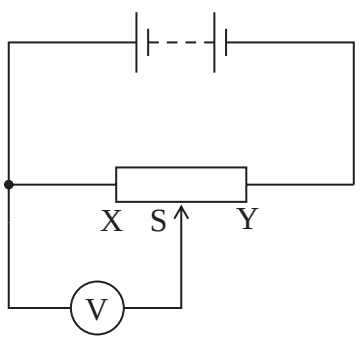
11 A student connected a voltmeter to a potential divider, as shown in the circuit diagram.



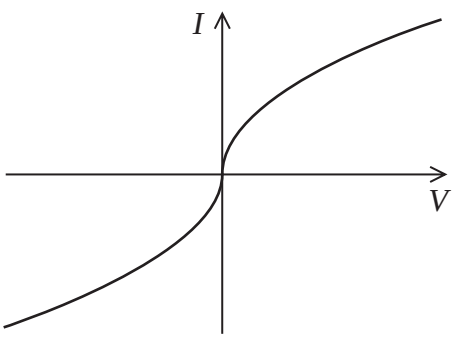
(a) The potential divider was adjusted by moving sliding contact S from position X to position Y.

Explain how the voltmeter reading *V* depends upon the position of S.

(3)

(b) A filament bulb and ammeter were connected to the potential divider. The potential divider was used to vary *V* across the filament bulb. The ammeter gave the corresponding current *I* in the filament.

I varied with *V*, as shown in the graph below.



Explain the shape of the graph.

(2)

(c) The temperature *T* of the filament varies with the potential difference *V* across the filament according to the expression

$$T = aV^b$$

where *a* and *b* are constants.

(i) Explain why a graph of log *T* against log *V* would give a straight line.

(2)

(ii) Data for *T* and *V* is shown in the table below.

***T* / K**	***V* / V**		
1480	5.03		
1680	6.89		
1850	8.95		
2010	11.11		
2140	12.94		
2280	15.06		

Plot a graph of log *T* against log *V* on the grid opposite. Use the extra columns provided to show any processed data.

(5)

(iii) Determine a value for *b* using your graph.

(2)

(Total for Question 11 = 14 marks)