NOTTINGHAM BRITISH SCHOOL – CURRICULUM DEVELOPMENT 2019

Year 9 Physics

STRAND	October Assessment	December Assessment	March Assessment	June Assessment	Age Related Expectation By the end of the year every student will be able to ….
General Physics	*Units and quantities:* Describe and list base quantities and know their correct units of measurement Units conversions Understand use Scientific notation and significant figures *Making Measurements of length and time* Use and describe the use of rules and measuring cylinders to find a length or a volume • Use and describe the use of clocks and devices, both analogue and digital,	*Force and their effects on motion* • Define forces and identify their types • Understand friction as the force between two surfaces which impedes motion and results in heating and recognise air resistance as a form of friction • Describe the ways in which a force may change the motion of a body • Find the resultant of two or more forces acting along the same line • Recognise that if there is no resultant force on a body it	*Pressure* • Recall and use the equation $p = F/A$ • Relate pressure to force and area, using appropriate examples • Recall and use the equation $p = h\rho g$ • Describe the simple mercury barometer and its use in measuring atmospheric pressure • Relate (without calculation) the pressure beneath a liquid surface to depth and to density, using appropriate examples • Use and describe the use of a manometer	*Thermal physics* Sates of matter and molecular model • Describe qualitatively the molecular structure of solids, liquids and gases in terms of the arrangement, separation and motion of the molecules • Relate the properties of solids, liquids and gases to the forces and distances between molecules and to the motion of the molecules • Interpret the temperature of a gas in terms of the motion of its molecules • Describe qualitatively the pressure of a gas in	***AO1 Knowledge with understanding*** Students should be able to demonstrate knowledge and understanding of: • scientific phenomena, facts, laws, definitions, concepts and theories • scientific vocabulary, terminology and conventions (including symbols, quantities and units) • scientific instruments and apparatus, including techniques of operation and aspects of safety

	for measuring an interval of time • Obtain an average value for a small distance and for a short interval of time by measuring multiples (including the period of a pendulum) • Understand that a micrometer and screw gauge and Vernier calipers are used to measure very small distances. <u>*Scalars and vectors*</u> • Understand that vectors have a magnitude and direction • Demonstrate an understanding of the difference between scalars and vectors and give common examples	either remains at rest or continues at constant speed in a straight line • Recall and use the relationship between force, mass and acceleration (including the direction), F = ma • State that the acceleration of free fall for a body near to the Earth is constant • Describe qualitatively the motion of bodies falling in a uniform gravitational field with and without air resistance (including reference to terminal velocity) • Describe qualitatively motion in a circular path due to a perpendicular force. <u>*Momentum*</u> • Understand the concepts of momentum and impulse	<u>*Energy, work and power*</u> <u>Energy resources</u> • Describe how electricity or other useful forms of energy may be obtained from: – chemical energy stored in fuel – water, including the energy stored in waves, in tides, and in water behind hydroelectric dams – geothermal resources – nuclear fission – heat and light from the Sun (solar cells and panels) – wind • Give advantages and disadvantages of each method in terms of renewability, cost, reliability, scale and environmental impact • Show a qualitative understanding of efficiency • Understand that the Sun is the source of energy for all our energy resources except geothermal, nuclear and tidal	terms of the motion of its molecules Explain pressure in terms of the change of momentum of the particles striking the walls creating a force • Show an appreciation that massive particles may be moved by light, fast-moving molecules • Show an understanding of the random motion of particles in a suspension as evidence for the kinetic molecular model of matter • Describe this motion (sometimes known as Brownian motion) in terms of random molecular bombardment <u>*Evaporation*</u> • Describe evaporation in terms of the escape of more-energetic	• scientific and technological applications with their social, economic and environmental implications. Subject content defines the factual material that candidates may be required to recall and explain. Candidates will also be asked questions which require them to apply this material to unfamiliar contexts and to apply knowledge from one area of the syllabus to another. ***<u>AO2 Handling information and problem solving</u>*** Students should be able, in words or using other written forms of presentation (i.e.

	• Determine graphically the resultant of two vectors *Mass and weight* • Show familiarity with the idea of the mass of a body • State that weight is a gravitational force • Distinguish between mass and weight • Recall and use the equation W = mg • Demonstrate understanding that weights (and hence masses) may be compared using a balance • Demonstrate an understanding that mass is a property that 'resists' change in motion	• Recall and use the equation momentum = mass × velocity, p = mv • Recall and use the equation for impulse Ft = mv – mu • Apply the principle of the conservation of momentum to solve simple problems in one dimension *Forces and their effects (change in shape and dimensions)* • State Hooke's Law and recall and use the expression F = kx, where k is the spring constant • Recognise the significance of the 'limit of proportionality' for an extension–load graph Turning effect of a force (Moment) • Describe the moment of a force as a measure of its turning effect and give everyday examples • Understand that increasing force or distance from the pivot	• Show an understanding that energy is released by nuclear fusion in the Sun • Identify changes in kinetic, gravitational potential, chemical, elastic (strain), nuclear and internal energy that have occurred as a result of an event or process • Recognise that energy is transferred during events and processes, including examples of transfer by forces (mechanical working), by electrical currents (electrical working), by heating and by waves • Apply the principle of conservation of energy to simple examples • Recall and use the equations: efficiency = useful energy output/ energy input × 100% efficiency = useful power output power/ input × 100% Work	molecules from the surface of a liquid • Relate evaporation to the consequent cooling of the liquid Differentiate between evaporation and boiling • Demonstrate an understanding of how temperature, surface area and draught over a surface influence evaporation • Explain the cooling of a body in contact with an evaporating liquid *Thermal processes* Conduction • Describe experiments to demonstrate the properties of good and bad thermal conductors • Give a simple molecular account of conduction in solids	symbolic, graphical and numerical), to: • locate, select, organise and present information from a variety of sources • translate information from one form to another • manipulate numerical and other data • use information to identify patterns, report trends and draw inferences • present reasoned explanations for phenomena, patterns and relationships • make predictions and hypotheses

