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 2012

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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	alternative wording
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
NBOD	no benefit of doubt
R	reject
✓	correct response
≈	draw attention to particular part of candidate's response
^	information omitted

Subject-specific Marking Instructions

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

Eg
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 1 mark.

Put ticks (✓) in the two correct boxes.

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

This would be worth 1 mark.

c. 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, eg 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.

d. 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, eg 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.

Eg 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 <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**

e. For answers marked by levels of response:
   i. **Read through the whole answer from start to finish**
   ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
   iii. **To determine the mark within the level**, consider the following:

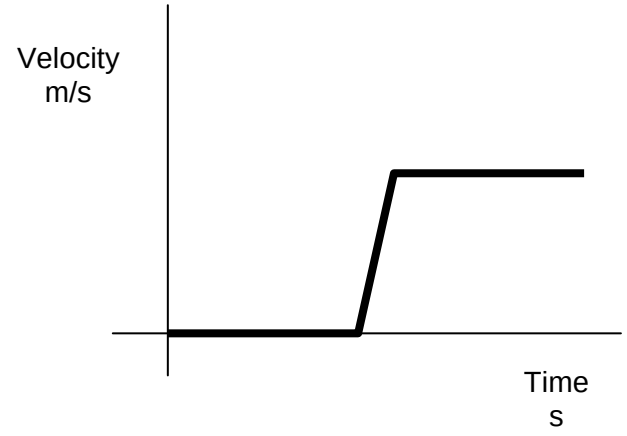
Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

   iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

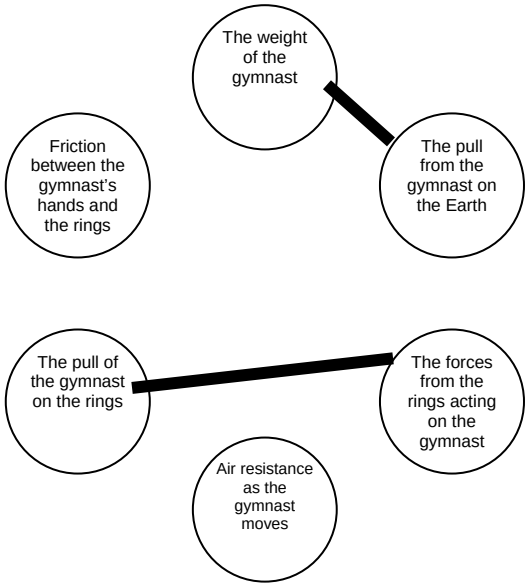
Quality of Written Communication skills assessed in 6-mark extended writing questions include:

