Syllabus for Physics 4IA

Theory

	<u>Topic</u>		Contents
1	Measurements and units	Numbers and units Measuring length and time Volume and density	- Know how to work with units in particular S.I. units and their prefixes - Writing numbers in scientific notation and significant figures - Read Vernier and micrometer - Understand meaning zero error - Understand period movement and period - Define volume and density - Units of volume and density - Measuring volume and density for regular and irregular solids - Simple calculations using density - Compare masses with beam balance - Difference between beam balance and digital scales
2	Forces and motion	Speed, velocity and acceleration Forces in balance	 Measuring speed Difference between speed and velocity Define acceleration Understand deceleration Motion graphs: distance-time graph, speed-time graph Meaning of slope (gradient) as rate of change of speed in time Recognize difference between uniform and non-uniform movement from velocity- time graphs Interpret area under speed-time line as distance travelled Acceleration g of free fall (omit upward movement) Free body diagram: isolate object to identify forces acting on it Measuring force Different types of forces and arrow representation Newton's first law of motion Meaning of terminal velocity
		Force, mass and acceleration Friction and braking	 Newton's second law: notion of inertia, resulting force in one direction Different effects of forces Stopping distance Friction: how can it be useful, how can it be reduced

Force, weight and gravity Action and reaction Propulsion of rockets Forces and pressure Forces and pressure Forces and compressing Pressure Pressure in liquids Pressure using a manometer Define efficiency Understand difference between work done and energy transformed Sankey diagrams Solve simple problems Pressure in liquids Understand notion of temperature Understand difference between heat and thermal energy Absolute zero and kelvin unit Expanding solids and liquids Pressure between weight and mas Prosure in liquids Define difference between weight and mas Prosure in law Propulsion of rockets Propulsion of rockets Propulsion of rockets Propulsion of rockets Pressure in law Propulsion of rockets Principle of moments Contition of equilibrium: forces and moments Principle of moments Define equilibrium: forces and moments Propulsion of equilibrium: forces and moments Propulsion Pressure in manuelis Propulsion Pressure in manuelis Pressure in manuelis			I		
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				-	Absolute zero and kelvin unit
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Thermal conduction	 Effects and uses of thermal expansion Volume change when water freezes and its effects Factors affecting thermal conduction Good and poor thermal conductors Uses of insulating materials
Thermal convection	Examples of convection currents - Examples and uses of convection currents
Thermal radiation	 Nature of thermal radiation Examples of emitters, reflectors and absorbers
	- Greenhouse effect, solar panel and vacuum flask

General skills:

- 1. Use of command terms
- 2. Summarise key points in a text
- 3. Use of tables
- 4. Writing a method
- 5. Charts and graphs (see chemistry and physics)
 - o Present information as bar charts or scatter graphs
 - o Understanding direct and inverse proportion
 - o Identify relationships using scatter graphs (direct proportion and linear relationship; significance of intercept)
 - o Analyse and describe trends of a graph
- 6. Modelling in science: how to use models in science and testing them
- 7. Produce and present a presentation
- 8. Calculating with simple formulae : y = a times x, reciprocals, ratios, percentages, powers of ten
- 9. Measuring angles
- 10. Understand accuracy and precision
- 11. Understand random and systematic errors
- 12. Rounding numbers
- 13. Know the S.I. units and their multiples of the physical quantities introduced in the different chapters.
- 14. Make approximations and estimates
- 15. Understand notion of fair testing

Practical Work Suggestions

The practical activities are an integral part of the course.

	<u>Topic</u>	Contents		
1	Measurements and	Practice within the context of different labs		
	units			
2	Forces and motion	- Find speed from distance / time measurements		
		- Hooke's law for spring and elastic band		
		- Frictional forces		
		- Inertia		
3	Forces and pressure	- Investigate factors influencing upthrust		
4,5	Work and energy	Renewable energies		
		- Compare heat loss of different cups filled with hot drink (fair test notion)		