	• Describe, and use the concept of, weight as the effect of a gravitational field on a mass <u>*Density*</u> • Recall and use the equation $\rho = m/V$ • Describe an experiment to determine the density of a liquid and of a regularly shaped solid and make the necessary calculation • Describe the determination of the density of an irregularly shaped solid by the method of displacement • Predict whether an object will float based on density data	increases the moment of a force • Calculate moment using the product force × perpendicular distance from the pivot • Apply the principle of moments to the balancing of a beam about a pivot • Apply the principle of moments to different situations <u>*Conditions for equilibrium*</u> • Recognise that, when there is no resultant force and no resultant turning effect, a system is in equilibrium <u>*Centre of mass*</u> •Perform and describe an experiment to determine the position of the centre of mass of a plane lamina • Describe qualitatively the effect of the position of the centre of mass on the stability of simple objects	• Demonstrate understanding that work done = energy transferred • Relate (without calculation) work done to the magnitude of a force and the distance moved in the direction of the force • Recall and use $W = Fd = \Delta E$ <u>Power</u> • Relate (without calculation) power to work done and time taken, using appropriate examples • Recall and use the equation $P = \Delta E/t$ in simple systems	including lattice vibration and transfer by electrons <u>Convection</u> • Recognise convection as an important method of thermal transfer in fluids • Relate convection in fluids to density changes and describe experiments to illustrate convection <u>Radiation</u> • Identify infrared radiation as part of the electromagnetic spectrum • Recognise that thermal energy transfer by radiation does not require a medium • Describe the effect of surface colour (black or white) and texture (dull or shiny) on the emission, absorption and reflection of radiation Supplement	• solve problems, including some of a quantitative nature. Questions testing these skills may be based on information that is unfamiliar to candidates, requiring them to apply the principles and concepts from the syllabus to a new situation, in a logical, deductive way. ***<u>AO3 Experimental skills and investigation</u>*** Students should be able to: • demonstrate knowledge of how to safely use techniques, apparatus and materials (including following a sequence of

	Motion • Define speed and calculate average speed from total distance total time • Plot and interpret a speed–time graph or a distance–time graph • Recognise from the shape of a speed–time graph when a body is – at rest – moving with constant speed – moving with changing speed • Calculate speed from the gradient of a distance–time graph • Distinguish between speed and velocity • Calculate the area under a speed–time graph to work out the distance travelled for			• Describe experiments to show the properties of good and bad emitters and good and bad absorbers of infrared radiation • Show understanding that the amount of radiation emitted also depends on the surface temperature and surface area of a body *Thermal properties and temperature* *Thermal expansion of solids, liquids and gases* • Describe qualitatively the thermal expansion of solids, liquids, and gases at constant pressure • Identify and explain some of the everyday applications and consequences of thermal expansion • Explain, in terms of the motion and arrangement of molecules, the relative order of the magnitude of	instructions where appropriate) • plan experiments and investigations • make and record observations, measurements and estimates • interpret and evaluate experimental observations and data

	motion with constant acceleration • Demonstrate understanding that acceleration and deceleration are related to changing speed including qualitative analysis of the gradient of a speed–time graph • Define and calculate acceleration using change of velocity / time taken • Calculate acceleration from the gradient of a speed–time graph • Recognise linear motion for which the acceleration is constant • Recognise motion for which the acceleration is not constant			the expansion of solids, liquids and gases	

	• Understand deceleration as a negative acceleration ***Assessment for learning*** • Weekly quick quiz (20 min) • End of Chapter test (every 6-8 lessons) • Practise answering past exam papers questions • Self assessment • Peer assessment • End of half term test	***Assessment for learning*** • Weekly quick quiz (20 min) • End of Chapter test (every 6-8 lessons) • Practise answering past exam papers questions • Self assessment • Peer assessment • End of half term test	***Assessment for learning*** • Weekly quick quiz (20 min) • End of Chapter test (every 6-8 lessons) • Practise answering past exam papers questions • Self assessment • Peer assessment • End of half term test	***Assessment for learning*** • Weekly quick quiz (20 min) • End of Chapter test (every 6-8 lessons) • Practise answering past exam papers questions • Self assessment • Peer assessment • End of half term test	

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