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 2014

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 2014

1. 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:

BP	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	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

2. **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.

3. **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.

<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>i</td><td>D</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>ii</td><td>A</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>B and C</td><td>1</td><td>a correct pair is required for 1 mark</td></tr>
<tr><td></td><td>b</td><td></td><td>
<table>
<tr><td></td><td>the object the force acts on</td><td>the object that exerts the force</td></tr>
<tr><td>Force P</td><td>Earth</td><td>Moon</td></tr>
<tr><td>Force Q</td><td>Moon</td><td>Earth</td></tr>
</table>
</td><td>1
1</td><td>each correct row for [1] each

accept Moon exchanged for Earth throughout for [1]

look for top row matching order in the diagram

remember EM-ME?</td></tr>
<tr><td></td><td>c</td><td></td><td>pair of straight arrows in opposite direction (by eye);

of equal length (by eye);
one starting from ball going down, other starting from the ground going up;</td><td>1

1
1</td><td>accept straight arrows drawn free-hand
accept arrows which are not co-linear

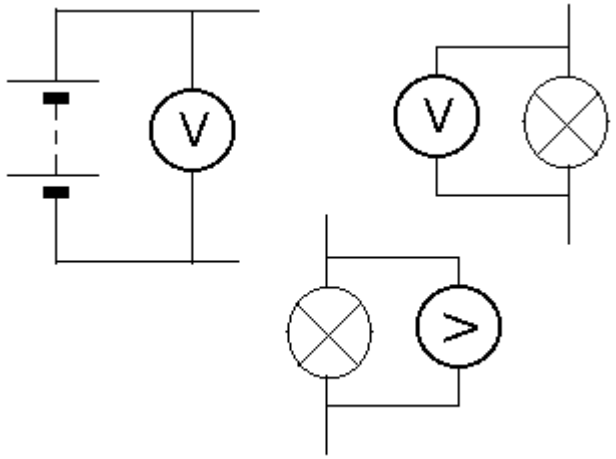
ignore labels on arrows
accept arrows which do not touch ball / ground with a gap much smaller than the length of the arrow</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>8</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
2	a		(momentum = mass x speed) = 0.3 x 4; 1.2;	1 1	look for correct substitution correct numerical response gains 2 marks
	b*		K.E = 0.5 x 0.3 x 4^2; = 2.4 (J); (The window does NOT break) **because** the balls ke (2.4J) is less than the windows breaking energy (10J);	1 1 1	 correct numerical response gains 2 marks **allow ecf** from incorrect value for ke **accept** doesn't break because 2.4 is less than 10
	c		increase the speed of the object ✓ increase the mass of the object ✓ increase the friction on the object increase the time it takes to stop the object increase the gravitational potential energy of the obiect	2	
			Total	7	

Question			Answer	Mark	Guidance
3			**[Level 3]** Correctly identifies sections with different speeds and directions as well as sections with no motion within their narrative. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Correctly identifies sections with different speeds or directions as well as sections with no motion within their narrative. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Correctly identifies a section where she is moving and a section with no motion within their narrative. 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 E** **ignore** references to mode of transport used in the journey **Indicative scientific points may include:** • no motion at C and E • moving away from home at A, B and D • moving towards home at F • ends up back where she started • B and F are faster motion than D or E **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

Question			Answer	Mark	Guidance
4*	a		axes labelled – power (lost) , current; line going up to the right; curves towards the power axis / away from current axis;	1 1 1	units not required **not** just scales **allow** units instead of quantity i.e. amps instead of current, and Joules or j/s or watts for power lost. **accept** power or current as vertical axis **accept** attempt to plot the points without a line line does not have to go through the origin use scales on axes to identify curvature if no labels a bar chart can earn the first and third marks
	b		any 3 correlation comment is correct / there is a correlation; because as current increases so does power; directly proportional is incorrect / it isn't directly proportional; because power does not double as current doubles/ not a straight line/ line is a curve / square relationship;	3	**not** just he is correct **accept** his first comment is correct **not** just he is wrong **accept** his second comment is wrong
			Total	6	

