



Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE

In Physics (5PH1F) Paper 1F



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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Acceptable answers	Marks
1 (a)(i)	<p>One from electromagnetic (waves) (1)</p> <p>(seismic) secondary / S (wave) (1)</p>	<p>any named electro-magnetic wave e.g. UV</p> <p>EM</p> <p>mexican wave</p> <p>correct diagram or description (e.g. how to use "slinky")</p> <p>ignore unqualified seismic/earthquak e</p> <p>ignore references to a.c. electricity/CRO traces</p>	(1)

Question number	Answer	Acceptable answers	Marks
1 (a)(ii)	<p>One from</p> <p>(seismic) primary / P (wave) (1)</p> <p>ultrasound (1)</p> <p>infrasound (1)</p>	<p>{shock/pressure} waves</p> <p>correct diagram or description (e.g. how to use "slinky")</p> <p>ignore unqualified seismic/earthquak e (waves)</p>	(1)

Question number	Answer	Acceptable answers	Marks
1 (b)	☒ C 24 (cm) The only correct answer is C A is not correct because 10 cm is half the wavelength B is not correct because 20 cm is the wavelength D is not correct because 48 cm is twice the amplitude		(1)

Question number	Answer	Acceptable answers	Marks
1 (c)	Must be in this order P: reflected (1) Q: refracted (1)	accept reflection, reflecting etc accept refraction, refracting etc ignore spelling errors as long as they do not confuse reflected and refracted eg reflacted or refrected score 0 do not award for a line if more than one word given on the line	(2)

Question number	Answer	Acceptable answers	Marks
1 (d)	substitution (1) 1100×3.00 evaluation (1) 3300 unit (1) m/s	award full marks (2) for correct numerical answer without working accept power of 10 error (even without working) for 1 mark ecf from MP1 to MP2 as long as working shows multiplication with at least one number correct. m s^{-1} , metres/sec, metres per second ignore mps	(3)

(Total for Question 1 = 8 marks)

Question number	Answer	Acceptable answers	Marks
2 (a)	☒ D no yes The only correct answer is D A is not correct because an S wave is transverse B is not correct because an S wave is not electromagnetic Outer core C is not correct because an S wave is not electromagnetic		(1)

Question number	Answer	Acceptable answers	Marks
2 (b)	☒ A in the crust The only correct answer is A B is not correct because there are no plates in the inner core C is not correct because there are no plates in the mantle D is not correct because there are no plates in the outer core		(1)

Question number	Answer	Acceptable answers	Marks
2 (c)	<p>An explanation linking any two of:</p> <p>(circles intersect) in two places (1)</p> <p>(earthquake could be) at either of these (1)</p> <p>three circles/stations are needed (1)</p>	<p>anywhere in overlap or where circles cross</p> <p>“triangulation”</p> <p>If no other mark scored, idea of inaccuracy of <i>distance measurement</i> = 1 mark</p> <p>marks can be scored from appropriate annotations on diagram</p>	(2)

Question number	Answer	Acceptable answers	Marks
2 (d)	<p>(initial) detection time (is different) (1)</p> <p>(maximum) {amplitude/height/strength} (of the signal is different) (1)</p>	<p>either order</p> <p>starting time / numerical values quoted (i.e. 20, 25, 30)</p> <p>'{hit / strikes} much later' is just sufficient</p> <p>ignore responses which are ambiguous with respect to the length of time for the signal</p> <p>louder / taller / magnitude / intensity / power / bigger</p> <p>ignore references to frequency / wavelength</p>	(2)

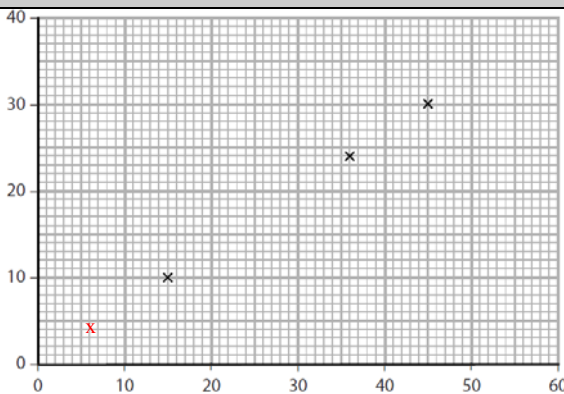
Question number	Answer	Acceptable answers	Marks
2 (e)	<p>An explanation linking any TWO of:</p> <p>earthquakes (1)</p> <p>(earthquakes) are difficult to predict (1)</p> <p>{(earthquake) under the water / tsunami {on/in} the water} (1)</p>	<p>P and S waves / meteorite / rock falls / volcanoes / plate movement</p> <p>difficult to monitor / difficult to get accurate readings random / sudden / unpredictable / can occur at any time</p> <p>ocean / sea for water</p>	(2)

