PHYSICS ***Electric Circuits***	***Students will know and remember…***	***So that they can…***
SEPARATE PHYSICS ONLY *Explain how objects become charged*	*What happens to the movement of electrons* *How do charged objects react to each other* *Name the type of force involved*	*Label the model of the atom* *Show the movement of electrons between insulating materials*
Describe the relationship between electrical current and charge flow	Recall the circuit symbols for electrical components How the size of an electric current is the rate of flow of electric charge Know the equation for electric current and how to rearrange to find charge flow	Draw the circuit symbols for components Calculate charge flow, current or time taken using the equation $Q = I \times t$
Explain what Ohm's law is	What is potential difference and how is it measured Know the equation for resistance How does the resistance of a wire depend on it's length and does it obey Ohm's law	Calculate P.D across a component Calculate resistance, P.D, or current using $R = V/I$ Interpret a IV graph for a resistor
Describe how the resistance of different components changes	What happens to the resistance of a filament lamp and thermistor as temperature increases How does the resistance of a diode change with p.d. How does the resistance of an LDR change with light intensity	Interpret IV graphs for a lamp, diode, thermistor and an LDR
Describe the rules for a series circuit in terms of current, p.d. and resistance	What happens to the current and p.d. for components in series How adding more resistors in series changes the current	Calculate the resistance for components in series using $R_{total} = R_1 + R_2$
To be able to calculate the overall resistance of different resistors in a parallel circuit	Measure current and p.d. in a parallel circuit Know how resistance affects current in a parallel circuit Measure the resistance of resistors in series and parallel	Calculate the current through a resistance in a parallel circuit $I = V/R$

PHYSICS ***Electricity in the Home***	***Students will know and remember…***	***So that they can…***
Describe what mains electricity is and where it comes from	What is the difference between AC and DC Understand the trace of Alternating P.D. on an oscilloscope and how to measure the frequency of a.c. and peak potential difference. What is the difference between the live wire and neutral wire	Interpret an oscilloscope trace for AC and DC Calculate the frequency, using the equation frequency = 1/time taken for 1 cycle
Explain the features of a plug and how it is wired	Why the materials of a plug are chosen – plastic, copper and brass How is a plug wired and why some appliances have an earth wire	Label the inside of a plug Evaluate why appliances with a metal casing need to be earthed
Explain how to calculate power of an appliance and choose the correct fuse	How to calculate the energy transferred to a device using power rating and time. How to calculate the power rating by using current and p.d. Know how to chose the correct fuse using the current flowing through a device	Calculate energy transferred using $E = P \times t$ Calculate the correct A rating for a fuse = W / V
Describe how the charge flow is related to the energy transferred in a circuit	How to calculate the charge flow How to calculate the energy transferred to a component using the charge flow	Calculate charge flow using $Q = I \times t$ Calculate energy transferred using $E = V \times Q$
Explain how to calculate the energy transferred to an appliance and efficiency	How to calculate the energy supplied to a device using power and time Understand what is meant by the efficiency rating of an appliance and how to calculate it	Calculate the energy supplied using $E = Pt$ Calculate efficiency using efficiency = output power/input power

