

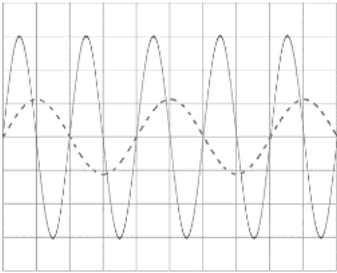


Mark Scheme (Results)

January 2021

Pearson Edexcel International GCSE
In Physics (4PH1) Paper 2P

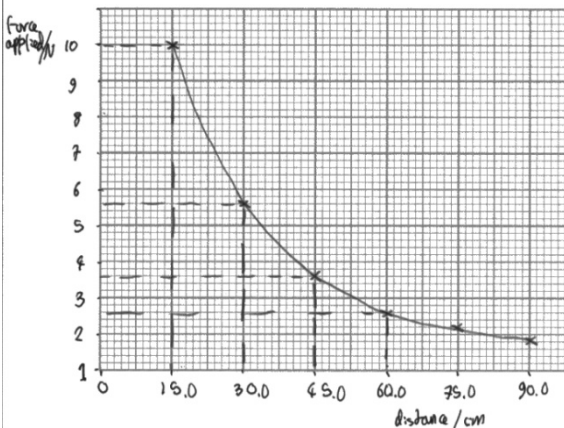
Question number	Answer	Notes	Marks
1 (a)	any two from: MP1. light waves are transverse and sound waves are longitudinal; MP2. light travels faster than sound; MP3. light can travel through vacuum but sound waves can't;	ignore references to frequency and wavelength condone 'different speeds'	2
(b) (i)	B (microwaves); A is incorrect because gamma rays have a shorter wavelength than infrared C is incorrect because ultraviolet rays have a shorter wavelength than infrared D is incorrect because visible light waves have a shorter wavelength than infrared		1
(ii)	B (heating lamps); A is incorrect because ultraviolet rays are used in fluorescent lamps C is incorrect because there is too much interference from the Earth for infrared to be used for satellite transmissions D is incorrect because gamma rays are used to sterilise medical equipment		1
(iii)	D (skin burns); A is incorrect because infrared is not absorbed by the retina B is incorrect because infrared is non-ionising C is incorrect because infrared cannot penetrate into the body to cause internal heating		1

(c)	trace drawn with higher amplitude throughout; trace drawn with higher frequency throughout; e.g. 	allow variable amplitude allow variable amplitude	2
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Total for Question 1 = 7 marks

Question number	Answer	Notes	Marks												
2 (a)	2;		1												
(b)	all rows correct;; any 2 rows correct; e.g. <table><tr><th>Constituent</th><th>Parent nucleus</th><th>Daughter nucleus</th></tr><tr><td>strontium-94</td><td></td><td>✓</td></tr><tr><td>uranium-236</td><td>✓</td><td></td></tr><tr><td>xenon-140</td><td></td><td>✓</td></tr></table>	Constituent	Parent nucleus	Daughter nucleus	strontium-94		✓	uranium-236	✓		xenon-140		✓		2
Constituent	Parent nucleus	Daughter nucleus													
strontium-94		✓													
uranium-236	✓														
xenon-140		✓													
(c)	any two from: MP1. neutrons absorbed by another <u>nucleus</u>; MP2. uranium-235 named; MP3. <u>nucleus</u> splits, releasing more neutrons (and process repeats);	do not penalize use of atom for nucleus for more than one mark	2												

Total for question 2 = 5 marks

Question number	Answer	Notes	Marks
3 (a)	(metre) rule(r)/(metal) tape measure;	allow (Vernier) caliper(s)	1
(b) (i)	3.6;	allow 3.7	1
(ii)	idea that the reading would be larger than the range of the instrument;		1
(c) (i)	suitable linear scale chosen (>50% of grid used); axes labelled with quantities and units; plotting correct to nearest half square; 	ignore plotting of 45cm point	3
(ii)	line (curve) of best fit acceptable;	allow ECF from plotting i.e. smooth curve with points evenly distributed about it	1
(d)	any four from: MP1. as distance increases, force decreases; MP2. (because) moment = force x distance; MP3. any one calculated moment value from results table or graph; MP4. a second calculated moment value from results table or graph; MP5. evidence shows moments are not all the same; MP6. (but) no pattern in the data (so could be attributed to experimental errors);	no mark for simply 'student is right/wrong' allow evidence shows moments are similar allow consistent conclusion i.e. variation isn't large enough	4

