

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T1 1	<p>MEASUREMENT</p> <ol style="list-style-type: none"> Understand the SI system of quantities for units. Use correct units, symbols and notation. Differentiate between accuracy and precision of data. Calculate uncertainty in experimental results. Carry out graphical analysis of data. 	<p>“Slide Measurement” Experiment.</p> <p>Watch video “Measurement & Uncertainty”</p>	<p>Chapt 1 Pages 36 -51</p>		
T1 2	<p>Unit 2A Motion & Forces</p> <p>Within motion and forces, students explore motion in one dimension to solve both qualitative and quantitative problems. Student unit learning contexts for motion and forces may include:</p> <p style="padding-left: 40px;">Running, jumping and standing still Toys and simple machines Vehicle safety and collisions</p> <ol style="list-style-type: none"> Distinguish between scalar and vector quantities. Add and subtract vectors in one dimension Define ‘displacement’ and state its SI unit. Distinguish between distance and displacement. Define ‘speed’ and ‘velocity’ and state their SI unit. Distinguish between speed and velocity 		<p>Chapters 2, 3 & 4</p> <p>Pages 54-59 Pages 60-62</p>	<p>Exploring Physics Set 1 page 15</p>	

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
<p>T1</p> <p>3</p>	<p>7. Calculate constant, instantaneous and average speed and velocity from tabulated and graphical data.</p> <p>8. Define ‘acceleration’ and state its SI unit.</p> <p>9. Calculate constant (average) acceleration for motion in one dimension.</p> <p>10. Draw and interpret graphs of objects moving in one dimension, including the interpretation of slope and area.</p> <p>11. Solve simple problems, including vertical motion under gravity using the equations:</p> $V_{av} = \frac{s}{t}$ $V_{av} = \frac{u + v}{2}$ $a = \frac{v - u}{t}$ <p>for constant acceleration.</p>	<p>Expt 2.1 Going Faster</p>	<p>Pages 63 - 67</p> <p>Pages 68 - 74</p> <p>Pages 75 - 83</p>	<p>Exploring Physics Set 2 page 21-23</p>	<p>BEGIN “Motion & Forces” RESEARCH ASSIGNMENT</p>
<p>T1</p> <p>4</p>	<p>12. Define ‘inertia’.</p> <p>13. Define ‘mass’ and state its SI unit.</p> <p>14. Define ‘momentum’ and state its SI unit.</p> <p>15. Describe the effects produced by forces.</p>		<p>Pages 97 - 98</p> <p>Pages 98 - 101</p>	<p>Exploring Physics Set 3 page 31-32</p>	

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T1 5	16. State Newton's First, Second and Third Laws of motion. 17. Explain Newton's First Law of motion and account for its apparent failure due to friction. 18. Define 'force' in terms of Newton's First and Second Laws of motion and state its SI unit. 19. Define 'impulse' as the product of force and time and state its SI unit. 20. Use Newton's Second Law to explain the relationship between impulse and change in momentum.	Expt 3.1 Newton's Second Law Expt 3.2 Friction	Pages 102 - 109 Pages 120 - 124		
T1 6	21. State and explain the law of conservation of momentum. 22. Perform calculations involving momentum and conservation of momentum in one dimension: $p = mv$ $p_{\text{before}} = p_{\text{after}}$ $Ft = mv - mu$	Expt 4.1 Conservation of Momentum in an explosion	Pages 130 - 134	Exploring Physics Set 4 pages 41-43	MID TOPIC TEST

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T1 7	23. Explain how Newton's Second Law is used to define the unit of force. 24. Distinguish between mass and weight. 25. Solve simple problems using $F = ma$ 26. Identify and explain Newton's Third Law in terms of pairs of forces in physical situations. 27. Use weight = mg to solve simple problems. 28. Draw free body diagrams showing the forces acting on objects from descriptions of real life situations		Pages 111 - 114		
T1 8	29. State that when a force moves its point of application in the direction of the force, work is done. 30. State and define the SI unit of work. 31. Solve problems using $W = Fs$ 32. Distinguish between work and energy 33. Explain that a system which has energy can be made to perform useful work. 34.* State and explain that one form of energy may be converted into another form. 35. State the SI unit of energy. 36.* Describe the energy changes that occur during energy transformations. 37. State and explain the principle of conservation of energy. 38. Explain that all forms of energy tend to degrade into thermal energy and relate this to the fact that the efficiency of mechanical systems is never 100%.		Pages 135 – 143 Pages 144 – 147 Pages 148 - 149		

