PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

PHYSICS



MARK SCHEME

TOPIC 3: CONSERVATION OF ENERGY (PAPER 1)

SCORE	PERCENTAGE
/127	%

STEMUP

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Mark Scheme

Q1.

Question Number	Answer	Additional guidance	Mark
	an explanation linking use of lubrication / oil (1) to reduce friction (between parts) (1)		**(2)** AO 2 1

(**Q14 1SC0/1PF, June 2018**)

Q2.

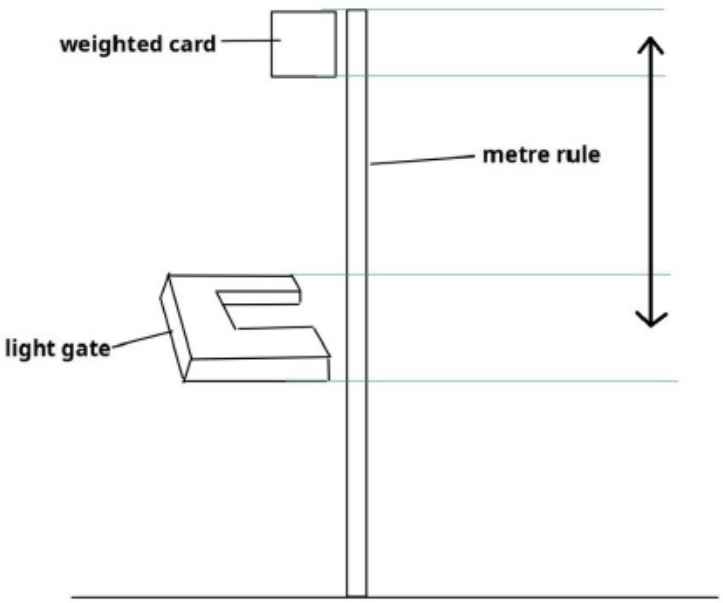
Question Number	Answer	Mark
(i)	**The only correct answer is D Bq** ***A*** *is not correct because it is the unit of pressure* ***B*** *is not correct because it is the unit of moment* ***C*** *is not correct because it is the unit of time*	**(1)** **AO1.1**

Question Number	Answer	Mark
(ii)	**The only correct answer is A** ***C and D*** *are not correct because they start with most penetrating* ***B*** *is not correct because gamma is more penetrating than beta*	**(1)** **AO1.1**

Question Number	Answer	Additional guidance	Mark
(iii)	selection of (KE =) ½ mv^2 (1) evaluation (1) 6.6×10^{-18} (J)	 $½ \times 9.1 \times 10^{-31} \times [3.8 \times 10^{6}]^2$ allow values that round to 6.6×10^{-18} (J) e.g. 6.5702×10^{-18} (J) award full marks for the correct answer without working	**(2)** **AO2.1**

(**QU06a 1SC0/1PH, June 2025**)

Q3.

Question number	Answer	Additional guidance	Mark
(i)	line drawn anywhere between the two ranges shown(1)  	upper end of drawn line/arrow between the top limits lower end of drawn line/arrow between the bottom limits accept drawn line without arrow heads or "h".	**(1)** **AO1.2**

Question number	Answer	Additional guidance	Mark
(ii)	to check for anomalies (1)	improve reliability / improve precision / (check for) consistency / (reduce) random error / calculate an average ignore accuracy / reproducible	**(1)** **AO1.2**

Question number	Answer	Additional guidance	Mark
(iii)	Any **two** from use a clamp to hold the ruler / light-gate (1) ensure eye is level (with the edge being measured and the rule) (1) use a set square (to aid the measurement) (1) make sure the rule is vertical (1) use a ruler with an improved resolution (1)	 look at straight (on) use of (horizontal) marker/pointer stand the ruler upright use a ruler with small(er) divisions ignore references to human error / repeat reading (by others)	**(2)** **AO1.2**

(**QU04a 1SC0/1PF, June 2025**)

Q4.

