

GCSE

Physics A

General Certificate of Secondary Education **A333/02**

Unit 3: Ideas in Context plus P7

Mark Scheme for June 2010

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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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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:
 - / = 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

E.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

- work done = 0 marks
- work done lifting = 1 mark
- change in potential energy = 0 marks
- gravitational potential energy = 1 mark

5. Annotations:

The following annotations are available on SCORIS.

 - ✓ = correct response
 - ✗ = incorrect response
 - bod = benefit of the doubt
 - nbod = benefit of the doubt **not** given
 - ECF = error carried forward
 - ^ = information omitted
 - I = ignore
 - R = reject
6. If a candidate alters his/her response, examiners should accept the alteration.
7. 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 boxes 3 and 4 are required for the mark:

Put ticks (✓) in
the two correct
boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be
worth 0 marks.

Put ticks (✓) in
the two correct
boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be
worth one mark.

Put ticks (✓) in
the two correct
boxes.

<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be
worth one mark.

8. 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.

9. 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, e.g. 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.

E.g. If a question requires candidates to identify a city in England, then in the boxes

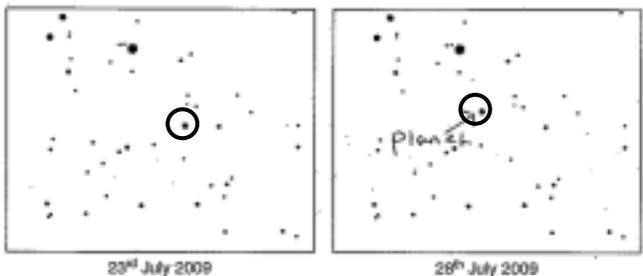
Edinburgh	
Manchester	
Paris	
Southampton	

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

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question			Expected Answers	Marks	Additional Guidance
1	a	i	<p>risk - idea of more uv radiation/ozone destruction (1)</p> <p>benefit - reduced global warming/less climate change/sunlight reflected(1)</p> <p>situation – when climate change is becoming catastrophic/specific example e.g. severe global flooding (1)</p>	[3]	<p>ignore ‘planet becomes too cool’</p> <p>ignore ‘cools the planet’ or reference to temperature</p> <p>accept specific examples of the benefits of reduced global warming e.g. reduces sea level rising</p>
		ii	<p>physical barrier to uv e.g. sun-screen, clothing / keep out of sun/in shade (1)</p>	[1]	<p>reject general remarks such as ‘protect from sun’ or ‘reduce exposure to sunlight’</p> <p>allow ‘put on sun protection’ (this assumes sun protection is some form of cream)</p>
	b	i	<p>evidence – volcanic eruptions (1)</p> <p>reason – very limited evidence/only one example/coincidence/just by chance (1)</p> <p> QoWC clear and ordered answer (1)</p>	[2 + 1]	<p>accept evidence as use of computer simulations or modelling</p> <p>allow ‘scientists suggest more research is needed’</p> <p>ignore suggestion of other factors</p> <p>if the candidate’s response makes sense on the first reading, and has addressed the question, they get the mark</p>
		ii	<p>sulfate particles <u>reflect</u> some sunlight/radiation (1)</p> <p>reduced energy/heat into atmosphere/surface (1)</p>	[2]	<p>reject ‘block the sunlight’ or ‘absorb’</p> <p>ignore reduces temperature/less warming</p> <p>allow ‘reflects energy’ for 2nd marking point but not the 1st</p>
		iii	<p>any two from:</p> <p>idea of cause / causal link;</p> <p>plausible explanation supports argument;</p> <p>provides (additional) evidence;</p>	[2]	<p>accept idea of provides a mechanism/shows how it works</p> <p>‘Theory’ is insufficient</p>