Question			Answer	Mark	Guidance
5			**[Level 3]** Correctly describes an energy transfer in part of the apparatus. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Correctly identifies type of energy in parts of the apparatus. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Adds some scientific detail to the description provided in the question. 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 E** **Indicative scientific points may include:** • weight transfers gpe to ke as it falls • generator transfers ke to electrical energy as shaft spins • current in wires transfers energy from generator to lamp • lamp transfers electrical energy to light (and heat) energy **Use the L1, L2, L3 annotations in Scoris; do not use ticks.** **accept** electricity as current **accept** potential / gravitational energy as gpe **accept** light as light energy **note that** "energy tranfers ... weight falls ... generator spins ... lamp lights up" is given in the question stem, so earns no credit.
			Total	6	

Question			Answer	Mark	Guidance
6	a	i	potential difference	1	**allow** p.d. **not** volts
		ii	battery charge	1 1	
	b		correct symbol connections to wires on either side of battery or lamp	1 1	**look for** a circle around V e.g. **accept** lines which are not straight 

Question			Answer		Mark	Guidance
	c		voltage increases, current increases	✓	1	
			voltage increases, current decreases			
			voltage decreases, current increases			
			voltage deceases, current decreases			
	d	i	There is no current in circuit.		1	
			The largest current is in the 3kΩ resistor			
			The smallest current is in the 3kΩ resistor			
			The current is the same in all three resistors	✓		
	d	iii	3(kΩ);		1	
			(largest voltage across) the largest resistance;		1	**accept** largest ohms /kilohms **don't award** second mark if an incorrect resistor is identified
			Total		9	

Question			Answer	Mark	Guidance
7	a	i	electron(s) proton(s) neutron(s)	1 2	**ignore** any numbers next to the words either order
		ii	removal of bit of atom this bit is an electron / turning the atom into an ion	1 1	**allow** description of ionising, breaking up atoms into bits **ignore** effects of radiation on nucleus
	b		**any two from** treat cancer / radiotherapy sterilise/clean surgical instruments sterilise/preserve food act as a tracer X ray (pictures) smoke detectors PET scan UV water cleaning sunbeds thickness control in sheet production crack detection in welds/pipes	2	**not** chemotherapy **not** nuclear power **accept** any valid use of alpha, beta, gamma, X-ray or UV radiation
			Total	7	
8	a	i	**B** and **C**	1	**accept** card and aluminium
		ii	**C**	1	**accept** card
		iii	Ring around 0	1	
	b		**Q** and **R** **R** lets through same as **Q**, but with beta as well	1 1	 **accept** the difference between them is beta
			Total	5	

Question			Answer	Mark	Guidance

9*			**[Level 3]**
			Explains risk of radioactive waste AND discusses methods of disposal of different types of waste.
			Quality of written communication does not impede communication of the science at this level.
			(5 – 6 marks)
			
			[Level 2]
			Explains risk of radioactive waste and describes a method of disposal OR discusses methods of disposal of different types of waste.
			Quality of written communication partly impedes communication of the science at this level.
			(3 – 4 marks)
			
			[Level 1]
			States a harmful effect of radioactive waste OR describes a method of disposal of the waste.
			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:
					• radioactive waste emits ionising radiation
					• ionising radiation damages/kills living cells
					• ionising radiation may cause cancer
					• radioactive materials become less so over time
					• different types High, Intermediate, Low
					• **High level**
					  • e.g. spent nuclear fuel rods
					  • very radioactive, high risk
					  • embedded in glass stored underwater
					• **Intermediate level**
					  • e.g. materials used to handle fuel rods, decommissioned reactors
					  • less radioactive, medium risk
					  • stored in drums, usually underground
					• **Low level**
					  • e.g. medical waste, protective clothing
					  • little radioactivity, low risk
					  • buried in landfill
					  •
					• Not all radioactive material is hazardous
					• Waste can be radioactive for a very long time
					• Those at risk may not be the ones who benefit the most
					
					Use the L1, L2, L3 annotations in Scoris; do not use ticks.

			Total	6	

* - overlap

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

© OCR 2014

PART OF THE CAMBRIDGE ASSESSMENT GROUP

LLOYD'S REGISTER QUALITY ASSURANCE · ISO9001 · UKAS MANAGEMENT SYSTEMS 001