The Purcell School Science Department

YEAR: 2019-20 *SCHEME OF WORK: YEAR 12 PHYSICS*

YEAR 12 - SUMMARY OF THE COURSE

Chapters		Duration (approximate)
1	Kinematics – describing motion	1 week
2	Accelerated motion	1 week
3	Dynamics – explaining motion	1 week
4	Forces – vectors and moments	1 week
5	Work, energy and power	2 weeks
6	Momentum	1 week
7	Matter and materials	2 weeks
		Duration (approximate)
8	Electric fields	2 weeks
9 & 10	Electric circuits & Kirchhoff's Laws	2 weeks
11	Resistance and resistivity	2 weeks
12	Practical circuits	2 weeks
13 & 14	Waves and Superposition of waves	3 weeks
15	Stationary waves	3 weeks
16	Radioactivity	2 weeks

(This document is “work in progress” and it is constantly updated)

Risk In any practical work risk assessment is crucial, the key is as follows**:**

B: Minor risk from hot objects (burns)
E: minor risk from electrical equipment
N: no significant risk
S: specific risk assessment
H: minor risk from heavy objects

In year 12, students are taught in one mixed-ability group.

Homework / Assessment

Students are given the pages from the book relating to the work we do in class. Their main task is to answer all the questions from the book. If necessary they are encouraged to make notes from the book to reinforce their learning. The answers to the questions are available to them on a CD ROM and they can check their own numerical answers. Their work is handed in on a daily basis for checking and monitoring by the teacher. At the end of each chapter there is a short test with questions from the book. This is marked in class.

Textbook: **Cambridge University Press: Cambridge International AS and A Level Physics Coursebook, David Sang et al.**

Lesson allocation: **7 ×40 minutes per week**

Homework allocation: **7 x 40 minutes per week**

Week	Learning Objectives	Learning Activities/Strategies (inc. homework)	Assessment	Different-iation	Resources	Risk
1	Chapter 1: Kinematics Speed Distance and displacement, scalar and vector Speed and velocity Displacement-time graphs Combining displacements Combining velocities	Measuring speed using ticker timer and light gates 8.5 What is the difference between a distance-time graph and a displacement-time graph? What does the gradient of a velocity-time graph represent? What does the area under the velocity-time graph represent?				N
2	Chapter 2: Accelerated Motion The meaning of acceleration Calculating acceleration Units of acceleration Deducing acceleration Measuring velocity and acceleration Determining velocity and acceleration in the laboratory The equations of motion Deriving the equations of motion Uniform and non-uniform acceleration Acceleration caused by gravity Determining g Motion in two dimensions – projectiles Understanding projectiles	Using ticker-tape to plot velocity-time graphs 8.4 What does free fall mean? How does the velocity of a freely falling object change as it falls? Do objects of different masses or sizes all fall with the same acceleration? Free fall experiments, dropping an object, using a ticker timer, using light gates Use of ticker timers to produce ticker tapes. 8.3 What is the difference between u and v? How can we calculate the displacement of an object moving with uniform acceleration? What else do we need to know to calculate the acceleration of an object if we know its displacement at a given time? Use ticker tapes to make distance time and speed time graphs. Using light gates and weights pulling trolleys through them. Projector files 8.6 How do we calculate the motion of an object with constant acceleration if its velocity reverses? Should the overall motion be broken down into stages? How do we use signs to work out if an object is moving forwards pr backwards?				N

Week	Learning Objectives	Learning Activities/Strategies (inc. homework)	Assessment	Different-iation	Resources	Risk
		8.7 Why is the acceleration of a projectile always vertically downwards? What is the horizontal component of a vertical vector? What is the effect of gravity on horizontal speed? 8.8 Where else do we meet projectile motion? What could happen if we could switch gravity off?				
3	Chapter 3: Dynamics – explaining motion	8.1 How does displacement differ from distance? What is the difference between instantaneous speed and average speed? When is it necessary to consider velocity rather than speed? 8.2 When do moving objects accelerate and decelerate? Why is uniform acceleration a special case? Why is acceleration considered to be a vector?				
4	Chapter 4: Forces – vectors and moments					
5	Chapter 5: Work, energy and power Doing work, transferring energy Gravitational potential energy Kinetic energy gpe – ke transformations Down, up, down – energy changes Energy transfers Power					
6	Chapter 6: Momentum The idea of momentum Modelling collisions Understanding collisions Explosions and crash landings Collisions in two dimensions Momentum and Newton's laws Understanding motion					

Week	Learning Objectives	Learning Activities/Strategies (inc. homework)	Assessment	Different-iation	Resources	Risk
7	Chapter 7: Matter and materials Density Pressure Compressive and tensile forces Stretching materials Elastic potential energy					
8	Chapter 8: Electric fields Attraction and repulsion Concept of an electric field Electric field strength Force on a charge					
9	Chapter 9: Electric current, potential difference and resistance Circuits, symbols and diagrams Electric current Charged particles An equation for current The meaning of voltage Electrical resistance Electrical power					
10	Chapter 10: Kirchhoff's laws Kirchhoff's first and second law Applying Kirchhoff's laws Resistor combinations Solving problems					
11	Chapter 11: Resistance and resistivity The I-V characteristics for a metallic conductor Ohm's law Resistance and temperature Thermistors and diodes Resistivity					
12	Chapter 12: Practical circuits Internal resistance					

Week	Learning Objectives	Learning Activities/Strategies (inc. homework)	Assessment	Different-iation	Resources	Risk
	Effects of internal resistance Potentiometer circuits					
13	Chapter 13: Waves Describing waves Longitudinal and transverse Wave energy and wave speed The Doppler effect Electromagnetic waves Electromagnetic radiation					
14	Chapter 14:Superposition of waves The principle of superposition of waves Diffraction of waves Interference Coherence The Young double slit experiment Diffraction gratings					
15	Chapter 15: Stationary waves From moving to stationary Nodes and antinodes Formation of stationary waves Determining the wavelength and speed of sound					
16	Chapter 16: Radioactivity Looking inside the atom Alpha particle scattering and the nucleus A simple model of the atom Nucleons and electrons					

Week	Learning Objectives	Learning Activities/Strategies (inc. homework)	Assessment	Different-iation	Resources	Risk
	Forces in the nucleus Fundamental particles? Families of particles Radiation from radioactive substances Fundamental families and forces Properties of ionising radiation Radiation penetration The electronvolt					
	P1: Practical skills at AS level Practical work in Physics Using apparatus and following instructions Gathering evidence Precision, accuracy, errors and uncertainty Recording results Analysing results Testing a relationship Identifying limitations in procedures Suggesting improvements	Instrument sensitivity The Vernier Caliper Micrometer Absolute, percentage errors Significant figures Tables of results				