Question number	Answer	Additional guidance	Mark
(i)	substitution (1) (ΔGPE =) 64 x 10 x 24 evaluation (1) 15 000 (J)	 accept 15 360(J) or 15 400(J) award full marks for correct answer without working.	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
(ii)	substitution (1) (KE=) ½ x 64 x $6^{(2)}$ calculation of 6^2 (1) evaluation (1) 1200 (J)	 accept 1152(J) award full marks for correct answer without working. 192 (J) scores 2 marks	**(3)** **AO2**

Question number	Answer	Additional guidance	Mark
(iii)	an explanation linking any **two** from: the kinetic energy (store)/it decreases (to zero) (1) (the energy) has dissipated (1) to the surroundings (1) thermal energy (store) increases (1)	 transferred to ground/brake(s) pads make the brakes hot	**(2)** **AO2**

(**Q02a 1SC0/1PF, Nov 2021**)

Q5.

Question Number	Answer	Additional guidance	Mark
(i)	1840 (J) (1)		**(1)**

Question Number	Answer		Mark
(ii)	substitution (1) (efficiency =) $\frac{160}{2000}$ evaluation (1) 0.08 OR 8 (%)	Ignore any units award full marks for the correct answer without working	**(2)**

Question Number	Answer	Additional guidance	Mark
(iii)	reference to : thermal (energy) (1) OR (lost to) environment /surroundings/dissipated (1) OR transferred/changed to another form of energy (1)	IGNORE gets re-used / recycled heat OR (to) atmosphere / (to) the air /sky/ steam accept named form of energy	**(1)**

Question Number	Answer	Additional guidance	Mark
(iv)	an answer that makes reference to **any two from** produces/ releases/makes/gives off carbon dioxide / CO_2 /greenhouse gases (1) produces carbon monoxide / CO (1) produces air pollution (1) produces sulphur dioxide/ $SO_{(2)}$ (1) produces soot /smoke (1) mining coal (1)	IGNORE unqualified pollutes/pollution IGNORE ozone layer IGNORE non-renewable IGNORE 'fumes' (causes) greenhouse effect OR contributes to global warming/climate change allow CO2 causes carbon monoxide poisoning accept (harmful) particles /dust causes <u>acid rain</u> blackens/ stains buildings/statues slag heaps/ mining damages the landscape/habitats/ecosystem OR ground needs to be dug up	(2)

(**Q02a 1SC0/1PF, June 2019**)

Q6.

Question number	Answer	Additional guidance	Mark
(i)	Substitution (1) PE = 7.26 x 10 x 1.3 Answer (1) 94.4 (J)		(2)

Question number	Answer	Additional guidance	Mark
(ii)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (1 mark): • (energy stored changes between) gravitational potential energy, kinetic energy (1) • Potential energy increases as it rises / decreases as it falls. (1)	Ignore reference to energy change after hitting the ground (eg sound / heat)	(2)

(**Q05c 1SC0/1PF, SAM**)

Q7.

Question number	Answer	Additional guidance	Mark
(i)	5000(J)	24 000 – 19 000	**(1) AO2**

Question number	Answer	Additional guidance	Mark
(ii)	substitution (1) (efficiency =)$\frac{19000}{24000}$ (x100%) evaluation(1) 0.79 or 79%	 allow 0.8 do not award 79 without percentage award full marks for correct answer without working.	**(2) AO2**

(**Q02b 1SC0/1PF, Nov 2021**)

Q8.

Question number	Answer	Additional guidance	Mark
(i)	substitution (1) 371 = (64.5+ m) x 3.5 rearrangement (1) m+64.5 = 371 / 3.5 evaluation of total mass (1) m+64.5 = 106 (kg) evaluation of woman's mass (1) m = 106-64.5 = 41.5 (kg)	full marks will be awarded for correct numerical answer without working	(4)

Question number	Answer	Additional guidance	Mark
(ii)	substitution (1) KE = ½ x 64.5 x 3.5^2 evaluation (1) 395 (J)	allow answers which round to 395 e.g. 395.0625 full marks will be awarded for correct numerical answer without working	(2)

(**Q06a 1SC0/1PH, SAM**)

Q9.

	Answer	Additional guidance	Mark
	substitution (1) (*ΔGPE* =) 57 × 10 × 2.1 evaluation (1) (*ΔGPE* =) 1200 (J)	 ignore attempts to convert kg to g for this MP only 1197 allow numbers that round to 1200 no ecf from MP1 award full marks for the correct answer without working.	**(2)** **AO2**

(**QU03a 1SC0/1PF, June 2022**)

Q10.

