Pearson

Mark Scheme (Results)

January 2018

Pearson Edexcel GCSE
In Physics (5PH1F)
Paper 01

edexcel

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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)	X-rays (1) infrared (1) in this order	2 marks if both correct in this order 1 mark if one correct in the right place 1 mark if order is 'infrared' 'X-rays'	(2)

Question number	Answer	Acceptable answers	Marks
1 (a) (ii)	gamma (rays)	symbol for gamma (Y)	(1)

Question number	Answer	Acceptable answers	Marks
1 (b)	A description including **one** of the following **pairs** • on items (1) • assist in identification (if stolen) (1) • on document/currency (1) • help to identify forgery (1) • write (on paper) (1) • secret message (1) • stamp / on (back of) hand (1) • as pass-out at an event (1)	 • named item • to identify (owner) • banknotes eq • (to identify) genuine notes/forgeries • (print on) t-shirt • shows up in club allow other correct examples allow to detect UV (radiation) for 1 mark	(2)

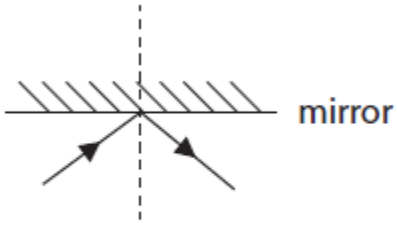
Question number	Answer	Acceptable answers	Marks
1 (c)	**B** internal heating of body cells		(1)

Question number	Answer	Acceptable answers	Marks
1 (d)	A description including **one** of the following pairs • treating/killing (1) • cancer (1) • detecting (1) • cancer (1) • tracing leaks (1) • in pipes (1)	radiotherapy scores 2 marks any other suitable examples e.g. exploring space (using a)gamma telescope	(2)

Question number	Answer	Acceptable answers	Marks
2 (a) (i)	transverse (wave)	accept reasonable spellings of transverse	(1)

Question number	Answer	Acceptable answers	Marks
2 (a) (ii)	**A** a bigger distance		(1)

Question number	Answer	Acceptable answers	Marks
2 (a) (iii)	substitution (1) 3.2 x 0.71 evaluation (1) 2.3 (m/s)	 allow answers that round to 2.3 e.g. 2.272 award full marks for the correct answer without working.	(2)

Question number	Answer	Acceptable answers	Marks
2 (b) (i)	 ☒ **B**		(1)

Question number	Answer	Acceptable answers	Marks
2 (b) (ii)	A description including **three** of the following points • reflection (of light) at (either) mirror (1) • the curved mirror focuses (the light) (1) • (mirror) inverts (1) • {lens / eyepiece} magnifies (image) (1) • image is formed where the light rays cross (1)	 bounces for reflects the curved mirror gives the image flips it over/turns it over/changes the direction (of light) {lens/eyepiece} refracts light virtual image formed by <u>lens</u> real image inside telescope Accept for 1 mark if no other mark awarded: (Telescope) reflects **AND** refracts light (1)	(3)

Question number	Answer	Acceptable answers	Marks
3 (a) (i)	the Sun		(1)

Question number	Answer	Acceptable answers	Marks
3 (a) (ii)	chemical		(1)

Question number	Answer	Acceptable answers	Marks
3 (b) (i)	440 (J)	500 - 60	(1)

Question number	Answer	Acceptable answers	Marks
3 (b) (ii)	Substitution (1) 60 ÷ 500 or 60 x 100 (%) 500 Evaluation (1) 0.12 or 12 (%)	 allow 0.88 or 88% for 1 mark only award full marks for the correct answer without working.	(2)

Question number	Answer	Acceptable answers	Marks
3 (c) (i)	An explanation linking the following points: black (1) (because) (good) absorber (of thermal radiation) (1)	 {absorbs / takes in} heat radiation **ignore** references to: attract good emitter of light dark / darker	(2)

Question number	Answer	Acceptable answers	Marks
3 (c) (ii)	an explanation linking any **three** of the following points: • (bag / water) absorbs {thermal energy / heat /radiation} (1) • (bag / water) {radiates /emits/loses} {thermal energy /heat / radiation} (1) • more heat radiated at higher temperature (1) • input and output are balanced (at steady temperature) (1)	idea of more heat lost (to surroundings) at higher temperature (at constant temp) "absorbing heat at same (rate) as radiating heat" (2 marks)) **ignore** (sun) light / rays	(3)

Question number	Answer	Acceptable answers	Marks
4 (a)	**C** Mars is further from the Earth than the Moon is		(1)

Question number	Answer	Acceptable answers	Marks
4 (b)	**B** the Moon		(1)

Question number	Answer	Acceptable answers	Marks
4 (c)	reference to the connection between water and life	water is needed for life see if we could live there could sustain life water gives possibility of life	(1)

Question number	Answer	Acceptable answers	Marks
4 (d)	substitution (1) 300 000 × 1.3 evaluation (1) 39(0 000) unit (1) km	Ignore powers of ten until the final mark e.g. 3.9 with wrong unit scores 2 marks unit consistent with answer award 2 marks for the correct numerical answer without working.	(3)

Question number	Answer	Acceptable answers	Marks
4 (e)	An explanation linking any two from • (telescope {above / out of}) {atmosphere/air} (1) • dust/clouds/obstructions etc (in atmosphere) (1) • no light pollution in space (1) • can detect a wider range of EM radiation (1)		(2)

Question number	Answer	Acceptable answers	Marks
4 (f)	An explanation linking the following • (pulled together by) gravity (1) • (transferring) {potential /kinetic} energy to {thermal/heat/kinetic} (1)	collisions create friction (not 'friction' by itself) friction produces {thermal/heat} (very) high pressure produced	(2)

