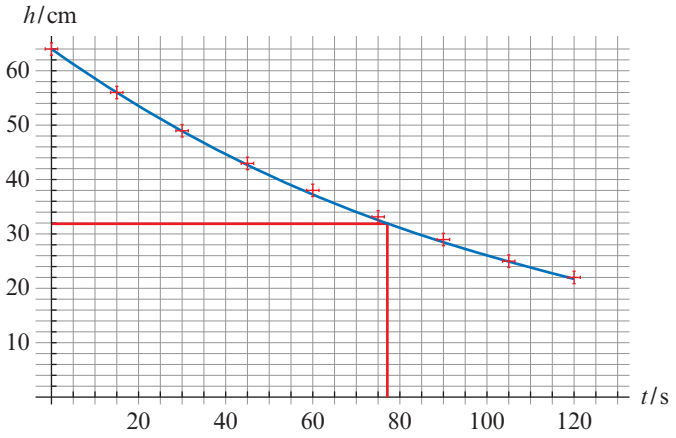
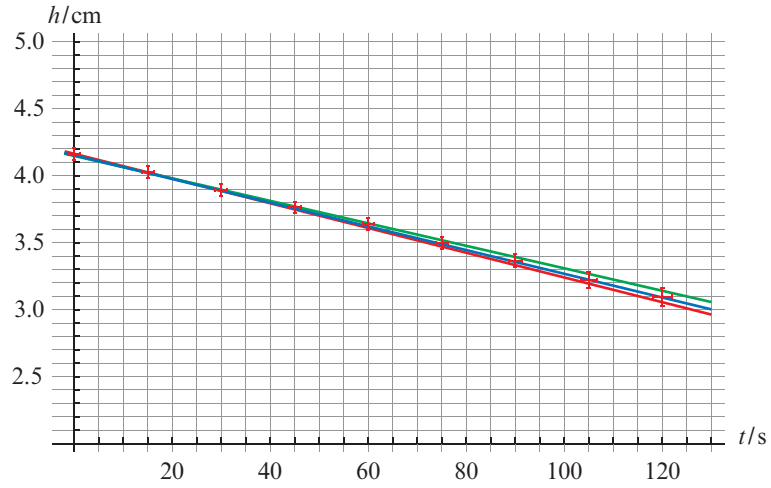
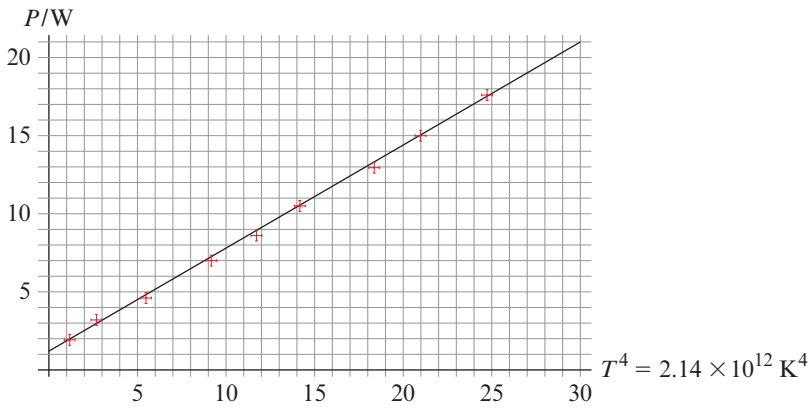
Markscheme

Section A

1 D
2 B
3 A
4 B
5 D
6 C
7 B
8 C
9 D
10 B
11 C
12 D
13 A
14 D
15 C
16 B
17 A
18 B
19 C
20 C
21 C
22 D
23 A
24 C
25 A

Section B

1				
a	I	s^{-1} ✓		[1]
	II	Chooses smallest value of h ✓ $\frac{\Delta(h)}{h} = \frac{1}{22} \times 100\% = 4.5\%$ ✓	Accept BCA	[2]
	III	Draw curve of best fit: ✓  77.5 s ✓	Accept time in range 75 s to 80 s	[2]
	IV	$\frac{\ln 2}{77.5} = 8.9 \times 10^{-3}\ s^{-1}$ ✓	Accept range $8.7 \times 10^{-3}\ s^{-1}$ to $9.2 \times 10^{-3}\ s^{-1}$	[1]
b	I	Draws line of best fit and lines of min and max slope ✓  Best fit slope = $8.8 \times 10^{-3}\ s^{-1}$ ✓ Max/min slopes = $-9.2 \times 10^{-3}\ s^{-1}$/$-8.4 \times 10^{-3}\ s^{-1}$ ✓ k = $(8.8 \pm 0.4) \times 10^{-3}\ s^{-1}$ ✓	Final answer for k consistent with max/min slopes	[4]
	II	This value uses all points, not just one ✓ And gives an estimate of the range of possible values through the uncertainty ✓		[2]

2				
a	I	Convection ✓	Do not accept conduction	[1]
	II	Radiation is significant/dominant at large temperatures ✓		[1]
b	I	$\frac{\Delta(T^4)}{T^4} = 4\frac{\Delta T}{T}$ ✓ $\Delta(T^4) = 4 \times \frac{30}{2.14 \times 10^3} \times (2.14 \times 10^3)^4 = 0.8 \times 10^{12}\ \text{K}^4$ ✓		[2]
	II	 $P \propto T^4$ implies a straight line of best fit through the origin, which is not the case ✓		[1]
	III	Since the filament loses energy by convection the actual power due to radiation is less ✓	Accept any other reasonable statement	[1]
	IV	It is more likely ✓ Since the values for power will be less, shifting the graph closer to the origin ✓	ECF from answer to b iii	[2]