Question number	Answer	Additional guidance	Mark
	selection **and** substitution (1) $17^{(2)} = 2 \times 10 \times$ distance evaluation (1) 14(.45) (m)	use of either $v^2 - u^2 = 2ax$ or $v^2 = 2gh$ $17^{(2)} = 2 \times a \times$ distance allow 289 for 17^2 award full marks for the correct answer without working give full credit for use of g=9.8 or 9.81 m/s^2 gives 14.7 (m)	**(2)** **AO2**

(**QU02b 1SC0/1PH, June 2023**)

Q11.

	Answer	Additional guidance	Mark
(i)	600 (J)	accept 3000 – 2400 accept -600	**(1)** **AO3**

	Answer	Additional guidance	Mark
(ii)	substitution (1) (efficiency =) $\frac{2400}{3000}$ evaluation (1) 0.8(0)	 allow $\frac{4}{5}$ accept 80 (%) award full marks for the correct answer without working allow 1.25 for 1 mark for selecting and evaluating from the correct pair of values	**(2)** **AO3**

(**QU05d 1SC0/1PF, June 2022**)

Q12.

Question number	Answer	Additional guidance	Mark
	Substitution or rearrangement (1) 980 = 35 x 10 x h	(Δh =) $\frac{\Delta GPE}{m \times g}$ or (Δh =) $\frac{980}{35 \times 10}$ allow use of 9.8 N/kg or 9.81 N/kg allow substitution into visible incorrectly rearranged algebraic expression	**2** **AO2.1**
	evaluation (1) (h =) 2.8 (m)	allow 2.85/2.86/2.9 for use of g = 9.8 N/kg or 9.81 N/kg ignore use of negative for decrease in GPE award full marks for the correct answer without working	

(**QU05a 1SC0/1PF, June 2024**)

Q13.

Question number	Answer	Additional guidance	Mark
	Substitution or rearrangement (1) 980 = 35 x 10 x h	(Δh =) $\frac{\Delta GPE}{m \times g}$ or (Δh =) $\frac{980}{35 \times 10}$ allow use of 9.8 N/kg or 9.81 N/kg allow substitution into visible incorrectly rearranged algebraic expression	**2** **AO2.1**
	evaluation (1) (h =) 2.8 (m)	allow 2.85/2.86/2.9 for use of g = 9.8 N/kg or 9.81 N/kg ignore use of negative for decrease in GPE award full marks for the correct answer without working	

(**QU01a 1SC0/1PH, June 2024**)

Q14.

Question number	Answer	Additional guidance	Mark
(i)	rearrangement (1) $h = \frac{\Delta GPE}{m \times g}$ evaluation (1) (h) = 56 (m)	 $h = \frac{39\,000}{70 \times 10}$ allow numbers that round to 56 (m) e.g. 55.71 allow numbers that round to 57 (m) e.g. 56.85 (use of g=9.8 N/kg) award full marks for correct answer without working	**(2)** **AO3.2**

Question number	Answer	Additional guidance	Mark
(ii)	selection of $v^2 - u^2 = 2 \times a \times x$ (1) rearrangement (1) $a = \frac{v^2 (- u^2)}{2 \times x}$ evaluation (1) 1.8 (m/s^2) ALTERNATIVE METHOD calculation of time = 14.814 using time = distance / average speed (1) substitution (1) a (=(v-u) /t) = $\frac{27(-0)}{14.814}$ evaluation (1) 1.8 (m/s^2)	$27^2 (- 0^2) = 2 \times a \times 200$ allow $27^2 (- 0^2) = 2 \times a \times$ their (a)(i) $a = \frac{27^2(- 0^2)}{2 \times 200}$ allow $a = \frac{27^2(- 0^2)}{2 \times \text{their (a)(i)}}$ no ecf for evaluation allow numbers that round **down** to 1.8 (m/s^2) e.g. 1.8225 award full marks for correct answer without working.	**(3)** **AO3.2**

Question number	Answer	Additional guidance	Mark
(iii)	An explanation linking (measure) GPE at top/start and KE at bottom/end (1) energy (at top) subtract energy (at bottom) (1)	 allow subtraction of any energies allow difference for subtraction award 2 marks for GPE at top subtract KE at bottom allow for 2 marks 39 000 – 25 515 OR 13485	**(2)** **AO3.3a**

(**QU04a 1SC0/1PH, June 2025**)

Q15.

