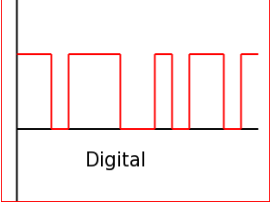
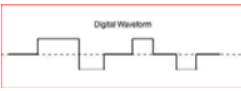
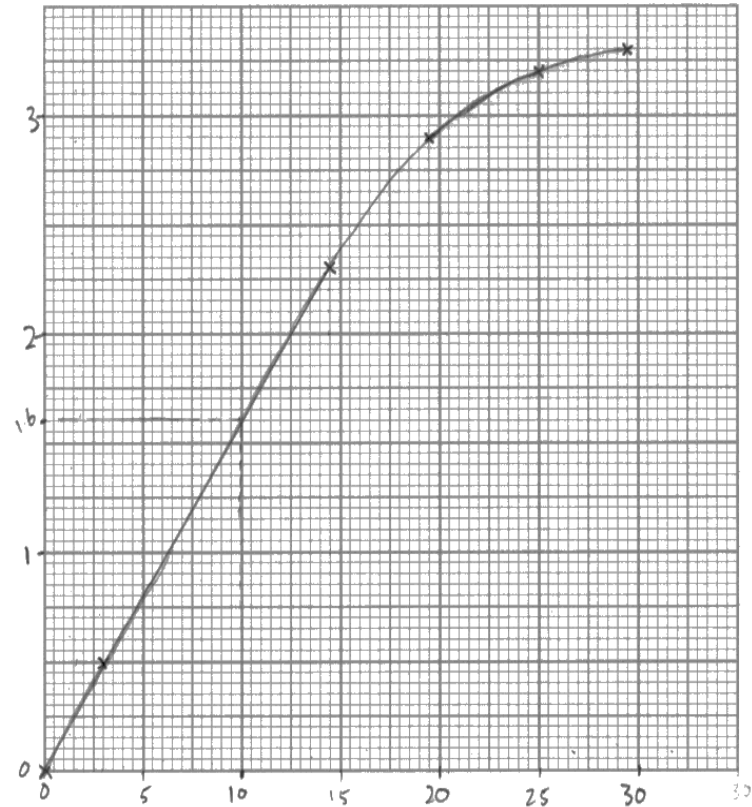


Mark Scheme (Results)

Summer 2016

Pearson Edexcel International GCSE
in Physics (4PH0) Paper 2PR

Question number	Answer	Notes	Marks
1 (a)	2 value line with top line & lower line at constant heights; straight up/down lines; e.g. typical 'top hat' waveform 	ignore spacing of pulses judge by eye allow waveform with 3 distinct values at +X, zero and - X 	2
(b)	any two described advantages from:- MP1. information density e.g. digital carry more information (per second); MP2. quality e.g. maintain quality over longer distances; MP3. easier to reduce noise/less affected by noise; MP4. regeneration e.g. able to boost signal to original strength;	accept clearer easier to process total marks = 4	2

Question number	Answer	Notes	Marks														
2 (a)	A		1														
(b) (i)	suitable scales; 6 points plotted;; curve of best fit;  <table><tr><th>Voltage across X in V</th><th>Current in X in A</th></tr><tr><td>0</td><td>0</td></tr><tr><td>3.0</td><td>0.5</td></tr><tr><td>14.5</td><td>2.3</td></tr><tr><td>19.5</td><td>2.9</td></tr><tr><td>25.0</td><td>3.2</td></tr><tr><td>29.5</td><td>3.3</td></tr></table>	Voltage across X in V	Current in X in A	0	0	3.0	0.5	14.5	2.3	19.5	2.9	25.0	3.2	29.5	3.3	• Must use > half width and half height of grid • to nearest ½ square, up to two marks available for this, -1 each error • reject dot to dot • allow a reasonably smooth curve, points should be evenly distributed about the line	4
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- to nearest ½ square, up to two marks available for this, -1 each error
- reject dot to dot
- allow a reasonably smooth curve, points should be evenly distributed about the line

(ii)	$V = I \times R$	in words, or accepted symbols or rearranged	1
(iii)	value of I from graph; rearranged equation/sub into equation; evaluation; unit; e.g. $I = 1.6$ ($\pm 1/2$ a small square) $10 = 1.6 \times R$ OR $R = 10/1.6$ $R = 6.3$ Ω / ohms	allow ECF from graph answers without working can gain full marks $R = 6.25$ allow answers which round to a number in the range 5.8 to 6.3	4
(iv)	any three descriptions from:- MP1. as V increases I increases (at first); MP2. constant gradient/constant R (at first); MP3. I is proportional to V; MP4. gradient changes at high voltage/eq; MP5. ΔI smaller (than previously) for $V > 15V$;	allow as I increases V increases graph line linear (at first) nonlinear above $\sim 15 V$ graph is less steep at high voltage R increases for $V > 15V$ (to $\sim 8\Omega$) ignore slows down positive correlation	3

