Name of the Student:_____
Max. Marks : 18 Marks **Time :18 Minutes**

Mark Schemes

Q1.

Question number:	Answer	Additional guidance	Mark
(i)			(4) AO 1 2
	(measurement of) the mass of water (1)	accept volume / weight of water ignore amount	
	(measurement of) the temperature (rise/change) (1)	accept (take) thermometer reading	
	(measurement of) the energy supplied / from heater (1)	accept (take) reading of the joulemeter ignore 'change in thermal energy' (from equation)	
	detail of any of the above (1)	e.g. measure temp at the start and end or measure mass of empty cup or start and end readings on the meter	

Question Number:	Answer	Additional guidance	Mark
(ii)	any two improvements from:	both marks can be scored in one answer space ignore repeating readings ignore increase voltage / power / energy ignore use of clamp to hold thermometer / heater	(2) AO 3 3b
	add lid /cover (1)		
	add lagging / insulation (1)	accept use better insulator or better insulated / thicker cup accept use calorimeter ignore use glass beaker unless cup is inside it ignore different type of cup	
	add a stirrer (1)		
	use a more sensitive thermometer (1)	accept use digital / electric thermometer / data logger	
	ensure heater fully submerged (1)		

Q2.

Question number	Answer	Additional guidance	Mark
(i)	two from: lagging (1) lid (1) repeat and average (1) surround heater/thermometer with oil (1)	 repeat with different time/temp rise/power Allow to reach maximum temperature at switch off.	(2)

Question number	Answer	Additional guidance	Mark
(ii)	temperature rise = 34 (°C) (1) substitution (1) $\frac{50 \times 300}{0.92 \times 34}$ evaluation (1) 480 (J/kg°C)	 ecf temperature rise award full marks for correct answer without working	(3)

Q3.

Question number	Answer	Additional guidance	Mark
i	(headings to the table should have) **units** or **names** (1)	accept any correct unit suggestion e.g. cm^3 / Pascals or any correct name e.g. pressure / volume	**(1)** **AO3**

Question number	Answer	Additional guidance	Mark
ii	attempts to find any 'in between number' (interpolates) (1) evaluation (1) 17.2, 17.3 or 17.25	accept any number between 16.6 and 17.9 award full marks for correct answer without working	**(2)** **AO3**

Question number	Answer	Additional guidance	Mark
iii	Suggestions, including any **two** from: take intervening pressure reading(s) (1) give (plenty of) time between readings (1) use apparatus with smaller scale divisions (1) take repeat readings and average (1) make sure temperature stays constant (1)	 e.g. steps of 0.2 cm^3 on volume scale allow repeat to check for anomaly e.g. check temperature of the room ignore any ideas of extending the investigation	**(2) AO3**

Question number	Answer	Additional guidance	Mark
iv	An explanation including any **three** from: any reference to data from the table (1) (the product) p x V remains constant (1) for most readings p x V is similar / close to 2800 (1) which points to $p_1 \times V_1 = p_2 \times V_2$ (1) OR equation doesn't fit because values are different (mp4 dependent upon mp2 / mp3) last value(s) of p x V discordant compared with the others (1)	 e.g. no, because almost all the (pV) values are different agrees / disagrees with hypothesis last value(s) values of pV don't agree	**(3) AO3**