

Physics A

General Certificate of Secondary Education **A332/01**

Unit 2: Modules P4, P5, P6

Mark Scheme for June 2010

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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.

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. Annotations:
The following annotations are available on SCORIS.
 - ✓ = correct response
 - ✗ = incorrect response
 - bod = benefit of the doubt
 - nbod = benefit of the doubt **not** given
 - ECF = error carried forward
 - ^ = information omitted
 - I = ignore
 - R = reject
6. If a candidate alters his/her response, examiners should accept the alteration.
7. 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.

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.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth one mark.

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth one mark.

8. 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.

9. 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	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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).

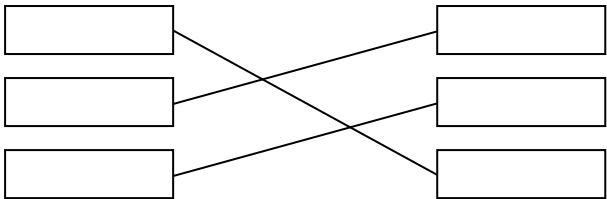
Edinburgh	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Manchester	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Paris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Southampton	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Score:	2	2	1	1	1	1	0	0	0	NR

Question			Expected Answers	Marks	Additional Guidance
1	a	i	electrons (1)	[1]	
		ii	positive (1)	[1]	
	b	i	<p>... stay still and do not move. <input type="checkbox"/></p> <p>... move together and touch. <input type="checkbox"/></p> <p>... move away from each other. <input checked="" type="checkbox"/> (1)</p> <p>... spin around together. <input type="checkbox"/></p>	[1]	
		ii	<p>like/same charges (1)</p> <p>repel (1)</p>	[2]	<p>allow 2 negative charges/they are both negative/both gain electrons</p> <p>allow push away for repel</p> <p>2 positives repel = one mark</p>
	c		<p>... they have high melting points. <input type="checkbox"/></p> <p>... free electrons that can move. <input checked="" type="checkbox"/> (1)</p> <p>... they conduct heat very well. <input type="checkbox"/></p> <p>... they are shiny. <input type="checkbox"/></p>	[1]	
Total				[6]	

Question			Expected Answers	Marks	Additional Guidance	
2	a	i	generator (1) electromagnetic (1) alternating (1)	[3]		
		ii	230 (1)	[1]	not 240	
		iii	transformer (1)	[1]		
		iv	core (1) coil of wire (1)	[2]	core on left coil on right	
	b	i	move the magnet/coil (1)	[1]	accept annotation of diagram accept rotate/spin the magnet	
		ii	<p>increase the number of coils <input checked="" type="checkbox"/> (1)</p> <p>use different coloured wire <input type="checkbox"/></p> <p>use a stronger magnet <input checked="" type="checkbox"/> (1)</p> <p>use a weaker magnet <input type="checkbox"/></p> <p>use a larger voltmeter <input type="checkbox"/></p>	[2]	take off one mark for every extra box ticked	
			Total	[10]		
3	a	i	arrow pointing up from the book (1)	[1]	allow arrow pointing up towards the book	
		ii	15 (1)	[1]	accept annotation on diagram	
		iii	an interaction (1)	[1]		
		b	i	friction (1) against the book / opposite direction to motion (1)	[2]	
			ii	1.5 x 6 (1) 9 (1)	[2]	
			iii	increases (1)	[1]	not faster
			Total	[8]		

Question		Expected Answers	Marks	Additional Guidance
4	a	$\frac{13000}{20}$ (1)	[1]	
	b	<p>any three from: burnt fuel / (hot) gases go down / downwards; there is an equal and opposite (thrust) on the rocket; weight/gravitational force/gravity acts down; upwards force/thrust greater than weight/gravity/downwards force;</p>	[3]	<p>owtte idea of interaction pair force pushing rocket up</p> <p>allow upthrust</p>
	c	700 000 (1)	[1]	allow 700 000 000 <u>Joules</u> / <u>J</u>
		Total	[5]	

Question		Expected Answers	Marks	Additional Guidance								
5	a	matter <input type="checkbox"/> energy <input checked="" type="checkbox"/> (1) disturbances <input checked="" type="checkbox"/> (1) particles <input type="checkbox"/> charge <input type="checkbox"/>	[2]									
	b	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">description</td> <td style="text-align: center;">type of wave</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">... same direction ...</td> <td rowspan="2" style="border: 1px solid black; padding: 2px; text-align: center;">longitudinal waves</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">... right angles ...</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">needs a medium</td> <td rowspan="2" style="border: 1px solid black; padding: 2px; text-align: center;">transverse waves</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">... vacuum</td> </tr> </table>	description	type of wave	... same direction ...	longitudinal waves	... right angles ...	needs a medium	transverse waves	... vacuum	[2]	2 or 3 lines correct = one mark 4 marks correct = two marks any two lines from a box on the left, that box is incorrect
description	type of wave											
... same direction ...	longitudinal waves											
... right angles ...												
needs a medium	transverse waves											
... vacuum												
	c	i C (1)	[1]									
		ii D (1)	[1]									
	d	i 5 oscillations/waves (1) every/per second (1)	[2]	allow definition of frequency eg the number of waves in given time for one mark								
		ii 50 (1)	[1]									
Total			[9]									

Question			Expected Answers	Marks	Additional Guidance
6	a		amateur modulation <input type="checkbox"/> american modulation <input type="checkbox"/> amplitude modulation <input checked="" type="checkbox"/> (1) analogue modulation <input type="checkbox"/>	[1]	
	b	i		[2]	1 or 2 lines correct = one mark 3 correct lines = two marks
		ii	idea of extra bits added to the signal (1)	[1]	do not accept idea of 'sound' allow interference
			Total	[4]	

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