



Oxford Cambridge and RSA Examinations
General Certificate of Secondary Education

SCIENCE: DOUBLE AWARD A **Paper 6**
PHYSICS **Paper 2**
HIGHER TIER

1983/6
1982/2

MARK SCHEME

Specimen Paper 2003

Qn	Expected answer	Marks	Additional guidance
1 a	changes it (1)	1	
	current change consistent with resistance change (1)	1	
b i	1.6 (A) (1)	1	
ii	use of $V = IR$ (1) $R = 4/1.6$ (1) = 2.5 (1)	3	
c	greater V : I ratio / further calculation (1)	1	
		(7)	

2 a	panels and windmills provide free energy / no bills / low running costs (1) saves other fuels / payback covers initial costs (1)	2	'renewable' ALONE is NOT sufficient for the mark
b	5000/20000 (1) 0.25 / 25% (1)	2	
		(4)	

3 a	idea of electromagnet/iron magnetised by the current (1) attracts <u>iron bar</u> (1)	1 1	Emphasis on electromagnetism REJECT 'current through iron' REJECT 'attract hammer'
b	circuit breaks/current stops (1) iron demagnetised/electromagnet stops working (1) spring pulls back (1) any two	2	
		(4)	

4 a i	$R_{15} = 60, R_{25} = 20$ (1)	1	
	$R_{15} - R_{25}$ (ecf) (1)	1	ACCEPT – 40 ohms evidence from graph for ecf

Qn	Expected answer	Marks	Additional guidance
b	reference to steeper gradient (1)	1	this alone is worth 2
	idea of bigger change in R per equal rise in temp (1)	1	
	QWC = 1 <i>This mark should only be awarded if the answer given by the candidate attempts to address the question and the quality of the description makes the meaning clear.'</i>	1	
		(5)	
5 a	curved waves (1) consistent wavelength (1)	2	
b	Diameter / width of gap (1) wavelength / frequency of waves (1)	2	ALLOW depth and speed as a factor if effect on λ is clear
	ii Description of how diffraction depends on each.	2	
	QWC=1. <i>This mark should only be awarded if the answer given by the candidate attempts to address the question and the quality of the description makes the meaning clear.</i>	1	
		(7)	
6 a	cosmic rays / Sun (1) rocks / granite (1) power stations (1) radon (1) fallout / nuclear accidents (1) nuclear weapons testing / atomic bombs (1) any two	2	Reject building materials Do not allow irradiated food or similar Accept nuclear waste
b	distance / use tongs (1) suitable reference to shielding (1) short time of exposure (1) minimum source strength (1) pupils not to handle source (1) direction of pointing source (1) any two	2	Lead apron should be thick or dense - Reject other protective clothing
c	120 60 30 15 0 0	1	Any 5 correct
d i	five points correctly plotted / ecf	1	Points to be within $\frac{1}{2}$ square Points to be visible
ii	single line smooth curve of best fit	1	

Qn	Expected answer	Marks	Additional guidance
e i	beta radiation will not pass through / stopped by 20 mm thick sheet / sheet too thick / owtte	1	
ii	gamma / X-rays	1	
iii	time for decay rate/ no. of radioactive nuclei to halve	1	
iv	5 (mg)	1	
v	count rate becomes too low for thickness checking / becomes too low too quickly (1) source needs to be frequently changed (1) detector needs to be frequently calibrated (e.g. appears to be thicker than it is)/ need a fairly constant count rate (1) sensible consequence e.g. effect on sheet thickness(1) any two	2 (13)	

7	damage to cells (1) ionisation of cells (1) can cause cancer / tumour (1) any two	2 (2)	
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8 a i	current / voltage (induced)	1	Reject produces electricity Reject electricity flows Allow charge/electron flow
ii	magnetic field lines cut conductor / field changes	1	Accept magnetism changes (in coil)
b i	same frequency (1) double amplitude (1)	2	
ii	double frequency (1) double amplitude (1)	2	
c	easily magnetised / demagnetised / magnetically soft/ strengthens field	1	

Qn	Expected answer	Marks	Additional guidance
d	<p>cables have resistance (1) power loss is in form of heat / lines get hot (1) larger current more power loss / heat loss / energy loss / (1) step up transformers increase voltage (1) increasing voltage reduces current (1) idea of <u>less</u> energy loss / power loss / I^2R (1)</p> <p>any four</p> <p>QWC = 1 <i>This mark should only be awarded if appropriate scientific terminology is used with correct spelling, punctuation and grammar.</i></p>	<p>4</p> <p>1</p> <p>(12)</p>	

9 a	<p>5 ± 0.5 (1)</p> <p>indication on graph how answer obtained ecf (1)</p>	2	Minimum indication is line/dot/cross between 420 and 440
b	due to force of gravity / gravity pull of Ida	1	
c	<p>see surface clearly (1) no reflection of sunlight off gases/vapour (1) surface is pock marked with craters (1) meteorites would burn up (1)</p> <p>any three</p> <p>QWC =1 <i>This mark should only be awarded if the candidate attempts to address the question using a correctly constructed sentence.</i></p>	<p>3</p> <p>1</p>	
d i	increase in wavelength / decrease in frequency / shift towards violet (end of spectrum)	1	
ii	<p>suitable line through points (1)</p> <p>1750 (1)</p>	2	tolerance of ± 50
iii	1750 (ecf)	1	
iv	<p>idea that $1/10$ speed \Rightarrow 10 x the time (implied) (1) answer to iii x 10 (17500) (1)</p>	<p>2</p> <p>(13)</p>	

Qn	Expected answer	Marks	Additional guidance
10 a	ball contains equal amounts of + and – charge (1) charge separates, + on R, – on L (1) attraction between + and – on strip (1)	3	
b	electrons flow down to earth (1) they are negative so are repelled (1)	2 (5)	
11 a	balanced equation implied (1) correct substitution: $F \times 0.25 = 250 \times 0.2$ (1) 200 (N) (1)	3	
b	250 N 'further out' from point (1) thus more turning effect / more force required (1)	2 (5)	ACCEPT arguments for greater rate of increase of potential energy
12 a	becomes semi-molten / gets hotter / dissolves	1	ACCEPT melts/ melts into the mantle
b	higher <u>density</u> / pushed by other plates / convection currents	1	
c i	primary / push-pull / pressure / longitudinal (1) 1,2,3,4,5 (1) secondary / shake / shear / sideways / transverse (1) 1,2,5 (1)	4	
ii	refraction	1	
iii	wave changes speed (1) change in density / going from solid to liquid (1)	2 (9)	

Qn	Expected answer	Marks	Additional guidance
13 a	idea of area (1) correct calculation of at least one area (e.g. 22.5, 270) (1) correct answer (1) unit (m) (1)	4	
b	15 000 000 / 15M / 15 000k (1) J (1)	2	
c	non-pollutant (1) not noisy (1) no fuels burnt or used/no electricity used/ renewable(1) any two	2 (8)	
14 (a)	Any two from Can communicate by Internet / Email / telephone which is immediate (1) Books take much less time to publish (1) Easier to travel to conferences (1) Scientific journals widely available / AW (1)	2	Allow other sensible examples of improved communication
(b)	Any two from There may be alternative theories (1) Not sufficient evidence (1) Results cannot be repeated (1) Contexts such as religious, political, historical, social /AW (1)	2	
(c)	Any two from More powerful telescopes / AW (1) Can use telescopes that detect more than visible light (1) Results can be collected using data-logging / AW Humankind has left Earth and looked from Moon to see position of Earth (1) Use of satellite and space probes to gather information (1)	2 (6)	Allow other sensible alternatives

