



# GCSE

# **Physics A**

Unit A183/01: Unit 3 – Module P7 (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

### Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning		
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.		
1	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
<b>^</b>	information omitted
CON	contradiction

A183/01	Mark Scheme	June 2014
R	reject	
?	indicate uncertainty or ambiguity	
$\bigcirc$	draw attention to particular part of candidate's response	

PMT

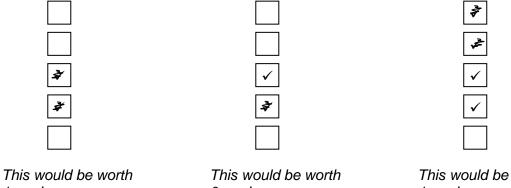
**ADDITIONAL OBJECTS:** You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

## Mark Scheme

#### Subject-specific Marking Instructions

- Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are phonetically correct, but always check the a. guidance column for exclusions).
- Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct b. 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:



1 mark.

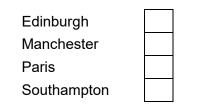
0 marks.

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:



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

Edinburgh			$\checkmark$			✓	✓	✓	✓	
Manchester	<ul><li>✓</li></ul>	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	<ul> <li>✓</li> </ul>	×		✓		✓	✓		✓	
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.

Q	uesti	ion	Answer	Mark	Guidance
1	а	i	prism with a triangular cross section (1) diverging rays inside or outside of the prism (1) at least one continuous ray that changes direction at a boundary (1)	3	<b>Accept</b> idea of dispersion with colour labels (which may not be diverging)
		ii iii	refraction diffraction grating	1 1 1	accept reasonable correct suggestion e.g. CD /DVD /Oil film
	b		light	2	/ water droplets /soap bubbles /crystals / etc. <b>ignore</b> mirror, glass
	С	i	lines B	2	any order
		ii	C hydrogen	2	any order
			helium		
			Tota	11	

Q	uesti	on	Answer	Mark	Guidance
2	а		Α	2	allow 1 mark for D and A reversed
			D		
	b		stars	1	
	с	i	correct for 5000K	2	
			correct for 1 L <sub>sun</sub>		
		ii	uses 273 in any calculation	2	allow -258 or 258 scores 1 mark
			288		correct numerical answer gains 2 marks
		iii	too cold / off the scales	1	allow too dim / it is not a star / not luminous
	d		stars     type of star       Main sequence       A and D       red giant       c       supergiant       white dwarf	2	
			Total	10	

Question	Answer	Mark	Guidance
3	<b>[Level 3]</b> Describes or names three or more main stages and gives the correct sequence.	6	nebula / cloud of gas and dust
	Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)		protostar / gravitational collapse / fusion begins
	[Level 2] Describes or names two main stages, in correct sequence.		main sequence / fuses H to He / Star for billions of years
	<b>OR</b> three stages are described or named, but in an incorrect sequence.		red giant / expands and fuses He
	Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)		white dwarf / shrinks, cools and fades
	[Level 1] Names or describes one of the main stages, 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)		Apply QWC to incorrect stages
			Use the L1, L2, L3 annotations in Scoris; do not use ticks.
	Total	6	

Question	Answer	Mark	Guidance
4	[Level 3]         Chooses W or Y with a relevant explanation of a factor         Quality of written communication does not impede communication of the science at this level.         (5 – 6 marks)         [Level 2]         Chooses W or Y and states relevant factors         Chooses W or Y and states relevant factors         Chooses X or Z with a relevant explanation of a factor         Quality of written communication partly impedes         communication of the science at this level.         (3 – 4 marks)         [Level 1]         Makes a choice and states relevant factors         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.	6	This question is targeted at grades up to E Indicative scientific points may include: Factors • height • cloudless nights • distance from town Explanations • higher – better visibility • fewer cloudless nights – more observations • greater distance from town – less light pollution • nearer to town – easier to access Use the L1, L2, L3 annotations in Scoris; do not use
	(0 marks)	6	ticks.

