OCR
RECOGNISING ACHIEVEMENT

GCSE

Physics A

General Certificate of Secondary Education

Unit **A332/02:** Unit 2 – Modules P4, P5, P6 (Higher Tier)

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.

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

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Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	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
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	no benefit of doubt

	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

Subject-specific Marking Instructions

a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).

b. If a candidate alters his/her response, examiners should accept the alteration.

c. 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 the third <u>and</u> fourth boxes are required for the mark:

This would be worth 1 mark.

This would be worth 0 marks.

This would be worth 1 mark.

d. 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.

e. Marking method for tick-box questions:

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 and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. 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 cities in England:

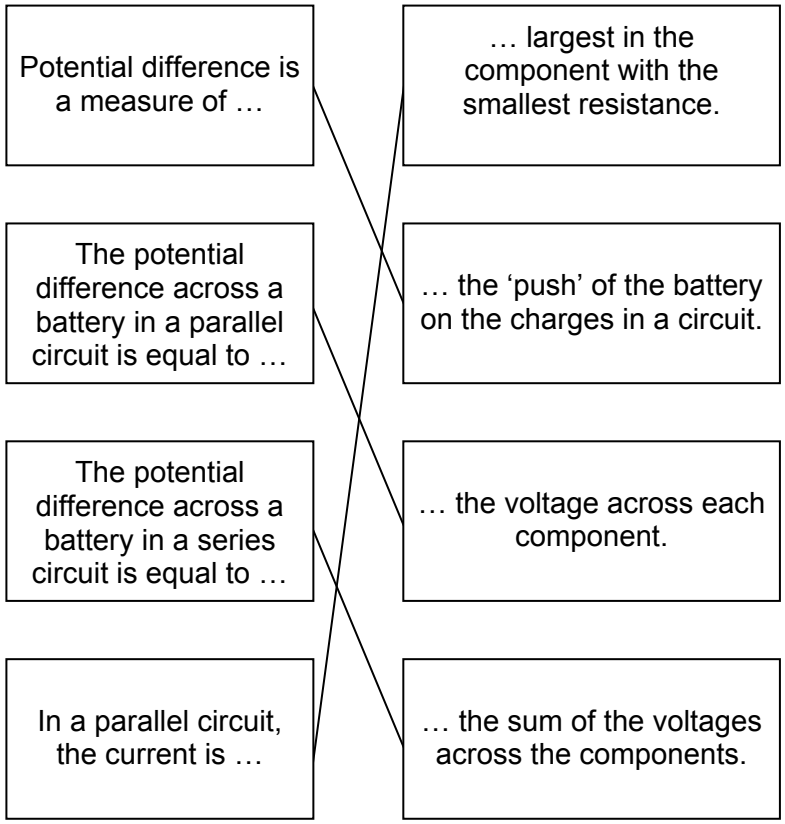
Edinburgh	
Manchester	
Paris	
Southampton	

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

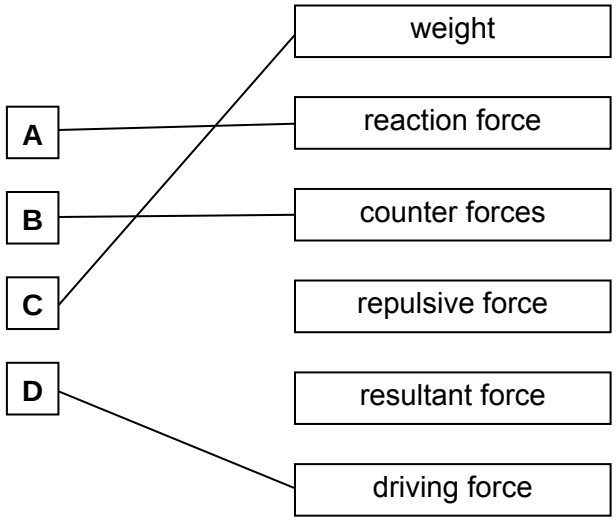
Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

MARK SCHEME:

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>1</td><td>a</td><td></td><td>
<table>
<tr><th></th><th>greater in circuit A</th><th>the same in circuits A and B</th><th>greater in circuit B</th></tr>
<tr><td>total resistance of the circuit</td><td>✓</td><td></td><td></td></tr>
<tr><td>current in the circuit</td><td></td><td></td><td>✓</td></tr>
<tr><td>voltage across each bulb</td><td></td><td></td><td>✓</td></tr>
</table>
</td><td>2</td><td>3 rows correct = 2 marks
1 or 2 rows correct = 1 mark</td></tr>
<tr><td>*</td><td>b</td><td></td><td>R = V/I = 12 / 0.3 (1)
= 40 (1)
ohms/Ω (1)</td><td>3</td><td>40 = 2 marks</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
</table>

Question	Answer	Mark	Guidance
2		3	Four correct = 3 marks three correct = 2 marks One or two correct = 1 mark
	Total	**3**	

Question			Answer	Mark	Guidance
3	a		Select correct formula (1); Selection of correct time in hours **and** of correct power(1); Any conversion of hours into seconds (1); Correct calculation using **their** selected values (1);	4	Energy=power x time (can be implied by e.g. energy= 9x10 000) Power = 9W **AND** time = 10 000 hours e.g. 10 000 x 60 x 60 = 36 000 000 s e.g Energy = 9 x 36 000 000= 324 000 000 (Joules) give full marks for correct answer with no working out **allow** 3.24 x 10^8 Joules and 324 MJ **allow** correct answer to 2 significant figures if 40W used instead of 9W (answer will be 1.44x10^9 J), 3 marks; if 1000h used instead of 10 000h (answer will be 3.24x10^7 J), 3 marks; if 40W and 1000h used (answer will be 1.44x10^8 J), 2 marks if 90kWh (with unit clearly stated), 3 marks if answer is incorrect: 9x 10 000 (not evaluated) is 2 marks 9 x 10 000=90 000 is 3 marks
	b		kilowatt hours/kWh (1) Idea that the joule is a very small amount of energy / using kWh makes the numbers more manageable (1)	2	 **Accept** idea that it is a 'more convenient unit to use' for second marking point
			Total	6	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>4</td><td>a</td><td></td><td> 
</td><td>3</td><td>four correct = 3 marks
three correct = 2 marks
One or two correct = 1 mark</td></tr>
<tr><td></td><td>b</td><td></td><td>force acts on the Earth (1)