Question number	Answer	Acceptable answers	Marks
5 (a)	**B** charge		(1)

Question number	Answer	Acceptable answers	Marks
5 (b)	substitution (1) 230 × 9.2 evaluation (1) 2100 (W)	 numbers that round to 2100 e.g. 2116, 2120 award full marks for the correct answer without working.	(2)

Question number	Answer	Acceptable answers	Marks
5 (c)	 Conversion (1) 0.35 (kW) Substitution (1) 0.35 x 4 x 20 (p) Evaluation (1) 28 (p)	 28(p) or £0.28 (3 marks) 28,000(p) or £280 (2 marks) 2.8 to any other power of 10 (1 mark) award 1 mark for any power x any time x a cost e.g. 3500 x 4 x 20 evaluated incorrectly scores 1 award full marks for the correct answer without working.	(3)

Question Number		Indicative Content	Mark
QWC	***5(d)**	A comparison including some of the following points **LED lamp** **Advantages** • saves energy / more efficient • cost efficient • lasts longer • lower power (needed) • less fossil fuels burnt • cool to touch • efficiency 25 % • lasts 14000 hours longer • lasts 15 times longer **Disadvantages** • higher initial cost • costs 5 times as much • costs £2.40 more **filament lamp** **Disadvantages** • wastes more energy • less efficient • shorter lifetime • higher power (needed) • more fossil fuels burnt • gets hot • wastes 95% of energy supplied • uses (about) 7 times as much power **Advantages** • costs less to buy **LED lamp** cost = £3.00 power = 9 W lifetime = 15 000 hours useful output energy is 25 J for every 100 J of input energy **filament lamp** cost = £0.60 power = 60 W lifetime = 1 000 hours useful output energy is 5 J for every 100 J of input energy	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited comparison of one advantage or one disadvantage e.g. LED lamps last a long time/ filament lamps get very hot **OR** A correct value quoted from information with no comparison • 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 of two different advantages / disadvantages e.g. LED lamps cost more but last longer / filament lamps have a short life time and use more power **OR** Correct values quoted from table and used to provide two comparisons without calculations… • 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 of two different advantages / disadvantages using **at least one quantitative** comparison. e.g. energy saving lamps cost 5 times more but last 10 times longer. / Energy saving lamps produce 4 times as much light energy for every 100J of electrical energy supplied and are much more efficient. / Energy saving lamps last 9,000 hours longer than and they use less power. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Question number	Answer		Acceptable answers	Marks
6 (a)	**statement**	**(✓)**	all three correct (2 marks) two correct (1 mark) one correct (zero marks) four boxes ticked (maximum 1 mark) more than four boxes ticked (zero marks)	(2)
	P-waves are transverse waves			
	S-waves are transverse waves	✓		
	P-waves travel faster than S-waves in the Earth's crust	✓		
	S-waves travel faster than P-waves in the Earth's crust			
	P-waves can travel through the liquid core of the Earth	✓		
	S-waves can travel through the liquid core of the Earth			

Question number	Answer	Acceptable answers	Marks
6 (b)	**A** more than 20 000 Hz		(1)

Question number	Answer	Acceptable answers	Marks
6 (c)	A description including **three** of the following: • (bats) emits /sends /makes (ultra)sound /it / signal/wave(1) •signal/wave/(ultra)sound reflects /bounces(back)/ rebounds (off moth/prey) (1) • bat's (ears) detect **reflected** (ultra)sound (1) • reflection is used to estimate distance (to moth) (1)	On diagram idea of something emitted e.g. line (with arrow) from anywhere on /near bat or outgoing waves On diagram idea of something reflected e.g. line with arrow from anywhere on/near moth or reflected waves (from moth) idea of reflection detected e.g. bat hears the reflected (ultra)sound/wave/signal idea of bat analyses data e.g. bat times how long (it takes) for reflected wave to get back **Ignore** idea that it listens for noises from prey	(3)

Question Number		Indicative Content	Mark
QWC	***6(d)**	A description linking some of the following: • ultrasound does not cause damage to (healthy) cells / ORA • idea of real-time image with ultrasound • ultrasound uses non-ionising radiation • idea that (consultant) can change image position during ultrasound scan • 3D image possible with ultrasound • ultrasound safer for consultant • ultrasound machines more portable ultrasound can be used to measure blood flow rates • ultrasound gives detail of soft tissue • X-rays are more suitable for bony structures • X-rays produce higher resolution images X- rays are more suitable for parts of body containing gas • (lungs, intestines) This list is not exhaustive. Give credit for other plausible suggestions	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited description with no comparison or contrast ie describes a use/fact about ultrasound OR X-rays eg Ultrasound can be used to look at a fetus (unborn child) • 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 giving some attempt at comparison or contrast ie describes a use of ultrasound AND X-rays eg Ultrasound can be used to look at a fetus (but) X-rays are used to detect broken bones OR Ultrasound can be used to look at a fetus because it's safer (than X-rays) • 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 with clear comparison and/or contrast ie describes a use of ultrasound AND X-rays, one of which is detailed, AND a clear comparison Ultrasound can be used to monitor a fetus. In ultrasound the waves reflect off soft tissue. X-rays (are used to look at bones because they) are absorbed by bones OR Ultrasound can be used to monitor a fetus. In ultrasound the waves reflect off soft tissue. X-rays are used to look at bones but not used for fetus because they can damage DNA/cause mutations of cells • 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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