

# **Mark Scheme for June 2011**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)



The **Abbreviations, annotations and conventions** used in the detailed Mark Scheme are:

/	=	alternative and acceptable answers for the same marking point
<b>(1)</b>	=	separates marking points
<b>not</b>	=	answers which are not worthy of credit
<b>reject</b>	=	answers which are not worthy of credit
<b>ignore</b>	=	statements which are irrelevant
<b>allow</b>	=	answers that can be accepted
( )	=	words which are not essential to gain credit
—	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

Question		Expected Answers	Marks	Additional Guidance
1	a	uranium (1)	1	mark answer line first. If no answer on line, <b>allow</b> correct answer ringed, underlined or ticked in the question.
	b	put in reactor (1)	1	<b>allow</b> higher level answers e.g. absorb / bombard with neutrons (1)
	c	nucleus (1)	1	<b>ignore</b> centre / middle / core
	d	smoke detector (1)	1	more than one tick scores 0
		<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
2	a	positive (1) negative (1)	2	any order
	b	explosion (1)	1	<b>allow</b> fire / spark (1) <b>ignore</b> references to fuel spillage etc <b>ignore</b> shock <b>not</b> to stop fire
	c	<b>any one from:</b> photocopier / laser printer (1) paint spraying (1)  crop spraying (1) dust precipitator (1) defibrillator (1)	1	<b>allow</b> spray cars / powder coating (1) <b>not</b> unqualified painting / spray can <b>ignore</b> paint sticking  <b>allow</b> remove dust in chimneys (1) <b>allow</b> restart heart (1) <b>allow</b> <u>electrostatic</u> duster (1) <b>allow</b> reference to piezo-electric ignition (1)
		<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
3	a	charge (1)	1	<b>allow</b> electrons / correct symbol e.g. e <sup>-</sup> (1) <b>ignore</b> electricity /ions
	b	4 (2) <b>but if answer not correct</b> 6/1.5 (1)	2	
	c	i	1	<b>not</b> snaps <b>not</b> blows up / burns e.g. melts and blows up=0 <b>ignore</b> current stops / switches circuit off / references to circuit e.g. switches off <b>ignore</b> completes circuit / overheats
	c	ii	1	<b>ignore</b> voltage / electricity / current too strong / charge <b>allow</b> too much power / amps / A (1) <b>not</b> merely fuse is only 0.5 amps / current is 1.5 amps but current is 1.5A and fuse is 0.5A = 1 as comparison
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
4	a		1	
	b		1	
	c	<p><b>any two from:</b>                      body scan (1)                      break down (kidney) stones (1)                      measure blood flow (1)</p>	2	<p><b>allow</b> named part of body scanned / reference to pregnancy scan                      AW / produce image of tissue (1)</p> <p><b>allow</b> physiotherapy / local heating effect / AW (1)  <b>allow</b> treat cancer (1)  <b>allow</b> break up of eye lens in cataract surgery (1)  <b>allow</b> treat muscle injury / in varicose vein surgery (1)  <b>allow</b> ultra-sonic cleaning (1)</p>
		<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
5	a	gamma and X-rays (1)	1	more than one answer ringed scores 0
	b	decreases (1)	1	<b>allow</b> gets weaker / dies away (1) <b>not</b> slows down / wears away / dies out
	c	sterilise equipment (1)	1	<b>ignore</b> merely cleaning <b>allow</b> tracer (1) <b>allow</b> gamma camera / imaging / scans / diagnose cancer (1)
		<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
6	a	natural (1)	1	<b>allow</b> moon (1) <b>ignore</b> planet
	b	i	2	<b>e.g.</b> controlled from Earth <b>allow</b> goes round the Earth / Sun / any named planet /orbits (1) <b>ignore</b> put into space
		ii	1	<b>ignore</b> communication / TV / SKY / unqualified ref to weather <b>allow</b> sat nav / Google Earth / photography (1)
<b>Total</b>			<b>4</b>	


