

Wah Yan College Kowloon
F.6 Physics Scheme of Work (2015-2016)

Textbook	1. New Senior Secondary Physics At Work E2 Atomic World (Elective Part) (WY) 2. New Senior Secondary Physics At Work E3 - Energy and Use of Energy (Elective, 2 nd) 3. 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	Electricity at home	Elective III	4	Lab		
		1.1 Energy- consuming appliances at home	1 Main sources of energy in Hong Kong 2 Energy efficiency a Energy conversion b End-use energy efficiency c Overall energy efficiency			Input and output Check-point 1 Practice 1.1	
	2	Lighting		4	Lux meter		
		1.2 Lighting	1 Types of lighting a Incandescent lamps (filament lamps) i Conventional incandescent lamps ii Halogen lamps		<i>Simulation</i> 1.1 Fluorescent tube lamps 1.2 P-n junction in an LED <i>Video</i> 1.1 Expt 1a - Measuring brightness with a light meter 1.2 Expt 1b - Comparing	Lighting and environmental protection Check-point 2 Check-point 3	

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			b Gas discharge lamps i Fluorescent tube lamps (FTL) ii Compact fluorescent lamps (CFL) ii High-intensity discharge lamps (HID) c Light emitting diodes (LED) 2 Measuring brightness a Luminous flux b Illuminance 3 Choosing lamps a Energy efficiency b Comparing different types of electrical lighting		the efficiency of different types of light sources	Check-point 4 Check-point 5 Check-point 6 Practice 1.2	
	3	Cooking without fire		4			
		1.3 Cooking without fire	1 Types of cookers a Electric hotplates b Induction cookers c Microwave ovens		<i>Video</i> 1.3 The induction cooker	Microwave oven accident Check-point 7	

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			2 Choosing cookers a Energy efficiency b Comparing different types of electric cookers			Check-point 8 Practice 1.3	
	4	Energy efficiency label		4			
		1.5 Energy Efficiency Labelling Scheme	1 Hong Kong Energy Efficiency Labelling Scheme 2 Saving energy a Pressure cookers b Vacuum cookers c Reverse cycle air conditioners d Lighting e Built-in timers and plug-in timers			Standby mode Check-point 11 Practice 1.5 Revision exercise 1	
	5-6	Efficiency in building		8			
		2.1 Energy performance of buildings	1 Factors affecting the energy performance of buildings 2 Heat transfer by conduction 3 U-value of building materials 4 Overall Thermal		<i>Simulation</i> 2.1 Energy saving apartment 2.2 Factors affecting the rate of conduction <i>Video</i> 2.1 Expt 2a - Estimating the thermal	The Integer Hong Kong Pavilion Check-point 1 Check-point 2	

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			Transfer Value (OTTV) 5 Controlling heat flow through windows a Tinted glass b Reflective glass c Double-glazing d Low-e glass e Solar control window film 6 Improving energy efficiency of buildings a Natural ventilation b Natural lighting c Renewable energy supplement d Energy management and control systems		conductivity of glass 2.2 Expt 2b - Rates of heat transfer by conduction through windows 2.3 Expt 2c - Rates of heat transfer by radiation through windows	Check-point 3 Practice 2.1	
	7	Electric vehicles		4			
		2.2 Energy performance of transportation	1 Electric vehicles 2 Hybrid vehicles 3 Efficient use of transportation		<i>Simulation</i> 2.3 Working principle of a hybrid vehicle <i>Video</i> 2.4 Expt 2d - A model of regenerative braking	Greener transportation Check-point 4 Check-point 5	

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					system	Practice 2.2 Revision exercise 2	
	8	Renewable energy sources		4			
		3.1 Characteristics of energy sources	1 Types of energy sources 2 Non-renewable energy sources a Fossil fuels b Nuclear energy i Binding energy ii Fission reactor 3 Renewable energy sources a Wind power b Hydroelectric power c Solar power i Solar constant ii Solar heating devices iii Solar cells		Green' street lamp Check-point 1 Check-point 2 Check-point 3 Check-point 4 Check-point 5 Practice 3.1		
	9	Uniform Test					
	10-11	Nuclear energy	Book 5	8			

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		Nuclear energy	1 Binding energy 2 Fission reactor			<i>Simulation</i> 3.1 Nuclear reactor	
	11-12	Problem Solving		2	Lab : SBA 3		
	13	Environmental impact		4	Chernobyl diaster		
		3.2 Environmental impact of energy consumption	1 Impact on environment and society a Extraction b Conversion c Distribution d Consumption 2 Greenhouse gases and global warming a Greenhouse effect b Global warming 3 Energy consumption patterns		<i>Video</i> 3.1 Greenhouse effect and global warming	Venus Activity 3a Check-point 6 Practice 3.2 Revision exercise 3	
	14	Rutherford's model	Elective : Atomic World	2			
		1.1 Rutherford's model and scattering experiments	1 Rutherford's atomic model 2 Limitations of Rutherford's model 3 The importance of scattering experiments		<i>Simulation</i> 1.1 Limitations of Rutherford's model <i>Video</i> 1.1 How are the straws distributed?	How are the straws distributed? Check-point 1 Practice 1.1	

