

GCSE

Physics A

Unit **A181/01**: Unit 1 – Modules P1, P2, P3 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2015

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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	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	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
	no benefit of doubt

	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

1. Subject-specific Marking Instructions

- If a candidate alters his/her response, examiners should accept the alteration.
- 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.

✗
✗

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

✓
✗

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

✗
✗
✓
✓

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 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

MARK SCHEME: overlap with A181/02 shown by shading in column 3

Question			Answer	Mark	Guidance
1			galaxy (1); star (1); hydrogen (1)	3	
			Total	3	
2	a		1 st & 3 rd boxes (continents fit & similar fossils)	2	one mark each
	b		2 nd & 4 th boxes (not seem to move & not enough evidence)	2	one mark each
			Total	4	
3	a	i	200 (m/s)	1	
	a	ii	distance = speed × time = 200 m/s × 30 000 s = 6 000 000 (m) = 6000 (km)	2	6000 (2) ecf wrong speed in (a)(i) If not (2) then EITHER 6 000 000 or 200 × 30 000 (1) OR allow correct conversion from m to km (1)
	b		If you divide the speed by the depth (or vice versa) you get the same value OR you plot a graph, it's a straight line though the origin OR speed = constant × depth (1); use of data to show that it is not true (1)	2	Proposing a test (which includes attempting to perform it) e.g. dividing one variable by the other, or sketching a graph, gets the first mark Second mark needs application of the test (which could be an annotated sketch graph or 45/10 is not 200/10)
	c		The amplitude is bigger on the shore OR smaller in mid-ocean (1); Wavelength gets smaller OR waves bunch more/waves slow down as they approach land (1); Large amplitude means more (potential) energy (to cause damage) (1); Waves go further inland OR can get over barriers (1)	2	any two points large amplitude could be 'taller/higher wave' but ignore 'bigger waves'; could describe vertical motion of e.g. ship ignore "frequency change" ignore kinetic energy e.g. can cause flooding inland
			Total	7	

Question	Answer	Mark	Guidance
4	<p>(Level 3) Good sketch of central star with at least five planets in separate orbits and at least two relevant statements about formation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>(Level 2) EITHER Good sketch of central star with at least five planets in separate orbits or at least two relevant statements about formation OR Sketches a star with one orbiting planet and relevant statement about formation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>(Level 1) Sketches a star with one orbiting planet or relevant statement about formation. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>(Level 0) Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	[6]	<p>This question is targeted at grades up to C</p> <p>Indicative scientific points may include:</p> <p>Sketch/description of τ Ceti system</p> <ul style="list-style-type: none"> • star/sun and planets (ignore any names) clearly distinguished e.g. by labelling or relative sizes • (at least) five planets: need not be in same plane • planetary orbits indicated/described • Star at centre of orbits • Ignore dust <p>description of formation</p> <ul style="list-style-type: none"> • started with cloud of dust and gas (nebula) • gas condensed/came together (by gravity) • most in middle • middle bit formed the star • nuclear fusion takes place in star • other bits formed planets • may also refer to asteroids or comet. <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	Total	6	

Question			Answer	Mark	Guidance
5	a		digital: consists of pulses OR just two values OR 0 & 1 (1); analogue: lots of different values OR varies all the time (1)	2	1 mark for digital statement 1 mark for analogue statement. allow 'on or off' ignore digital signal is straight allow analogue is a wave/wavy allow analogue goes below zero (1)
	b		(0) 1 0 1 1 0		all correct = (2); only uses 1s and/or 0s = (1)
	c		Noise/interference is less of a problem OR signal quality is better OR noise can be removed (1); can be stored in computers (1); can be processed by computers (1)	2	any two accept 'less affected by noise', 'clearer'; ignore 'do not pick up noise', 'stronger/better signal' accept 'more information per second' or 'more channels' as a separate marking point
			Total	6	
6	a	i	1950 (1); 2000 (1)	2	Any order
	a	ii	1700, 1750, 1800 and 1850	2	Any order ignore "all except 1900, 1950 and 2000" ignore "1700-1850" ignore "below 1851" all correct = (2) one omission OR one extra OR one incorrect date (1)
	b	i	Alice (1); Chandra (1)	2	
	b	ii	Ben (1); Eddie (1)	2	
			Total	8	

