Mark Scheme (Final)

Summer 2017

Pearson Edexcel GCSE

In Physics (5PH1H) Paper 1H

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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)	☒ **B** inverted and real **The only correct answer is B** **A** t is not correct because he image is never upright in this arrangement **C** is not correct because a virtual image cannot be obtained on a screen **D** is not correct because a virtual image cannot be obtained on a screen		**(1)**

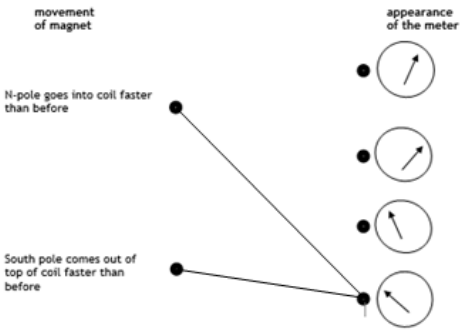
Question number	Answer	Acceptable answers	Marks
1 (a) (ii)	image distance when object is a long way away(1)	distance between (centre of) lens and {focal point/principal focus/ (point) where parallel rays meet (after lens)} NOT just where the image is formed 1/power(of lens)	**(1)**

Question number	Answer	Acceptable answers	Marks
1 (a) (iii)	14 ± 2 (cm) 12 to 16 (cm) (1)	0.12 to 0.16 (m)	**(1)**

Question number	Answer	Acceptable answers	Marks
1 (b)	Description to include two of the following for a reflecting telescope: converging mirror (1) (mirror) is used as an objective (1) a real image is formed (by reflection) (1)	 concave mirror(s) mirror(s) rather than lens(es) are used to collect light allow answers in terms of greater aperture for one mark	**(2)**

Question number	Answer	Acceptable answers	Marks
1 (c)	Explanation linking: relevant invention (1) eg 1.radio telescope 2. camera how it improves things – linking directly to first mark point (2) eg 1.new information as collects data/signals from other regions of em spectrum 2. brighter image as collects light over long period of time	 (named) space telescope / adaptive optics / radio etc telescope / cameras / arrays /rover	**(3)**

(Total for Question 1 = 8 marks)

Question number	Answer	Acceptable answers	Marks
2 (a)	One mark for each line correct  	if more than 2 lines used deduct 1 mark for each extra line	**(2)**

Question number	Answer	Acceptable answers	Marks
2 (b)	Explanation linking: current changes direction for P (1) but current does not change direction for Q (1)	In P current has both +ve and –ve values /(values/graph/line) above and below zero Q always +ve / always above zero	**(2)**

Question number	Answer	Acceptable answers	Marks
2 (c)	transformers work on ac	transformers do not work with d.c.	**(1)**

Question number	Answer	Acceptable answers	Marks
2 (d)	Identification of coils (1) i.e. 500 turns is N_p or 20 turns is N_s Substitution (1) $\frac{Vp}{12} = \frac{500}{20}$ (scores 2 marks) Transformation (1) $\frac{Vp}{12} = \frac{500 \times 12}{20}$ (scores 3 marks) evaluation (1) 300 (V)	Award full marks for correct answer with no working Transformation may take place before substitution ecf coil identification $\frac{Vp}{12} = \frac{20}{500}$ for 1 mark $Vp = \frac{20}{500} \times 12$ for 2 marks Vp = 0.48 (V) for 3 marks	**(4)**

(Total for Question 2 = 9 marks)

Question number	Answer	Acceptable answers	Marks
3 (a)(i)	☒ **C** 2500 joules per second **The only correct answer is C** **A** is not correct because amps per volt is not equivalent to joules per second **B** is not correct because joules per amp is not equivalent to joules per second **D** is not correct because joules per volt is not equivalent to joules per second		**(1)**

Question number	Answer	Acceptable answers	Marks
3 (a)(ii)	substitution (1) $\frac{2.5 \times 12 \times 20}{60}$ evaluation (1) 10 (p)	Award full marks for correct answer with no working allow 600 (p) for 1 mark	**(2)**