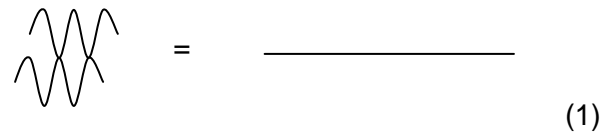
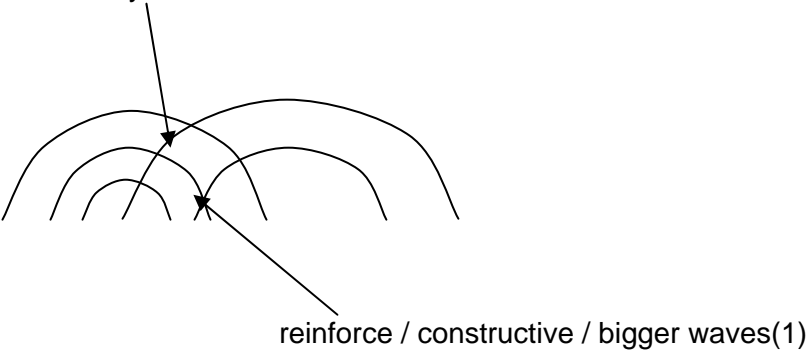
Question		Expected Answers	Marks	Additional Guidance
7	a	<b>A</b> (no mark) <b>idea that:</b> they are both in the same direction (1)	1	only allow mark if <b>A</b> given as answer <b>allow</b> higher level answers by use of correct figures e.g. <b>A</b> is only 10 (m/s)
	b	no (no mark) <b>idea that:</b> during the 300m, speed was both above 5m/s and below 5m/s (1)	1	<b>allow</b> e.g. he might have travelled 250 m in 10 seconds and travelled 50 m in the last 50 seconds (1) <b>allow</b> he was travelling faster and slower (than 5m/s) (1)  <b>allow</b> yes (no mark) with he was travelling at constant speed (as he had set his cruise control)
	c	$(v = u + at)$ 80 (m/s) (2) <b>but</b> if answer incorrect 10 x 8 unless contradicted (1)	2	<b>mark answer first</b>
<b>Total</b>			<b>4</b>	

Question			Expected Answers	Marks	Additional Guidance
8	a	i	trajectory (1)	1	mark answer line first. If no answer on line, <b>allow</b> correct answer ringed, underlined or ticked in the question.
		ii	parabolic (1)	1	mark answer line first. If no answer on line, <b>allow</b> correct answer ringed, underlined or ticked in the question.
	b		20N (1)	1	<b>allow</b> same force
<b>Total</b>				<b>3</b>	

Question			Expected Answers	Marks	Additional Guidance
9	a	i	red (1)	1	
		ii	idea that (different colours) have different wavelengths / different frequencies or travel at different speeds in glass (1)	1	<b>allow</b> different refractive index <b>ignore</b> simple references to refractions, angle or bending
	b		<b>C</b> (1)	1	mark answer line first. If no answer on line, <b>allow</b> correct answer ringed, underlined or ticked in the question.
<b>Total</b>				<b>3</b>	

Question			Expected Answers	Marks	Additional Guidance
10	a		<b>D</b> (1)	1	mark answer line first. If no answer on line, <b>allow</b> correct answer ringed, underlined or ticked in the question.
	b		convex (1)	1	<b>allow</b> biconvex / convex meniscus / planoconvex / positive (1)
	c		projector / camera / telescope / microscope / binoculars (1)	1	<b>allow</b> spectacles for long sight / contact lenses for long sight / reading glasses (1) <b>ignore</b> just spectacles / contact lenses / glasses / bifocals / varifocals
<b>Total</b>				<b>3</b>	


















