OCR
RECOGNISING ACHIEVEMENT

GCSE

Physics A

General Certificate of Secondary Education

Unit **A182/01:** Unit 2 – Modules P4, P5, P6 (Foundation Tier)

Mark Scheme for June 2013

Oxford Cambridge and RSA Examinations

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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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1. **Contradictory Responses:**
When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

2. **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:

	correct response
	incorrect response
BOD	benefit of doubt
NBOD	no benefit of doubt
ECF	error carried forward
0 , L1 , L2 , L3	indicate level awarded for a question marked by level of response
^	information omitted

CON	contradiction
R	reject
	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

3. **ADDITIONAL OBJECTS:** You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

4. 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. 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.

c. 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**

d. 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:

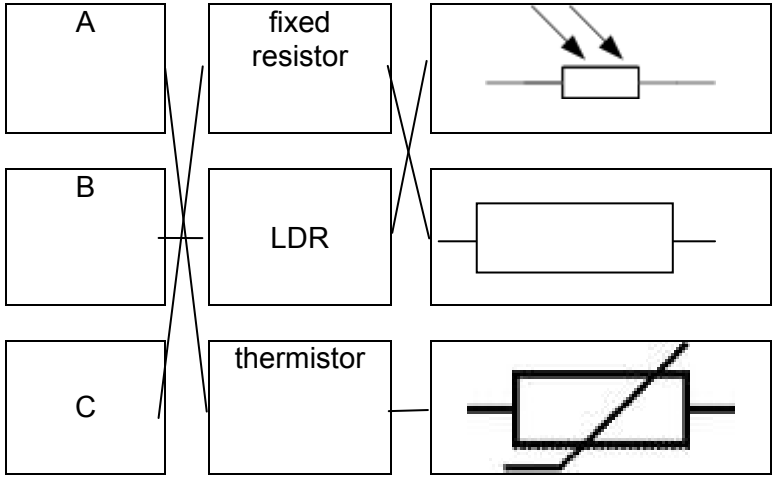
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question			Answer	Marks	Guidance
1	(a)	(i)	decays (1) (is) radioactive (1)	2	**allow** material decays (1) **allow** radioactive material (1) **NOT** radioactive material decays
		(ii)	alpha – beta – gamma	1	**allow** correct symbols or a mixture of words and symbols
	(b)	(i)	can break molecules into bits ✓ kills living cells ✓	2	
		(ii)	 The decay is not affected by chemicals in the body. ✓ 	1	
	(c)		 to send messages from mobile phones ✓	1	

Question			Answer	Marks	Guidance
	(d)		(substance 2) **any three from** substance 2 – is active at 6 months (1) **or** activity decreases after 6 months (1) **or** is low after 6 months (1) substance 2 – less risk after 6 months (1) **or** less risky than substance 3 (1) substance 1 – not active for long enough / not active after 2 months (1) substance 3 – High activity for too long is risky (1) **OR** (substance 3) substance 3 – is active at 6 months (1) substance 1 – not active for long enough / not active after 2 months (1)	3	substance 1 chosen = 0 marks **allow** it will last long enough (1) not just 'the activity decreases' **allow** it won't be effective / it won't work (1) maximum of 2 marks for choosing substance 3 **allow** it will last long enough (1) **allow** it won't be effective / it won't work (1)
	(e)	(i)	**any three from** statement that: the benefits outweigh the risks (1) idea that for the treatment the chance/rate of success is good/high/likely/probable ORA e.g. failure is rare (1) risk (of secondary cancer) is low **or** secondary cancer could occur anyway (1) risk from prostate cancer is reduced **or** cancer will spread without treatment (1) will be being checked for secondary cancer **or** secondary cancer can also be treated (1)	3	**ignore** just restating the bullet points **allow** 2 in 125 is a low risk (1) **allow** he will be cured (1)

