

Wah Yan College Kowloon
F.5 Physics Scheme of Work (2015-2016)

Textbook	1. New Senior Secondary Physics at Work 4 - Electricity and Magnetism (1 st) 2. New Senior Secondary Physics at Work 5 - Radioactivity and Nuclear Energy (for Physics, 2 nd)
Other Resources	

SL: Scheduled number of lessons

AL: Actual number of lessons

School Term	Weeks	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	SL/AL	Teaching and Learning Activities	Consolidation and Assessment	Values [#]
First Term (1/9/2015- 1/1/2016, Weeks 1 to 18)	1	Electrostatics		4			I
		1.1 Electric charges	1 Two kinds of charge 2 Where do charges come from? 3 Unit of charge 4 Insulators and conductors 5 Attraction of uncharged object a Conductors b Insulators 6 Coulomb's law 7 Earthing a Connecting two conductors b How does earthing occur? 8 Fun with electric		<i>Simulation</i> 1.1 Attraction of uncharged objects <i>Video</i> 1.1 Expt 1a - Charging by friction 1.2 Attraction of uncharged objects 1.3 Expt 1b - Fun with electric charges	Hair standing on end Check-point 1 Check-point 2 Check-point 3 Practice 1.1	

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			charges				
	2-3	Electric field		8	Plotting equipotentials		
		1.2 Electric field	1 What is an electric field? 2 Electric field lines 3 Electric field pattern a Electric field around a point charge b Electric field between two parallel charged plates 4 Electric field strength a Point charge b Parallel charged plates		<i>Simulation</i> 1.2 Electric field <i>Video</i> 1.4 Expt 1c - Electric field patterns	Electroreception Check-point 4 Check-point 5 Practice 1.2	
		1.3 Electric potential	1 Electric potential energy 2 Electric potential a Potential difference b Electric potential around a point charge c Electric potential between parallel plates		<i>Simulation</i> 1.3 Equipotential lines <i>Video</i> 1.5 Expt 1d - Finding points of equal potential	ECG Check-point 6 Check-point 7 Practice 1.3 Revision exercise 1	

School Term	Weeks	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	SL/AL	Teaching and Learning Activities	Consolidation and Assessment	Values#
			3 Relationship between electric field strength and electric potential				
	4	Resistance		4	Ohm's Law		
		2.3 Resistance	1 Definition of resistance a Resistance and its unit b Measuring resistance 2 Ohm's law 3 Factors affecting resistance a Temperature b Length and thickness c Resistivity 4 Fixed and variable resistors		<i>Simulation</i> 2.4 Ohm's law 2.5 Resistance of a metal wire <i>Video</i> 2.1 Using the multimeter 2.2 Expt 2a - Ohm's law 2.3 Expt 2b - To investigate the $V-I$ relationship of a light bulb 2.4 Expt 2c - Effect of length and thickness on resistance <i>DIY corner</i> Polystyrene cutter	Body fat monitor Check-point 5 Check-point 6 Check-point 7 Practice 2.3	
		2.4 Resistors in series and in parallel	1 Resistors in series 2 Resistors in parallel 3 Short circuit 4 Summary — Bulbs in series and in parallel		<i>Simulation</i> 2.6 Series circuit 2.7 Parallel circuit 2.8 Complicated circuit 2.9 Parallel and series	Christmas light Check-point 8 Practice 2.4	

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					combinations <i>Video</i> 2.5 Expt 2d - Equivalent resistance of resistors in series 2.6 Expt 2e - Equivalent resistance of resistors in parallel		
		2.5 Resistance of ammeters, voltmeters and power sources	1 Resistance of ammeters 2 Resistance of voltmeters 3 Internal resistance of power sources		<i>Video</i> 2.7 Expt 2f - Using an ammeter to measure current 2.8 Expt 2g - Using a voltmeter to measure voltage across resistors 2.9 Expt 2h - E.m.f. of a power supply 2.10 Internal resistance of a battery	Car dashboard Check-point 9 Check-point 10 Practice 2.5 Revision Exercise 2	
	5-6	Parallel and series circuits		8	Lab		
		2.1 Electric current	1 Flow of electric charges 2 Electric current a Convention of		<i>Simulation</i> 2.1 Model of simple circuit	Light up a torch Check-point 1	

