OCR
RECOGNISING ACHIEVEMENT

GCSE

Physics A

General Certificate of Secondary Education

Unit **A333/01:** Unit 3 – Ideas in Context plus P7 (Foundation Tier)

Mark Scheme for June 2012

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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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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
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
NBOD	no benefit of doubt

R	reject
✓	correct 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**

e. 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.

Section A

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>
<table>
<tr><td>most are smaller than moons</td><td>✓</td></tr>
<tr><td>most are larger than moons but smaller than planets</td><td></td></tr>
<tr><td>some are bigger than planets</td><td></td></tr>
<tr><td>most are found orbiting the Sun between mars and Jupiter</td><td>✓</td></tr>
<tr><td>most are on a collision course with the Earth</td><td></td></tr>
</table>
</td><td>2</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>0.08 – 0.10 (million years)</td><td>1</td><td>80 000 to 100 000 years</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>3000 (m)</td><td>1</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>
<table>
<tr><td>iridium found in rock layers around the world</td><td></td></tr>
<tr><td>super volcanic eruptions in India</td><td>✓</td></tr>
<tr><td>‘shocked quartz’ found at the KT boundary</td><td></td></tr>
<tr><td>ecosystems destroyed rapidly</td><td></td></tr>
<tr><td>volcanoes give out large amounts of sulfur dioxide</td><td>✓</td></tr>
</table>
</td><td>2</td><td></td></tr>
</table>

Question			Answers	Marks	Guidance
	(d)		*any 2 from:* idea that they are looking for evidence to support or contradict a particular theory (1) difficult to interpret data on rocks (1) idea of different interpretations or misinterpretation (1) rocks had undergone complex processes/changes after the impact (1)	2	
	(e)	(i)	*any 2 from:* idea of evaluation e.g. evaluated/assessed/checked (1); by other scientists/experts/ (1) idea of before being published (1) QwC clear and well ordered (1)	2 1	**do not accept** any reference to doing *further* experiments **ignore** give opinions/feedback, reviewed **accept** palaeontologists, geochemists, climate modellers, geophysicists, sedimentologists answer must address the question
		(ii)	idea of past evidence/theories/ideas (1) to compare evidence/ to draw conclusions/to judge theories (1)	2	**accept** identified conclusion/theory e.g. asteroid impact
			Total	**13**	

Section B

Question			Answers	Marks	Guidance
2	(a)	(i)	arrow pointing from east to west (left to right)	1	
		(ii)	the Earth rotates/spins (on its axis)	1	**reject** 'around the Sun' **ignore** 'tilted axis'
		(iii)	*any 2 from:* Moon (1) stars (1) galaxies (1)	2	**allow** planets or named planet (1) **allow** named astronomical object
	(b)		planets	1	
	(c)		Earth, Moon and Sun in a line (1) Moon between Earth and Sun (1) rays drawn to show shadow on Earth (1)	3	**allow** written statement to indicate that the moon produces a shadow on the Earth for third marking point (1)
	(d)		Earth orbits the Sun (1); Earth on other side of the Sun (in winter compared to summer) (1) (So) Earth faces opposite direction (at night) (1)	3	**allow** full marks on a suitably labelled diagram **ignore** reference to tilt of Earth
			Total	**11**	

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td>
<table>
<tr><td>less interference from the atmosphere</td><td>✓</td></tr>
<tr><td>easy to repair</td><td></td></tr>
<tr><td>space project may lose funding</td><td></td></tr>
<tr><td>can use more parts of the spectrum</td><td>✓</td></tr>
<tr><td>closer to the stars</td><td></td></tr>
</table>
</td><td>2</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>economic argument (1);
idea of pooling of expertise/ other resources (1)</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>any correctly named <u>astronomical</u> project involving international cooperation</td><td>1</td><td>e.g. Hubble telescope, international space station etc.</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>
<table>
<tr><td>Parallax compares the position of stars at different times.</td><td>✓</td></tr>
<tr><td>Parallax counts the number of stars in part of the sky.</td><td></td></tr>
<tr><td>Parallax compares the size of stars.</td><td></td></tr>
<tr><td>Parallax looks at the colour of stars.</td><td></td></tr>
</table>
</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>one (1);
parsec/(pc) (1)</td><td>2</td><td>accept
3.3 (1)
light years /(ly) (1)</td></tr>
</table>

Question	Answers	Marks	Guidance
(d)		2	

the time it takes for light to come from the star	
the period of the star	✓
the diameter of the galaxy	
the brightness of the star	✓
the colour of the star	

			Total	**10**	

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4</td><td>(a)</td><td>(i)</td><td>Helium / He (1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>using spectroscopy (1)</td><td>1</td><td>allow analysing the light/ spectrum (from the Sun)
allow looking at the spectra (from the Sun)</td></tr>
<tr><td></td><td>(b)</td><td></td><td>core (1);
radiative zone (1);
convective zone (1);
photosphere (1)</td><td>4</td><td>answers must be in the correct positions</td></tr>
<tr><td></td><td>(c)</td><td></td><td><table><tr><td>will be a red giant</td><td>✓</td></tr><tr><td>will be a supernova</td><td></td></tr><tr><td>will fuse helium in its core</td><td>✓</td></tr><tr><td>will have a core of iron</td><td></td></tr><tr><td>will go out</td><td></td></tr></table></td><td>2</td><td></td></tr>
<tr><td></td><td>(d)</td><td></td><td><table><tr><td>neutron star</td><td>✓</td></tr><tr><td>supergiant</td><td></td></tr><tr><td>white dwarf</td><td></td></tr><tr><td>protostar</td><td></td></tr><tr><td>black hole</td><td>✓</td></tr></table></td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>10</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>5</td><td>(a)</td><td>(i)</td><td>concave mirror (1);

incoming rays <u>reflect</u> to a point (1)</td><td>2</td><td>

at least two reasonable rays needed</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>bigger to collect more radiation/light (1)

from faint / distant sources / to see very distant objects (1)</td><td>2</td><td>allow better resolution / gives brighter image
ignore reduces diffraction
do not accept absorbs more light

do not accept more powerful/high magnification</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><td>Each lens has a different power.</td><td>✓</td></tr><tr><td>The objective lens is more powerful than the eyepiece lens.</td><td></td></tr><tr><td>The most powerful lens has a longer focal length.</td><td></td></tr><tr><td>There must be a minimum of 3 lenses.</td><td></td></tr><tr><td>The eyepiece lens has the most curved surface.</td><td>✓</td></tr></table></td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>centre ray continues straight (1);

top ray crosses other 2 where they intersect (1);

point where the correct rays meet is labelled as image/star (1)</td><td>3</td><td>the centre ray intercepts with lower ray should be directly above the letters ‘scopes’ in the second word telescopes in the line below

at least one of the first two marking points must be correct for this mark</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>computer control (1);

(the computer) can position the telescope / find the star (1)</td><td>2</td><td>

for detail of use e.g., (computer) has a sky map/ co-ordinates
ignore idea of tracking object across sky</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>11</td><td></td></tr>
</table>

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