Question number	Answer	Additional guidance	Mark
(i)	substitution (1) 11 = 0.42 x 10 x Δh rearrangement (1) (Δh =) $\frac{11}{0.42 \times 10}$ evaluation (1) 2.6 (m)	accept substitution and rearrangement in either order (Δh =) $\frac{\Delta GPE}{m \times g}$ accept any value which rounds to 2.6 (m) award 2 marks for 2.6 to any other power of 10 allow 1 mark for 0.38 allow 1 mark for 46(.2) award full marks for the correct answer with no working give full credit for use of g=9.8 or 9.81 N/kg (gives 2.7 (m))	(3) AO2

Question number	Answer	Additional guidance	Mark
(ii)	substitution(1) (KE=) $\frac{1}{2} \times 0.42 \times 12^2$ evaluation (1) 30 (J)	 allow 30.2(4) (J) award 1 mark for 30 240 (J) award 1 mark for 2.52 (J) award 1 mark for 60.5 (J) award full marks for the correct answer with no working	(2) AO2

Question number	Answer	Additional guidance	Mark
(iii)	A description including: KE/kinetic (energy store) (1) (transfers to) and **one** of: elastic (potential energy store) (1) OR thermal (energy of ball/wall/surroundings) (1) OR dissipates (to surroundings) (1)	 allow mechanically / mechanical transfer ignore reference to gravitational potential energy allow heat for thermal allow sound in this context ignore reference to the ground	**(2)** **AO2**

(**QU06a 1SC0/1PF, June 2023**)

Q16.

Question number	Answer	Additional guidance	Mark
(i)	substitution (1) 11 = 0.42 x 10 x Δh rearrangement (1) (Δh =) $\frac{11}{0.42 \times 10}$ evaluation (1) 2.6 (m)	 accept substitution and rearrangement in either order (Δh =) $\frac{\Delta GPE}{m \times g}$ accept any value which rounds to 2.6 (m) award 2 marks for 2.6 to any other power of 10 allow 1 mark for 0.38 allow 1 mark for 46(.2) award full marks for the correct answer with no working give full credit for use of g=9.8 or 9.81 N/kg (gives 2.7 (m))	**(3)** **AO2**

Question number	Answer	Additional guidance	Mark
(ii)	substitution(1) (KE=)$\frac{1}{2}$ x 0.42 x 12^2 evaluation (1) 30 (J)	 allow 30.2(4) (J) award 1 mark for 30 240 (J) award 1 mark for 2.52 (J) award 1 mark for 60.5 (J) award full marks for the correct answer with no working	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
(iii)	A description including: KE/kinetic (energy store) (1) (transfers to) and **one** of: elastic (potential energy store) (1) OR thermal (energy of ball/wall/surroundings) (1) OR <u>dissipates</u> (to surroundings) (1)	 allow mechanically / mechanical transfer ignore reference to gravitational potential energy allow heat for thermal allow sound in this context ignore reference to the ground	**(2)** **AO2**

(**QU02a 1SC0/1PH, June 2023**)

Q17.

	Answer	Additional guidance	Mark
(i)	selection and substitution (1) (KE) = $\frac{1}{2}$ x 3.6 x 10^5 x 71^2 evaluation (1) 9.1 x 10^8 (J)	 accept 9.07 x 10^8 (J) accept 907 380 000 (J) award full marks for correct answer without working do not award a power of ten error	**(2)** **AO2**

	Answer	Additional guidance	Mark
(ii)	any **one** from: mechanically (to the thermal store) (1) (heating) due to air resistance / friction (1) thermally (1)	 allow dissipated thermal (store) / heat (energy)	**(1)** **AO2**

(QU03b 1SC0/1PH, June 2022)

Q18.

	Answer	Additional guidance	Mark
	select correct equation (1) $KE = ½ \times m \times v^2$ substitution (1) (*KE* =) ½ × 70 × 8(.0)$^{(2)}$ evaluation (1) (*KE* =) 2200 (J)	 ignore attempts to convert kg to g for this MP only allow numbers that round to 2200 e.g. 2240 280 or 35 x 8 seen scores 2 marks award full marks for the correct answer without working.	**(3)** **AO2**

(QU03b 1SC0/1PF, June 2022)

Q19.

