OCR
Oxford Cambridge and RSA

GCSE

Physics A

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

General Certificate of Secondary Education

Mark Scheme for June 2017

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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	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

R	reject
✓	correct response
≈	draw attention to particular part of candidate's response
^	information omitted

Subject-specific Marking Instructions

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

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 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 <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**

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

Question			Answer	Mark	Guidance
1	a		**C**	1	
	b		**B**	1	
			Total	2	
2			**Any two points from;** these planets are (too) far away (1) ; can't go there / it would take too long to get there (1) ; need to rely on signals/light received (1) ; signals/light from the planets would be very faint (1)	2	**ACCEPT** It would take years/a long time to get there **IGNORE** it will take years to find out **IGNORE** difficult to see
			Total	2	
3	a		**Y**	1	
	b		**X**	1	
	c		4000 m/s	1	1st box
			Total	3	

Question			Answer	Mark	Guidance
4			**(Level 3)** Explains what stars and galaxies are and how this information was discovered. At least one of these is described in some detail. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Explains both stars and galaxies **OR** explains stars and how information about them was discovered **OR** explains galaxies and how information about them was discovered. One aspect is covered in some detail. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Explains in some detail the nature of stars **OR** galaxies **OR** how information about them was discovered. 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)	**[6]**	**This question is targeted at grades up to E** **Indicative scientific points may include:** **nature of stars** • much larger than e.g. planets • (large ball of hot) gas • like the Sun • The Sun is a/our star • Radiates/gives (out) energy/light • energy from fusion/fusion makes them very hot • elements heavier than hydrogen are made in stars • (mainly) hydrogen (and helium) • (other stars are) far away / light years away **nature of galaxies** • are collections of stars • contain millions of stars • much further away than (visible) stars / light years away • (distant) galaxies are moving away from us • The Milky Way is a/our galaxy **how information about them was discovered** • Needed/used telescopes • distances could be found • all information comes from radiation • from e.g. brightness (if identical then brighter star is closer) colour (temperature) spectra (elements present) • from parallax (closer stars appear to move more) • from blue/red shift (moving closer/further away) • imagination/brilliance/creativity needed to create theories **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

Question			Answer	Mark	Guidance
5	a		**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **If answer = 168 000 (m) award 2 marks.** distance = 8000 (m/s) × 21 (s) (1) ; = 168 000 (m) (1)	**2**	
	b		Turkey is at the edge of a tectonic plate.	**1**	2nd box
	c	**i**	**D**	**1**	
	c	**ii**	**C**	**1**	
	c	**iii**	**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **If answer = 2000 (m/s) award 2 marks** **if answer = 2 (m/s) award 1 mark** 1 km = 1000 m (1); speed (= frequency × wavelength) = 2 (Hz) × 1000 (m) = 2000 (m/s) (1)	**2**	Needs use of equation & evaluation of own values of f and λ for this mark, e.g. λ = 100 m and speed = 200 m/s would get m.p.2 (ecf) only, as m.p.1 has a conversion error.
			Total	**7**	

Question			Answer	Mark	Guidance
6	a	i	**B**	1	
	a	ii	**A**	1	
	b		Respiration and photosynthesis (1) ; these processes were balanced (1) ; **OR** Respiration put CO_2 into the atmosphere (at same rate as) photosynthesis removed it (2) ;	2	**IGNORE** label letters **IGNORE** Other processes for releasing CO_2 e.g. burning /decomposition/dissolving **ALLOW** same amount of carbon (dioxide) taken in & given out **ALLOW** max mark of 1 for idea that fossil fuels were not being burnt **OR** less deforestation if no other marks scored.
	c	i & ii	(increased use of /burning) fossil fuels (1) ; deforestation (1)	2	**ALLOW** answers to **i** & **ii** given in either order **ALLOW** (use of/burning) a named fossil fuel **ALLOW** example of increased use e.g. cars / factories **IGNORE** more people / more pollution / CO_2 emissions
			Total	6	

Question			Answer	Mark	Guidance
7	a		**A** = microwaves (1) ; **B** = ultraviolet / UV (1)	2	
	b		Gamma / γ (rays) (1)	1	
	c		**Any two from** X-rays gamma / γ (rays) ultraviolet / UV (1)	1	
	d		infrared **or** visible (1)	1	
			Total	5	
8	a		Vertical jumps from 0 to 1 and no other levels shown – must have at least 2 changes between levels.	1	Judge vertical by eye.
	b		TV needs more or Radio needs less (information / bytes) (1) ; because TV has images (as well as sound) / Radio has only sound/ no images (1)	2	**ALLOW** TV has colour/ video **ALLOW** for 2 marks the idea that images need more information than sound (candidates not expected to know that this is not true) **IGNORE** they are different /transmit different things
			Total	3	

