**6** **(a)** Using energy transformations, describe the *electromotive force* (*e.m.f.*) of a battery and the *potential difference* (*p.d.*) across a resistor.

e.m.f.: .....

.....

p.d.: .....

.....[2]

**(b)** A battery of e.m.f. 6.0 V and negligible internal resistance is connected to a network of resistors and a voltmeter, as shown in Fig. 6.1.

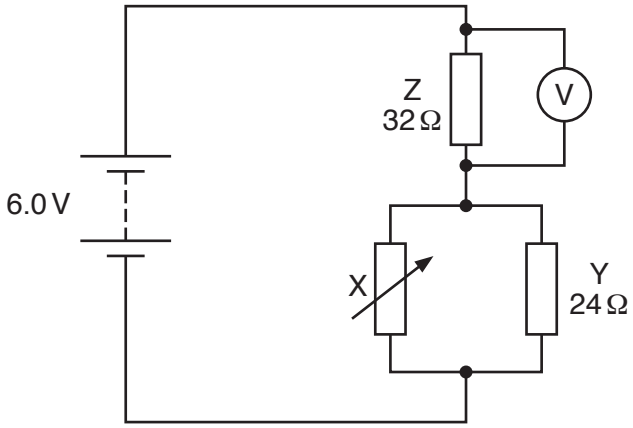


**Fig. 6.1**

Resistor Y has a resistance of 24 Ω and resistor Z has a resistance of 32 Ω.

**(i)** The resistance $R_X$ of the variable resistor X is adjusted until the voltmeter reads 4.8 V.

Calculate:

**1.** the current in resistor Z

current = ..... A [1]

**2.** the total power provided by the battery

power = ..... W [2]

**3.** the number of conduction electrons that move through the battery in a time interval of 25 s

number = ..... [2]

**4.** the total resistance of X and Y connected in parallel

total resistance = ..... Ω [2]

**5.** the resistance $R_X$.

$R_X$ = ..... Ω [2]

**(ii)** The resistance $R_X$ is now decreased.

State and explain the change, if any, to the reading on the voltmeter.

.....

.....

.....[2]

[Total: 13]