7 **(a)** Fig. 7.1 shows the variation with potential difference V of the current I for a filament lamp X rated at 6.0 V and 1.5 W.

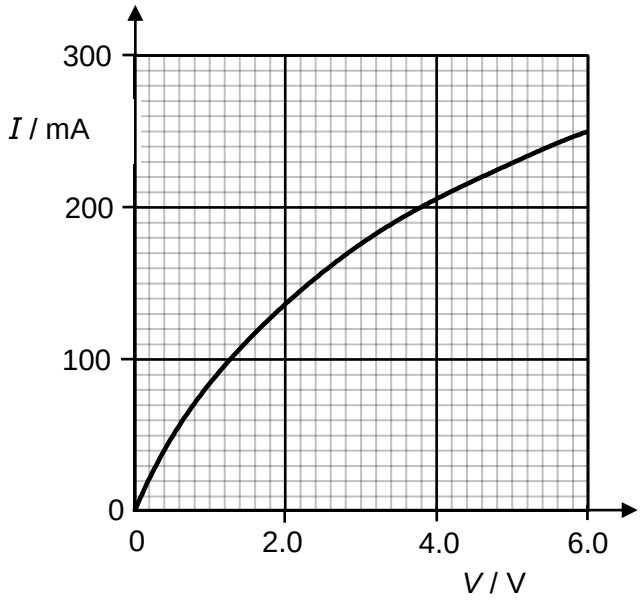

Fig. 7.1

(i) Calculate the resistance of the filament lamp at 6.0 V.

resistance = ……..…...…….. Ω [2]

(ii) Explain how Fig. 7.1 shows that the resistance of the filament lamp increases as the potential difference across the filament lamp increases.

……...

…… [1]

[Turn over

(iii) The filament lamp X is connected in series with a battery B and a variable resistor R, and, in parallel with a voltmeter, as shown in Fig. 7.2.

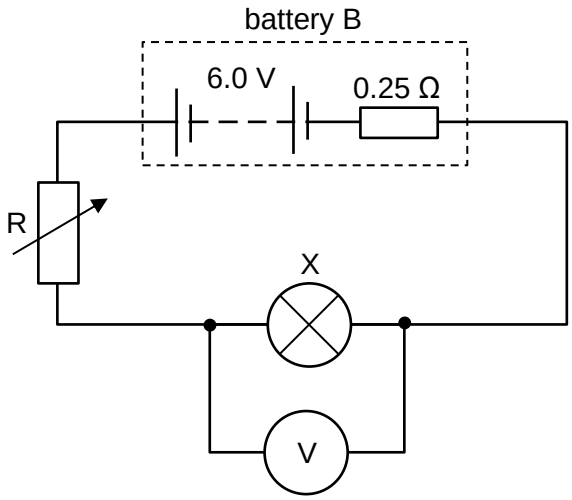

Fig. 7.2

Battery B has electromotive force 6.0 V and internal resistance 0.25 Ω.

The resistance of R is adjusted such that the voltmeter reads 5.0 V.

Calculate the terminal potential difference (p.d.) across B. Show your working.

terminal p.d. across B = ……..…..…….. V [3]

(b) Fig. 7.3(a) and Fig. 7.3(b) show two circuits which can be used to act as a dimmer switch for a lamp.

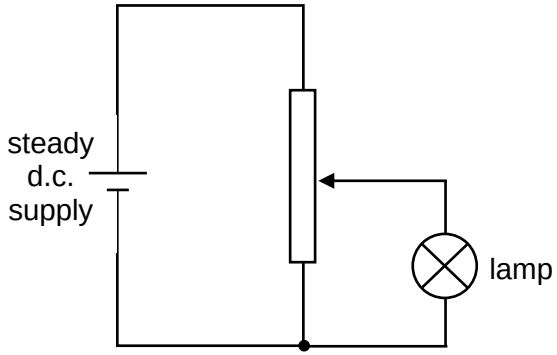

Fig. 7.3(a)

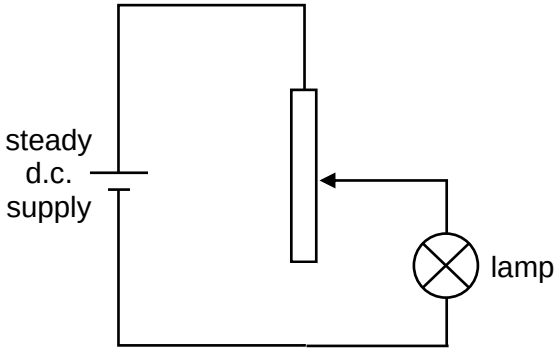

Fig. 7.3(b)

State and explain one advantage the circuit in Fig. 7.3(a) has over the circuit in Fig. 7.3(b) in varying the brightness of the lamp.

……...……...

……...……...

……... [2]

[Total: 8]