Question			Answer	Marks	Guidance
		(ii)	a measure of the possible harm to the body from radiation ✓	1	
			Total	**14**	

Question			Answer	Marks	Guidance
2			**Level 3 (5–6 marks)** A description of the nucleus that includes at least two features **AND** a description of fusion that includes high temperature or energy release as one of at least two features Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** A description of the nucleus that includes at least two features **OR** a description of fusion that includes at least two features **OR** a simple description of the nucleus AND a simple description of fusion Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** a simple description of the nucleus or atom **or** a simple description of fusion **or** a simple description of fission Quality of written communication impedes communication of the science at this level **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to D** **Indicative scientific points:** discussion of nuclear fusion • hydrogen/small nuclei • brought close to each other • fuse (owtte) • to make larger nuclei • lots of energy released. • large energy required to bring nuclei together • (even larger) amounts of energy released • need for magnetic containment • due to high temperatures • ionising radiation description of what nuclei are • the centre of atoms • protons • neutrons • the electrons are round the outside. correct description of fission for level 1 information from diagram **ignore** chemical reaction ideas where atoms join and energy is released **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>3</td><td>(a)</td><td>(i)</td><td>
</td><td>4</td><td>mark per side
3 lines correct on either side, 2 marks for that side
1 or 2 lines correct per side, 1 mark for that side</td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table>
<tr><th></th><th>true</th><th>false</th><th>cannot tell</th></tr>
<tr><td>Anita repeated her experiment three times.</td><td></td><td></td><td>✓</td></tr>
<tr><td>Anita had an outlier in her results.</td><td>✓</td><td></td><td></td></tr>
</table></td><td>2</td><td>one mark per correct row</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>resistance = V/I = 6/0.06
= 100 Ω</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>10 ˚C</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>9</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
4			**Level 3 (5–6 marks)** At least three parts labelled or referred to (not including switch but allowing slight errors in vocabulary) **AND** links motion to electricity/current **or** explains how the commutator works (accept confusion with descriptions of generators at this level) Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** At least two parts of the diagram labelled or referred to using recognised scientific vocabulary **AND** an attempt to explain the cause of motion which may be incorrect Quality of written communication partly impedes communication of the science at this level **Level 1 (1–2 marks)** Two parts of the diagram correctly labelled or referred to **or** A correct label and a use of motors **or** an attempt to explain the cause of motion which may be incorrect Quality of written communication impedes communication of the science at this level **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to E** **Indicative scientific points:** **Parts of diagram labelled:** • magnet / identifies poles • coil (of wire) • split rings/brushes/commutator • power supply/battery/cell. • flux / magnetic field / lines of force **Explanation** • electricity/current produces rotation • uses direct current. **accept** higher level answers regarding interaction of magnetic field and current. **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>5</td><td>(a)</td><td></td><td>any three from
rubbing the objects causes them to become charged (1)

electrons move from cloth to object (or other way around) (1)

tray and flyer must have the same charge (1)

so repel (each other) (1)</td><td>3</td><td>allow they become charged / they gain charge / become positive / become negative</td></tr>
<tr><td></td><td>(b)</td><td></td><td>
<table>
<tr><th></th><th>Static electricity</th><th>Current electricity</th><th>Both</th></tr>
<tr><td>involves electrons</td><td>(✓)</td><td>(✓)</td><td>✓</td></tr>
<tr><td>involves a flow of charge</td><td></td><td>✓</td><td></td></tr>
<tr><td>requires a power supply or battery</td><td></td><td>✓</td><td></td></tr>
<tr><td>involves charged insulators</td><td>✓</td><td></td><td></td></tr>
</table>
</td><td>3</td><td>4 rows correct: 3 marks
3 rows correct: 2 marks
2 rows correct: 1 mark

allow ticks in all three columns or both of the first two columns for involves electrons</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>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>mean time calculated (1.3+1.2+1.1)/3 or 1.2 (1)