Question	Expected Answers	Marks	Additional Guidance
11 a	diffracts (1) over mountain / obstacle (1)	2	both marks can be scored by diagram <b>allow</b> around mountain (1) <b>not</b> through mountain
b	<p><b>Any one from</b>                      two waves combine with each other (to produce a single wave) (1)</p> <p>constructive interference / reinforce or destructive interference / cancel out (1)</p> <p>or</p>  <p>or</p>  <p>(1)</p>	1	mark can be in the form of a written answer or as a labelled diagram  <b>ignore</b> paths cross <b>allow</b> diagrams or descriptions to show two waves in phase with a (correct or incorrect) outcome two waves out of phase with a (correct or incorrect) outcome “umbrella diagram” with any interference points labelled  <b>allow</b> correct wave front diagram / ripple tank diagrams e.g. cancel out / destructive / no waves <b>not</b> merely interference  
	<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
12	a	food mixer and hair dryer (1)	1	<b>both</b> needed for the mark in any order
	b	i	1	<b>allow</b> 'spins more' (1) <b>allow</b> 'more powerful' (1) <b>any</b> reference to generating electricity = 0 e.g. generates more electricity = 0
		ii	1	<b>allow</b> 'spins less' (1) <b>allow</b> stops spinning / turning / working(1) <b>allow</b> 'less powerful' (1) <b>any</b> reference to generating electricity = 0
		<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
13	a	isolating (1)	1	allow 'step-down' (1)
	b	<p><b>any three from:</b></p> <p><b>transformer A</b> voltage increases (1) is a step-up transformer (1)</p> <p><b>transformer B</b> voltage reduces (1) is a step-down transformer (1)</p>	3	Place ✓s at marking points.
	c	<p>100 (turns) scores (2) <b>but</b> if answer is incorrect then <math>20\ 000 / 500 = 4000/N_s</math> / AW scores (1)</p> <p>(Before erratum) 10 000 (turns) scores (2) <b>but</b> if answer is incorrect then <math>20\ 000/500 = 400\ 000/N_s</math> / AW scores (1)</p>	2	<p>allow <math>\frac{N_s}{500} = \frac{4000}{20\ 000}</math> (1)</p> <p>allow <math>N_s = \frac{4000}{20\ 000} \times 500</math> (1)</p> <p>(Before erratum) allow <math>\frac{N_s}{500} = \frac{400\ 000}{20\ 000}</math> (1)</p> <p>allow <math>N_s = \frac{400\ 000}{20\ 000} \times 500</math> (1)</p> <p>allow any error carried forward from amended diagram (2)</p>
<b>Total</b>			<b>6</b>	

Question			Expected Answers	Marks	Additional Guidance						
14	a	i	<table border="1"> <tr> <td>Input</td> <td>output</td> </tr> <tr> <td>(0)</td> <td>1</td> </tr> <tr> <td>(1)</td> <td>0</td> </tr> </table> (1)	Input	output	(0)	1	(1)	0	1	<b>both</b> needed for the mark
Input	output										
(0)	1										
(1)	0										
		ii	(0 means)- 0V / low voltage / off / no input / no output (1 means)- 5V / high(er) voltage / on / is input / is output (1)	1	<b>both</b> needed for the mark <b>allow</b> correct answers in terms of current / power (1) <b>not</b> reference to no electricity / electricity <b>ignore</b> unqualified references to low / high						
	b		so that alarm stays on / AW (1)	1							
	c		one way / in one direction / AW (1)	1	<b>allow</b> forwards (1)						
<b>Total</b>				<b>4</b>							

Question		Expected Answers		Marks	Additional Guidance												
15	a	<table border="1"> <thead> <tr> <th>symbol</th> <th>component</th> </tr> </thead> <tbody> <tr> <td></td> <td>(variable resistor)</td> </tr> <tr> <td></td> <td>light source / bulb (1)</td> </tr> <tr> <td></td> <td>switch (1)</td> </tr> <tr> <td></td> <td>battery (1)</td> </tr> <tr> <td></td> <td>power supply (1)</td> </tr> </tbody> </table>		symbol	component		(variable resistor)		light source / bulb (1)		switch (1)		battery (1)		power supply (1)	4	
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Question		Expected Answers	Marks	Additional Guidance
	<b>b</b>	<b>any one from:</b> change brightness of light / dimmer switch (1) volume control (in a television / radio) (1) change temperature setting (1)  increase or decrease speed of a motor / AW (1)	1	<b>ignore</b> unqualified reference to television / radio <b>allow</b> thermostat (1) <b>ignore</b> unqualified reference to oven / central heating <b>allow</b> e.g. increases fan speed (1)
	<b>c</b>	resistance changes / it is non-ohmic (1)	1	<b>allow</b> higher level answers eg resistance increases <b>ignore</b> resistance decreases <b>ignore</b> it gets hotter
	<b>d</b>	LDR's have <b>LOW</b> resistance thermistors .....when temperature <b>FALLS</b> / AW (1)	1	<b>both LOW and FALLS</b> / AW needed for the mark
		<b>Total</b>	<b>7</b>	

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
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**Telephone: 01223 552552**  
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