Question	Answer	Mark	Guidance
7	<p>(Level 3) Gives a scientific statement related to risk and gives a scientific statement related to scepticism.</p> <p>Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>(Level 2) EITHER Gives a non-scientific statement related to risk and gives a non-scientific statement related to scepticism. OR Gives a scientific statement related to risk or gives a scientific statement related to scepticism</p> <p>Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>(Level 1) Gives a non-scientific statement related to risk or gives a non-scientific statement related to scepticism.</p> <p>Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>(Level 0) Insufficient or irrelevant science. Answer not worthy of credit. E.g. 'because it produces so much radiation in an hour' - repeats question. 'Because it is dangerous' 'because they are journalists' 'because it's not true' (0 marks)</p>	[6]	<p>This question is targeted at grades up to E</p> <p>Indicative scientific points related to risk may include:</p> <ul style="list-style-type: none"> • mobile phones used close to head • could damage/'cook/fries' your brain • as brain is mostly water, which absorbs microwaves • idea of skin or cell damage by heating • the longer the use of the phone greater the risk <p>Indicative scientific points related to scepticism may include:</p> <ul style="list-style-type: none"> • most of the microwave energy escapes (in all directions) • difficult as some heat lost to the environment • no (scientific) evidence (that phones cause harm) • when we use our phones we do not experience this heating effect <p>Indicative non-scientific points related to risk may include:</p> <ul style="list-style-type: none"> • phones may harm/cook/fry you • their children may use phones • (they may think that) phones may give out ionising radiation and/or increase cancer risk or (cell) mutations <p>Indicative non-scientific points related to scepticism may include:</p> <ul style="list-style-type: none"> • there's a lot of rubbish on the internet • not everything journalists say is true • wouldn't be allowed to sell phones (if risk) • you don't hear about people getting hurt by phones <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	Total	6	

Question			Answer	Mark	Guidance																				
8	a	i	1.5 (kW)	1																					
	a	ii	$P = 0.5 \text{ (kW)}$ $E = 0.5 \text{ kW} \times 24 \text{ h} = 12 \text{ (kWh)}$	2	A bald answer of 12 (2) If not (2) then EITHER 0.5 in working or answer (1) OR any number x 24 correctly evaluated and presented as the final answer (1) e.g. $7.5 \times 24 = 180$																				
	b		dark / cold in the winter (1); need (more) energy/electricity/power for heat/light (in the wintertime in the UK) (1); in the wintertime turbines in action more (often) (1) more power/energy/electricity output (when windier) (1)	2	any two points allow light/hot in summer (1) ignore wind farms need wind																				
	c		<table><thead><tr><th>Place</th><th>wind?</th><th>distribution?</th><th></th></tr></thead><tbody><tr><td>Paisley</td><td>no</td><td>yes</td><td>(1);</td></tr><tr><td>Leuchars</td><td>yes</td><td>yes</td><td>(1);</td></tr><tr><td>Kinloss</td><td>no</td><td>yes</td><td>(1);</td></tr><tr><td>Kirkwall</td><td>yes</td><td>no</td><td>(1)</td></tr></tbody></table>	Place	wind?	distribution?		Paisley	no	yes	(1);	Leuchars	yes	yes	(1);	Kinloss	no	yes	(1);	Kirkwall	yes	no	(1)	4	One mark for each correct row accept only yes/Y and no/N responses
Place	wind?	distribution?																							
Paisley	no	yes	(1);																						
Leuchars	yes	yes	(1);																						
Kinloss	no	yes	(1);																						
Kirkwall	yes	no	(1)																						
			Total	9																					
9	a		<table><tbody><tr><td>(3)</td><td rowspan="5">all correct = (2); two correct = (1) (1) ecf own entries above</td></tr><tr><td>4.4</td></tr><tr><td>1</td></tr><tr><td>1</td></tr><tr><td>9.4</td></tr></tbody></table>	(3)	all correct = (2); two correct = (1) (1) ecf own entries above	4.4	1	1	9.4	3															
(3)	all correct = (2); two correct = (1) (1) ecf own entries above																								
4.4																									
1																									
1																									
9.4																									
	b		90 p	1																					
	c		The currents through them... (2nd box)	1																					
			Total	5																					

Question	Answer	Mark	Guidance
10	<p>(Level 3)</p> <p>An advantage and a disadvantage for each identified power station Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>(Level 2) EITHER One advantage and disadvantage for one identified power station OR One advantage or one disadvantage for nuclear and one advantage or one disadvantage for gas Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>(Level 1)</p> <p>An advantage or disadvantage for an identified power station Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>(Level 0) Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	[6]	<p>This question is targeted at grades up to E</p> <p>Indicative scientific points about gas may include:</p> <p>advantages</p> <ul style="list-style-type: none"> • build power stations quickly/ cheaply • can respond quickly to changes in demand • gas supply in the UK • doesn't depend on weather/season • can be built anywhere <p>disadvantages</p> <ul style="list-style-type: none"> • produces carbon dioxide • (which is) a cause of global warming. • it is not renewable/sustainable • contributes to acid rain <p>Indicative scientific points about nuclear may include:</p> <p>advantages</p> <ul style="list-style-type: none"> • no carbon dioxide produced (in use) • can provide lots of energy • doesn't depend on weather/season • not in short supply or more sustainable (ignore 'it is renewable') <p>disadvantages</p> <ul style="list-style-type: none"> • produces nuclear waste • which remains radioactive for a very long time • and can cause cancer • more expensive/slow to build and/or decommission • needs to be near water • will run out eventually <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	Total	6	

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