Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Mark Schemes

Q1.

	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**

Q2.

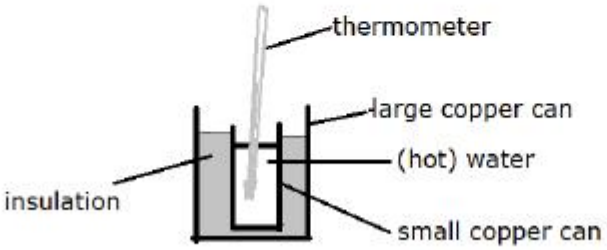
Question number	Indicative content	Mark
	Answers will be credited according to the candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not 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)

Q3.

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

Q4.

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**

Q5.

		Indicative Content	Mark
QWC	*	a description including some of the following points: • chemical to kinetic while in his hand • kinetic (gradually) to potential while rising / from 0-10 m • eventually all potential at 10 m with a little thermal (heat) energy • some mention of conservation of energy • potential	**(6)**

		(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	