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T1 9	39. Define 'kinetic energy' as energy of motion. $E_k = \frac{1}{2}mv^2$ 40. Solve problems using the expression: 41. Define 'potential energy' as energy of position or state. 42. Give examples of potential energy. 43. Solve problems using the expression $E_p = mgh$ for gravitational potential energy.	Expt 5.1 Roller Coaster		Exploring Physics Set 5 page 49-51	RESEARCH ASSIGNMENT DUE
T1 10	44. Describe and analyse kinetic and potential energy interchanges in everyday situations. 45. Perform calculations involving the transformation of gravitational potential energy to kinetic energy and vice-versa. 46. Define 'power' as the rate of doing work and state its SI unit. 47. Perform calculations using the expression $P = \frac{W}{t}$ 48. Draw and interpret graphs involving force, displacement, work, time and power in the chosen context		Pages 150-151		MOTION & FORCES TOPIC TEST

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
<p>T2</p> <p>1</p>	<p>Unit2B Heating and Cooling Students gain insight into temperature measurement, conduction, convection and radiation to develop understandings about how energy is transferred through different types of materials. They also examine the thermal properties of substances, including thermal expansion, specific heat capacity and latent heat.</p> <p>Contexts for heating and cooling may include: Temperature control Heat and Motor Vehicles Food preparation and preservation Climate change</p> <ol style="list-style-type: none"> 1. Explain the ways by which heat is transferred: conduction, convection and radiation. 2. Explain that heat is the flow of energy from one object to another because of a difference in temperature. 3. Explain the difference between heat, internal energy and temperature. 4. State that temperature is related to the average kinetic energy of the molecules. 5.* Explain how properties which change with temperature may be used to measure and control temperature. 6. State the fixed points on the Celsius (0°C and 100°C) and Kelvin (0 K, 273 K) scales. 	<p>Expt 10.2 The Power of a Bunsen Burner</p>	<p>Page 229</p> <p>Pages 257 - 265</p> <p>Pages 235 - 239</p>	<p>Exploring Physics Set 11 pages 109 - 110</p>	

‘Heinemann Physics Content and Contexts Units 2A & 2B’ 1st Edition

‘Exploring Physics Stage 2’, STAWA

- January 2014

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T2 2	7.* Describe the experimental evidence which supports the kinetic theory. 8. Explain the relationship between pressure, volume and temperature using the kinetic theory. 9. Apply the kinetic theory to explain qualitatively physical phenomena related to the chosen context.		Pages 233 – 234 Pages 240 - 241	Exploring Physics Set 10 pages 102 -103	
T2 3	10. Explain and apply the principles involved in the effective operation of heating, cooling and insulation systems in contextual situations. 11. Use terms ‘specific heat capacity’ and ‘latent heat’ in explaining contextual situations.	Expt 12.1 The specific Heat Capacity of a Liquid	Pages 243 – 244 Pages 248 - 250		
4	12. Use $Q = mc\Delta T$ and $Q = mL$ for simple calorimetry problems (excluding the method of mixtures).			Exploring Physics Set 12 Q 1 - 18 pages 118 - 120	

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T2 4	13 Methods of mixtures calculations.		Pages 245 - 246	Exploring Physics Set 12 Q 19 - 25 pages 118 - 120	INVESTIGATION VALIDATION TEST The specific heat capacity of a metal or Lf of ice
5	14. Use the principles of heat storage and transfer to evaluate and explain the operation of common devices. 15. State the principle of conservation of energy and explain the implications of energy degradation.				HEATING & COOLING TOPIC TEST
6	Examinations				SEMESTER 1 EXAM

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
<p>T2</p> <p>7</p>	<p>Examination review</p> <p>Unit 2A Nuclear Physics</p> <p>Students learn about atomic structure and subatomic particles to understand the emission of nuclear radiation, and nuclear energy.</p> <p>Learning contexts may include:</p> <ul style="list-style-type: none"> Nuclear energy Radioisotopes Medical imaging and therapies <ol style="list-style-type: none"> 1. Understand the structure of the atom. 2. Define the terms ‘atomic number’ and ‘mass number’, and be able to use them, together with a chemical symbol, to define a nuclide. 3. Define the term ‘isotope’. 				