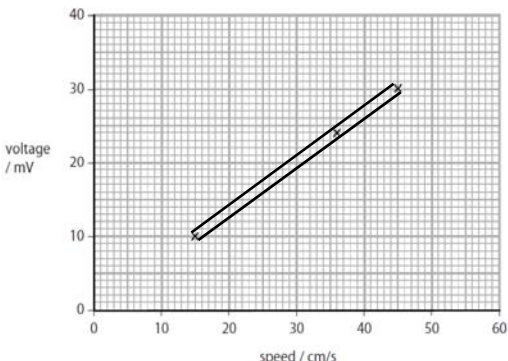
(Total for Question 2 = 8 marks)

Question number	Answer	Acceptable answers	Marks
3 (a)	☒ C volt The only correct answer is C A is not correct because the amp is a unit of current B is not correct because the joule is a unit of energy D is not correct because the watt is a unit of power		(1)

Question number	Answer	Acceptable answers	Marks
3 (b)	Must be in this order high (1) efficiency (1) loss (1)	accept recognisable misspellings do not award for a line if more than one word given on the line	(3)

Question number	Answer	Acceptable answers	Marks
3 (c)	substitution (1) 0.5 x 12 evaluation (1) 6 unit (1) W	award full marks (2) for correct numerical answer without working watt joule per second J/s J s ⁻¹ Joule per second VA AV ignore j/s ignore jps unit must be compatible with numerical answer IF no numerical answer or working, accept kW etc.	(3)

Question number	Answer	Acceptable answers	Marks
3 (d)(i)		<p>must be shown with a cross (bod noticeable dot)</p> <p>if a second or more crosses are given, this mark should not be awarded</p> <p>+/- ½ a small square but clearly associated with correct intersection</p>	(1)

Question number	Answer	Acceptable answers	Marks
3 (d)(ii)	 <p>line within region shown</p>	<p>straight line – judge by eye</p> <p>passing through top x and bottom marked x somewhere</p> <p>ignore extension to their own marked x</p>	(1)

Question number	Answer	Acceptable answers	Marks
3 (d)(iii)	☒ B 13 mV The only correct answer is B A is not correct because 6.5 is not 13 C is not correct because 26 is not 13 D is not correct because 30 is not 13		(1)

(Total for Question 3 = 10 marks)

Question number	Answer	Acceptable answers	Marks
4 (a)	591 – 15.0 (1) 576 (units of distance) (1)	clear indication of subtraction award full marks for correct answer without working	(2)

Question number	Answer	Acceptable answers	Marks
4 (b)	Explanation linking any two of: (both) orbiting/moving (around the Sun) (1) at different (orbital) speeds / rates / radii (1) positions relative to Sun changes (1)	different eccentricities in different (orbital) times different radii and orbits can be shown on a (labelled) diagram to score 2 marks ignore expanding universe ignore red shift ignore rotation / spinning / tilt	(2)

Question number	Answer	Acceptable answers	Marks
4 (c)	<p>EITHER</p> <p>$591/15$ (1)</p> <p>$8 \times 591/15$ (1)</p> <p>315 (mins) (1)</p> <p>OR</p> <p>$15 \div 8$ (1)</p> <p>$591 \div 1.875$ (1)</p> <p>315 (mins) (1)</p>	<p>39.4</p> <p>accept in range 311 -320 due to possible rounding</p> <p>1.875</p> <p>$591 \times 8 \div 15$</p> <p>accept in range 311 -320 due to possible rounding</p> <p>award full marks for correct answer without working</p> <p>5.25 hours with unit – 3 marks 5.25 without unit – 2 marks</p> <p>Look out for alternative scaling factors 0.025 and 0.53, which can lead to full marks.</p>	(3)

Question number	Answer	Acceptable answers	Marks
4 (d)	<p>Must be in this order</p> <p>nebula (1)</p> <p>red giant (1)</p> <p>white dwarf (1)</p>	<p>accept recognisable misspellings.</p> <p>the names do not score if they are in the incorrect place in the table</p> <p>if more than one word per line, no mark for that line</p>	(3)

(Total for Question 4 = 10 marks)

Question number	Answer	Acceptable answers	Marks
5 (a)(i)	☒ C all travel at the same speed in a vacuum The only correct answer is C A is not correct because wavelength in a vacuum can change B is not correct because wavelength in glass can change D is not correct because speed in glass can be different		(1)

Question number	Answer	Acceptable answers	Marks			
5 (a)(ii)	red and orange (in this order) (1) green (1) violet (1)	do not accept 'purple' for violet do not award for a box if more than one word given in the box accept recognisable misspellings as long as the meaning is clear (eg violent)				
(RED	ORANGE) (1)	yellow	GREEN (1)	blue	indigo	VIOLET (1)
(3)						

Question number	Answer	Acceptable answers	Marks
5 (a)(iii)	any two from: cooking (1) (mobile) phones (1) satellite (transmissions) (1)	heating water / food sterilization 'mobiles' allow communications for either mp2 or mp3 but not both allow any other sensible use e.g. skin treatments/ ablation / radar ignore unqualified medical use	(2)

