Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Mark Schemes

Q1.

Question Number:	Answer	Additional Guidance	Mark
	an explanation linking: over the **same time / in 300s**, more work done / energy transferred in session 1 than in session 2 (1) (therefore) more power (developed) in session 1 (1)	allow reverse argument power in session 1 = $\frac{45.2}{300}$ = 0.15 (kW) or 150(W) allow statement that power = work / time or power = energy(transferred) / time for MP1 power in session 2 = $\frac{37.9}{300}$ = 0.13 (kW) or 126(W)	**(2)** AO 3 2a AO 3 2b

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Q2.

Question Number:	Answer	Additional Guidance	Mark
	recall and substitution (1) 1600 = force x 28 rearrangement (1) (force) = $\frac{1600}{28}$ evaluation (1) 57 (N)	substitution and rearrangement in either order accept f, F or ? for force accept values that round down to 57 e.g. 57.14 award full marks for correct answer without working award 1 mark for answers of 44800 or 0.0175 **and** a correct expression relating work, force and distance	**(3)** AO 2 1

Q3.

Question number	Answer	Additional guidance	Mark
i	rearrangement **and** substitution (1) ($\Delta\theta$ =) $\frac{210\ (x10^3)}{5.8 \times 860}$ evaluation (1) 42 (°C)	($\Delta\theta$ =) $\frac{210\ (x10^3)}{4988}$ accept any value which rounds to 42 e.g. 42.10 award full marks for the correct answer without working 4.2 to any other power of 10 scores 1 mark	**(2) AO2.1**

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Question number	Answer	Additional guidance	Mark
ii	an explanation linking any **two** from not **all** the energy supplied goes to the brick (1) not all the energy supplied stays in the brick (1) energy transferred to the storage heater parts (1)	ignore: • energy is lost / wasted, unqualified • not 100% efficient • arguments about sound energy accept heat for energy throughout less (thermal) energy given to brick energy transfers from the brick	**(2)** **AO2.1**
	energy transferred to the surroundings (1) argument linking Δθ to ΔQ **using** $\Delta\theta = \frac{\Delta Q}{m \times c}$ (1)	energy dissipated from the equation, if energy supplied to the block is smaller the change of temperature will be smaller 'brick transfers (thermal) energy to the surroundings' scores 2 marks	

Q4.

Question number	Answer	Additional guidance	Mark
(i)	rearrangement of work = force × distance to give distance = work ÷ force (1) substitution and evaluation (1) 18 (m)	seeing 2700 ÷ 150 Award full marks for correct answer without working	**(2)**

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Question number	Answer	Mark
(ii)	2700 (J)	(1)

Question number	Answer	Additional guidance	Mark
(iii)	rearrangement of $KE = ½ mv^2$ $v = \sqrt{(2 \times KE \div m)}$ (1) substitution and evaluation (1) 19 (m/s)	 $v = \sqrt{(2 \times 2700 \div 15)}$ $v^2 = (2 \times 2700 \div 15)$ allow answers that round to 19 award full marks for correct answer without working allow alternative route using $v^2 - u^2 = 2ax$ for full marks	(2)

Q5.

Question Number	Answer	Additional guidance	Mark
(i)	substitution (1) (ΔGPE=) (0.0)46×10×2.05 evaluation (1) 0.94(3) (J)	allow $g=9.8(1)$ m/s^2 0.9 (J) values that round to 0.92 or 0.93 (from using g = 9.8 or 9.81) do not award for 1(J) no POT error in evaluation award full marks for the correct answer without working.	(2)

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Question Number	Answer	Additional guidance	Mark
(ii)	recall (1) (KE=) $\frac{1}{2} \times m \times v^2$ substitution (1) (KE=) $\frac{1}{2} \times (0.0)46 \times 3.5^2$ evaluation (1) 0.28 (J)	 allow answers that round to 0.28 e.g. 0.28175 (J) allow max 2 marks for POT error e.g. 0.00028 award full marks for the correct answer without working	**(3)**

Question Number	Answer	Additional guidance	Mark
(iii)	Any value between 0.8 (m) and 0.95 (m) inclusive		**(1)**

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Question Number	Answer	Additional guidance	Mark
(iv)	An explanation linking (the ball) has lost energy (1) identification of what has happened to that energy (1)	accept (energy) dissipated **or** (transferred to) surroundings / ground **or** thermal energy **or** heat / sound **or** system is not 100% efficient **or** bounce is not (100%) elastic **or** squashing (the ball or the ground)	**(2)**

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