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			direction of current b Current and its unit c Measuring current			Check-point 2 Practice 2.1	
		2.2 Electromotive force and potential difference	1 Energy change in a circuit 2 Voltage, potential difference and electromotive force a Measuring voltage b Voltage around a simple circuit c Cells in series and parallel		<i>Simulation</i> 2.2 Energy changes in a circuit 2.3 Reading an ammeter and a voltmeter	Analogy of energy conversion in a simple circuit Check-point 3 Check-point 4 Practice 2.2	
	7	Domestic electricity		4			II
		3.1 Electrical power and energy	1 Electrical power 2 Power rating 3 Electrical energy a Measuring electrical energy		<i>Video</i> 3.1 Expt 3a - Measuring electrical energy with a kilowatt-hour meter	Which one is brighter? Check-point 1	

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			b Electric bill			Check-point 2 Practice 3.1	
		3.2 Mains electricity and household wiring	1 Alternating current and mains circuit 2 Safety designs in domestic electricity a Fuse b Earth wire as a safety wire c Double insulation d Three-pin plug and socket 3 Household wiring a Lighting circuit b Ring main		<i>Simulation</i> 3.1 Alternating current 3.2 The 3D model of plug and socket 3.3 Household wiring <i>Video</i> 3.2 Fuse 3.3 The electrician's 'live' probe	Electricity: friend or foe? Check-point 3 Check-point 4 Practice 3.2 Revision exercise 3	
	8-9	Magnetic field		8	Search coil, Hall probe		
		4.1 Magnetic field	1 Magnets 2 Magnetic fields 3 The earth's magnetic field		<i>Simulation</i> 4.1 Magnetic field <i>Video</i> 4.1 Banknote with magnet 4.2 Expt 4a - Magnetic	Banknote Activity 4a Check-point 1	

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					field patterns 4.3 3D magnetic field pattern	Practice 4.1	
	10-11	Magnetic effect due to current		8	Lab : SBA 1		
		4.2 Magnetic field of electric currents	<p>1 Magnetic field due to electric current</p> <p>a Field around a straight wire</p> <p>(Apply $B = \frac{\mu_0 I}{2\pi r}$ to represent the magnetic field around a long straight wire)</p> <p>b Field around a circular coil</p> <p>(Apply $B = \frac{\mu_0 I}{2r}$ to represent the magnetic field at the centre of a flat circular coil)</p> <p>c Field due to a long solenoid</p> <p>(Apply $B = \frac{\mu_0 NI}{l}$ to</p>		<p><i>Simulation</i></p> <p>4.2 Magnetic field around a long straight wire</p> <p><i>Video</i></p> <p>4.4 Expt 4b - Magnetic fields from currents</p> <p>4.5 Expt 4c - Electromagnets</p>	<p>Electromagnetic lock</p> <p>Check-point 2</p> <p>Check-point 3</p> <p>Check-point 4</p> <p>Practice 4.2</p>	

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			<p>represent the magnetic field at the centre of a long solenoid)</p> <p>2 Electromagnets</p> <p>3 Applications of electromagnets</p> <p>a Magnetic levitation (Maglev) train</p> <p>b Electric bells and buzzers</p> <p>c Telephones</p>				
	12-13	Force due to B-field		8			
		4.3 Current -carrying conductor in a magnetic field	<p>1 Force on a current-carrying conductor</p> <p>a Fleming's left-hand rule</p> <p>b Factors affecting magnetic force (Represent the force on a straight current-carrying wire by</p>		<p><i>Simulation</i></p> <p>4.3 Turning effect on a coil</p> <p>4.4 Simple d.c. motor</p> <p>4.5 Working principle of a loudspeaker</p> <p><i>Video</i></p> <p>4.6 Expt 4d - Force on a current-carrying conductor</p> <p>4.7 Expt 4e - Effect of</p>	<p>Battery car</p> <p>Check-point 5</p> <p>Check-point 6</p> <p>Check-point 7</p> <p>Check-point 8</p>	

