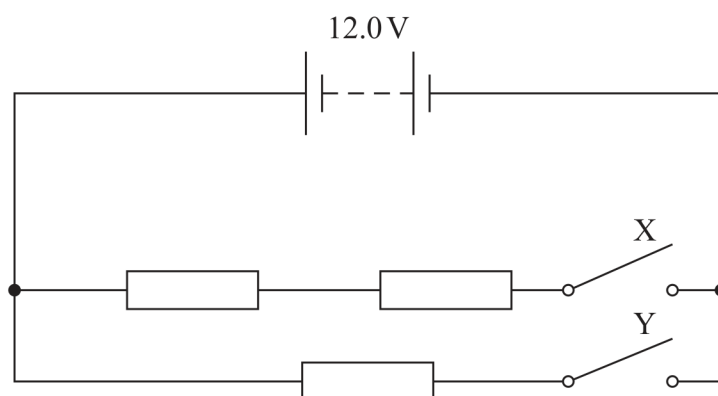


- 18 The circuit diagram shows three identical resistors and two switches, X and Y. The battery has negligible internal resistance.



Each resistor consists of a wire of diameter 0.181 mm and length 55.0 cm. At room temperature, the resistivity of the wire is $1.10 \times 10^{-6} \Omega \text{ m}$.

- (a) Show that the resistance of one resistor at room temperature is about 24Ω .

(3)

- (b) A student suggests that the maximum power output from the resistors in this circuit will be greater than 12 W.

Assess whether the student's suggestion is correct.

(4)



(c) Switch X was open and switch Y was closed.

- (i) Calculate the number of conduction electrons passing through the resistor every second immediately after switch Y was closed.

(3)

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Number of electrons =

- (ii) After switch Y had been closed for a few minutes, the power dissipated by the resistor decreased.

Explain why.

(3)

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(Total for Question 18 = 13 marks)