Question Number	Answer	Additional guidance	Mark
	substitution (1) ½ x 8 x 1.5(^{2}) calculation of v^2 (1) 2.25 evaluation (1) 9(.0) (J)	9000 (J) scores 2 marks 6(.0)(J) scores 2 marks 6000 (J) scores 1 mark award full marks for the correct answer without working	**(3)**

(**Q02b 1SC0/1PF, June 2019**)

Q20.

Question number	Answer	Additional guidance	Mark
	substitution (1) $(v^2) = \frac{950 \times 2}{35}$ evaluation of v^2 (1) 54(.29) evaluation of v (1) (v =) 7.4 (m/s)	accept values that round to 7.3(m/s) or 7.4(m/s) accept answer of 7 (one sig. fig.) award 2 marks for an answer that rounds to 54 (m/s) if no other mark scored allow 1 mark for an answer that rounds to 0.23 (m/s) (use of mass in g) award full marks for correct answer without working	**3** **AO2.1**

(**QU05b 1SC0/1PF, June 2024**)

Q21.

Question number	Answer	Additional guidance	Mark
	substitution (1)		**3 AO2.1**
	$(v^2) = \frac{950 \times 2}{35}$	$\frac{1900}{35}$	
	evaluation of v^2 (1) 54(.29)		
	evaluation of v (1) (v =) 7.4 (m/s)	accept values that round to 7.3 (m/s) or 7.4 (m/s)	
		accept answer of 7 (one sig. fig.) award 2 marks for an answer that rounds to 54 (m/s) if no other mark scored, allow 1 mark for an answer that rounds to 0.23 (m/s) (use of mass in g) award full marks for correct answer without working	

(**QU01b 1SC0/1PH, June 2024**)

Q22.

Question Number	Answer	Additional guidance	Mark
(i)	selection and substitution (1) $3(.00) \times 10^8 = 2.45 (\times 10^9) \times \lambda$ rearrangement (1) $(\lambda =) \frac{3(.00)\times 10^8}{2.45 (\times 10^9)}$ evaluation (1) 0.12 (m)	allow substitution and rearrangement in either order $2.45 \left(\times 10^9\right) = \frac{3(.00) \times 10^8}{\lambda}$ $\lambda = \frac{v}{f}$ accept 0.122(m) power of ten error gains 2 marks award full marks for the correct answer without working	**(3)** **AO2**

Question Number	Answer	Additional guidance	Mark
(ii)	selection and substitution (1) $(0.)55=\frac{42\,000}{\text{total energy supplied (to device)}}$ rearrangement (1) $(\text{total energy supplied to device}=)\frac{42\,000}{(0.)55}$ evaluation (1) 76 000(J)	allow substitution and rearrangement in either order $(0.)55=\frac{42\,000}{x}$ accept any value that rounds to 76 000(J) 760/764/763(J) gains 2 marks any other power of ten error gains 1 mark award full marks for the correct answer without working	**(3)** **AO2**

(**QU06b 1SC0/1PH, June 2022**)

Q23.

Question number	Answer	Additional guidance	Mark
(i)	substitution Time = 37/ 25 (1) Evaluation (1) = 1.5 (s)	 Allow 1.48 (s) full marks will be awarded for correct numerical answer without working	**(2)**

Question number	Answer	Additional guidance	Mark
(ii)	substitution K.E. = 0.5 x 1300 x 20^2 (1) evaluation (1) = 260,000 J	 260 kJ full marks will be awarded for correct numerical answer without working	(2)

(**Q01c 1SC0/1PF, SAM**)

Q24.

Question number	Answer	Additional guidance	Mark
	Calculation of area (1) 7 × 11 Substitution (1) 77 × 0.12 Answer (1) 9.2 (J)	77 ecf area award full marks for correct numerical answer without working	 (3)

(**Q01aiii 1SC0/1PF, SAM 2016**)

Q25.

