PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

PHYSICS



MARK SCHEME

TOPIC 1: KEY CONCEPTS OF PHYSICS (PAPER 2)

SCORE	PERCENTAGE
/28	%

STEMUP

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Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	Substitution: Density = mass/ volume (1) = 28 $x10^{-3}$/ 3.6 x 10^{-6} (1) Evaluation = 7777 kg / m^3 (1)	 (recalled / used) ignore any power of ten (pot) error here do not penalise any sf errors (7.77 etc. would get 2 marks: losing the pot mark in the evaluation)	(3)

Question number	Answer	Additional guidance	Mark
(ii)	(Use $\Delta Q = m \times c \times \Delta\ \theta$) substitution thermal energy gained = 0.028 x 510 x 80 (1) evaluation = 1100 (J) (1)	 ignore any pot error here 1142 (J)	(2)

Question number	Answer	Mark
(iii)	An explanation that combines identification – knowledge (2 marks) and reasoning / justification (1 mark) Solid state → particles vibrate (1) → about fixed positions (1) Liquid state → particles move randomly / freely (1)	(3)

(**Q04a 1SC0/2PH/S2, SAM**)

Q2.

	Answer	Additional guidance	Mark
(i)	2.4 (N) OR 2.375 (N) OR 2.38 (N)		(1) AO2.2

	Answer	Additional guidance	Mark
(ii)	straight line extended to meet h = 0.80 m axis (1) 3.1 (N) (1)	judge by eye allow 3.05 to 3.20 inclusive award full marks for the correct answer without working	(2) AO2.2

	Answer	Additional guidance	Mark
(iii)	select two points on the line (1) evaluation (1) 3.90 ± 0.10 (N/m)	allow triangle drawn on graph award full marks for the correct answer without working	**(2)** **AO2.2**

(QU05c 1SC0/1PF, June 2025)

Q3.

	Answer	Additional guidance	Mark
(i)	an explanation linking **two** from: (wet road means) less / no friction (between tyres and road) (1) (wet weather means) increased stopping distance (1) (slower speed means) shorter braking / stopping distance (1) (dry weather / slower speed) reduces possibility of skidding / sliding / idea of losing control / crashing (1)	accept reverse arguments throughout accept road more slippery / less grip accept idea of reduced visibility accept braking or thinking distance in this context accept takes longer to slow down / stop ignore harder to brake	**(2)** **AO1**

	Answer	Additional guidance	Mark
(ii)	convert **either** distance or time (1) (31 m =) $\frac{31}{1000}$ (km) or 0.031 (km) **OR** (1 s =) $\frac{1}{3600}$ (h) = $\frac{1}{60\times60}$ (h) or 0.000 28 (h) evaluation (1) (31 m/s =) 110 (km/h)	(130 km =) 130 × 1000 (m) or 130 000 (m) **OR** (1 h =) 60 x 60 (s) or 3600 (s) (130 km/h =) 36(.1) (m/s) accept 111.6 or 112 (km/h) for 2 marks if no other marks awarded accept 1860 m/min and 2167 m/min for 1 mark each award full marks for the correct answer without working	**(2)** **AO2**

	Answer	Additional guidance	Mark
(iii)	select and substitute into distance travelled = average speed x time (1) 46 = 31 x t rearrangement and evaluation (1) (t=) 1.48(3) (s) evaluation given to 2 sf (1) (t =) 1.5 (s)	 $31 = \frac{46}{t}$ $(t =) \frac{46}{31}$ award two marks for the correct evaluation without working any answer written to 2 sf independent mark 1.5 scores 3 marks 1.4 scores 2 marks 1.50 scores 2 marks 0.67 scores 2 marks 1400 scores 2 marks 0.673(9) scores 1 mark 1426 scores 1 mark	**(3)** **AO2**

(QU06a 1SC0/1PF, June 2022)

Q4.

	Answer	Additional guidance	Mark
(i)	an explanation linking **two** from: (wet road means) less / no friction (between tyres and road) (1) (wet weather means) increased stopping distance (1) (slower speed means) shorter braking / stopping distance (1) (dry weather / slower speed) reduces possibility of skidding / sliding / idea of losing control / crashing (1)	accept reverse arguments throughout accept (road) more slippery / less grip accept idea of reduced visibility accept braking or thinking distance in this context accept takes longer to slow down / stop ignore harder to brake	**(2)** **AO1**

	Answer	Additional guidance	Mark
(ii)	convert **either** distance or time (1) (31 m =) $\frac{31}{1000}$ (km) or 0.031 (km) **OR** (1 s =) $\frac{1}{3600}$ (h) = $\frac{1}{60\times60}$ (h) or 0.000 28 (h) evaluation (1) (31 m/s =) 110 (km/h)	(130 km =) 130 × 1000 (m) or 130 000 (m) **OR** (1 h =) 60 x 60 (s) or 3600 (s) (130 km/h =) 36(.1) (m/s) accept 111.6 or 112 (km/h) for 2 marks ` accept 1860 m/min and 2167 m/min for 1 mark each award full marks for the correct answer without working	**(2)** **AO2**

