can explain why a particular wave is suited to its application.	☐	I can describe the interactions between a range of waves and matter, including the effect of absorption.	☐
	I can carry out a practical task to determine the penetrating power of an electromagnetic signal.	☐	I can determine whether the law of reflection applies to a microwave signal.	☐	I can plan, carry out, and evaluate in detail an investigation into the penetrating power of microwaves.	☐

AQA Physics GCSE
Student Checklist

P12 Electromagnetic waves

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P12.3 Communications	I can state that radio waves and microwaves are used in communications through the atmosphere.	☐	I can compare the rate of information transfer through optical fibres and radio signals.	☐	I can describe in detail how carrier waves are used in the transfer of information.	☐
	I can state that the higher the frequency of a wave, the greater the rate of data transfer possible.	☐	I can outline the operation of a mobile phone network and the waves used.	☐	I can describe the structure of a radio communication system, including the effect of a radio wave on the current in the receiver.	☐
	I can describe the sub-regions of the radio spectrum.	☐	I can discuss the evidence for mobile phone signals causing damage to humans.	☐	I can discuss the relationship between wavelength data transmission and range to explain to explain why particular frequencies are chosen for particular transmissions.	☐
P12.4 Ultraviolet waves, X-rays, and gamma rays	I can state that high-frequency EM radiation is ionising.	☐	I can describe the penetrating powers of gamma rays, X-rays, and ultraviolet rays.	☐	I can describe in detail the interaction between ionising radiation and inorganic materials.	☐
	I can describe the uses and dangers of UV radiation.	☐	I can compare X-rays and gamma radiation in terms of their origin.	☐	I can compare different regions of the electromagnetic spectrum in terms of their potential harmfulness.	☐
	I can describe the uses and dangers of X-rays and gamma radiation.	☐	I can describe the ionisation of atoms in simple terms.	☐	I can explain how the process of ionisation can lead to cell death or cancer through damage to DNA.	☐
P12.5 X-rays in medicine	I can state some safety procedures that take place during the operation of devices that produce ionising radiation.	☐	I can describe the operation of an X-ray machine.	☐	I can compare the operation of a CT-scanner and that of a simple X-ray device.	☐
	I can describe the formation of an X-ray photograph in terms of absorption or transmission.	☐	I can explain why contrast media can be used during X-rays.	☐	I can evaluate the doses of ionising radiation received in a variety of occupations or medical treatments.	☐
	I can state that X-ray therapy can be used to kill cancerous cells in the body.	☐	I can describe the factors that affect the radiation doses received by people.	☐	I can explain in detail how various safety features reduce exposure to ionising radiation.	☐

Student Checklist

P15 Electromagnetism

Name .... Class .... Date ....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P13.1 Magnetic fields	I can state the names of the poles of a magnet.	☐	I can sketch the shape of a magnetic field around a bar magnet.	☐	I can describe the regions in a magnetic field where magnetic forces are greatest using the idea of field lines.	☐
	I can describe the interaction of magnetic poles (attraction and repulsion).	☐	I can describe how the shape of a magnetic field can be investigated.	☐	I can explain in detail how a magnetism can be induced in some materials.	☐
	I can list some magnetic and non-magnetic metals.	☐	I can compare the Earth's magnetic field to that of a bar magnet.	☐	I can plan in detail how the strength of a magnetic field can be investigated.	☐
P13.2 Magnetic fields of electric current	I can state that the magnetic field produced by a current carrying wire is circular.	☐	I can use the corkscrew rule to determine the direction of the field around a current carrying wire.	☐	I can determine the polarity of the ends of a solenoid from the direction of the current.	☐
	I can describe the effect of increasing the current on the magnetic field around a wire.	☐	I can describe the shape of the field produced by a solenoid.	☐	I can sketch the shape of the field surrounding a solenoid relating this to the direction of the current through the coil.	☐
	I can describe the effect of reversing the direction of the current in the wire.	☐			I can plan a detailed investigation into the factors that affect the strength of the magnetic field around a solenoid.	☐
P13.3 The motor effect			I can describe the operation of a moving-coil loudspeaker.	☐	I can describe and explain in detail the operation of a d.c. motor.	☐
			I can apply Fleming's left-hand rule to determine the direction of the force acting on a conductor.	☐	I can perform calculations involving rearrangements of the equation $F = BIl$.	☐
			I can calculate the force acting on a conductor when it is placed in a magnetic field.	☐	I can investigate the factors that affect the rotation of an electric motor.	☐