		Indicative Content	
QWC	*	A discussion including some of the following points	

Energy saving lamp	Filament lamp
Advantages • Saves energy / uses energy more efficiently • Cost efficient • Lasts longer • Lower power (needed) • Less fossil fuels burnt • Cool to touch • Efficiency 20% • Lasts 9000 hours longer • Lasts 10 times longer • Produces 4 times as much light energy for every 100J of electrical energy supplied. • More readily available **Disadvantages** • Higher initial cost • May contain harmful gases • Takes longer to reach maximum brightness • Not such a bright light • Costs 5 times as much • Costs £1.20 more	**Disadvantages** • Wastes more energy • Less efficient • Shorter lifetime • Higher power (needed) • More fossil fuels burnt • Gets very hot • Only 5% efficient • Wastes 95% of energy sup • Uses 4 times as much pow • Less readily available **Advantages** • Costs less to buy • Do not contain harmful gas • Lights immediately • Bright light

Table of information given in the question

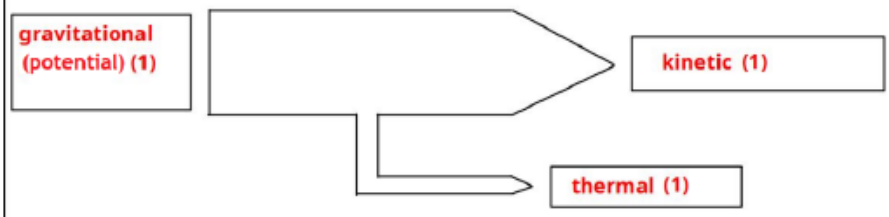
Energy saving lamp	Filament lamp
power =15 W	power =60W
Cost = £1.50	Cost = £0.30
Lifetime = 10 000 hours	Lifetime = 1000 hours
Produces 20J of light energy for every 100J of electrical energy supplied	Produces 5J of light e for every 100J of ele energy supplied

Level	**0**	No rewardable content
1	**1 - 2**	• A limited description of one advantage or one disadvantage e.g. energy saving 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 description of two different advantages / disadvantages e.g. energy saving 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 description of two different advantages / disadvantages using a **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	

(**Q12 1SC0/1PF, June 2013**)

Q26.

Question number	Answer	Mark
	 accept heat or sound for thermal accept kinetic or thermal in either order in the right-hand boxes accept GPE or GP for gravitational (potential) accept KE for kinetic	(3) AO3.1

(**QU04b 1SC0/1PF, June 2025**)

Q27.

Question number	Answer	Additional guidance	Mark
	A description to include: mention relevant energy store such as GPE or chemical (1) 'correct' transfer in context (1)	 allow KE or mechanical or thermal or heat chemical to (G)PE or chemical to KE (in lifting) allow misread GPE to KE/thermal on slope Allow KE to GPE in lifting	**(2)**

(**Q05a 1SC0/1PF, Nov 2020**)

Q28.

Question number	Answer	Additional guidance	Mark
	A description to include: mention relevant energy store such as GPE or chemical (1) 'correct' transfer in context (1)	 allow KE or mechanical or thermal or heat chemical to (G)PE or chemical to KE (in lifting) allow misread GPE to KE/thermal on slope Allow KE to GPE in lifting	**(2)**

(**Q01a 1SC0/1PH, Nov 2020**)

Q29.

	Answer	Additional guidance	Mark
	a description giving as the density (of expanded polystyrene) increases the (thermal) conductivity decreases (1) non-linear / gradient decreases / at a decreasing rate / levels off / plateaus / becomes (almost) constant (1)	 ORA allow inversely proportional / exponential for non-linear in this context ignore negative correlation unqualified quoted values are insufficient	**(2)** **AO3**

(QU05c 1SC0/1PF, June 2022)

Q30.

	Answer	Additional guidance	Mark
	a description giving as the density (of expanded polystyrene) increases the (thermal) conductivity decreases (1) non-linear / gradient decreases / at a decreasing rate / levels off / plateaus / becomes (almost) constant (1)	 ORA allow inversely proportional / exponential for non-linear in this context ignore negative correlation unqualified quoted values are insufficient	**(2)** **AO2**

(QU01c 1SC0/1PH, June 2022)

Q31.