Question			Answer	Mark	Guidance
9			**(Level 3)** States a UV danger and a way in which the danger has been reduced and refers to relevant gas/layer as 'ozone' **AND** does not include inappropriate reference to CO_2 /global warming issues. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** States a UV danger and a way in which the danger has been reduced **OR** States a UV danger and refers to relevant gas/layer as 'ozone' **OR** States a way in which the danger has been reduced and refers to relevant gas/layer as 'ozone' **AND** does not include inappropriate reference to CO_2 /global warming issues. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** States a UV danger **OR** states a way in which the danger has been reduced **OR** refers to relevant gas/layer as 'ozone' **and** does not include inappropriate reference to CO_2 /global warming issues. 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)	**[6]**	**This question is targeted at grades up to E** **Indicative scientific points related to ultraviolet danger may include:** • Ultraviolet radiation from the Sun reaches Earth's surface / is not absorbed/ is transmitted • Ultraviolet radiation is ionising • it can damage skin/ eyes • may mutate DNA • may cause cancer **Indicative scientific points related to the correct scientific terminology for the gas /layer may include:** • gas is ozone / O_3 • Natural layer is ozone layer / O_3 **Indicative scientific points related to reducing the danger may include:** • Don't use chemicals that damage the layer • Don't use CFCs • Use chemicals that don't damage the layer • prevent (further) damage to/ allow recovery of the layer. • (international laws) ban the (damaging) chemicals • Regulations/ methods of disposal of fridges • raise awareness so people reduce exposure • exposure can be reduced e.g. by staying out of the sunshine, wearing sunscreen and covering up. **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
			Total	**6**	

Question			Answer	Mark	Guidance
10			secondary (1) ; fossil (1)	2	
			Total	2	
11	a		800 J	1	
	b		**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **If answer = 40 (%) award 2 marks** **If answer = 0.4 award 1 mark** efficiency = (800/2000)×100% (1) ; = 40 (%) (1)	2	ecf wrong answer from (a)
	c		divides energy flow at either 4th dotty line up or 4th dotty line down (1) ; one division labelled as wasted/ 1200(J)/ 60% **and** one division labelled as useful/ electrical/ 800(J)/ 40% (1)	2	**Max 1 mark if wider division is labelled as useful** **ALLOW** ecf (a) or (b) values J/% for useful label with waste correct or =2000J - ecf value (a) or =100% - ecf value (b) **ALLOW** appropriate alternative labels to wasted energy e.g. thermal energy, heat, heat and sound.
			Total	5	
12	a	i	24	1	
	a	ii	£2.70	1	
	b		**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **If answer = 1.15 (kWh) award 3 marks** **If answer = 1150 (kWh) award 2 marks** power (= 10 A × 230 V) = 2300 (W) (1) ; power = 2.3 (kW) **OR** time = 0.5 (hours) (1) ; energy transferred (= 2.3 kW × 0.5 h) = 1.15 (kWh) (1)	3	Only 1 conversion needed for m.p.2 No ecf from m.p.2
	c		**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **If answer = 540 (J) award 2 marks** **If answer = 1.8 award 1 mark** power = 0.6 A × 3.0 V = 1.8 W (1) ; (t = 5 × 60 s = 300 s) so E (= 1.8 W × 300 s) = 540 J (1)	2	e.g. no working but 1.8 on the answer line would get m.p.1
			Total	7	

Question			Answer	Mark	Guidance
13			**(Level 3)** Discusses advantages and disadvantages to householders and to the country as a whole, using examples from all three areas. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Discusses advantages and disadvantages, using examples from more than one area. May restrict answer to householders or to the country as a whole but not consider both. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Discusses advantages **or** disadvantages using examples from one area **OR** gives an advantage **and** disadvantage, using examples from one area. May restrict answer to householders or to the country as a whole but not consider both. 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)	**[6]**	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Supply issues** • reliability • capacity • locating sufficient sites for installation • displaced land use • reduces the need to import energy from other countries **Environmental impact** • reduces use of fossil fuels • less CO_2 • reduces global warming • habitat loss • identified pollution, e.g. health issues related to air quality, ugly solar farms, noisy wind farms • no radioactive waste produced **Economic impact** • cheaper • installation costs • job loss/creation • payback time • need to be aware of lobbying by e.g. local groups, big oil companies • renewables won't run out / sustainable **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

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