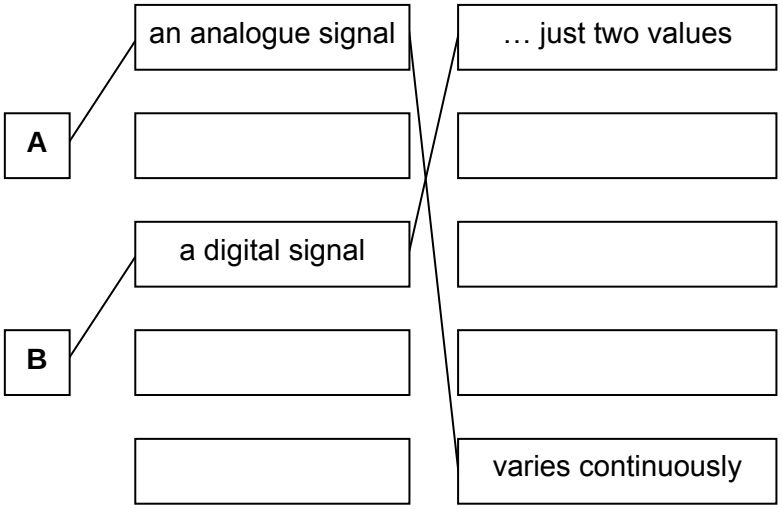
Idea of the partner force being equal in size but opposite in direction to the weight of the car (1)</td><td>2</td><td>e.g. ‘The pull of the car on the Earth’ for first marking point

e.g. The (partner) force/ interaction pair is equal and opposite (to C) for second marking point</td></tr>
<tr><td></td><td>c</td><td>i</td><td><table>
<tr><th></th><th>greater for car A</th><th>greater for car B</th><th>same for both cars</th><th>cannot tell</th></tr>
<tr><td>the velocity</td><td></td><td></td><td>✓</td><td></td></tr>
<tr><td>the momentum</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>the kinetic energy</td><td></td><td>✓</td><td></td><td></td></tr>
</table></td><td>3</td><td>one mark for each correct row</td></tr>
<tr><td></td><td></td><td>ii</td><td>800 000 (joules) (1)</td><td>1</td><td>Allow 800 kJ if units clearly changed.</td></tr>
<tr><td colspan="3"></td><td>Total</td><td>9</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
5	a		50 (1)	1	
	b		instantaneous speed → the speed of the car as it passes one camera average speed → … how long the car takes to travel 800 m	2	one mark per correct line
	c		**E** (1)	1	**accept** unambiguous indication on graph **E**
			Total	4	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>6</td><td>a</td><td></td><td>
<table>
<tr><th>label</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>not shown</th></tr>
<tr><td>wavelength</td><td>✓</td><td></td><td></td><td></td><td></td><td>✓</td><td></td></tr>
<tr><td>frequency</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>amplitude</td><td></td><td>✓</td><td></td><td></td><td>✓</td><td></td><td></td></tr>
</table>
</td><td>3</td><td>one mark per row
all ticks in each row must be shown for the mark

If first and third rows are incorrect, but candidate has at least 1 correct tick for wavelength **and** for amplitude **and** no other boxes ticked in those rows, **allow 1 mark** i.e. 2 Max for question</td></tr>
<tr><td></td><td>b</td><td></td><td>not affected by (1)</td><td>1</td><td></td></tr>
<tr><td></td><td>c</td><td>i</td><td>**C** (1)</td><td>1</td><td>**allow** unambiguous indication on the table of the correct row</td></tr>
<tr><td></td><td></td><td>ii</td><td>**D** (1)</td><td>1</td><td>**allow** unambiguous indication on the table of the correct row</td></tr>
<tr><td colspan="3"></td><td>**Total**</td><td>6</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
7	a			1	all lines must be in place for the mark
	b		**any two from:** noise can be removed from the digital signals ; the 'on' and 'off' states of the digital signal can still be seen ; it is impossible / difficult to know which part of the analogue signal is noise, and which is the signal ;	2	idea that you can clean up the digital / can't clean up analogue idea that you can still see the shape in digital/type B OR you can't see the shape in the analogue/type A

Question			Answer	Mark	Guidance
7	c		the intensity…depends on its amplitude ☑ (1) ☐ ☐ ☐ the intensity…will reduce as it travels ☑ (1) ☐	2	one mark per correct tick
			Total	**5**	

Question			Answer	Mark	Guidance
8	a		☐ ☐ ☐ not strongly absorbed by the atmosphere ☑ (1)	1	
	b		Interference (1) **Then any 2 points from**: Idea that when direct and reflected waves meet, their effects add ; constructive (interference) ; destructive (interference) ;	3	Interference mark can be awarded for the use of the term in a discussion of constructive/ destructive interference. **allow** superposition / superpose for interference mark Award 2 marks for either of the following ideas clearly expressed: when two waves arrive in step they reinforce (when this happens the picture is good) **and/ or** when two waves arrive out of step they cancel out (when this happens the picture is bad) **allow** points shown using a labelled diagram **allow** idea of path difference correctly applied for second and/or third marking points.
			Total	4	

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