Question number	Indicative content	Mark
	Answers will be credited according to the candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **A03 (6 marks)** <u>Apparatus</u> • beakers • thermometer(s) • stop watch • foam and new material <u>Measurement of energy loss</u> • put material around cylinder/ beaker/calorimeter (or use foam jacket to start with) • put hot water into cylinder/beaker • measure temperature • measure temperature at intervals/at start / at finish/after fixed period of time • or measure time taken to cool to set temperature <u>Comparison between two materials</u> • change to other material around cylinder/beaker • compare the temperatures of the two after fixed time • or compare time taken to cool • the better insulator cools down more slowly <u>Measures to ensure fair test</u> • same mass of water • same thickness of material • same starting temperature • same time interval • same room temperature <u>Accuracy</u> • repeat readings • take average of readings	**(6)**

Level	Mark	Descriptor
	0	• No awardable content
Level 1	1–2	• Analyses the scientific information but understanding and connections are flawed. (AO3) • An incomplete plan that provides limited synthesis of understanding. (AO3)
Level 2	3–4	• Analyses the scientific information and provides some logical connections between scientific enquiry, techniques and procedures. (AO3) • A partially completed plan that synthesises mostly relevant understanding, but not entirely coherently. (AO3)
Level 3	5–6	• Analyses the scientific information and provide logical connections between scientific enquiry, techniques and procedures. (AO3) • A well-developed plan that synthesises relevant understanding coherently. (AO3)

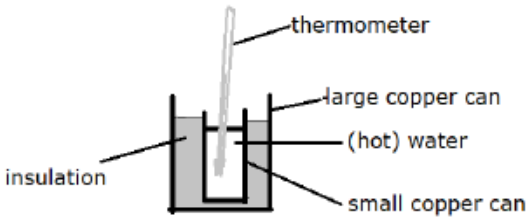
(**Q06c 1SC0/1PF, SAM**)

Q32.

	Answer	Acceptable answers	Mark
	☒ **B** conservation of energy		**(1)**

(**Q29 1SC0/1PH, June 2013**)

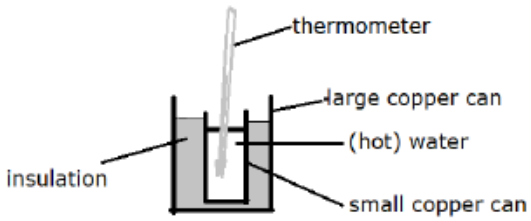
Q33.

Question Number	Answer	Additional guidance	Mark
(i)	A diagram showing: apparatus labelled to include **three** from • thermometer • water • insulator / sand / sawdust/ material • (copper) can (1) thermometer in the **water** (1) arrangement for water and insulator in and between copper cans (e.g. as in diagram below) (1)  	independent of arrangement ignore kettle and stop clock accept reverse positions for water and insulator	**(3)** **AO2**

Question Number	Answer	Additional guidance	Mark
(ii)	any **three** factors from: {mass / volume} of water (1) {volume / thickness / mass} of insulators /materials (1) {starting / initial} temperature of water (1) time interval / temperature change (1)	 accept amount / specified values / "how much" accept amount / specified values / "how much" accept temperature of hot / boiling water / specified values accept specified values of interval or change unqualified "same time" is insufficient	**(3)** **AO3**

(**QU05b 1SC0/1PF, June 2022**)

Q34.

Question Number	Answer	Additional guidance	Mark
(i)	a diagram showing: apparatus labelled to include **three** from • thermometer • water • insulator / sand / sawdust / material • (copper) can (1) thermometer in the **water** (1) arrangement for water and insulator in and between copper cans (e.g. as in diagram below) (1)  	independent of arrangement ignore kettle and stop clock accept reverse positions for water and insulator	**(3)** **AO2**

Question Number	Answer	Additional guidance	Mark
(ii)	any **three** factors from: {mass / volume} of water (1) {volume / thickness / mass} of insulators / materials (1) {starting / initial} temperature of water (1) time interval / temperature change (1)	 accept amount / specified values / "how much" accept amount / specified values / "how much" accept temperature of hot / boiling water / specified values accept specified values of interval or change unqualified "same time" is insufficient	**(3)** **AO3**

(**QU01b 1SC0/1PH, June 2022**)

Q35.

