OCR
Oxford Cambridge and RSA

GCSE

Physics A

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

General Certificate of Secondary Education

Mark Scheme for June 2015

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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.

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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
BOD	benefit of doubt
CON	contradiction
	incorrect response
ECF	error carried forward
	draw attention to particular part of candidate's response
NBOD	no benefit of doubt
R	reject
	correct response

L1 , L2 , L3	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
	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. 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. 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.

d. 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).

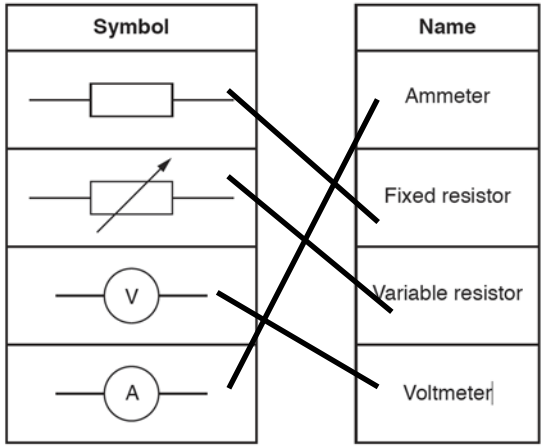
Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

Question			Answer	Marks	Guidance
1	(a)		50 N x 1.2 m (4th answer)	1	
	(b)	(i)	weight	1	**allow** gravity
		(ii)	kinetic	1	**allow** thermal
	(c)		the same as (3rd answer)	1	**allow** correct answer ringed
	(d)		same speed because: EITHER same distance fallen in same time OR objects have the same size and/or shape OR same acceleration (in same time)	1	 **accept** same surface area
			different KE because EITHER they have different masses OR because mass is part of formula for calculating KE	1	 **accept** weight for mass, heavier/lighter for different mass **not** smaller mass has larger KE
			TOTAL	6	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2</td><td>(a)</td><td></td><td>
<table>
<tr><th rowspan="2">Type of Motion</th><th colspan="3">Region</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>stationary</td><td></td><td>√</td><td></td></tr>
<tr><td>moving with constant speed</td><td>√</td><td></td><td>√</td></tr>
<tr><td>fastest speed</td><td></td><td></td><td>√</td></tr>
</table>
</td><td>3</td><td>One mark for each row</td></tr>
<tr><td></td><td>(b)</td><td></td><td>0 – 2min: starts at 0 and positive slope (1);
2 – 8min: horizontal line (1);
8 – 11min: negative slope to 0 (1)</td><td>3</td><td>allow straight or curved line
allow line drawn freehand
allow straight or curved line</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>air resistance / friction</td><td>1</td><td>allow rolling friction
allow moving against / through the air
allow wind as moving air</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>The driving force is the same as the counter force. √</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>TOTAL</td><td>8</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
3			**[Level 3]** Describes interaction pair (words or arrows) **AND** explains the effect of icy **and** normal conditions on motion. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **EITHER** Describes interaction pair (words or arrows) **OR** Explains the effect of icy **and** normal conditions on motion. **OR** Describes one half of the interaction pair (words or arrow) **and** makes a correct statement about icy **or** normal conditions. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **EITHER** describes one half of the interaction pair (words or arrow) **OR** makes a correct statement about icy **or** normal conditions. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit.(0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Arrows on diagram:** • arrow to right on road • arrow to the left on the car / above the road • arrows same length **Interaction pair of forces:** • (rotating) wheel pushes road backwards • road pushes wheel / car forwards • (resultant) force moves the car **Effect of normal conditions:** • friction/grip between wheel and road • wheel does not spin / slip • exerts force on road / car **Effect of icy conditions:** • little/no friction/grip between wheel and road • wheel spins / slips exerts little / no force on road / car **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	6	