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			$F = BIl \sin \theta$ c Magnetic force between two parallel currents 2 Application: electric motors a Turning effect on a coil b Simple d.c. motors c Factors affecting the turning effect on coils d Practical motors 3 Application: moving-coil loudspeakers		current on magnetic force 4.8 Expt 4f - Effect of magnetic field on magnetic force 4.9 Expt 4g - Constructing a model electric motor 4.10 Expt 4h - Investigating factors that affect the turning effect on a coil <i>DIY corner</i> simple electric motor	Practice 4.3	
	14	Problem solving		4			
	14	Revision		4			
	15-16	Examination					
	17-18	Holiday					
Second Term (2/1/2016-15/7/2016, Weeks 19 to	19-20	Electromagnetic induction		8			
		5.1 Current generation in a magnetic field	1 Induced e.m.f. and current a Conductor		<i>Simulation</i> 5.1 Lenz's Law <i>Video</i>	Naughty balls Check-point 1	

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46)			<ul style="list-style-type: none"> experiencing a change in a magnetic field b Conductor cutting through magnetic field lines c Faraday's law of electromagnetic induction 2 Direction of induced e.m.f. and current <ul style="list-style-type: none"> a Lenz's Law b Fleming's right-hand rule 		5.1 Naughty balls 5.2 Expt 5a - Relative movement of conductor and magnet 5.3 Expt 5b - Moving a conductor across a steady magnetic field 5.4 Expt 5c - Investigating induced e.m.f. in a coil using data-logger <i>DIY corner</i> Dancing aluminium foil	Check-point 2 Practice 5.1	
		5.2 Generators and other applications of electromagnetic induction	1 Generators <ul style="list-style-type: none"> a Induced e.m.f. and current in a rotating coil b Simple a.c. generator c Simple d.c. generator d Practical generators i Bicycle dynamos 		<i>Simulation</i> 5.2 Induced current in a rotating coil 5.3 Simple a.c. generator 5.4 Simple d.c. generator <i>Video</i> 5.5 Motor-dynamo unit 5.6 Shake-shake torch 5.7 Expt 5d - Measuring magnetic field using a search coil	Reverse a motor Check-point 3 Check-point 4 Practice 5.2 Revision exercise 5	

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			ii Alternators 3 Eddy currents 4 Applications a Moving coil microphones b Induction cookers c Hard disks		5.8 Expt 5e - Eddy current 5.9 The induction cooker <i>DIY corner</i> Floating aluminium disc		
	21-22	Alternating currents		8	Lab slow AC		
		6.1 Alternating current	1 A.c. and d.c. a Sinusoidal a.c. b Varying d.c. c Constant d.c. 2 Effective value of an a.c. 3 Root-mean-square value of an a.c. 4 Root-mean-square and peak values		<i>Video</i> 6.1 Expt 6a - Current and e.m.f. produced by a small a.c. generator (dynamo) 6.2 Expt 6b - The effective values of alternating current and voltage	Patterns formed by light emitting diodes Check-point 1 Check-point 2 Check-point 3 Practice 6.1	
	23	Transformer		4			
		6.2 Transformer and high-voltage transmission	1 Induction between two coils 2 Working principle of a transformer 3 Voltage ratio		<i>Simulation</i> 6.1 Mutual inductance 6.2 Simple transformer <i>Video</i> 6.3 Expt 6c - Simple	Caution! High voltage! Check-point 4	

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			4 Current in a transformer 5 Improving efficiency of transformers		transformer 6.4 Expt 6d - Measuring the voltage ratio of a transformer	Check-point 5 Check-point 6	
	24-25	Lunar New year holiday					
	26	Transmission of electricity		4			III
		6.2 Transformer and high-voltage transmission	1 High voltage transmission of electrical energy 2 Power loss in transmission cable		6.5 Expt 6e - The model power line	Practice 6.2 Revision exercise 6	
	27	X-rays		4			I
		1.1 X-rays and nuclear radiation	1 X-rays a Properties of X-rays b Applications and potential hazards		<i>Video</i> 1.1 Expt 1a - Blackening of photographic plate	Looking inside Check-point 1	
	28	Nuclear radiation		4			
		1.1 X-rays and nuclear radiation	1 Nuclear radiation			Practice 1.1	
	30-31	Easter holiday					
	32	Radioactive decay		4	Simulating radioactive decay		II
		1.2 Radioactivity	1 Origin and nature of nuclear radiation		<i>Simulation</i> 1.1 Penetrating power	Ex-spy poisoned by	

