

Name of the Student: _____

Max. Marks : 24 Marks

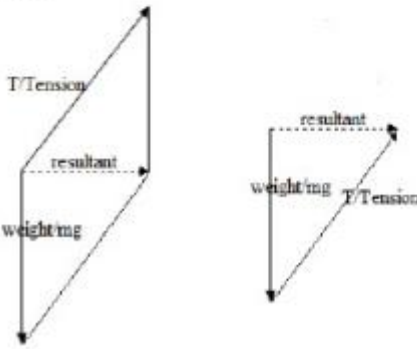
Time : 24 Minutes

Mark Schemes

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)(i)	- Use of $P = VI$ (1) $P = 1900 \text{ W}$ (1.9 kW) (1)	<u>Example of calculation</u> $P = 230 \text{ V} \times 8.20 \text{ A} = 1890 \text{ W}$	2
(a)(ii)	- Use of $\Delta E = mc\Delta\theta$ (1) - Use of $P = \frac{\Delta E}{\Delta t}$ (1) $\Delta t = 112 \text{ s}$ or 113 s [106 s or 107 s if show that value used] (1) ECF from (a)(i)	<u>Example of calculation</u> $\Delta E = 0.655 \text{ kg} \times 4190 \text{ J kg}^{-1}\text{K}^{-1} \times (100 - 22.5)\text{K}$ $\Delta E = 2.13 \times 10^5 \text{ J}$ $\Delta t = \frac{2.13 \times 10^5 \text{ J}}{1890 \text{ W}} = 112.5 \text{ s}$	3

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)(i)	- After a short time of boiling in the flask, all the apparatus would be at 100 °C. - Or so energy is not being used to heat up the flask (1) - Or so steam won't condense in the flask		1
(b)(ii)	- Use of $\Delta E = mL$ (1) - Use of $P = \frac{\Delta E}{\Delta t}$ (1) 1720 W (1.72 kW) (1)	<u>Example of calculation</u> $\frac{\Delta m}{\Delta t} = \frac{95 \times 10^{-3} \text{ kg}}{125 \text{ s}}$ $= 7.6 \times 10^{-4} \text{ kg s}^{-1}$ $\frac{\Delta E}{\Delta t} = 7.6 \times 10^{-4} \text{ kg s}^{-1}$ $\times 2.26$ $\times 10^6 \text{ J kg}^{-1}$ $P = 1720 \text{ J s}^{-1}$	3
(b)(iii)	- Comparison of answer to (a)(i) with answer to (b)(ii) (1) - Not all of the energy from the heater is used to turn water from liquid state into vapour (1) - Or energy is being used to heat the heat exchanger (1) - Or not all the steam condenses in the heat exchanger (1) - Some energy is transferred to the surroundings	e.g. rate at which thermal energy is supplied to the water in the flask is greater than rate at which thermal energy is removed from the water in the heat exchanger. If answer for (b)(ii) is bigger than 2 kW, 1 mark for correct comparison can be scored.	3

Question Number		Mark
(a)(i)	Weight (accept W or mg or gravitational pull/force) ('gravity' doesn't get the mark) (1) Tension (accept T) (1) (Both arrows and labels required for each marking point)  (Arrows must touch mass for marks; ignore any arrows, for correct or incorrect forces, not touching) (Minus one from maximum possible mark for each additional force (e.g. resultant, pull) or other arrow (e.g. speed or motion) touching mass)	2
(a) (ii)	A triangle or parallelogram with W and T in correct position for vector addition with correct labels and directions. (1) Triangle or parallelogram completed correctly with resultant in correct directions. (1) (Can score 2 marks even if the resultant is not horizontal) e.g. (scores 2 marks) 	2

