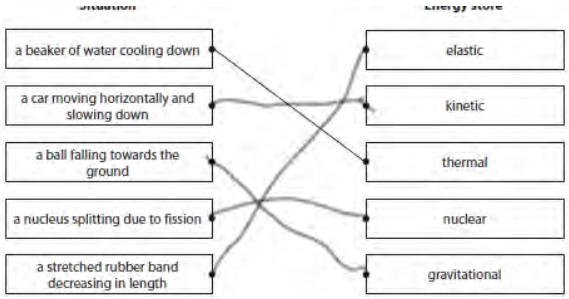
Pearson Edexcel

Mark Scheme (Results)

January 2021

Pearson Edexcel International GCSE
In Physics (4PH1) Paper 1PR and Science (Double Award) (4SD0) Paper 1PR

Question number	Answer	Notes	Marks
1 (a)		-1 for each additional line	4
(b) (i)	A - electrical;		1
(ii)	B - light radiation;		1

(Total for Question 1 = 6 marks)

Question number	Answer	Notes	Marks
3 (a)	planet;		1
(b)	comet;	accept planet	1
(c)	substitution into given formula; conversion of 35 days into seconds; evaluation; e.g. $v = 2 \times \pi \times 1.5 \times 10^{11} / (35 \times 24 \times 60 \times 60)$ $v = 310\,000$ m/s	 allow full credit for 2.6927937×10^{10} if unit changed to m/day. 311665.93(7)8 Answer for incorrect/no conversion of days→ seconds 2.69etc x 10^{10} scores 2 -1 for POT error	3

(Total for Question 3 = 5 marks)

Question number	Answer	Notes	Marks
7 (a) (i)	as pressure increases, volume decreases; pattern statement relating to gradient; e.g. 'at a decreasing rate'	ORA 'inversely proportional' scores 2 marks.	2
(ii)	pressure = depth × gravitational field strength × density;	allow recognised symbols e.g. P or p for pressure d or h for depth ρ for density reject d for density, reject gravity for g	1
(iii)	substitution; evaluation; e.g. pressure = 0.22 × 10 × 1080 pressure = 2 400 (Pa)	Accept use of g=9.8(1) (N/kg) 2376 (Pa) -1 for POT error provided *g* is used	2
(iv)	103 000 (Pa)	accept 103 400 (Pa) allow ECF	1
(v)	substitution into given formula; rearrangement; evaluation; e.g $p_1 \times V_1 = p_2 \times V_2$ 101 000 × 0.084 = 103 000 x V_2 V_2 = 0.082 (cm^3)	allow ECF from (iv) e.g. 98624 gives 0.086 (cm^3) 0.082368932 -1 for POT error	3
(b)	vertical arrow upwards labelled upthrust; vertical arrow downwards labelled weight; upthrust > weight;	 ignore drag reject this mark if there are more than two arrows	3

(Total for Question 7 = 12 marks)

Question number	Answer	Notes	Marks
9	Any FIVE from: MP1 reference to Doppler effect; MP2 wavefronts are emitted at constant frequency by buzzer; MP3 wavefronts arrive at student (A) further apart than when they were emitted; MP4 distance between wavefronts is the wavelength; MP5 speed = frequency × wavelength; MP6 speed of waves is constant; MP7 as speed is constant and wavelength has increased, frequency must decrease; MP8 decrease in frequency is experienced as a decrease in pitch;	Allow 'wavelength increases' if MP3 or MP4 not awarded	5

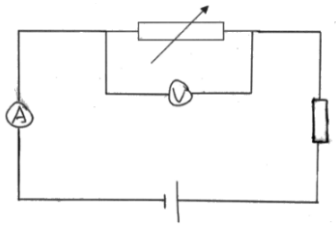
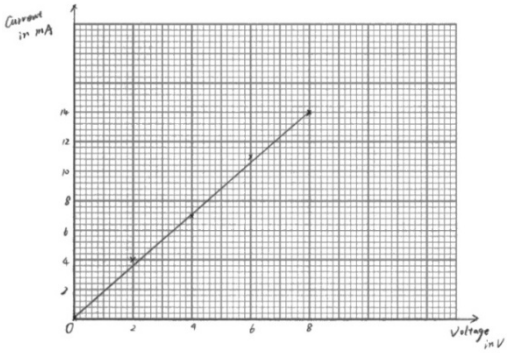
(Total for Question 9 = 5 marks)

Question number	Answer	Notes	Marks
10 (a)	236 – (97 + 135); x = 4;	answer of 4 scores 2	2
(b)	(fission) releases neutrons; neutrons can be captured by other uranium **nuclei**; (these nuclei) then undergo fission;		3
(c)	evidence of halving of 72 (kBq); evidence of four half-lives required; e.g. count rate after 4 half-lives is 4.5 (kBq) evidence that four half-lives is equivalent to 60 million years;		3
(d)	Any FIVE from: MP1 Idea of strong containers; MP2 idea that containers can't rust; MP3 idea that rust-proof containers expensive/difficult to manufacture; MP4 reference to security of waste site; MP5 reference to dilution in sea water; MP6 reference to leakage into water table;	 accept idea of a location that prevents rust accept low earthquake risk	5

(Total for Question 10 = 13 marks)

Question number	Answer	Notes	Marks
11 (a) (i)	work done = force × distance (travelled);	allow accepted symbols	1
(ii)	substitution; evaluation; e.g work done = 0.89 × 26 work done = 23.1(4 J)		2
(iii)	evidence of recall of formula GPE = mgh; substitution; evaluation; e.g. GPE = mgh GPE = 1.3 × 10 × 0.11 GPE = 1.4(3 J)	allow g = 9.8(1) (N/kg) -1 for POT error providing use of *g* seen	3
(iv)	any TWO from: any reference to friction/air resistance; energy transferred to the surroundings (by mechanical work); block not necessarily at constant speed;	allow 'heat/thermal energy transferred to air/ramp by friction for 2 marks	2
(b)	any TWO from: lower force required; to prevent block from slipping down required / to move block; any TWO from: longer distance required (with a lower force); more inefficient; greater proportion of energy transferred to the surroundings;	allow 'to overcome friction' allow 'easier to move block' for 2 marks Allow idea of more work required (for same increase in GPE)	4

(Total for Question 11 = 12 marks)

Question number	Answer	Notes	Marks
12 (a) (i)	correct symbol for resistor; correct symbol for cell; correct symbol for ammeter; circuit is complete series circuit;  	reject extra components allow ECF for missing/incorrect symbols	4
(ii)	voltmeter symbol is correct and in parallel with any component; voltmeter is in parallel with variable resistor;		2
(b)	any FOUR from: stretchy resistor increases in resistance (when mass increased); total resistance increases; I = V/R; current in circuit less; voltage across fixed resistor decreases; so voltage across stretchy resistor increases; as total voltage is constant/voltage of cell constant;	reject V=IR or I=V/R with assumption of constant current	4
(c) (i)	voltage;	allow 'V'	1
(ii)	suitable linear scale chosen (>50% of grid used); axes labelled with quantities and unit; all plotting correct to nearest half square;  	ignore orientation	3
(iii)	correct best fit line judged by eye;		1

(Total for Question 12 = 15 marks)