

# Specific Heat Capacity MS

## QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	temperature (increase) and time switched on are directly proportional	accept the idea of equal increases in time giving equal increases in temperature answers such as: as time increases, temperature increases positive correlation linear relationship • temperature and time are proportional score 1 mark	2
a)ii)	any one from: • energy transfer (from the block) to the surroundings • (some) energy used to warm the heater / thermometer (itself) • (metal) block is not insulated	accept lost for transfer accept air for surroundings accept takes time for heater to warm up	1
a)iii)	15000	allow 1 mark for correct  substitution, ie $50 \times 300$ provided no subsequent step shown	2
b)	lead  needs least energy to raise temperature by $1^{\circ}\text{C}$	reason only scores if lead is chosen accept needs less energy to heat it (by the same amount) lowest specific heat capacity is insufficient	1  1
Total marks			6

## QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
	2550000	$E = m \times c \times \theta$ allow 1 mark for correct	2

	joules /J	substitution ie $100 \times 510 \times 50$ provided no subsequent step shown answers of 1 020 000, 3 570 000 gain 1 mark accept kJ / MJ do not accept j for full credit the unit and numerical answer must be consistent	1
Total marks			3

### QUESTION 3

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	there is a bigger temperature difference between the water and the surrounding air so the transfer of energy (from hot water) is faster	accept the water is hottest / hotter  accept heat for energy ignore temperature falls the fastest	1  1
b)	120	allow 1 mark for converting kJ to J  correctly, ie 4 032 000 or correctly calculating temperature fall as 8°C or allow 2 marks for correct substitution, ie $4\,032\,000 = m \times 4200 \times 8$ answers of 0.12, 19.2 or 16.6 gain 2 marks answers of 0.019 or 0.017 gain 1 mark	3
Total marks			5

#### QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	any two from: mass (of block) starting temperature final / increase in temperature voltage / p.d. power (supplied to each block) type / thickness of insulation	accept weight for mass temperature is insufficient  same power supply insufficient  same insulation insufficient	2
a)ii)	one of variables is categoric or  (type of) material is categoric	accept the data is categoric accept a description of categoric do not accept temp rise is categoric	1
a)iii)	concrete (heater on for) longest / longer time	reason only scores if concrete chosen a long time or quoting a time is insufficient do not accept it is the highest bar	1 1
a)iv)	4500(J)	allow 1 mark for correct  substitution ie $2 \times 450 \times 5$ provided no subsequent step shown	2
b)i)	point at 10 minutes identified		1
b)ii)	line through all points except anomalous	line must go from at least first to last point	1
b)iii)	20 (°C)	if 200C is given, award the mark. If an answer other than 200C is given, look at the graph. If the graph shows a correct extrapolation of the candidate's best-fit line and the intercept value has been correctly stated, allow 1 mark.	1
b)iv)	2 (minutes)		1
Total marks			11

**QUESTION 5**

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	4200	allow 2 marks for correct substitution ie $6930 = 0.330 \times c \times 5.0$ answers of 1050 or 840 or correctly calculated answer from correct substitution of incorrect temperature change or identification of temperature change ie $5^\circ\text{C}$ gain 1 mark accept J/kg K	3
	J/kg $^\circ\text{C}$		1
b)	temperature		1
c)	(top pan) balance		1
Total marks			6