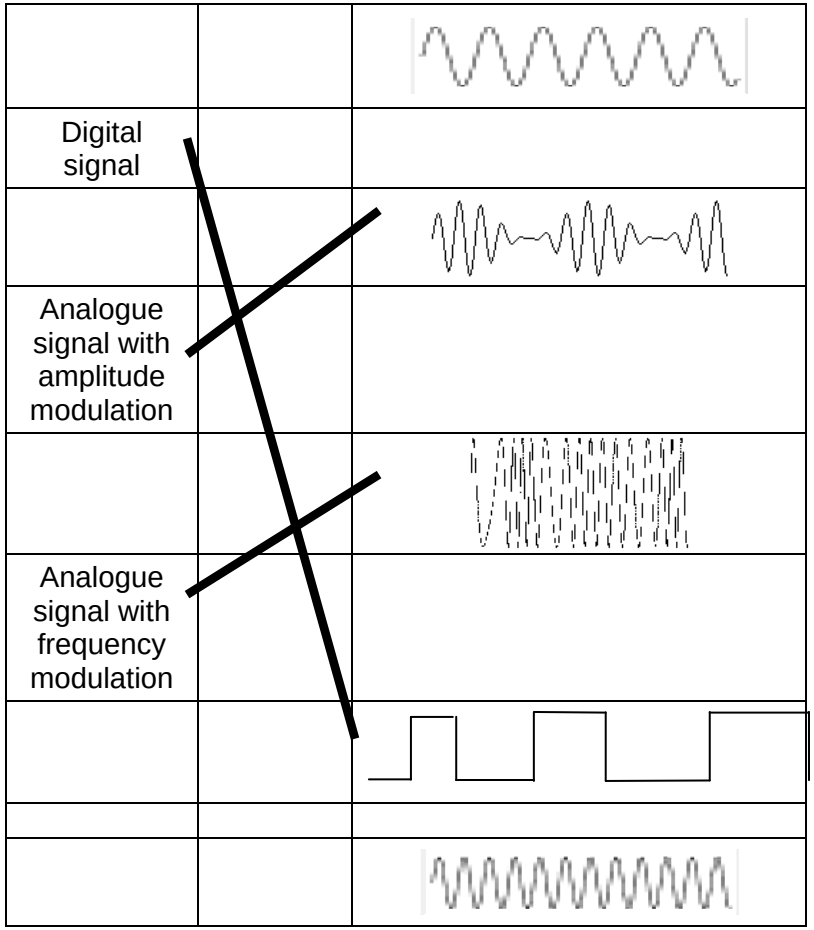
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>20 m/s</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>average speed → it is the speed in a particular direction
instantaneous speed → it is the speed shown at a particular point by the car’s speedometer
velocity → the car will speed up and slow down as it travels</td><td>1</td><td>More than one line drawn = 0 marks</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>
<table>
<tr><th></th><th>true</th><th>false</th></tr>
<tr><td>The car slowest speed in section A.</td><td></td><td>✓</td></tr>
<tr><td>The car was always moving forwards.</td><td></td><td>✓</td></tr>
<tr><td>The car was going at the same speed in sections B and D.</td><td>✓</td><td></td></tr>
<tr><td>The speed of the car varied the most in section G.</td><td>✓</td><td></td></tr>
</table>
</td><td>2</td><td>2 marks for all 4 correct
1 mark for 2 or 3 correct
0 mark for 1 correct</td></tr>
</table>

Question			Answers	Marks	Guidance
	(b)	(ii)		1	mark is for a section at zero m/s and one higher up the axis. both need to be horizontal. the gradient between the low level and the high level does not matter **ignore** line beyond or on end of section D
			Total	**5**	

Question			Answers	Marks	Guidance
2	(a)		4 kg m/s	2	1 mark for 4 1 mark for correct units **allow** Ns instead of kg m/s or $kgms^{-1}$ do not allow kg/ms or km/s or m/skg
	(b)		For first mark allow 'driving force greater than counter force' or words to that effect For second mark allow 'acceleration/increase in speed/velocity causes momentum increase, but not just change on its own	2	
			Total	**4**	

Question			Answers	Marks	Guidance
3	(a)			2	one mark for each correct line deduct a mark for any extra lines drawn, minimum mark zero.
	(b)	(i)	1 500 N	1	
		(ii)	correct rearrangement of KE = ½ mv^2 6.32 m/s	2	Allow correct numerical equation for first mark **allow** 6.3 m/s
			Total	**5**	

Question			Answers	Marks	Guidance
4	(a)			2	all three lines correct – two marks one or two lines correct – one mark