	Answer	Additional guidance	Mark
(iii)	select and substitute into distance travelled = average speed x time (1) 46 = 31 x t rearrangement and evaluation (1) (t=) 1.48(3) (s) evaluation given to 2 sf (1) (t =) 1.5 (s)	 $31 = \frac{46}{t}$ $(t =) \frac{46}{31}$ award two marks for the correct evaluation without working any answer written to 2 sf independent mark 1.5 scores 3 marks 1.4 scores 2 marks 1.50 scores 2 marks 0.67 scores 2 marks 1400 scores 2 marks 0.673(9) scores 1 mark 1426 scores 1 mark	**(3)** **AO2**

(**QU02a 1SC0/1PH, June 2022**)

Q5.

Question number	Answer	Additional guidance	Mark
	C is correct because 0.85 is less than 2V A is incorrect because 0.85 V is greater than 20 mv B is incorrect because 0.85 V is greater than 200 mv D is incorrect because 0.85 V would show a (very) small reading on the scale.		**(1)** **AO1**

(**QU06b 1SC0/2PH, June 2025**)

Q6.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	proton(s) (1)	NOT photon	**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	electron(s) (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	evidence of halving activity eg line on graph at 80 (Bq) or two lines at, say, 100 and 50. (1) 8 (days) gains both marks (2)	accept halving in answer space e.g. 160 -> 80 or 80 -> 40 or 160 ÷ 2 = 80 NOT 160 ÷ 40 or 131 ÷ {2 or 4} or 40 ÷ 2 (unless clearly an activity)	**(2)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	idea of two half-lives (1) but, 16 (days) gains both marks (2)	halving of 800 twice, e.g. 400 AND 200 seen Allow ECF from graph eg allow half-life from graph x 2 for both marks	**(2)**

Question Number		Indicative Content	Mark
QWC	* **(c)**	A discussion including some of the following points Advantages - (currently) large resources of **fuel**/ **fuel** (reserves) will last a long time - (Produces) large amount of (electrical) energy/electricity - Does not produce (much/any) carbon dioxide - Does not produce (much/any) sulphur dioxide - Does not add to global warming/climate change - Good safety record (under normal operating conditions) - Only small amount of fuel needed to produce large amount of energy/electricity - Reliable supply/provides continuous supply of electricity (for a long time) - Reduces dependence on foreign supplies of energy - Conserves fossil fuel supplies - (Spent) fuel can be processed (to produce fuel for other reactors) - Provides employment/jobs Disadvantages - Produces nuclear/radioactive {waste/materials} - nuclear/radioactive waste/materials can cause mutations in DNA/cells/people/animals - Non- renewable (energy source) - Difficulties in transporting nuclear/radioactive waste/material - Difficulty in (safely) storing/disposing nuclear waste/material - Nuclear accidents (can) pollute large areas - Accept named example of accidents eg Fukishima, Chernobyl, 3-mile island - Mining and processing fuel both produce large amounts of carbon dioxide - Expensive to build and/or decommission (nuclear power stations) - Reference to target for terrorist attacks - Produces material which can be used to develop nuclear weapons/by terrorists - Negative public perception OWTTE ignore references such as unsightly, large area needed, noisy as true for most large buildings. Ignore cost of generation or restating stem ie generates electricity or supplies electricity to homes etc.	**(6)**

Level	0	No rewardable content
1	1 - 2	• A limited discussion giving one fact e.g. they give people jobs (in that area) OR they can have accidents like in Japan (after the tsunami). • 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 discussion that states one advantage and one disadvantage OR states more than one advantage OR states more than one disadvantage. e.g. they are a reliable energy source and do not produce any carbon dioxide. OR they do not cause any global warming as they do not produce sulphur dioxide. OR they produce radioactive waste and many people don't want them built. • 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 discussion of either advantages or disadvantages AND at least a mention of the other one. e.g. They produce large amounts of electricity and don't produce carbon dioxide but they produce radioactive materials (in the fuel rods). OR They are a reliable source of energy but they can damage large areas if there is an accident and the fuel is non-renewable. • 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 =12 marks)

(**Q03 1SC0/1PF, June 2014**)

Q7.

Question Number	Answer	Acceptable answers	Mark
	B cm		**(1)**

(**Q03 1SC0/1PF, June 2015**)

Q8.

Question Number	Answer	Acceptable answers	Mark
	B cm		**(1)**

(**Q06 1SC0/2PF, June 2015**)