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 January 2013

Oxford Cambridge and RSA Examinations

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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.

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 and 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).

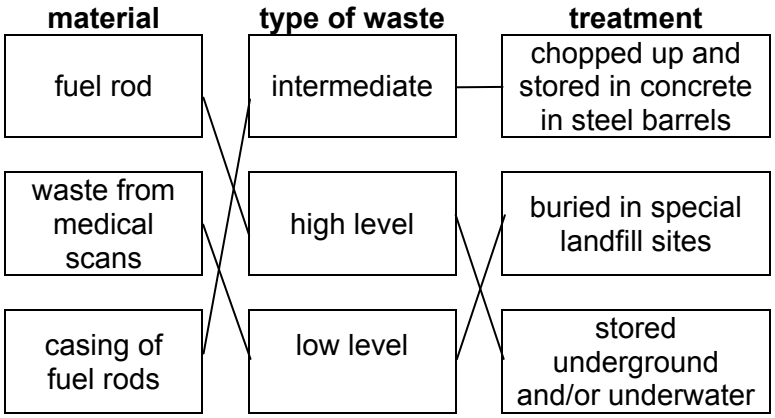
Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

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.

Question			Answer	Marks	Guidance
1	(a)			2	left hand side boxes (1) right hand side boxes (1)
	(b)	(i)	toxic / poisonous	1	**allow** terrorist threat of using plutonium / "dirty bombs"
		(ii)	radiation / activity decreases	1	**accept** changes into another element / it decays **ignore** degrades / disintegrates
		(iii)	10	1	
		(iv)	When the source has the same activity as the background radiation. ✓ When the source is half as radioactive. When the source stops being toxic. When two half-lives have passed.	1	

Question			Answer	Marks	Guidance
	(c)		an example of a benefit eg more money, only job available, altruism, interest (1) an example of the risk eg cancer/health problems (1) explicit statement that (they think) benefits outweigh risks (1) QWC well sequenced answer	4	**allow** social responsibility e.g. 'someone has to do it' **allow** job security they don't understand the risks **ignore** exposure to radiation **ignore** exposure to toxic waste **ignore** harm you unless qualified **accept** benefits outweigh risks
	(d)	(i)	difference to fire alarm - alarm is always on/making a noise/if it stops then something is wrong (1) this means you can tell it is working (1)	2	
		(ii)	**any two from:** name/description AND how reduces risk needed for each mark eg thick armoured pipe – reduce exposure to radiation hazardous material shielded chambers / metre thick leaded glass windows - reduce exposure to radiation OR to absorb radiation before reaching workers remote arms - reduce exposure to radiation/hazardous material / contamination OR not in direct contact OR increase distance from waste put in glass/steel barrels - reduce exposure to hazardous material / contamination OR to prevent leakage of waste OR glass does not degrade owtte	2	
			Total	**14**	

Question			Answer	Marks	Guidance
2	(a)	(i)	**D**	1	
		(ii)	**C**	1	
	(b)	(i)	1 - **F** 2 - **C** 3 - **A**	3	
		(ii)	south to north. ☐ west to east. ☐ north to south. ☐ east to west. ✓	1	
			Total	**6**	

Question			Answer	Marks	Guidance
3	(a)	(i)	**X** (1)	1	
		(ii)	1/0.9 (1) 1.1(1) (1) **D** or Dioptre (1)	3	2 marks for correct numerical answer **allow** two or more of significant figures
		(iii)	...largest diameter. ✓ ...longest focal length. ...collect the most light. ✓ ...the most powerful.	2	
	(b)		2	1	
	(c)		(concave) mirror	1	**ignore** reflector
			Total	**8**	

Question			Answer	Marks	Guidance
4	(a)	(i)	**A** closer (to Earth) than **B** OR **B** further away (from Earth) than **A**	1	**not** A closer **to** B **not** B further away **from** A
		(ii)	10 parsecs	1	
	(b)		advantage: idea of atmosphere in the way; allows use of different parts of spectrum; disadvantage: cost of launch / setting up/maintenance / repair; uncertainties of space program	2	**allow** effects of rotation / position of Earth **allow** clearer image / effect of clouds/distortion owtte
	(c)	(i)	1.5 (±0.1)	1	
		(ii)	5 to 5.5; (1) days (1)	2	
	(d)	(i)	observed brightness / how bright it looks	1	

Question			Answer	Marks	Guidance
		(ii)	observed brightness ☐ size of star ✓ temperature of star ✓ distance to star ☐	2	
	(e)	(i)	parsecs (1) megaparsecs (1)	2	
		(ii)	light year	1	
			Total	**13**	

Question			Answer	Marks	Guidance
5	(a)		gravity / gravitation	1	**do not accept** 'g force'
	(b)	(i)	pressure increase (1) *any one from:* particles move faster / have more kinetic energy; more frequent / energetic collisions; particles have increased momentum; increased forces during collision	2	**do not accept** high pressure OR pressure changes **do not accept** 'vibrates' **ignore** 'moves more' or just 'more energy' **allow** collisions with 'edge' or 'boundary' **accept** 'more collisions'
		(ii)	-270	1	minus sign be present
	(c)	(i)	**name of particle** **charge on particle** neutron none proton positive	1	both required **do not accept** 'neuron' or 'nucleon'
		(ii)	electrical/electrostatic/electromagnetic (repulsion)	1	**accept** 'repulsion of charges' or 'static' OR 'proton repelling proton' **do not accept** 'magnetic' repulsion is insufficient on its own
	(d)	(i)	hydrogen ➔ helium	2	per correct answer (1) **allow** H and He (symbols must be correct) **ignore** any balancing/additional numbers

Question			Answer	Marks	Guidance
		(ii)	**top box:** **either** photosphere (1) light/energy radiated into space/energy transferred to light (1) **or** convection zone (1) energy transferred (outwards) by convection currents (1) **middle box:** **either** convection zone (1) energy transferred (outwards) by convection currents (1) **or** radiative zone (1) energy transferred (outwards) as radiation/light/photons (1) **bottom box:** core (1) energy produced/fusion takes place (1)	6	**do not accept** 'fission' **do not accept** energy built up or energy increasing **accept** 'convective' or 'convectional' zone requires idea of convection currents or cells **do not accept** convection zone for both **accept** 'emitted' or idea of energy leaving star **accept** 'convective' or 'convectional' zone requires idea of convection currents or cells
			Total	**14**	
			Paper Total	**55**	

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