Speed calculated = 1.5 (1)

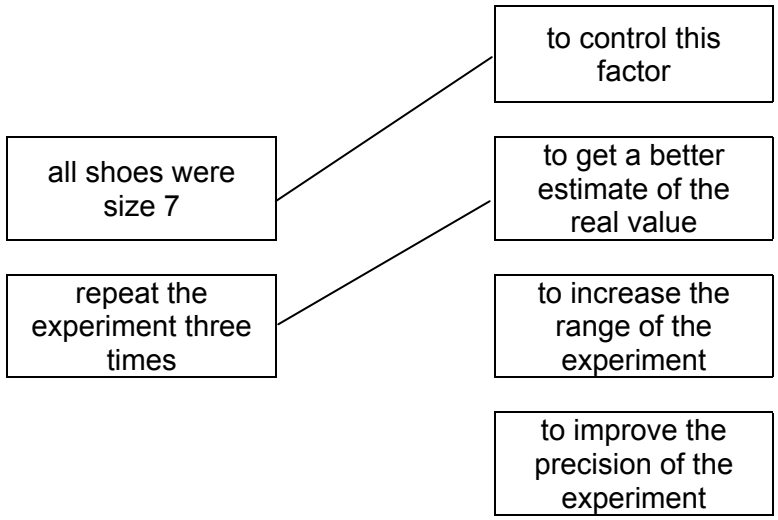
m/s (1)</td><td>3</td><td>NOT if either is incorrect
allow an average of the speeds (1)

but 1.5 gets 2 marks if no working is shown
allow ecf calculated from 1.8 ÷ their mean time (1)

NOT mps
allow ms^{-1} or ‘metres per second’ (1)</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>As the shoe size increases, the time taken to slide down the ramp increases.</td><td>✓</td><td></td></tr><tr><td>As some of the repeats are different, Ross must have made mistakes in his experiment.</td><td></td><td>✓</td></tr></table></td><td>1</td><td>both required for the mark.</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>ignore yes or no
a maximum of 2 marks from: (Ross thinks the mistakes are):
*Idea that ramps are different
*idea that shoes are different
*Results are affected by different reaction times

a maximum of 2 marks from: (Discussion of data):
*New result doesn’t fit his data e.g. the times should be lower than size 5/7 ORA
*Sample size is small
*Time differences are small, so correlation (between shoe size and slide-time) is weak
*Slide-time depends on a combination of factors
*calculation of the average of the other student’s results = 1.3 seconds (1)
*idea that both sets of data show good repeatability (1)</td><td>3</td><td>the maximum mark is 3

allow e.g length/start-point/steepness/friction
allow e.g weight/tread/friction</td></tr>
</table>

Question			Answer	Marks	Guidance
	(c)		ramp (1) Earth (1) balanced (1)	3	**reject** equal
	(d)	(i)		1	both lines required for the mark
		(ii)	C	1	
		(iii)	C A B	1	all correct for one mark
			Total	**13**	

Question			Answer	Marks	Guidance
7			**Level 3 (5–6 marks)** Correctly links changes in speed or height to changes in KE or GPE **or** describes the energy transfer from GPE to KE **and** explains why the vehicle has lost speed or KE or height or GPE during the ride Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Links changes in speed or height to changes in KE or GPE at correct points in the ride **or** describes the energy transfer from GPE to KE **or** explains why the vehicle has lost speed or KE or height or GPE during the ride Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Correctly links GPE with height **or** Correctly links KE with speed **or** limited discussion of energy or forces Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C** **Indicative scientific points:** • gains GPE as raised • this turns to KE as falls • KE increase means speed increases • on other side, KE drops, so speed decreases • GPE increases again • energy lost on each move • due to friction • heat • surroundings/structure/wheels etc • so lower speed/lower rise • no more energy needed after initial input • total energy is conserved. **accept** correct discussion of forces use of diagrams to explain **ignore** **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

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