

Name of the Student: _____

Max. Marks : 25 Marks

Time : 25 Minutes

Mark Schemes

Q1.

Question number	Indicative content	Mark
*	Answers will be credited according to 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. AO1 1 (6 marks) fission • (heavy) nucleus split • by a neutron • releases 2 daughter nuclei + more neutrons + energy • starts chain reaction advantages • already in use disadvantages • waste is radioactive • hard to dispose of • risk of accident	(6) AO1

	fusion • (light) nuclei joined • at high energy/temperature/pressure/particle density • releases (eg) helium + energy advantages • no harmful waste products disadvantages • not achieved yet (on a practicable scale) • difficulty in achieving high energy/temperature/pressure/particle density	
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Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

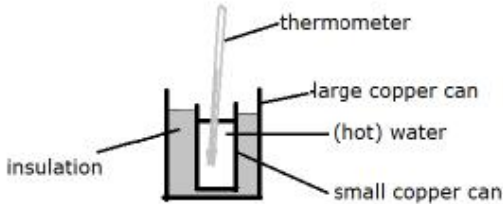
Level	Mark	Additional Guidance	General additional guidance – the decision within levels
	0	No rewardable material.	e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
Level 1	1–2	<u>Additional guidance</u> isolated facts	<u>Possible candidate responses</u> fission involves a nucleus being split by a neutron
Level 2	3–4	<u>Additional guidance</u> simple comparison of fission and fusion	<u>Possible candidate responses</u> fission involves a nucleus being split by a neutron whereas fusion requires combining two light nuclei.
Level 3	5–6	<u>Additional guidance</u> detailed comparison of fission and fusion and one advantage or one difficulty compared to the other	<u>Possible candidate responses</u> Fission involves nuclei split by a neutron. Fusion involves combining two light nuclei. The waste from fission is radioactive. Practicable fusion has not been achieved.

Q2.

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)

Q3.

	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

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

	Answer	Acceptable answers	Mark
(ai)	(Bow and arrow:) kinetic (1) (Electric kettle:) heat (thermal) (1) (Microphone:) sound (1)	Heat/thermal	(3)
(a)(ii)	Any one from (transferred into) thermal/heat/sound(energy) (1) (Energy) is dissipated (1)	Do not accept light energy or it disappears goes into surroundings/air (energy) is wasted/lost	(1)
(b)(i)	12 (J) Ignore any unit given by candidate.	20 - 8 (J)	(1)
(b)(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)
(c)	An explanation linking - dissipating heat (1) - at same (rate)/as quickly as energy is being supplied (1)	gives out/radiates/conducts/ convects /loses /produces heat/thermal/ energy gives out as much energy/power as it takes in(each second) Gains both marks If no other marks scored: There is a constant current/ steady flow of energy into the heater gains one mark Ignore refs to thermostat	(2)

Total for Question = 9 marks