Year 10 Classical Physics Program (based on new edition of Fundamentals of Science 4)

Content area	Objectives	Text: Fundamentals of Science 4	Questions	Activities
This is a challenging and rigorous program that requires concentrated effort over a long period of time. Answers to problems must be clearly and fully set out. To do Year 11 Physics you need to aim for an A or B grade or Level 6 in the Energy and Change strand. Make sure you see your teacher if you are having problems as the work shifts from topic to topic quickly. If your class is efficient then you will be able to do some interesting activities using sensors in some computer based laboratory work.	Other sources of problems can be found in *"Introduction to Physics Calculations: Matthews & Winter"* Every couple of weeks there will be a **PROGRESS TEST** that will cover the basics of physics. If you wish to be successful in Physics in Year 11 you should be aiming at obtaining 80% or more in these tests. STUDENTS SHOULD BE ABLE TO: ➢ Explain that a description of motion requires the measurement of time intervals and distances. ➢ Define the differences between vectors and scalars. ➢ Show how vectors can be represented using an arrow.	Chap 9 p86 - 91	Chapter Questions p92 Nos 1-7 MW set 2	**Activity 1** Using Ticker Timer (Use 6 V AC)
Introduction (Assessment Sheet) **Measurement** **Vectors and Scalars**	➢ Define displacement and distinguish between speed and velocity.		Practice Examples p89 Nos 1-6 MW sets 3,4,5	**Activity 2** Uniform velocity **Activity 3** Vectors & Scalars (Optional)
Average Speed **Average velocity** **Displacement/Time Graphs** *3 periods*	➢ Perform average velocity and average speed calculations using $v_{av} = s/t$ ➢ Be familiar with displacement-time graphs.		Chapter Quest p92 Nos 8-21 MW sets 6,7,14	**Activity 4** Motion graphs introduction (Essential)

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Acceleration *9 periods* (⇓ *12 periods*)	STUDENTS SHOULD BE ABLE TO: ➢ Define acceleration as the change in velocity that occurs in a unit of time. ➢ Perform calculations using the relationship: $a = \frac{v-u}{t}$ ➢ Realise that acceleration is caused by an unbalanced force. ➢ Interpret velocity-time graphs. ➢ Calculate displacement of an accelerating object using: $s = ut + \frac{1}{2}at^2$	Chap 10 p94-99	Chapter Questions p102 Nos 1-8,11 MW sets 8,9,10,11 Practice Examples p96 Nos 1-5 Chap Quest p104 Nos 14-15 p105 Nos 18-20 MW set 14 Practice Examples p97 Nos 1-3 p98 Nos 1-3	**Activity 5** Acceleration **Activity 6** Analysis of a drag strip (Essential) **Activity 7** More Motion Graphs **PROGRESS TEST 1**
Forces **Newton's 1st Law of Motion** *2 periods*	STUDENTS SHOULD BE ABLE TO: ➢ Recall that a force is any push or pull that changes or tries to change an objects state of rest or straight line motion. ➢ Understand the concept of inertia.	Chap 8 p80-83	Chapter Questions p84 Nos 1-20	**Activity 8** Forces (Optional) **Activity 9** Inertia (Physics Alive CD See Mr Lyle)
End of Stage 1 – 4 Week TEST ***[Will also be tested in the SEMESTER 1 EXAMINATION in physics, chemistry and biology]***				
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Forces **Newton's 1st Law of Motion** *2 periods* (⇓ *14 periods*)	STUDENTS SHOULD BE ABLE TO: ➢ Define Newton's First Law of Motion.	Chap 8 p80-83	Chapter Questions p84 Nos 1-20	**Activity 10** Newton's 1st Law
Acceleration and Force **Newton's 2nd Law of Motion** *5 periods* (⇓ *19 periods*)	STUDENTS SHOULD BE ABLE TO: ➢ Be able to use acceleration formula ➢ State Newton's Second Law of Motion ➢ Apply the Second Law to simple situations ➢ Perform calculations using: $F = ma$ and $a = \frac{v-u}{t}$	Chap 10 p99-101	Practice Examples p101 Nos 1-5 MW sets 15,16 Chap Quest p104 Nos 9-10 p104 Nos 12-20	**Activity 12** Newton's 2nd Law
Force and Weight *4 periods* **Reaction Forces Newton's 3rd Law of Motion** *1 periods* (⇓ *24 periods*)	STUDENTS SHOULD BE ABLE TO: ➢ Realise that weight is a force Show that g = 9.8 ms^{-2} by experiment ➢ State Newton's Third Law of Motion ➢ Apply the Third Law to simple situations ➢ Appreciate that forces never occur in isolation ➢ Appreciate that the pair of forces acts on different objects ➢ Apply the Third Law to car collisions and the secondary collisions of the passengers.	Chap 11 p106-113	MW set 17 Examples p109 Nos 1-3 p112 Nos 1-3 Chap Quest p113 Nos 1-21	**Activity 13** Force and Weight **Activity 14** Newton's 3rd Law **PROGRESS TEST 2**

