Name of the Student:_____

Max. Marks : 22 Marks   **Time : 22 Minutes**

Mark Schemes

Q1.

	Answer	Additional guidance	Mark
(i)	selection and substitution (1) $$(KE) = \tfrac{1}{2} \times 3.6 \times 10^5 \times 71^2$$ evaluation (1) 9.1×10^8 (J)	accept 9.07×10^8 (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**

Q2.

Question number	Answer	Additional guidance	Mark
	substitution (1)		3 AO2.1
	$(v^2) = \dfrac{950 \times 2}{35}$	$\dfrac{1900}{35}$	
	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	

Q3.

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

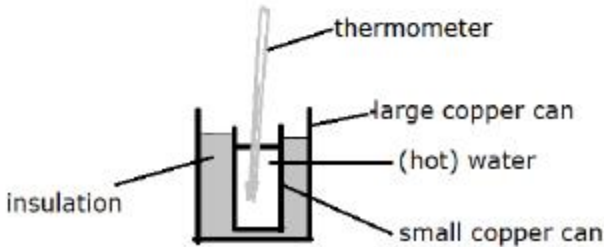| Question Number	Answer	Additional guidance	Mark
(ii)		allow substitution and rearrangement in either order	(3) AO2
	selection and substitution (1) $$(0.)55=\frac{42\,000}{\text{total energy supplied (to device)}}$$	$$(0.)55=\frac{42\,000}{x}$$	
	rearrangement (1) $$(\text{total energy supplied to device=})\frac{42\,000}{(0.)55}$$		
	evaluation (1) 76 000(J)	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	

Q4.

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 <u>slope</u> Allow KE to GPE in lifting	(2)

Q5.

	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

Q6.

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:		(3) AO3
	{mass / volume} of water (1)	accept amount / specified values / "how much"	
	{volume / thickness / mass} of insulators / materials (1)	accept amount / specified values / "how much"	
	{starting / initial} temperature of water (1)	accept temperature of hot / boiling water / specified values	
	time interval / temperature change (1)	accept specified values of interval or change	
		unqualified "same time" is insufficient	