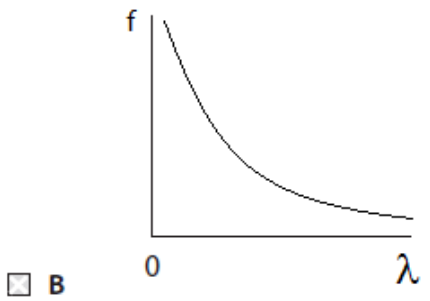
Question number	Answer	Acceptable answers	Marks
3 (a)(iii)	substitution (1) 2500 = 230 x I transformation (1) current = power / voltage $\frac{2500}{230}$ evaluation (1) 11 (A)	Award full marks for correct answer with no working Allow either order for transformation and substitution ignore powers of 10 until evaluation 10.87 (A) numbers that round to 11 (A)	**(3)**

Question number	Answer	Acceptable answers	Marks
3 (b)(i)	An explanation linking energy {radiated / emitted / given out/output} (1) at the same <u>rate</u> as it is taken {in / from the supply}/input (1)	 allow heat/infrared for energy dependent on first marking point power radiated/out/output = power supplied/in/input scores 2 marks	**(2)**

Question number	Answer	Acceptable answers	Marks
3 (b)(ii)	An description including (the temperature) falls/drops (1) to a lower equilibrium value (1) 2nd mark depends on 1st	 accept constant/steady for equilibrium	**(2)**

(Total for Question 3 = 10 marks)

Question number	Answer	Acceptable answers	Marks
4 (a)(i)	☒ **D** Ultraviolet **The only correct answer is D** **A** is not correct because infrared is not an ionising radiation **B** is not correct because microwave is not an ionising radiation **C** is not correct because radio is not an ionising radiation		**(1)**

Question number	Answer	Acceptable answers	Marks
4 (a)(ii)	B  ☐ B **The only correct answer is B** **A** is not correct because graph **A** does not show that as wavelength increases frequency decreases **C** is not correct because graph **C** does not show that as wavelength increases frequency decreases **D** is not correct because graph **D** does not show that as wavelength increases frequency decreases		**(1)**

Question number	Answer	Acceptable answers	Marks
4 (b)	Description to include: from/emitted by radioactive sources/ nuclei (1) all the time/constantly (1)	 from (nuclei) of unstable atoms or radioactive atoms/isotopes/materials/rocks randomly /(nuclear) decay/ nuclear reactions/ fission/fusion positron - electron annihilation/collision scores 2	**(2)**

Question number	Answer	Acceptable answers	Marks
4 (c)	Description to include: a use for X-rays (1) a use for gamma rays (1) further detail about one of them (1)	 e.g. X-rays to look at bones/skeleton scores 1 mark to look at/for broken bones scores 2 e.g. gamma sterilise 1 mark sterilise food/ medical equipment 2 marks accept detect and treat cancer 2 marks	**(3)**

Question number	Answer	Acceptable answers	Marks
4 (d)	substitution (1) $3.0 \times 10^{8} = 2.8 \times 10^{19} \times \lambda$ transformation (1) $\frac{3.0 \times 10^{8}}{2.8 \times 10^{19}}$ evaluation (1) 1.1×10^{-11} (m)	Award full marks for correct answer with no working Allow either order for transformation and substitution ignore powers of 10 until evaluation 1.07×10^{-11} (m) numbers that round to 1.1×10^{-11} $1.071428571 \times 10^{-11}$ 1×10^{-11}	**(3)**

(Total for Question 4 = 10 marks)

Question number	Answer	Acceptable answers	Marks
5 (a)(i)	Description including any two from: (red giant) one/next stage/phase in the life of a star (1) (after) main sequence (1) hydrogen runs out (1)	 two clear stages referred to similar in mass to the Sun/ expands/cools/ before white dwarf fuel runs out/helium fusion starts next stage in the life of the Sun scores two marks	**(2)**

