



INTERNATIONAL AS/A LEVEL-PHYSICS

Introduction

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Content and assessment overview

IAS Unit 1: Mechanics and Materials	*Unit code: WPH11/01	
Externally assessed Written examination: 1 hour and 30 minutes Availability: January, June and October First assessment: January 2019 80 marks	40% of the total IAS	20% of the total IAL
Content overview <ul style="list-style-type: none">• Mechanics• Materials		
Assessment overview <p>The paper may include multiple-choice, short open, open-response, calculations and extended-writing questions.</p> <p>The paper will include questions that target mathematics at Level 2 or above (see <i>Appendix 6: Mathematical skills and exemplifications</i>). A minimum of 32 marks will be awarded for mathematics at Level 2 or above.</p> <p>Candidates will be expected to apply their knowledge and understanding to familiar and unfamiliar contexts.</p>		

IAS Unit 2: Waves and Electricity	*Unit code: WPH12/01	
Externally assessed Written examination: 1 hour and 30 minutes Availability: January, June and October First assessment: June 2019 80 marks	40% of the total IAS	20% of the total IAL
Content overview <ul style="list-style-type: none"> • Waves and Particle Nature of Light • Electric Circuits 		
Assessment overview <p>The paper may include multiple-choice, short-open, open-response, calculations and extended-writing questions.</p> <p>The paper will include questions that target mathematics at Level 2 or above (see <i>Appendix 6: Mathematical skills and exemplifications</i>). A minimum of 32 marks will be awarded for mathematics at Level 2 or above.</p> <p>Candidates will be expected to apply their knowledge and understanding to familiar and unfamiliar contexts.</p>		

IAS Unit 3: Practical Skills in Physics I	*Unit code: WPH13/01	
Externally assessed Written examination: 1 hour and 20 minutes Availability: January, June and October First assessment: June 2019 50 marks	20% of the total IAS	10% of the total IAL
Content overview <p>Students are expected to develop experimental skills, and a knowledge and understanding of experimental techniques, by carrying out a range of practical experiments and investigations while they study Units 1 and 2.</p> <p>This unit will assess candidates' knowledge and understanding of experimental procedures and techniques that were developed in Units 1 and 2.</p>		
Assessment overview <p>The paper may include short-open, open-response, calculations and extended-writing questions.</p> <p>The paper will include questions that target mathematics at Level 2 or above (see <i>Appendix 6: Mathematical skills and exemplifications</i>). A minimum of 20 marks will be awarded for mathematics at Level 2 or above.</p> <p>Candidates will be expected to apply their knowledge and understanding of practical skills to familiar and unfamiliar situations.</p>		

RELATIONSHIP OF ASSESSMENT OBJECTIVES TO UNITS

UNIT NUMBER	ASSESSMENT OBJECTIVE			
	A01	A02 (a)	A02 (b)	A03
UNIT 1	17–18	17–18	4.5–5.5	0.0
UNIT 2	17–18	17–18	4.5–5.5	0.0
UNIT 3	0.0	0.0	0.0	20
TOTAL FOR INTERNATIONAL ADVANCED SUBSIDIARY	34–36	34–36	9–11	20

STUDENT BOOK TOPIC	IAS CORE PRACTICALS
TOPIC 1 MECHANICS	CP1 Determine the acceleration of a freely-falling object
TOPIC 2 MATERIALS	CP2 Use a falling-ball method to determine the viscosity of a liquid
	CP3 Determine the Young modulus of a material
TOPIC 3 WAVES AND THE PARTICLE NATURE OF LIGHT	CP4 Determine the speed of sound in air using a two-beam oscilloscope, signal generator, speaker and microphone
	CP5 Investigate the effects of length, tension and mass per unit length on the frequency of a vibrating string or wire
	CP6 Determine the wavelength of light from a laser or other light source using a diffraction grating
TOPIC 4 ELECTRIC CIRCUITS	CP7 Determine the electrical resistivity of a material
	CP8 Determine the e.m.f. and internal resistance of an electrical cell

UNIT 1 (TOPICS 1 AND 2) MECHANICS AND MATERIALS

Possible further practicals include:

- Strobe photography or the use of a video camera to analyse projectile motion
- Determine the centre of gravity of an irregular rod
- Investigate the conservation of momentum using light gates and air track
- Hooke's law and the Young modulus experiments for a variety of materials

UNIT 2 (TOPICS 3 AND 4) WAVES AND ELECTRICITY

Possible further practicals include:

- Estimating power output of an electric motor
- Using a digital voltmeter to investigate the output of a potential divider and investigating current/voltage graphs for a filament bulb, thermistor and diode
- Determining the refractive index of solids and liquids, demonstrating progressive and stationary waves on a slinky



BASIC QUANTITY	UNIT NAME	UNIT SYMBOL
mass	kilogram	kg
time	second	s
length	metre	m
electric current	ampere	A
temperature	kelvin	K
amount of substance	mole	mol
light intensity	candela	cd

SI UNITS

FACTOR	NAME	SYMBOL	FACTOR	NAME	SYMBOL
10^1	deca-	da	10^{-1}	deci-	d
10^2	hecto-	h	10^{-2}	centi-	c
10^3	kilo-	k	10^{-3}	milli-	m
10^6	mega-	M	10^{-6}	micro-	μ
10^9	giga-	G	10^{-9}	nano-	n
10^{12}	tera-	T	10^{-12}	pico-	p
10^{15}	peta-	P	10^{-15}	femto-	f
10^{18}	exa-	E	10^{-18}	atto-	a
10^{21}	zetta-	Z	10^{-21}	zepto-	z
10^{24}	yotta-	Y	10^{-24}	yocto-	y

PREFIXES

DERIVED UNITS

DERIVED QUANTITY	UNIT NAME	UNIT SYMBOL	BASE UNITS EQUIVALENT
force	newton	N	kg m s^{-2}
energy (work)	joule	J	$\text{kg m}^2 \text{s}^{-2}$
power	watt	W	$\text{kg m}^2 \text{s}^{-3}$
frequency	hertz	Hz	s^{-1}
charge	coulomb	C	A s
voltage	volt	V	$\text{kg m}^2 \text{s}^{-3} \text{A}^{-1}$
resistance	ohm	Ω	$\text{kg m}^2 \text{s}^{-3} \text{A}^{-2}$

ORDER OF MAGNITUDE SCALE	TYPICAL OBJECT
1×10^{13} m	size of the solar system
1×10^{11} m	size of Earth's orbit around the sun
1×10^8 m	size of Moon's orbit around Earth
1×10^4 m	diameter of Manchester
1×10^0 m	human height
1×10^{-3} m	ant height
1×10^{-5} m	biological cell diameter
1×10^{-8} m	wavelength of ultraviolet light
1×10^{-10} m	diameter of an atom
1×10^{-14} m	diameter of an atomic nucleus

ORDER OF MAGNITUDE