	Answer	Acceptable answers	Mark
(a)	kinetic (energy)	Movement (energy) KE	**(1)**
(b)	substitution: 0.6 × 20 (1) evaluation 12 (1) J (1)	 give 2 marks for correct answer no working unit is an independent mark joules, Nm, kgm^2/s^2 , Ws	**(3)**
(c)	substitution: 0.5 × 18 (1) evaluation 9.0 (1)	 9 give full marks for correct answer no working	**(2)**

			Indicative Content	
QWC		***(d)**	a description including some of the following points: • chemical to kinetic while in his hand • kinetic (gradually) to potential while rising / fr • eventually all potential at 10 m with a little the energy • some mention of conservation of energy • potential (gradually) to kinetic as falls / 10 m-0 • with a little more thermal (heat) energy • at 0 m sound energy • at 0 m thermal (heat) energy	
Level	**0**	No rewardable content		
1	**1 - 2**	• a limited description which identifies a change in one relevant type energy or a transfer of energy from one form to another e.g. kinetic energy increases OR kinetic energy changes to sound. • 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 detail of a relevant energy change/transfer e.g. kinetic energy changes into potential energy as it moves upwards OR kinetic energy increases as it falls. • 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 of a sequence of relevant energy changes /transfers e.g. kinetic energy is transferred into potential energy as it rises. This then changes back into kinetic energy as it falls back down. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors		

(**Q07 1SC0/1PH, June 2013**)

Q36.

			Indicative Content	
QWC		*	a description including some of the following points: • chemical to kinetic while in his hand • kinetic (gradually) to potential while rising / fr • eventually all potential at 10 m with a little the energy • some mention of conservation of energy • potential (gradually) to kinetic as falls / 10 m-0 • with a little more thermal (heat) energy • at 0 m sound energy • at 0 m thermal (heat) energy	

Level	**0**	No rewardable content
1	**1 - 2**	• a limited description which identifies a change in one relevant type energy or a transfer of energy from one form to another e.g. kinetic energy increases OR kinetic energy changes to sound. • 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 detail of a relevant energy change/transfer e.g. kinetic energy changes into potential energy as it moves upwards OR kinetic energy increases as it falls. • 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 of a sequence of relevant energy changes /transfers e.g. kinetic energy is transferred into potential energy as it rises. This then changes back into kinetic energy as it falls back down. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

(**Q22 1SC0/1PF, June 2013**)

Q37.

	Answer	**Acceptable answers**	**Mark**
	Description including 3 of the following: • (Gravitational) potential energy (transferred) to KE(1) • Idea of energy transfer to heat/sound whilst descending (1) • Chemical energy is transferred to heat energy in Andrew (1) • Idea of energy dissipated on stopping (1)	(G)PE (transferred) to KE Allow gravitational energy for GPE Energy transferred to heat because of air resistance/ friction The energy goes to heat as he stops. Energy is transferred to the surroundings	**(3)**

(**Q34 1SC0/1PF, Mar 2013**)

Q38.

	Answer	**Acceptable answers**	**Mark**
(i)	12 (J) Ignore any unit given by candidate.	20 - 8 (J)	**(1)**
(ii)	An explanation linking any **two** of • (For the) same amount of {electrical/supplied} (energy/power) (1) • (CFL/it) has a greater output (of light energy) (1) • (CFL/it) wastes less (electrical energy) (1)	Same input (energy) gives out/produces more {light/useful} (energy) Do not accept more energy is used in the (CFL/it) Ignore brightness. (CFL/it) produces less thermal/heat (energy) Accept explanations using data from the energy transfer diagrams as comparisons eg (CFL/it) is four times as efficient gains both marks	**(2)**

(**Q04 1SC0/1PF, Mar 2013**)

Q39.

Question Number	**Answer**	**Additional guidance**	**Mark**
(i)	kinetic (1)	**only** (adding another incorrect alternative negates)	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
(ii)	any one of increase the speed (of spinning) (1) increase the mass / weight (of the flywheel) (1)	 accept (idea of) faster ignore make it bigger	(1) AO 2 1

(**Q08 1SC0/1PF, June 2018**)

Q40.

	Answer	Acceptable answers	Mark
	kinetic (energy)	Movement (energy) KE	**(1)**

(**Q21 1SC0/1PF, June 2013**)