Question number	Answer	Acceptable answers	Marks
5 (a)(ii)	Description including: increase in (observed) wavelength of light /longer (observed) wavelength of light (1) from a galaxy/star moving away (from us) (1)	 decrease in (observed) frequency of light / lower (observed) frequency of light ignore moving to the red end of (visible) spectrum. ignore planets moving away ignore universe expanding	**(2)**

Question number	Answer	Acceptable answers	Marks
5 (b)	change in λ (1) 478-434 (nm) evaluation (1) 3.04×10^7 (m/s)	Award full marks for correct answer with no working 44 ignore powers of ten error until evaluation 30414746.54 allow 1 mark max if original λ taken as 478 nm and evaluated to 2.76×10^7 (m/s) 27615063	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	A comparison including some of the following points: Big Bang theory • Universe is expanding • Universe had a beginning • Universe started with an 'explosion' • Universe cooling / density decreasing Steady State • Universe is expanding • Universe did not have a beginning • (allow) Universe has always been there • Universe the 'same' at any time/place evidence against Steady State • cosmic microwave background radiation (CMBR) supports only BB • indicates a cooling Universe	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description including two points from indicative content. e.g. BB - Universe is expanding and had a beginning • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple comparison including a similarity and a difference e.g. BB - Universe is expanding and had a beginning , SS is also expanding but has always been there • 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**	• a detailed comparison involving a similarity and a difference and a reason why SS not supported e.g. BB - Universe is expanding and had a beginning , SS is also expanding but has always been there .CMBR only supports BB • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

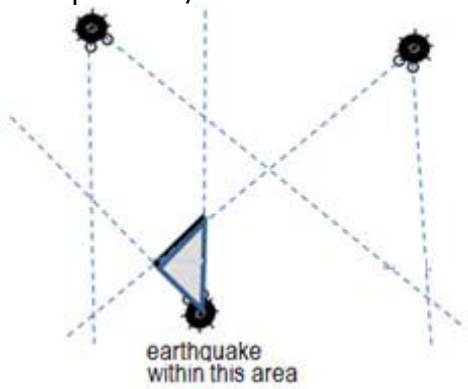
(Total for Question 5 = 12 marks)

Question number	Answer	Acceptable answers	Marks
6 (a)(i)	☒ **B** infrasound **The only correct answer is B** **A** is not correct because elephants do not communicate using electromagnetic waves of frequency 10 Hz **C** is not correct because supersonic refers to a speed greater than that of sound **D** is not correct because the frequency of ultrasound is greater than 20 000 Hz		**(1)**

Question number	Answer	Acceptable answers	Marks
6 (a)(ii)	20 000 (Hz)	20 kHz a number between 20 000 and 20 001(Hz)	**(1)**

Question number	Answer	Acceptable answers	Marks
6 (a)(iii)	suggestions which: make reference to frequency (1) idea of below range of human/our hearing (1)	Hz hertz outside/beyond for below **NOT** above "too low" must be linked to frequency	**(2)**

Question number	Answer	Acceptable answers	Marks
6 (b)	☒ D S-waves cannot refract at the boundary **The only correct answer is D** **A** is not correct because P-waves can reflect at the boundary **B** is not correct because P-waves can refract at the boundary **C** is not correct because S-waves can reflect at the boundary		**(1)**

Question Number		Indicative Content	Mark
QWC	***6 (c)**	A description including some of the following points • Draw two lines from M • Straight • Through ball and centre of instrument • Draw two lines from N • To show limits of directions from each place • Find position/area which is within all three limits  	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description of method e.g. draw (two) lines from M and (two) lines from N • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description of method e.g. draw two straight lines from M and two straight lines from N that appear (by eye) to pass through the ball and the centre of the instrument. Some of the lines cut each other. • 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**	• a detailed description of method e.g. draw two straight lines from M and two straight lines from N that appear (by eye) to pass through the ball and the centre of the instrument. Some of the lines cut each other. AND an approximate area/position shown clearly on the diagram or referred to in the text. • The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately. • spelling, punctuation and grammar are used with few errors	

(Total for Question 6 = 11 marks)

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