PHYSICS ***Radioactivity***	***Students will know and remember…***	***So that they can…***
Explain what radioactivity is	Explain what causes an element to be radioactive Recall the 3 types of radiation State that radioactive decay is a random event Understand the 3 types of radiation	
Describe the nuclear model of the atom and how it was established	What is the plum pudding model of the atom Understand how Rutherford used alpha particles to explain the nucleus of an atom Explain what Bohr's model of the atom is	The experiments that were used to identify parts of the atom Draw and label the plum pudding model and Bohr's model of the atom
Describe what alpha, beta and gamma are and how the nucleus changes when radiation is emitted	Explain an isotope in terms of protons and neutrons The definition of an isotope Understand alpha decay results in 2 protons and 2 neutrons being lost from the nucleus Understand that beta decay results in a neutron changing into a proton in the nucleus	Write and work out decay equations for alpha and beta emissions
Describe the penetrating powers of radiation	Explain how far each radiation can travel in air State which materials absorb/stop alpha, beta, gamma Explain why ionising radiation is so dangerous	Draw a diagram of alpha, beta and gamma showing what materials absorb them Give examples of how these properties are used in everyday life
Explain what is meant by the half-life of a radioactive element	Define half-life Understand what half-life is Know how to calculate half-life (H) Count rate = initial count rate/2*n* (H) Understand how to work out the half-life from a graph	Calculate half-life using: Calculate half-life from a graph
SEPARATE PHYSICS ONLY *Explain how radioactive isotopes are used in medicine*	*List the properties of radioactive isotopes in medicine* *Describe the properties of radioactive isotopes used in medicine* *Explain the safety procedures put in place to keep patients and staff safe*	*Give examples of how beta and gamma is used in medicine*
SEPARATE PHYSICS ONLY *Explain what nuclear fission is*	*Define nuclear fission* *Identify parts of the nuclear reactor which help control the reaction* *Describe what happens during nuclear fission* *Explain the difference between spontaneous and induced fission* *Describe the chain reaction that occurs*	*Understand what happens in a nuclear reactor*
SEPARATE PHYSICS ONLY *Explain what nuclear fusion is*	*Define nuclear fusion* *Describe what happens during nuclear fusion* *State some of the difficulties in using fusion for nuclear energy*	
SEPARATE PHYSICS ONLY *Describe some of the safety issues surrounding Nuclear power*	*Describe the dangers of naturally occurring radon gas* *List the issues with nuclear waste* *Describe how nuclear reactors can be unsafe, using examples*	*Explain why nuclear waste is such a problem*

PHYSICS ***Forces in balance***	***Students will know and remember…***	***So that they can…***
Explain displacement, scalar and vector quantities	Define displacement Describe what is meant by displacement Describe what the difference between a vector and scalar quantity List examples of scalar and vector quantities Explain how to represent a vector quantity by an arrow	Draw a scale diagram of a vector quantity
Describe the forces between objects	What is meant by a contact and non-contact force List contact and non-contact forces Explain Newton's third law, with examples	Calculate the reaction force on an object Explain the role of friction with a moving car
Explain what is resultant force	What is resultant force Explain Newton's first law of motion, with examples Understand how to calculate the resultant force from force diagrams	Calculate resultant force from a force diagram (H) Draw a free-body force diagram, showing the forces acting on it.
SEPARATE PHYSICS ONLY *Explain how to calculate the moment of a force*	*Describe what a moment is and how it can be increased* *Show to how calculate moments by using force and distance*	*Calculate the moment by using: M = F x d*
SEPARATE PHYSICS ONLY *Explain what a force multiplier is and how gears work*	*How does a lever act as a force multiplier* *How do gears change the moment of a turning effect*	
Describe the centre of mass of an object	How do you find the centre of mass of a symmetrical object How can you find the centre of mass of an irregular object Describe what is meant by suspended equilibrium	Draw lines of symmetry on a shape to find the centre of mass Write a method for finding the centre of mass for an irregular object
SEPARATE PHYSICS ONLY *Describe how to calculate the force acting on an object that is balanced*	*How to identify whether a turning force turns an object clockwise or anticlock* *What is the principle of moments and use it to calculate an unknown weight*	*Calculate the weight of an object on a pivot using:* $W_1d_1=W_2d_2$

(H)Describe how we can use the parallelogram of forces to calculate resultant force	What is the parallelogram of forces How to draw a scale diagram to show the forces How to calculate the resultant force	Draw a scale diagram to show the forces of 2 vectors Measure the resultant force
(H)Explain how to resolve a force using a force diagram	Define the conditions for an object at rest How can we resolve a force by drawing and measuring perpendicular and parallel components Explain what is meant by objects in equilibrium	Draw a scale diagram to resolve a force of an object on a slope