Q	uestion	Answer	Mark	Guidance
5	a	EITHER planets (1) OR the discovery of many planets increases the likelihood that life exists on one of them (2)	2	Accept solar systems accept an additional mark for conditions suitable for life e.g. water / suitable temperature / atmosphere / suitable distance from star / Goldilocks zone Ignore planets of the solar system
	b	none/0/zero	1	
		Total	3	
6		diagram includes Earth, Moon and Sun Earth is directly between Moon and Sun some rays from the Sun are drawn to show a shadow on the Moon	3	<b>Accept</b> a solar eclipse - 2 marks max. Moon is between Earth and Sun Some rays from the Sun are drawn to show a shadow on the Earth
		Total	3	

Q	Question		Answer	Mark	Guidance
7*	а		these were the (only) planets visible / known about /discovered	1	Accept other planets not bright enough Ignore references to distance
	b	i	(24+4)/10 2.8 (AU)	2	<b>allow</b> answer in table correct numerical answer gains both marks
		ii	the distance calculated is similar ( so it supports law).	1	Accept yes with a reference to 2.8 is just sufficient allow comment consistent with ecf from bi allow anything in range 2.6 – 2.9 to be similar
		iii	any 2	2	<b>Ignore</b> references to peer review / accuracy / calculations / bias / opinion
			observations may be mistakes / wrong		Accept in case he made them up
			check observation / confirm results / check predictions		Ignore more observations
			greater confidence / more reliable ( if observations can be reproduced by others)		

Question	Answer	Mark	Guidance
C	EITHER <i>any 3 from</i> Uranus - good agreement / numerical comparison Neptune - poor agreement / numerical comparison Pluto - (very) poor agreement / numerical comparison Pluto not a major planet, so should not be included. OR 2 marks for general description with no specific planets mentioned e.g. The results show the further out the less accurate An additional mark may be gained for giving an example as above	3	Accept numerical comparison without name
	suitable conclusion (about confidence), <b>based on discussion</b> (1)	1	<b>E.g</b> The Law doesn't work when the distance is large
	Total	10	

Question	Answer	Mark	Guidance
8*	[Level 3] Explains an improvement and states aspects of Cepheid Variable distance measurement Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) [Level 2] Explains an improvement due to space telescopes OR States two improvements OR States an aspect of Cepheid variable distance measurement and states an improvement due to space telescopes OR State aspects of Cepheid variable distance measurement Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) [Level 1] States an improvement due to space telescopes OR states an aspect of Cepheid variable distance measurement Quality of written communication partly 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	<ul> <li>This question is targeted at grades up to C Indicative scientific points may include:</li> <li>how telescopes in space improve measurements <ul> <li>increased baseline</li> <li>lack of atmosphere</li> <li>less light absorbed</li> <li>improved luminosity measurement</li> <li>parallax calculations for more distant objects</li> <li>brightness measurements for more distant objects</li> </ul> </li> <li>Explanation for improvements <ul> <li>idea that there is less absorption or refraction of light by the atmosphere / less scattering of light by the atmosphere</li> <li>increased baseline gives bigger/more accurate angle</li> </ul> </li> <li>Cepheid variables <ul> <li>Cepheids have a period of brightness / pulse / are variable</li> <li>Cepheids have apparent brightness and luminosity</li> <li>luminosity is related to the period of the Cepheid</li> <li>This relationship is used to find distance to more distant Cepheid variables</li> <li>luminosity is compared with apparent brightness to find distance of the Cepheid</li> <li>Must know distance to nearby Cepheids</li> </ul> </li> <li>Do not accept space telescopes are closer to observed stars <ul> <li>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</li> </ul> </li> </ul>
	Total	6	

Guidance
e or disagree findings / looked over /data is <b>ccept</b> any reference to doing <i>further</i> experiments ive opinions/feedback, reviewed
ne's using secondary data / he's used a reference looked up the data
he

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: <u>general.qualifications@ocr.org.uk</u>

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 PART OF THE CAMBRIDGE ASSESSMENT GROUP



© OCR 2014