Question			Answer	Marks	
4	(a)	(i)	**ANY TWO** from: • complete circuit / no gaps • with a battery • copper is a conductor • conductors contain free charges/electrons • battery pushes free charges/electrons around circuit • charge/electrons move round the circuit	2	
		(ii)	use more cells/battery (in series)	1	**allow** use greater voltage / use greater current / connects clips to each other / better conductor than copper / shorter leads / more powerful battery / connect another piece of copper in parallel **ignore** a different lamp,
	(b)		contains no free charges/electrons / (plastic) is an insulator / electrons cannot flow through	1	**not** current can't pass through, **ignore** not a metal **ignore** not a conductor
			Total	4	

Question			Answer	Marks	Guidance
5					all correct = 3 marks 3 or 2 correct = 2 marks 1 correct = 1 mark
			Total	**3**	

Question			Answer	Marks	Guidance
6	(a)	(i)	downwards arrow	1	Needs to be near CD
		(ii)	current / moving charge / moving electrons (in wires);	1	**not** induced/creates current **accept** magnetic field around the wire (produced by the current)
			(in) magnetic field;	1	**accept** between magnets/poles **ignore** N and S
	(b)		any **three** of the following: • allows coil/motor to spin / rotate • without tangling the wires; • allows current to flow (in/out of coil); • reverses direction of current • reverses direction of the coil's magnetic field • keeps forces on coil in same direction • every half turn / each time coil passes vertical	3	
			Total	6	

Question	Answer	Marks	Guidance
7	**[Level 3]** Describes the correlation **and** gives some ways of confirming it. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** EITHER Describes the correlation **or** gives some ways of confirming it. OR Makes a statement about correlation **and** gives a way of confirming it. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Makes a statement about correlation **or** gives a way of confirming it. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Correlation:** • there is a correlation • resistance decreases as it gets warmer **What to do:** • (cold and warm not quantified) so use thermometer • (limited range so) extend temperature range • (not enough readings) so repeat them **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**6**	

Question			Answer	Marks	Guidance
8	(a)		radon / rocks / ground / buildings / food & drink / cosmic rays / medical / nuclear waste / fallout / Sun	1	**Ignore** X-rays / gamma / alpha / beta / UV etc.
	(b)		beta √ gamma √ red light ultra violet X-rays	2	
	(c)	(i)	Quotes two values from the graph, one half the other; States they are five minutes apart;	1 1	**Accept** just pairs of lines drawn on graph **Accept** just one pair of lines from 60 c.p.m.
		(ii)	10 (minutes)	1	
	(d)		irradiation: (exposure to radiation) from sources outside the body or clothing (1); contamination: (exposure to radiation) from sources inside the body or on clothing. (1)	2	
			Total	8	

Question			Answer	Marks	Guidance
9	(a)		proton to circle with + ⊕ neutron to black ● electron to white circle (in rings) ○	2	all correct = 2 marks 2 or 1 correct = 1 mark
	(b)		fusion (2nd answer)	1	
	(c)		**Level of waste** / **Method of disposal** High — Mix with concrete; put in steel drums; keep in purpose built stores Intermediate — Store under water for many years; then put in drums in an underground store Low — Put in drums; surround by concrete; keep in landfill sites	2	All correct = 2 marks 2 or 1 correct line = 1 mark
	(d)		**ANY TWO** from: • waste is harmful (e.g. causes cancer) • radiation can't reach people from space • rocket could explode on launch • spreading the waste around (the land or atmosphere)	2	
			Total	7	

Question	Answer	Marks	Guidance
10	**[Level 3]** States some risks for Gail **and** states a benefit and a risk for Tom Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** EITHER states some risks for Gail **or** states a benefit and a risk for Tom OR states a risk for Gail **and** states a benefit or a risk for Tom. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** EITHER States a risk for Gail **or** states a benefit or a risk for Tom OR States a benefit and a risk of X-rays without linking them to Gail or Tom. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Risks for Gail** • baby / Gail could be damaged • X-rays damage cells / organs • Dose is similar to background • Dose is relatively high • X rays can cause cancer **Benefits for Tom** • Identifying problems with teeth early on • Allows prompt treatment • Benefit much greater than risk **Risks for Tom** • Dose is much less than background • Risk of cancer is small • Dose is relatively low **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**6**	

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