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td>(b)</td><td></td><td>
<table>
<tr><td>As signals travel, their amplitude becomes smaller and they pick up noise.</td><td>✓</td></tr>
<tr><td>Digital signals travel at the speed of light.</td><td></td></tr>
<tr><td>When a signal is amplified, noise is also amplified.</td><td>✓</td></tr>
<tr><td>Radio waves are not strongly absorbed by the atmosphere.</td><td></td></tr>
<tr><td>Analogue signals vary continuously.</td><td></td></tr>
<tr><td>The information in digital signals can usually be recognised despite some noise picked up.</td><td>✓</td></tr>
<tr><td>The job of the receiver is to reproduce the original sound from a signal.</td><td></td></tr>
</table>
</td><td>2</td><td>three ticks correct – 2 marks
two ticks correct – 1 mark
one tick correct – 0 marks</td></tr>
<tr><td></td><td>(c)</td><td></td><td>$\frac{3 \times 10^8}{1{\cdot}5}$</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>5</td><td>(a)</td><td>(i)</td><td>reflection
refraction</td><td>1</td><td>both required for the mark</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>decreases
stays the same</td><td>1</td><td>both required for the mark</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><td>more photons</td><td>✓</td></tr><tr><td>increase distance to dog</td><td></td></tr><tr><td>the speed of light</td><td></td></tr><tr><td>photons of lower energy</td><td></td></tr><tr><td>photons of shorter wavelength</td><td>✓</td></tr><tr><td>photons of lower frequency</td><td></td></tr></table></td><td>2</td><td>One mark for each correct tick
Deduct one mark for each incorrect answer if more than 2 ticked</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>diffraction: waves spread outwards/waves are curved/come out curved(from narrow gap); (1)
wavelength of light is (much) smaller than the aperture/gap (1)</td><td>2</td><td>allow first mark for a diagram

the second mark is for a comparison</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>6</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>A: longitudinal

B: transverse</td><td>1</td><td>both required for the mark.
must be in the right order.
Do not accept ‘transversional’</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><td>the distance from one end of the spring to the other end</td><td></td></tr><tr><td>the distance from the wave crest to the wave trough of the spring</td><td></td></tr><tr><td>the thickness of the spring</td><td></td></tr><tr><td>the distance from the first wave crest to the second wave crest</td><td>✓</td></tr><tr><td>the distance from a wave crest to the dotted line</td><td></td></tr></table></td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table><tr><td>the distance from one end of the spring to the other end</td><td></td></tr><tr><td>the distance from the wave crest to the wave trough of the spring</td><td></td></tr><tr><td>the thickness of the spring</td><td></td></tr><tr><td>the distance from the first wave crest to the second wave crest</td><td></td></tr><tr><td>the distance from a wave crest to the dotted line</td><td>✓</td></tr></table></td><td>1</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>2 m/s</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>7</td><td>(a)</td><td></td><td><u>electrons</u> transferred (1)
both rods have same(+ or -) charge (1)
like charges <u>repel</u> (1)</td><td>3</td><td>accept to or from cloth as unspecified
do not accept protons/particles
maximum 2 marks for correct magnetic charge argument</td></tr>
<tr><td></td><td>(b)</td><td></td><td>
<table>
<tr><td>metal rods contain lots of charges</td><td></td><td>which can not move</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>metal rods contain few charges</td><td></td><td>which are free to move</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>metal rods contain no charges</td><td></td><td>which move only when connected to a battery</td></tr>
</table>
</td><td>1</td><td>0 mark if more than one line drawn</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>8</td><td>(a)</td><td></td><td>use of 230 in calculation (1)

230/ 23 V
10 Amps</td><td>2</td><td>Do not accept 230 as the answer

ecf from whatever voltage they choose.</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table>
<tr><th>quantity</th><th>increase</th><th>decrease</th><th>stay the same</th></tr>
<tr><td>the number of paths for the charges</td><td></td><td>✓</td><td></td></tr>
<tr><td>the potential difference across the heating element</td><td></td><td></td><td>✓</td></tr>
<tr><td>the current in the circuit</td><td></td><td>✓</td><td></td></tr>
<tr><td>the resistance of the circuit</td><td>✓</td><td></td><td></td></tr>
</table></td><td>2</td><td>4 rows correct – 2 marks
2 or 3 rows correct – 1 mark
1 row correct = 0 marks</td></tr>
<tr><td></td><td>(c)</td><td></td><td>£2.30/20p = 11.5 (1)
11.5/2.3 = 5 hours (1)</td><td>2</td><td>5 hours = 2 marks</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>6</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>9</td><td>(a)</td><td></td><td><u>alternating</u> voltage in primary coil (1);

produces changing magnetic field (in core) (1);

<u>induces</u> voltage in secondary coil (1)</td><td>3</td><td>Do not allow ‘changing’ voltage
accept alternating current

allow 1 mark for correct reference to ratio of coils.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>3</td><td></td></tr>
</table>

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