Question		Expected Answers	Marks	Additional Guidance
1	c	<p>any two greenhouse effect points from:</p> <p>carbon dioxide/methane/water vapour;</p> <p>prevents (some) radiation escaping (from Earth);</p> <p>global warming/climate change/specific examples e.g. polar ice caps melting;</p> <p>plus</p> <p>any two ozone layer points from:</p> <p>Ozone/O₃;</p> <p>(Ozone layer) reduces ultraviolet/hole lets more through;</p> <p>ionising radiation/harmful effects to living organisms;</p>	[4]	<p>any 2 marks for greenhouse effect</p> <p>reject non greenhouse gases allow nitrous oxide/nitrogen oxide ignore etc.</p> <p>allow temperature rise</p> <p>any 2 marks for ozone layer</p> <p>accept CFCs</p>
		Total	[15]	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	correctly labelled planet (1) 	[1]	
		ii	move differently from (fixed) stars / retrograde/complex motion (1)	[1]	allow 'move more' comparison with (fixed) stars is required, not just 'it moves'
	b	i	Earth rotates/spins / stars move across the sky / around the pole star / the camera is open for along time so the stars move (1)	[1]	'Earth moves' is insufficient
		ii	6 (1)	[1]	
	c		Idea of Earth on opposite sides of its orbit; facing different directions/looking at different part of the sky;	[1] [1]	both marks can be gained from diagram allow 1 mark only for observer has moved to other side of earth argument
	d		any two from: idea that the Earth orbits the sun (in the same sense as the Earth's spin) (1) idea of earth has to rotate more (than 360°) (1) Idea that the Sun returns to the same position (in the sky) (1)	[2]	
	e		idea of angle (1) additional detail of how to use the angle e.g. across and up / azimuth is angle from North (1)	[1] [1]	accept declination measured from equator or right ascension measured from the vernal equinox ignore coordinates latitude and longitude are insufficient on their own
	f	i	C (1)	[1]	

Question			Expected Answers	Marks	Additional Guidance
2	f	ii	<p>any two from:</p> <p>benefit of remote control;</p> <p>Idea of greater precision;</p> <p>tracking of stars / idea of used over a long period of time (astronomical objects);</p>	[2]	<p>e.g. she doesn't have to be outside/she can do something else/saves time</p> <p>reject ideas about processing images/sharing data</p> <p>allow greater accuracy/finding stars more easily</p> <p>ignore human error</p>
			Total	[13]	
3	a		C (1)	[1]	accept 0.75 as a unique identifier from table
	b	i	0.05 (1) m (1)	[2]	accept 5 cm for 2 marks
		ii	W (1)	[1]	accept 4 or 20 as unique identifiers from table
		iii	<p>Y (1)</p> <p>largest (1)</p> <p>need to collect as much light as possible (1)</p>	[3]	<p>Independent marking points</p> <p>accept 10 or 0.67 as unique identifiers from table</p> <p>accept large diameter or bigger aperture</p> <p>ignore diffraction effects</p>
	c		<u>concave/converging</u> mirror (1)	[1]	
			Total	[8]	

Question			Expected Answers	Marks	Additional Guidance
4	a	i	increased temperature, increased <u>luminosity</u> (1)	[1]	allow positive correlation reject proportional
		ii	Increasing temperature gives decreasing (peak) wavelength (1)	[1]	more smaller wavelengths with increasing temperature
		iii	6973(.15) (1)	[1]	
	b		A (1) C (1)	[2]	list principle applies
Total				[5]	
5	a		idea of gravity (1) volume of cloud decreases / collapse / condenses / increased cloud density (1) Idea of a pressure increase (1)	[3]	accept particle explanations for each marking point e.g. 'gravity brings about an increase in the kinetic energy of particles hence more collisions between them' gains 3 marks ignore fusion
		b	(nuclear) fusion (1)	[1]	
Total				[4]	
6	a	i	a speed ÷ a distance (1) 500 (± 50) (1)	[2]	correct numerical answer (500 ± 50) gains 2 marks
		ii	750 ÷ 71 (1) 10 .6 or (10.56338) (1) Mpc/megaparsec (1)	[2] [1]	correct numerical answer gains 2 marks accept 11 for 2 marks
	b	i	A Cepheid's brightness varies (1) period luminosity relationship (1) idea of comparing luminosity/period and apparent brightness (1)	[3]	must be explicit allow rate of 'pulses' linked to luminosity accept ' (intrinsic) brightness' for luminosity
		ii	parallax (1) idea of colour/brightness/luminosity linked to distance (1)	[2]	accept using apparent brightness and luminosity
Total				[10]	

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

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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