Question Number	Indicative Content	Mark
QWC	<p>*5(b)</p> <p>Exp</p> <p>A comparison including some of the following points:</p> <ul style="list-style-type: none"> e.m. waves (from low to high frequency) <ul style="list-style-type: none"> radio (waves) microwaves infrared (<i>light</i>) ultraviolet X-rays gamma (rays) effects of e.m. waves <ul style="list-style-type: none"> radio (waves) no harm to humans / may cause headaches / inconclusive evidence microwaves internal heating of body cells (ignore cancer) infrared (skin) burns (ignore cancer) ultraviolet eye damage / cause (skin) cancer / sunburn / damage to {cells/tissues} X-rays mutation or damage to {cells/tissues} / cause cancer gamma (rays) mutation or damage to {cells/tissues} / cause cancer <p>NOTE: If two effects are given for one wave, one right and one wrong, ignore the incorrect one.</p>	(6)
Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> a limited comparison giving two em waves on opposite sides of light OR one wave and {its harmful effect / frequency higher or lower} e.g. infrared and gamma are em waves the answer communicates ideas using simple language and uses limited scientific terminology spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> a simple comparison giving two em waves, comparing frequencies OR harmful effects OR one wave comparing frequencies AND harmful effects e.g. infrared and gamma are em waves, infrared has the lower frequency OR Gamma rays are harmful as they mutate cells but radio waves are harmless the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately spelling, punctuation and grammar are used with some accuracy

3	5 - 6	<ul style="list-style-type: none"> • a detailed comparison giving two appropriate em waves, comparing their frequencies AND their harmful effects e.g. infrared and gamma are em waves, infrared has the lower frequency, infrared causes skin burns, gamma causes cancer • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors
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(Total for Question 5 = 12 marks)

Question number	Answer	Acceptable answers	Marks								
6 (a)(i)	61 AND 9 (1)	Note: THERE IS ONLY ONE MARK FOR TOP BOX AND MIDDLE BOX TOGETHER	(2)								
	70 (1)										
	The numbers must be in the correct box										
	<table><tr><th>type of energy</th><th>amount of energy / J</th></tr><tr><td>thermal (heat)</td><td>61</td></tr><tr><td>light</td><td>9</td></tr><tr><td>electrical</td><td>70</td></tr></table>			type of energy	amount of energy / J	thermal (heat)	61	light	9	electrical	70
	type of energy			amount of energy / J							
	thermal (heat)			61							
light	9										
electrical	70										

Question number	Answer	Acceptable answers	Marks
6 (a)(ii)	<p>An explanation linking</p> <p>(electrical) energy supplied {equals / is constant} (1)</p> <p>(to) energy given out (1)</p>	<p>idea of equilibrium can score 2</p> <p>stays the same</p> <p>simple idea of using and losing scores 1</p> <p>heat given out and taken in are equal is minimum for 2 marks</p>	(2)

Question number	Answer	Acceptable answers	Marks
6 (b)	substitution (1) $2500 \times 20/100$ evaluation (1) 500 (J)	2500×0.2 20% of 2500 accept $2500 \times 0.2/100$ 5 (J) for 2 marks award full marks for the correct answer without working. award 1 mark for a power of 10 error (with or without working)	(2)

Question Number	Indicative Content	Mark
QWC	<p>*6(c) Exp</p> <p>An explanation including some of the following points:</p> <ul style="list-style-type: none"> • 15 W lamp is the energy-saving lamp • light energy output for both lamps is 1.5 J • energy is lost/wasted for both lamps in power station, transmission lines and lamp • less energy is lost at each stage for 15 W lamp than 60 W lamp • 15 W lamp wastes 13.5J energy • 60 W lamp wastes 58.5 J • 186.5 J is wasted in producing 1.5 J for 60 W lamp • 45.5 J is wasted in producing 1.5 J for 15 W lamp • energy input of 60 W lamp is 188 J • energy input for 15 W lamp is 47 J 	(6)
Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited explanation quoting any value from chart in the correct context e.g. 8 J is wasted in transmission lines for 60 W lamp <p>OR</p> <ul style="list-style-type: none"> • a qualitative statement about an input or an output e.g. one lamp takes in more energy at the power station. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<p>a simple explanation linking qualitatively the same output energy from lamp with the input energy at supply or lamps e.g. (so) for the same {useful / light} output less energy is drawn from the supply with the energy-saving lamp</p> <p>OR</p> <p>a quantitative link between useful / waste energies, only for lamps e.g. the 15 W lamp wasted only 13.5 W whereas the 60 W lamp wastes 58.5 W e.g. energy outputs of both lamps are 1.5 J</p> <p>OR</p> <p>a quantitative link showing the wasted energies from supply to lamp for one lamp. e.g. 186.5J is wasted by the 60W lamp</p> <ul style="list-style-type: none"> • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • a detailed explanation linking stated values of energy output compared to stated values of input, illustrating energy savings. e.g. (so) for the same 1.5 J (or {useful / light} output), less energy, 47 J, is drawn from the supply with 15 W lamp than with 60 W lamp, 188 J.

		<ul style="list-style-type: none"> the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately spelling, punctuation and grammar are used with few errors
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(Total for Question 6 = 12 marks)