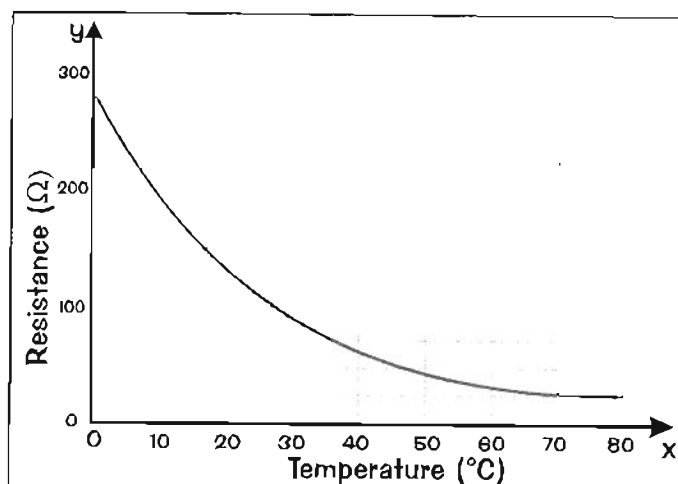


# Current in Circuits

19.1

Q1 The graph below shows how the resistance of a thermistor changes with temperature.

- Briefly describe what happens to the resistance of the thermistor as the temperature changes.
- What is the resistance at  $25^{\circ}\text{C}$  (approximately)?
- Give an example of a thermistor in use.
- What change in temperature increases the resistance from 90 ohms to 130 ohms?



Q2 Draw a circuit diagram of a 6V battery, a switch and two lamps in series.

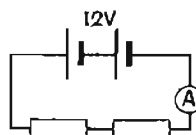
Q3 Draw a circuit diagram of a 12V power supply with a fuse and a heater in series.

Q4 Draw a circuit with a 2 ohms and 4 ohms resistor in series with a 6V battery.

- What is the total resistance?
- Calculate the current in the circuit.

Q5 The resistances of the resistors in this circuit are equal.

What are they if the ammeter reads 1A?



Q6 Christmas tree lights are a shining example of lamps in series.

What happens if one of the lamps is removed?

Find the total resistance of 10 lamps running off the mains (240V), if the current in each lamp is 0.5A. What is the resistance of each lamp?



Q7 Match each series combination

a) – d) with the equivalent single resistor 1) – 4).

a)  $1\Omega$  —  $9\Omega$

b)  $3\Omega$  —  $4\Omega$  —  $5\Omega$

c)  $6\Omega$  —  $3\Omega$

d)  $5\Omega$  —  $3\Omega$  —  $3\Omega$

1)  $9\Omega$

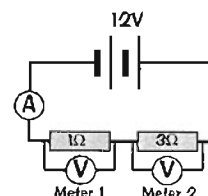
2)  $11\Omega$

3)  $12\Omega$

4)  $10\Omega$

Q8 Look at the circuit diagram on the right.

- Find the total resistance in the circuit.
- What current will the ammeter show?
- Calculate the voltmeter reading for Meter 1 and Meter 2.



Q9 Complete the following, using these words: decreases, dimmer, up, increased, smaller.

If lamps are connected in series the current goes through all the lamps in turn. The more lamps you add, the \_\_\_\_\_ they get. The ammeter reading \_\_\_\_\_ because the current is \_\_\_\_\_. This means the resistance in the circuit has \_\_\_\_\_. When we add more resistors to a series circuit, the total resistance goes \_\_\_\_\_.

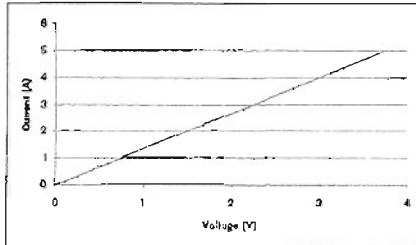
# Module Ten — Electricity

Q2 From top: 12V; 10A; 2 Ohms; 0.1A; 3 Ohms ; 7.5V.

Q3 23 Ohms.

Q4 0.5A.

Q5 a)



b) 0.75 Ohms.

c) Resistor.

d) Voltage proportional to current (straight line graph through origin).

Q6 a) It decreases.

b) It increases.

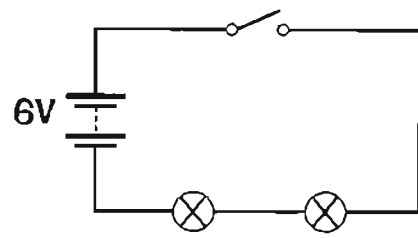
c) With increasing light intensity, the slope of the curve becomes less steep → resistance decreases more slowly.

d) Automatic night light; LDR increases resistance in the dark, the circuit 'detects' the increase and turns the light on.

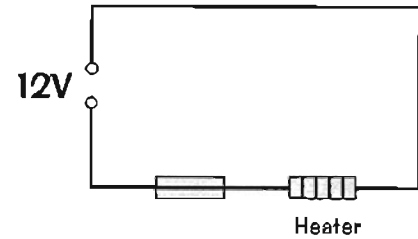
A detector could be placed on a fridgefreezer door to warn of a door left open.

Some new cars have sensors that automatically switch their headlights on when it gets dark.

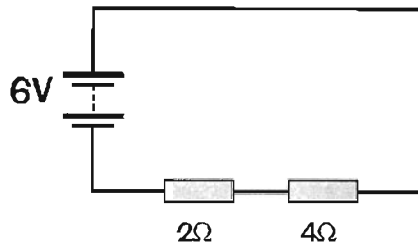
Q2



Q3



Q4



a) 6 Ohms.

b) 1A.

## Page 72 — Current in Circuits

Q1 a) 1 V.

b) 3 V.

c) 1.5 A.

d) 0.6 A.

e) 1.5 Ohms.

f) 3 Ohms.

Q2 Shorter, lower; thick, lower; temperature, increases; one direction.

Q3 a) Flow of charged particles.

b) Reduces current.

c) Allows current in one direction only.

d) Unit of power.

e) Ions dissolved in water.

f) Unit of current.

g) Measures current.

h) Measures voltage.

i) Metal wire of low resistance.

j) Unit of voltage.

## Page 73 — Current in Circuits

Q1 a) Resistance increases as temperature decreases.

b) 110 Ohms.

c) Car engine temperature sensors, electronic thermostats.

d) 30°C to 20°C, so temperature change is 10°C.

Q5 6 Ohms each.

Q6 All lamps go out; 480 Ohms; 48 Ohms each lamp.

Q7 a and 4; b and 3; c and 1; d and 2.

Q8 a) 4 Ohms. b) 3A. c) Meter 1: 3V Meter 2: 9V.

Q9 dimmer; decreases; smaller; increased; up.

## Page 74 — Currents in Series and Parallel

Q1 a) 6 Ohms.

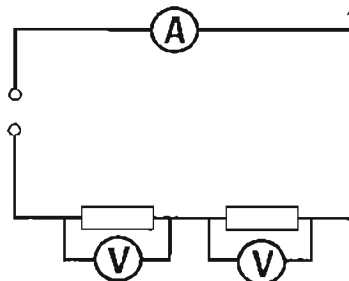
b) 1A.

c)  $V_1 = 1V$ ;  $V_2 = 2V$ ;  $V_3 = 3V$ .

Q2 a) 2 Ohms.

b) 3 more (5 in all).

Q3



a) 8 Ohms; 40 Ohms.

b) 24V.