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	14	Photoelectric effect		2			
		1.2 The puzzling photoelectric effect	1 Photoelectric effect and photoelectrons 2 Some observations about the photoelectric effect a Threshold frequency b Rate of photoelectron emission and intensity of light c Stopping potential 3 Failure of wave theory in explaining certain experimental results		<i>Simulation</i> 1.2 Photoelectric effect <i>Video</i> 1.2 Expt 1a - Photoelectric effect	History of the photoelectric effect Check-point 2 Check-point 3 Practice 1.2	
	15	Einstein's equation		4			
		1.3 Einstein's interpretation of the photoelectric effect	1 Light as particles: photons a Energy of a photon b Electron-volt 2 Interaction between photons and electrons a Work function b Threshold frequency		<i>Video</i> 1.3 Light up a bulb by light of different colours 1.4 Expt 1b - Determination of Planck constant	Light up a bulb by light of different colours Check-point 4 Check-point 5 Practice 1.3	

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			c Einstein's photoelectric equation d Time delay in the photoelectric effect 3 Verification of Einstein's model 4 Particle nature of light			Revision exercise 1	
	16	Line spectra		2			
		2.1 Atomic spectra	1 Line spectrum a Emission spectrum b Absorption spectrum 2 Spectral series of the hydrogen spectrum 3 Line spectra and energy levels of atoms		<i>Video</i> 2.1 Expt 2a - Emission spectrum 2.2 Expt 2b - Absorption spectrum <i>DIY corner</i> Making a DVD spectrometer	Identifying elements in the Sun Check-point 1 Practice 2.1	
	17-18	Holiday					
Second Term (2/1/2016-15/7/2016, Weeks 19 to 46)	19	Bohr's atomic model		4			II
		2.2 Bohr's model of the hydrogen atom	1 Bohr's postulates a Constant energy of an electron in its orbit b Discrete orbits and quantized angular momentum		<i>Simulation</i> 2.1 Emission spectrum and spectral series 2.2 Absorption spectrum	Aurorae Check-point 2 Check-point 3 Check-point 4	

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			<ul style="list-style-type: none"> c 'Quantum' and 'classical' aspects in Bohr's postulates 2 Discrete energy levels of the hydrogen atom <ul style="list-style-type: none"> a Deriving the energy levels b Ionization energy and excitation energy 3 Explaining the line spectrum of hydrogen <ul style="list-style-type: none"> a Emission spectrum b Spectral series c Absorption spectrum 4 Limitations of Bohr's model 			Practice 2.2	
	19	Particles or waves		2			
		2.3 Particles or waves?	<ul style="list-style-type: none"> 1 The wave-particle duality of light 2 Wave nature of matter <ul style="list-style-type: none"> a De Broglie wavelength b Experimental 		<i>Simulation</i> 2.3 Electron orbits <i>Video</i> 2.3 Stationary waves in a closed circular-wire loop	What is the nature of light again?! Check-point 4	

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			evidence of wave nature of matter c De Broglie's wavelength and quantization of angular momentum			Check-point 5 Practice 2.3 Revision exercise 2	
	20	Materials in nano scale		4	video		
		3.1 Introduction to nanotechnology	1 Nano scale 2 Nano materials a Nano particles b Fullerenes c Carbon nano tubes d Nano wires e Nano sheets and nano films 3 What is so special about nano materials? 4 Why do nano materials behave so differently? a Surface area effect b Quantum effect			Colour of gold in nano scale Check-point 1 Activity 3a Check-point 2 Practice 3.1	
	21-23	Mock Exam					
	24-25	Holiday					
	25	Seeing at nano scale		2			

School Term	Weeks	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	SL/AL	Teaching and Learning Activities	Consolidation and Assessment	Values [#]
		3.2 Seeing at nano scale	1 Development of microscopes 2 The optical microscope a From single lens to compound lens b Diffraction-limited resolution 3 Transmission electron microscopes a Basic structure and working principles Electron gun Electromagnetic lenses b Atomic resolution 4 Scanning tunneling microscopes		<i>Simulation</i> 3.1 Resolution 3.2 Scanning tunnelling microscopes <i>Video</i> 3.1 Expt 3a - Resolving power of human eyes	Eagle eyes Check-point 3 Check-point 4 Check-point 5 Practice 3.2	
	26	Development in nanotechnology		2			
		3.3 Some current applications and development of nanotechnology	1 Applications in daily life a Water-repelling property for self-cleaning b Water-attracting		<i>Video</i> 3.2 Expt 3b - Lotus effect 3.3 Water-attractive property of self-cleaning glass 3.4 Water-repelling	Inspiration from lotus Check-point 6 Activity 3b	

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			<ul style="list-style-type: none"> property for self-cleaning c Size-dependent optical property d Antimicrobial effects e ‘Nanofinishing’ in textiles industry f Light and ultra-strong properties of nano tubes g Field-emission displays using carbon nano tubes h Improved catalytic action at nano scale 2 Potential hazards <ul style="list-style-type: none"> a Health risks b Environmental impact c Hopes and concerns 		property of nano textiles	Check-point 7 Practice 3.3 Revision exercise 3	

* 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 3. Empathy & Compassion	4. Forgiveness & Reconciliation 5. Service 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