Summer Work – Transition from Year 11 to Year 12

A Level Subject: Physics

Required textbook:

Advanced Physics For You (Advanced for You)

Publisher: OUP Oxford ISBN: ***1408527375***

Revision Guide: **A-Level Physics: OCR A Year 1 & 2 Complete Revision**

Publisher: CPG ISBN: **1789080398**

Useful sources:

Physics and Maths tutor (https://www.physicsandmathstutor.com)

Equipment List:

A4 Ring binder

Lined Paper

Calculator

FAKENHAM ACADEMY

Tasks

Topic	Option A basics	Option B calculations	Option C Thinking hard
Waves	**Task**: Create a labeled diagram of a transverse wave and a longitudinal wave. Then, define and give an example for each of the following terms: • Amplitude • Wavelength • Frequency • Period • Wave speed • Compression • Rarefaction **Extension**: Explain the difference between mechanical and electromagnetic waves and give three examples of each.	**Task**: Use the wave equation: $v=f\lambda$ to calculate: 1. The wavelength of BBC Radio one FM and BBC talk sport medium wave 2. A sound wave in air travels at 340 m/s. What is the wavelength of the highest sound people can hear **Extension**: Design a simple experiment (or describe one) to measure the speed of sound in air using a stopwatch and two people.	**Task**: Explain the principle of superposition in your own words. Then describe (with diagrams if possible): • Constructive interference • Destructive interference • Stationary waves (including nodes and antinodes) **Challenge**: Research and explain how noise-cancelling headphones use the principle of superposition to reduce unwanted sound.
Electricity	**Task**: Define the following terms and state their standard units: • Charge (Q) • Current (I) • Voltage (V) • Resistance (R) Then, explain what is meant by the statement: **"1 ampere is 1 coulomb per second."** **Extension**: Convert 1.2 mA into amperes and calculate how much charge flows in 3 minutes.	**Task**: 1. Use Ohm's Law $(V=IR)(V=IR)$(V=IR) to calculate: a. The current through a 12 Ω resistor when 6 V is applied. b. The voltage across a 4 Ω resistor with a current of 0.5 A. 2. In a **series circuit** with three resistors (2 Ω, 3 Ω, and 5 Ω) and a 10 V battery: a. What is the total resistance? b. What is the total current? 3. In a **parallel circuit** with two resistors (6 Ω and 3 Ω) connected across a 6 V supply:	**Task**: Plan an experiment to investigate **how the resistance of a wire depends on its length**. Include in your plan: • A clear hypothesis • A diagram of the circuit • List of equipment • Method (step-by-step) • How to make it a fair test • Safety considerations • How you would calculate resistance from your measurements **Extension**: Suggest how you could reduce sources of error in this investigation.

		a. What is the total resistance? b. What is the current through each resistor? **Extension**: Compare how current and voltage behave differently in series and parallel circuits.	
Forces and motion	**Task**: Define the following terms, including units where appropriate: • Displacement • Velocity • Acceleration • Force • Mass • Weight • Resultant force Then, write out **Newton's three laws of motion** in your own words and give a real-life example of each. **Extension**: Explain how mass and weight are different, and calculate the weight of a 60 kg person on Earth.	**Task**: Use the **SUVAT equations** to solve these problems (assume constant acceleration): 1. A car accelerates from rest at 2.5 m/s^2 for 6 seconds. a. What is its final velocity? b. How far does it travel? 2. A ball is thrown upwards at 12 m/s. a. How long until it reaches the top of its path? b. What is its displacement at that point? Also, draw: • A velocity-time graph for an object accelerating and then decelerating. • A displacement-time graph for a stationary object, then a steadily moving object. **Extension**: Rearrange the SUVAT equations to make each variable the subject.	**Objective**: Plan an experiment to explore Newton's Second Law. **Task**: Design a practical investigation to explore how **force affects acceleration** using a trolley, pulley, and weights. Your plan should include: • A clear hypothesis • Diagram of the setup • Equipment list • Method (step-by-step) • Variables (independent, dependent, control) • How you will calculate acceleration • Safety considerations **Extension**: Explain how friction might affect your results and how you could reduce its impact.

Time Allowance: 5 hours