PHYSICS Motion	***Students will know and remember…***	***So that they can…***
Explain how to calculate speed and interpret a distance-time graph	What is the speed equation What does a horizontal line on a d-t graph represent What does the gradient on a d-t graph represent	Calculate the speed of an object using: speed = distance/time Rearrange the speed equation Interpret the lines on a d-t graph
Explain the difference between speed and velocity and calculate velocity	Describe what is meant by the velocity of an object How do you calculate the acceleration of an object? What is the difference between acceleration and deceleration	Calculate acceleration using: acceleration = change in velocity/time taken for the change
Describe what the lines on a velocity-time graph show	What does a horizontal line on a v-t line represent What does the gradient on a v-t graph represent How can I calculate distance travelled by using the area under a graph (H)	Interpret the lines on a v-t graph Calculate the distance travelled using the area under the graph (H)
Explain how to calculate speed from a d-t graph	How can you use the gradient on a d-t graph to calculate speed where it is constant How can you draw a tangent to calculate speed where it is changing (H)	Calculate the speed of an object using: Gradient of the line = height of the triangle/base of the triangle Draw a tangent to the curve where the object speed is changing (H)

PHYSICS ***Force & Motion***	***Students will know and remember…***	***So that they can…***
Explain how does force and mass effect the acceleration of an object	Explain what Newton's second law of motion How does changing the force on an object effect it's acceleration How does changing the mass of an object effect it's acceleration (H) Explain what is meant by the inertia of an object	Calculate acceleration using: Force = mass x acceleration and rearrange this equation
Describe the difference between mass and weight and what is meant by terminal velocity	Define mass, weight and terminal velocity Know how to calculate weight Describe the term terminal velocity for a falling object	Calculate weight using: weight = mass x gravitational field strength
Explain what affects the stopping distance of a car	Describe the forces acting on a car whilst driving List the factors that affect thinking distance List the factors that affect braking distance	Interpret a stopping distance diagram
(H) Explain what momentum is and how to calculate it	Define momentum How can you calculate momentum What is meant by a closed system	Calculate momentum using: Momentum of a moving object = mass x velocity
SEPARATE PHYSICS ONLY *Explain and apply the conservation of momentum*	*Describe momentum in terms of direction and size* *Define the conservation of momentum* *What happens to the momentum when two objects push apart* *What happens to the momentum when two objects collide*	*Calculate momentum and recoil using: MaVa+MbVb=0*
SEPARATE PHYSICS ONLY *Describe the impact forces during a crash*	*What affects the forces of impact when vehicles collide* *Describe what is meant by impact time* *Explain how to calculate the total momentum when two vehicles collide*	*Calculate impact force, using: Impact force= change of momentum/impact time*
SEPARATE PHYSICS ONLY *Explain how car safety features reduce the impact during a collision*	*Explain how all the safety features in a car reduce forces on the passenger* *Describe how to use the conservation of momentum to calculate the speed at impact*	
Describe how the extension of a spring changes with the force applied to it	Explain what is meant by an elastic object How to measure the extension of an object that is stretched What is Hooke's law and how can we apply it to data Describe what is meant by the limit of proportionality of a spring	Write a method for measuring the extension of a spring Calculate the extension of spring using: force applied, F = spring constant, k x extension, e

PHYSICS SPACE	***Students will know and remember…***	***So that they can…***
SEPARATE PHYSICS ONLY *Explain how the universe was formed*	*How was the universe formed* *Describe the birth of a star* *How is energy released from the sun*	
SEPARATE PHYSICS ONLY *Describe the life history of a star*	*Explain how stars eventually become unstable* *Describe the life cycle of a star* *Define a supernova*	*Draw and label the life cycle of a star*
SEPARATE PHYSICS ONLY *Explain how planets and satellites orbit*	*Explain how the gravitational force keeps planets and satellites moving in their orbits* *Describe what centripetal force is* *Explain how satellites orbit the earth and why their speed is important*	*List the uses of satellites*
SEPARATE PHYSICS ONLY *Explain why scientists think the universe is expanding*	*What is meant by red-shift* *Explain how red-shift relates to galaxies* *What is the evidence for the expanding universe*	*Describe the evidence for the expanding universe*
SEPARATE PHYSICS ONLY *Explain what is the big bang theory*	*What is the big bang theory* *Define CMBR*	*Explain what CMBR is and how it is used as evidence* *What is the future of the universe*