Total for Question 3 = 11 marks

Question number	Answer	Notes	Marks
4	(a) (i) idea that it will run out / cannot be replaced;	ignore renewed/re-used	1
	(ii) any two correct readings taken from graph; evaluation of total; e.g. (proportion =) $27.5 + 35 + 19.5$ (proportion =) 82 (%)	allow 81-83 (%)	2
	(b) a named effect e.g. global warming, acid rain; a named pollutant e.g. carbon dioxide, sulphur dioxide, nitrogen (di)oxide;	-1 for incorrectly linked effect and pollutant	2
(c)	(i) correct reading of solar from graph; evaluation; e.g. solar = 1.5% (solar output = $0.015 \times 4.76 \times 10^{11}$ =) $7.1(4) \times 10^9$ (W)	seen anywhere in working	2
	(ii) correct use of ratio; evaluation; e.g. land area = $4.76 \times 10^{11} / 250$ (land area =) 1.90×10^9 (m ²)	allow $1.904... \times 10^9$ (m ²)	2
	(iii) any three from: MP1. land area needed is much less than total land area of USA / there is enough space; MP2. land area needed is (much) less than 1% of total land area; MP3. idea that Sun doesn't shine all the time; MP4. idea that some areas of land may not be suitable for solar power;	no mark for simple yes/no for suitability allow ecf from (ii) also scores MP1 allow idea of competing land uses e.g. housing/agriculture	3

Total for question 4 = 12 marks

Question number	Answer	Notes	Marks
5 (a) (i)	(soft) iron;	accept other suitable ferromagnetic materials	1
	(ii) input power = output power; OR primary voltage $\times$ primary current = secondary voltage $\times$ secondary current;	allow • formula in words or symbols • standard abbreviations: i.e. s, p, in, out, 1, 2	1
(iii)	substitution; rearrangement; evaluation; e.g. $275\,000 \times I_p = 230 \times 95$ $(I_p =) 230 \times 95 / 275\,000$ $(I_p =) 0.079 \text{ (A)}$	-1 for POT error 79.45...(A) scores 2 marks allow 0.07945...	3
(b)	any five from: MP1. step-up transformer used before transmission; MP2. voltage is increased before transmission; MP3. current is reduced before transmission; MP4. less heating in transmission cables; MP5. less energy wasted in transmission cables; MP6. step-down transformer used after transmission; MP7. voltage is decreased after transmission for safety;	allow any mark if clear from diagram	5

Total for question 5 = 10 marks

Question number	Answer	Notes	Marks
6 (a)	W marked between +10 and +15 absolute magnitude and between blue and white/yellow colour marks;		1
(b)	X marked between 0 and -5 absolute magnitude and between yellow/red and end of colour scale;		1
(c)	Y marked above and to the left of the Sun;	judge by eye	1
(d)	Z marked vertically in line with and below the Sun;	judge by eye	1
(e)	Any one from: MP1. idea that the Moon does not emit its own light; MP2. Idea that the Moon is not a star MP3. idea that the (surface) temperature of the Moon is too low / does not fit on the scale;		1

Total for Question 6 = 5 marks

Question number	Answer	Notes	Marks
7 (a)	substitution into momentum = mass $\times$ velocity; evaluation; e.g. $p = 0.0041 \times 0.15$ (p =) 0.00062 (kgm/s)	allow use of standard symbols e.g. $p = m \times v$ -1 for POT error allow decimal or standard form allow 0.000615	2
(b)	velocity of ball increases; momentum increases;	allow ball speeds up	2
(c)	substitution into $F = (mv - mu) / t$; rearrangement; evaluation; e.g. $1.3 = 0.0041 \times v (-0) / 0.0025$ (v =) $1.3 \times 0.0025 / 0.0041$ (v =) 0.79 (m/s)	-1 for POT error allow 0.79268...	3

Total for Question 7 = 7 marks

Question number	Answer	Notes	Marks
8 (a)	(force to the) right; (because) opposite charges attract / like charges repel;	allow 'towards the positive plate' or 'away from the negative plate'	2
(b)	line drawn showing the ink drop deflecting to the right of the centre and hitting paper below; line drawn starts vertical and becomes increasingly more curved as the ink drop moves towards paper;	allow ECF from (a) if direction of force to the left DOP	2
(c) (i)	substitution into force = mass $\times$ acceleration; rearrangement; evaluation; e.g. $8.5 \times 10^{-7} = 1.1 \times 10^{-10} \times a$ (a =) $8.5 \times 10^{-7} / 1.1 \times 10^{-10}$ (a =) 7700 (m/s ²)	-1 for POT error allow 7727.27...	3
(ii)	use of $v^2 = u^2 + (2 \times a \times s)$; substitution OR rearrangement; evaluation in metres; conversion to mm; e.g. $v^2 = u^2 + (2 \times a \times s)$ $3.9^2 = 0 + (2 \times 7700 \times s)$ OR $s = (v^2 - u^2) / 2a$ (s =) 9.9×10^{-4} (m) (s =) 0.99 (mm)	can be implied from substitution allow ECF from (i) independent mark award if correct conversion attempted on incorrect answer allow 9.8×10^{-4} - 9.9×10^{-4} allow 0.98 - 0.99	4
(d)	idea of swapping polarities of plates; idea of increasing the amount of charge on plates;	allow positively charging ink drop allow increasing amount of charge on ink drop allow decreasing {mass or volume} of the ink drop	2

Total for Question 8 = 13 marks