

Physics A

General Certificate of Secondary Education

Unit **A331/01**: Unit 1 – Modules P1, P2, P3 (Foundation Tier)

Mark Scheme for January 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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.
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1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

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

e.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

"work done" = 0 marks

"work done lifting" = 1 mark

"change in potential energy" = 0 marks

"gravitational potential energy" = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

The example below illustrates how to apply this principle to an objective question.

e.g. for a one mark question, where ticks in boxes 3 and 4 are required for the mark

Put ticks (✓) in the two correct boxes.

✓
✗

This would be worth zero marks.

Put ticks (✓) in the two correct boxes.

✗
✗

This would be worth one mark.

Put ticks (✓) in the two correct boxes.

✗
✗
✓
✓

This would be worth one mark.

7. The list principle:

If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

8. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question		Expected Answers	Marks	Additional Guidance	
1	a	<div style="text-align: right;"> <input type="checkbox"/> <input type="checkbox"/> Changes happen in a nucleus. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </div>	[1]		
	b	i	radiation (1) active (1) half-life (1)	[3]	
		ii	<p>type of radioactive waste</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>method of disposal</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">bury in sealed containers in deep mines</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">store in sealed containers in a deep pool of water ...</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">wash down the sink</div> <div style="border: 1px solid black; padding: 5px;">bury in landfill sites in sealed containers.</div> </div> <div style="width: 45%;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">high level</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">intermediate level</div> <div style="border: 1px solid black; padding: 5px;">low level</div> </div> </div>	[3]	Two lines from a left hand box then zero for that box.

	c	<p>identify hazard (1)</p> <p>describe hazard (1)</p> <p>how to reduce risk (1)</p>	<p>[3]</p>	<p>e.g. radioactive materials / spills / pollution / ionising / radiation / nuclear spill / too much fission (1) Not radioactive waste.</p> <p>which can cause cancer / damage cells / radiation sickness / (reactor) explodes/melt down occurs (1)</p> <p>you could use shielding / living quarters away from reactor / protective clothing / monitor exposure or limit exposure / monitor and control the reactor (1)</p> <p>Accept terrorist threat for 1 mark.</p>
Total			[10]	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	1.8 (1)	[1]	Allow 1.76 or 1.77.
		ii	nuclear power (1)	[1]	Must ecf from (a) (i). If this is larger than 2.6 then answer must be dental.
	b		benefit outweighs risk (1) example of benefit (1)	[2]	Allow two marks for two benefits. Allow one economic benefit.
Total				[4]	
3	a	i	sound (1)	[1]	
		ii	radio gamma	[1]	Any order. Both required for the mark.
		iii	gamma / X-ray / ultraviolet (1)	[1]	
		iv	gamma (1)	[1]	
	b		heat the cells up <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> make ions in the cell <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[2]	
Total				[6]	

Question		Expected Answers	Marks	Additional Guidance
4	a	<div style="text-align: right; border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 10px;">photosynthesis</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 10px; width: 100px;">respiration</div> <div style="text-align: right; border: 1px solid black; padding: 2px; display: inline-block;">feeding</div>	[3]	
	b	<div style="text-align: right; margin-bottom: 5px;"><input type="checkbox"/></div> <div style="text-align: right; margin-bottom: 5px;"><input type="checkbox"/></div> <div style="text-align: right; margin-bottom: 5px;"><input type="checkbox"/></div> <div style="text-align: right; margin-bottom: 5px;"><input checked="" type="checkbox"/> (1)</div>	[1]	
Total			[4]	
5		<p>source – sunlight / bulb / a light / named source emits light (1)</p> <p>idea of light travelling / air is transparent / not absorbed by air / transmitted through air (1)</p> <p>Idea of paper reflects light / absorbed by ink / writing (1)</p> <p>Eye / retina is the detector. Eye / retina absorbs light / photons (1)</p>	4	<p>Maximum of 2 marks only can be scored for an incorrect sequence of events (correct sequence is 'source – paper – eye').</p> <p>Marks may be obtained from a suitably annotated diagram.</p> <p>Accept: receptors in eye / retina.</p>
Total			[4]	

Question	Expected Answers	Marks	Additional Guidance
6	crust (1) core (1) mantle (1)	[3]	
Total		[3]	

7	a	<table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%; text-align: center;">statement</th> <th style="width: 50%; text-align: center;">explanation</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input type="text"/></td> <td style="text-align: center;"><input type="text"/></td> </tr> <tr> <td style="text-align: center;">All stars look younger ...</td> <td style="text-align: center;"><input type="text"/></td> </tr> <tr> <td style="text-align: center;"><input type="text"/></td> <td style="text-align: center;">Light travels at 300 000 km/s.</td> </tr> </tbody> </table>	statement	explanation	<input type="text"/>	<input type="text"/>	All stars look younger ...	<input type="text"/>	<input type="text"/>	Light travels at 300 000 km/s.	[2]	<p>First mark is for a line starting from centre left box. Second mark is for this line to bottom right box.</p> <p>More than one line will be zero UNLESS all lines start at centre left box and then a max of one mark.</p>
statement	explanation											
<input type="text"/>	<input type="text"/>											
All stars look younger ...	<input type="text"/>											
<input type="text"/>	Light travels at 300 000 km/s.											
	b	<p>age of the Universe <input checked="" type="checkbox"/> (1)</p> <p style="margin-left: 100px;"><input type="checkbox"/></p> <p>distances to far galaxies <input checked="" type="checkbox"/> (1)</p> <p style="margin-left: 100px;"><input type="checkbox"/></p> <p style="margin-left: 100px;"><input type="checkbox"/></p>	[2]									

	c	star is a ball of gas which is hot/emits light (1) galaxy is collection of many (owtte) stars (1) Universe is all stars and galaxies/ everything (owtte) (1)	[3]	Accept: like our sun. NOT burning gas/ball of fire/bright/toxic. Accept 'all space'.
		Total	[7]	

Question		Expected Answers	Marks	Additional Guidance
8	a	<p style="text-align: center;"> <input type="checkbox"/> at the edge of tectonic plates <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> </p>	[1]	
	b	<p style="text-align: center;"> <input type="checkbox"/> The Earth's mantle moves. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> </p>	[1]	
	c	<p>Example of suitable government action, e.g. building regulations / emergency plans (1)</p> <p>Explanation of how damaged is reduced, e.g. buildings less likely to collapse / people get medical help immediately so fewer die (1).</p>	[2]	<p>Ignore governments building houses / shelters / schools etc. Ignore early warning systems / evacuation before earthquake. Allow send in army / rescue teams / evacuation after earthquake.</p>
Total			[4]	

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