(v)	any two conclusions from:- MP1. resistance is constant at first; MP2. resistance is not constant / resistance increases as V (or I) increases; MP3. because X gets hot(ter); MP4. X is a filament lamp;	allow V and I are proportional at first, it obeys Ohms law at first non-ohmic /does not obey Ohms law / V and I are not proportional increasing temperature total marks = 15	2
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Question number	Answer	Notes	Marks
3 (a) (i)	any two from:- MP1. travels at speed of 3×10^8 m/s; MP2. travels in a vacuum; MP3. transverse wave; MP4. transfer energy / information; MP5. can be reflected/refracted/diffracted;	travel at the same speed /speed of light	2
(ii)	B gamma rays;		1
(b) (i)	step- up;		1
(ii)	$\frac{\text{input (primary) voltage}}{\text{output (secondary) voltage}} = \frac{\text{primary turns}}{\text{secondary turns}}$ $\frac{V_P}{V_S} = \frac{n_P}{n_S}$	allow equation in any rearrangement	1
(iii)	substitution; rearrangement; evaluation; e.g. $\frac{230}{2000} = \frac{110}{n_S}$ $n_S = \frac{110 \times 2000}{230}$ $n_S = 960$	sub and rearrangement in either order	3
(iv)	to protect user from high voltage/eq;	allow plastic is an insulator to prevent (electric) shock	1
Total 9 marks			

Question number	Answer	Notes	Marks
4 (a) (i)	uranium/plutonium;	allow chemical symbols	1
(ii)	(particles) formed after fission/ after U breaks up; plus any one from:- neutron; daughter nuclei; named products;	do not allow after decay allow gamma (radiation)	2
(iii)	MP1 they are (still) radioactive/ emit ionising radiation /eq; MP2 they last for a very long time/have a long half-life/eq;	allow harmful to people/environment	2
(iv)	it slows down neutrons/eq;	ignore absorbs neutrons	1
(v)	any two ideas from:- MP1 fewer neutrons would be absorbed; MP2 fission rate would increase / / (reactor) become critical ; MP3 too much energy produced (too fast); MP4 meltdown of core/reactor;	more neutrons available the reaction would go out of control do not accept "turns into a bomb" meltdown of 'it'	2

(b) (i)	773(K);		1
	(ii) substitution; rearrangement; evaluation; e.g. $\frac{8.4}{773} = \frac{P_2}{1170}$ $P_2 = \frac{8.4 \times 1170}{773}$ 13 (MPa)	no mark for the equation rearrangement and substitution in either order 12.7 allow ecf from (b)(i) for all 3 marks if calculation seen with °C for T_1 instead of K, then max mark = 2 answer of 19.7 (MPa) with no working = 1 mark total marks = 12	3

Question number	Answer	Notes	Marks
5 (a) (i)	$p = m \times v$	accept answer in words, standard symbols or rearranged	1
(ii)	statement of conservation of momentum; calculation of momentum before seen; use of correct mass for momentum after; evaluation of velocity; e.g. $m_1 v_1 = m_2 v_2$ 43.2×4.10 OR $177(.12)$ seen ($m_2 =$) 45.7 ($v =$) 3.88 (m/s)	allow in words 3.9, 3.876	4
(b)	MP1. boy and skateboard move backwards/in opposite direction to the ball; Either MP2. because of conservation of momentum/eq; MP3. because of Newton's 3 rd law/eq;	total marks = 7	2

Question number	Answer	Notes	Marks
6	five suitable comments: O/P = output power Wind • wind O/P is (far) too low (to meet demand)/the lowest; • (can't rely on) wind O/P is weather dependent; Gas • gas O/P (too) low /need many gas power stations (to meet demand); • gas (turbine) is the fastest to start up; Tidal • tidal gives the highest O/P; • tidal only occurs at fixed times (so is not useful); Nuclear • nuclear O/P is (relatively) high; • nuclear takes too long to start up; Coal • coal O/P is second highest; • coal second fastest to start up; Evaluation statement(s) • none of them is enough to meet the power demand; • nuclear/wind/tidal would be unsuitable; OR coal or gas could be suitable; OR a mixture of stations would be suitable; Costs allow 1 mark for relevant statement	ignore comments about • renewable • non-renewable • green-house effect • climate change • pollution can't be used for sudden need/RA e.g. coal is most expensive fuel gas is second most expensive fuel total marks =5	5

Question number	Answer	Notes	Marks
7 (a) (i)	lever arm / bolt moves to the left;		1
(ii)	to return the metal bar (and lever) to the right/eq	allow pulls it back (again)	1
(b) (i)	$F_1 d_1 = F_2 d_2$;	accept answer in words, standard symbols or rearranged clockwise (moments) = anticlockwise (moments)	1
(ii)	substitution; rearrangement; evaluation; e.g. $110 \times 22 = 38 \times F_2$ $F_2 = \frac{110 \times 22}{38}$ 63.7 (N)	rearrangement and substitution in either order 63.684 (N) -1 for incorrect rounding	3
(iii)	any two from MP1 (since distance to A greater) moment is greater; MP2 distance to B is constant / still 110 cm; MP3 (hence) force will increase;	allow correct re-calculation with d_B	2
total marks = 8			