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			2 Sources of radiation a Common radioactive sources in school laboratory b Background radiation 3 Ionizing power		1.2 Deflection of α , β and γ radiations in a magnetic field <i>Video</i> 1.2 Expt 1b - Ionizing power of radiation 1.3 Expt 1c - Diffusion cloud chamber 1.4 Simulation of particle collision	radioactive substance Activity 1a Check-point 2 Check-point 3 Practice 1.2	
	33	Detection of radiation		4	GM tube, cloud chamber		
		1.2 Radioactivity	1 'Seeing' nuclear radiation 2 Penetrating power a Range in a material b Penetration through various materials 3 Deflections in electric and magnetic fields a In an electric field b In a magnetic field		1.5 The Geiger-Muller (G-M) counter 1.6 Expt 1d - Penetrating power and range of radiation 1.7 Expt 1e - Magnetic deflection of beta radiation	Revision exercise 1	

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	34-36	Problem Solving		8	Lab : SBA 2		
	37	Radiation safety		2			
		2.3 Radiation safety	1 Potential hazard of radiation 2 Background radiation a Monitoring background radiation b Exposure pathways 3 Equivalent dose 4 Protection against radiation			Smoking and radiation Check-point 6 Practice 2.3	
	37	Atomic model		2			
		2.1 The atomic model	1 Historical development of the atomic model a Ancient Greek atomic model b Thomson's 'plum-pudding' model c Rutherford's nuclear model 2 Structure of an atom 3 Atomic number and mass number		<i>Simulation</i> 2.1 Rutherford-Bohr model of the atom <i>Video</i> 2.1 Gravitational model of Geiger-Marsden scattering experiment	Scientific model Check-point 1 Practice 2.1	

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			4 Nuclides and isotopes				
	38	Isotopes		2			
		2.2 Radioactive decay and uses of radioisotopes	1 Three types of decay a Alpha decay b Beta decay c Gamma emission d Decay series 2 Characteristics of radioactive decay a Random nature b Rate of decay c Half-life 3 Uses of radioisotopes		<i>Simulation</i> 2.2 Radioactive decay 2.3 Radioactive decay and half-life <i>Video</i> 2.2 Expt 2a - Radioactive decay—a dice analogue	What heats up the earth's core? Check-point 2 Check-point 3 Check-point 4 Check-point 5 Practice 2.2	
	39	Fission and fusion		4	Chernobyl diaster		IV
		3.1 Nuclear fission and fusion	1 Nuclear fission 2 Chain reaction 3 Nuclear fusion 4 Nuclear power a Controlled nuclear fission b Potential hazards c Benefits and		<i>Simulation</i> 3.1 Nuclear fission and chain reaction 3.2 Nuclear fusion <i>Video</i> 3.1 Explosion of atomic bomb and hydrogen bomb	The life of sun Check-point 1 Check-point 2 Practice 3.1	

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			disadvantages d Controlled nuclear fusion 5 Nuclear weapons a Atomic bomb b Hydrogen bomb and neutron bomb				
	40	Mass energy relationship		2	The Manhattan Project		III, IV
		3.2 Mass-energy relationship	1 Mass-energy equivalence 2 Energy released in nuclear reactions a Atomic mass unit b Mass difference and energy			Missing mass Check-point 3 Practice 3.2 Revision exercise 3	
	41-43	Final Exam					
	44-46	Post Exam					

* The extended parts should be marked with asterisks. These parts should be more challenging and can be covered when the students can master the knowledge and skills covered in the conventional topics.

Core Values of Wah Yan College, Kowloon

I. Love and care	1. Accept & feel positive about himself 2. Appreciation & Gratitude	4. Forgiveness & Reconciliation 5. Service
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	3. Empathy & Compassion	6. Family as a basic unit of society; marriage is the foundation of a family
II. Strive for excellence	7. Reflective 8. Commitment 9. Perseverance	10. Curiosity & willingness to learn 11. Value imagination and creativity
III. Respect and Justice	12. Life is valuable and respectable 13. Openness to good in all things 14. Respect for himself & others	15. Integrity 16. Faithfulness
IV. Responsibility	17. Freedom & Self-discipline 18. Care for the environment	19. Social Identities: citizen identity, national identity and global citizen identity
V. Faith	20. Experience of God 21. Explore & practise one's faith	22. Appreciate religious liturgies