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
<p>T2</p> <p>8</p>	<p>4. Define an ‘atomic mass unit (u)’.</p> <p>5. Explain that many nuclides are unstable and that these nuclides decay.</p> <p>6. Describe the basic differences and similarities between the nature and properties of α, β and γ radiation.</p>		<p>Pages 160 – 173</p>		

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T3 1	16. Define the terms ‘mass defect’ and ‘binding energy’. 17. Solve simple problems involving binding energy and mass defect using $E = mc^2$. 18. Use the variation in binding energy per nucleon of nuclides to explain the release of energy by fission and fusion processes. 19. Explain the principle of a neutron-induced chain reaction and critical mass configuration.	Investigation 9.4 Smoke Detectors	Pages 179 - 184	Exploring Physics Set 8 pages 82 - 84	
T3 2	20. Explain that the heat produced by nuclear fission can be used to generate electrical energy in the same way as burning fossil fuels. 21. Describe the major sources of radiation in the environment. 22. Describe the short- and long-term effects of radiation on humans. 23. Describe the short- and long-term advantages and disadvantages of both nuclear and conventional power stations and other applications of nuclear technology.		Pages 185 - 197	Exploring Physics Set 9 pages 89 - 91	COMPREHENSION ASSESSMENT
T3 3	Review & Consolidation				NUCLEAR PHYSICS TOPIC TEST

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
<p>T3</p> <p>4</p>	<p>Unit 2B Electrical Fundamentals Students learn to apply the concepts of charge and energy transfer to situations involving both electrostatics and current electricity. They construct and study characteristics of electric circuits; learn how to work safely with electricity; and gain an understanding of the relationship between electricity and magnetism. Contexts for Electrical Fundamentals may include;</p> <ul style="list-style-type: none"> Car electrical systems Domestic power Electrical safety Direct current devices 				
<p>T3</p> <p>5</p>	<ol style="list-style-type: none"> 1. Explain that atoms can gain or lose electrons so gaining a net charge. 2. State that like charges repel and unlike charges attract. 3. Describe, using diagrams, electric field distributions around simple combinations of charged points, spheres and plates. 	<p>Expt 14.1 Creating & Storing Electric Charge</p>	<p>Pages 270 – 282</p>		

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
<p>T3</p> <p>7</p>	<p>14.* Be able to calculate the energy consumed by and the cost of operating common electrical appliances.</p> <p>15. Draw and interpret simple circuit diagrams including the use of standard symbols for resistor (fixed and variable), light bulb, switch, ammeter, voltmeter, dry cell and power supply.</p> <p>16. Describe the flow of electrical current through series and parallel circuits.</p>		<p>Pages 297 – 300</p> <p>Pages 304 – 305</p>	<p>Exploring Physics Set 15 pages 149 - 150</p>	
<p>T3</p> <p>8</p>	<p>17. State Ohm's Law and state the conditions under which it applies</p> <p>18. Define 'resistance' and state its unit.</p> <p>19. State the factors that affect electrical resistance.</p> <p>20. Perform calculations using the relationship $V = IR$</p> <p>21. Describe the effect of having resistors connected in series.</p>	<p>Expt 16.1 Potential difference, current & resistance</p> <p>Expt 17.1 Resistors in Series</p>	<p>Pages 290 – 296</p>	<p>Exploring Physics Set 16 pages 157 - 158</p>	

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T4 1	30. Perform calculations to determine I, V and R in different parts of simple and compound circuits. 31. Connect components in simple circuits and measure values of current and potential difference using ammeters and voltmeters.			Exploring Physics Set 17 pagea 168 - 171	
T4 2	32. Explain the operating principles of commonly encountered electrical devices in contextual applications. 33. Identify sources of electrical energy in simple circuits.	Expt 18.1 Fuses Expt 18.2 Short Circuits	Pages 313 - 319	Exploring Physics Set 18 pages 178 - 179	
T4 3	34. Identify energy transformations which occur in electrical devices. 34 Describe the cause of electric shock and identify hazardous situations and safety precautions in everyday uses of electrical energy.				INVESTIGATION DUE ELECTRICITY TOPIC TEST

YEAR 11 2A/2B Physics Programme

2014

Week	OUTCOMES	Experiments	Reading	Problem Solving & Calculations	Major Assessment
T4 4	CONSOLIDATION & REVIEW				
T4 5	SEMESTER EXAMINATIONS				