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Work **Work and Energy** **Kinetic Energy** **Potential Energy** *3 periods* (⇓ *27 periods*)	STUDENTS SHOULD BE ABLE TO: ➢ Define work as the energy transformed during an action, frequently one of the energy forms produced is heat $W = F\,s = mas = mgh = \Delta E$ ➢ Realise that work is a type of energy ➢ Define kinetic energy ➢ Use kinetic energy formula $E_k = \frac{1}{2}mv^2$ ➢ Define gravitational potential energy as the energy required to change the position of an object relative to the earth ➢ Use the potential energy formula $E_p = mgh$	Chapter 13 p130-134 Chapter 14 p136-139 Chapter 15 p143-148	Practice Examples p133 Nos 1-4 MW set 21,22 Chapter Quest p134 Nos 1-16 p140 Nos 1-12 MW set 23 Practice Examples p145 Nos 1-6 p147 Nos 1-5 MW set 24 Chapter Quest p148 Nos 1-15	**Activity 15** Work and Energy
Work and Energy Transformations *2 periods* (⇓ *29 periods*)	STUDENTS SHOULD BE ABLE TO: ➢ State that energy can be transformed without loss ➢ Apply energy transformation to simple situations	Chapter 16 p151-155	Practice Examples p152 Nos 1-3 p154 Nos 1-4 Chap Quest p155 Nos 1-24	**Activity 16** Conservation of Energy (Optional) **Activity 17** Energy Transformations (Optional)

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Power **Review** *1 periods* (⇓ *30 periods*)	STUDENTS SHOULD BE ABLE TO: ➢ Define power as the rate of transformation of energy ➢ Understand the units of power ➢ Realise that power can be used in electrical and mechanical situations ➢ Use the formula for power in simple situations $P = \frac{W}{t} = \frac{Fs}{t} = \frac{mas}{t} = \frac{mgh}{t} = \frac{\Delta E}{t}$	Chap 17 p160-162	Practice Examples p162 Nos 1-4 Chap Quest p163 Nos 1-17 MW set 25	**Activity 18** Power **Activity 19** Power Comparison (Optional) **PROGRESS TEST 3**
Electricity *7 periods* (⇓ *37 periods*)	STUDENTS SHOULD BE ABLE TO: ➢ Definitions of voltage, current and resistance. ➢ Correctly use ammeters and voltmeters. ➢ Ohms Law-graph V *versus* I and use the slope to calculate R. ➢ Explain the characteristics of resistors in series and parallel. ➢ Calculate the total resistance of resistors in series. ➢ Do V=IR calculations			Ohms Law activity Other activities can be found in the *Electricity Notes and Activities* booklet.
Astronomy **OPTIONAL** **(may also be done at the end of year)** *17 periods* (⇓ *44 periods*)	STUDENTS SHOULD BE ABLE TO UNDERSTAND: ➢ The force of attraction between two masses ➢ Weight, falling objects, and satellite motion is due to gravity ➢ Revolution, rotation, seasons and tides ➢ The major "players" in the universe: nebulae, stars, novae, supernovae, black holes & galaxies ➢ A model of cosmology & the age of the universe ➢ Telescope design, the use of spectra & the Doppler effect			**Web Site** *NASA.GOV* **Major Library Assignment** **PROGRESS TEST 4**
	FINAL Test Motion Graph Interpretation; Displacement, velocity, acceleration; Newton's Laws of Motion; Work, Energy and Power; Basic Electricity			