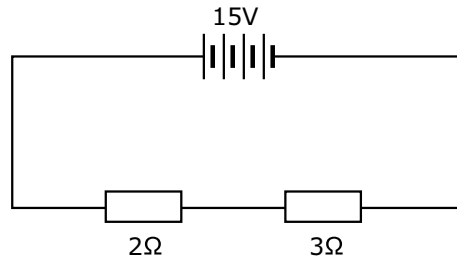


Circuits 5

Name & Set

- 1** A resistor of 2Ω is joined in series to one of 3Ω . The p.d. across the combination is 15V .



Calculate

- (a) the total resistance of the circuit.

_____ [2]

- (b) the current through each resistor.

(i) Current through 2Ω resistor _____ [2]

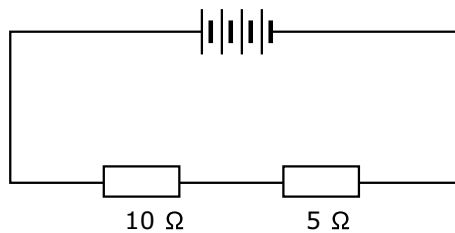
(ii) Current through 3Ω resistor _____ [1]

- (c) the p.d. across each resistor.

(i) p.d. across 2Ω resistor _____ [2]

(ii) p.d. across 3Ω resistor _____ [1]

- 2** A resistor of 10Ω is joined in series with one of 5Ω .



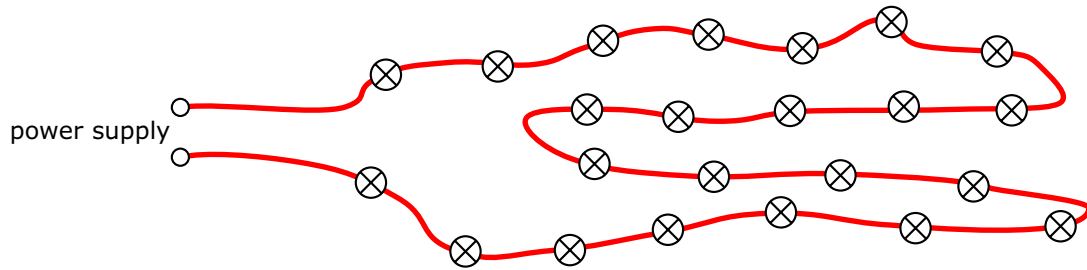
- (i) What is the total resistance of the circuit?

_____ [2]

- (ii) What is the p.d. of the battery that will drive a current of 0.1A through the combination?

_____ [2]

- 3** (a) Christmas tree lights are connected in series as shown in the diagram. A typical arrangement consists of twenty lamps connected to the mains supply. Mains voltage is 230 V.



- (i) If the filament in one of the lamps breaks, all the other lamps go out. Why is this?

_____ [2]

- (ii) How does the brightness of the lamps change if another five similar lamps are connected in series?

_____ [1]

- (iii) Explain why the brightness changes in the way you have described in part (ii).

_____ [2]

- (b) The current through the string of lights is 0.25 amps

- (i) How many lamps does the diagram show? _____ [1]

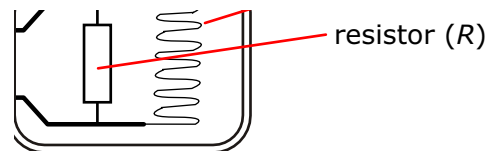
- (ii) Calculate the current through each lamp.

_____ [2]

- (v) Calculate the resistance of one of these lamps.

_____ [2]

- (b) Some Christmas tree lights use lamps that have a resistor placed across the filament as shown in the diagram below. The value of the resistor (R) is much larger than the resistance of the lamp filament.



- (i) In this case when a filament breaks the other lamps in the series circuit remain on. Why is this?

_____ [2]

- (ii) Explain what happens to the brightness of the other lamps in this series circuit when one lamp filament breaks.

_____ [3]