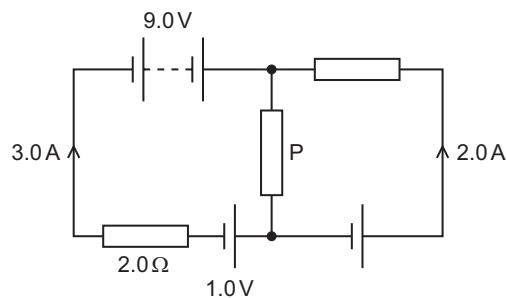


34 The diagram shows a circuit containing a battery and cells with negligible internal resistance.

Some values of current, electromotive force (e.m.f.) and resistance are shown.

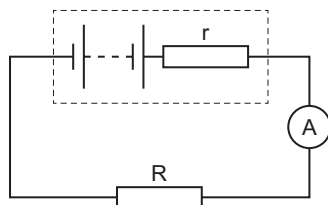
One resistor is labelled P.



What is the resistance of resistor P?

- A** 0.40Ω **B** 0.80Ω **C** 2.0Ω **D** 2.8Ω

35 The diagram shows a circuit with a battery connected to a resistor R. The battery has an internal resistance represented by resistor r.

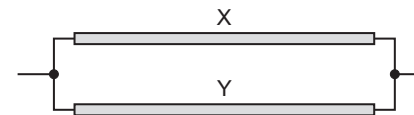


A second resistor, identical to R, is connected in parallel with R.

Which row describes the changes to the potential difference (p.d.) across r and the current shown on the ammeter when the second resistor is connected?

	p.d. across r	current shown on ammeter
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

36 Two identical wires X and Y, each of length L and radius r , are connected in parallel as shown.



The total resistance of this combination is R_1 .

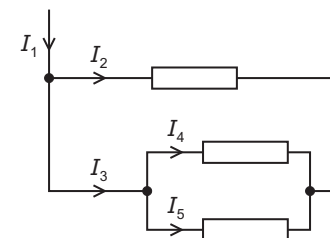
Wire X is replaced with a wire of the same material with length L and radius $2r$.

The total resistance of the new combination is R_2 .

What is the ratio $\frac{R_1}{R_2}$?

- A** $\frac{2}{5}$ **B** $\frac{2}{3}$ **C** $\frac{3}{2}$ **D** $\frac{5}{2}$

37 The diagram shows the currents in part of an electric circuit.



The resistors are identical.

Which equation is **not** correct?

- A** $I_1 = I_2 + I_4 + I_5$
B $I_2 = I_1 - I_3$
C $I_2 = I_3 + I_4 + I_5$
D $I_4 = I_3 - I_5$

5 (a) State Kirchhoff's first law.

.....
 [1]

(b) Fig. 5.1 shows a circuit containing a thermistor T that has a negative temperature coefficient.

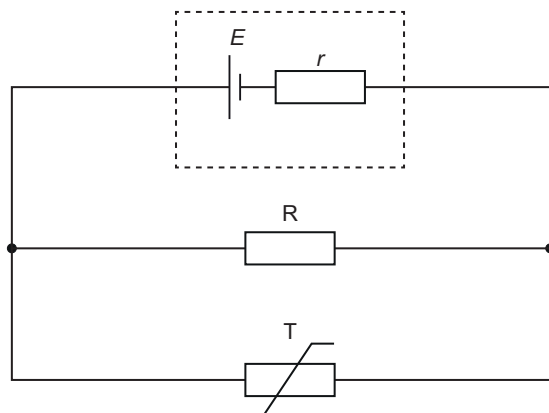


Fig. 5.1

(i) The thermistor has resistance R_0 at a temperature of 0°C .

On Fig. 5.2, sketch a possible variation of the resistance of the thermistor with temperature between 0°C and 100°C .

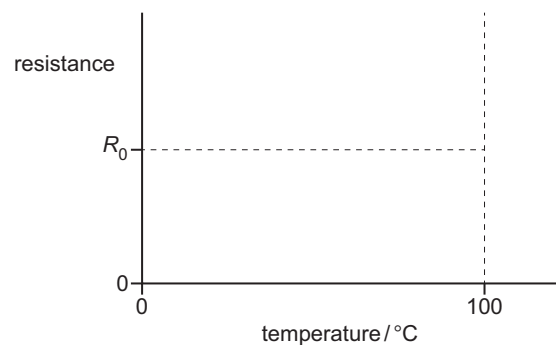


Fig. 5.2

[2]

(ii) With reference to the current in the cell, explain why the current in **resistor R** decreases with increasing temperature of the thermistor.

.....

 [3]

(c) The electromotive force (e.m.f.) E of the cell in Fig. 5.1 is 1.50 V . The internal resistance r of the cell is $0.12\ \Omega$.

Resistor R has a resistance of $6.00\ \Omega$.

At a particular temperature of the thermistor, the current in R is 0.200 A .

For this temperature of the thermistor, determine:

(i) the current in the cell

current = A [2]

(ii) the resistance of the thermistor.

resistance = Ω [2]

[Total: 10]

- 5 Fig. 5.1 shows a circuit containing a battery, two fixed resistors X and Y, and a light-dependent resistor (LDR) Z.

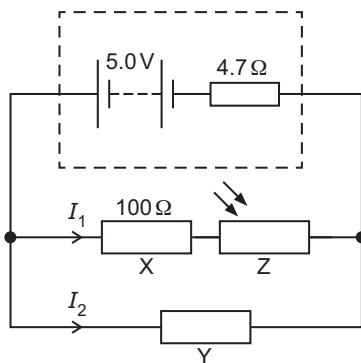


Fig. 5.1

The battery has electromotive force (e.m.f.) 5.0V and internal resistance 4.7Ω. The current in X is I_1 and the current in Y is I_2 .

The resistance of X is 100Ω. The resistance of Z varies with the intensity of light incident on it as shown in Fig. 5.2.

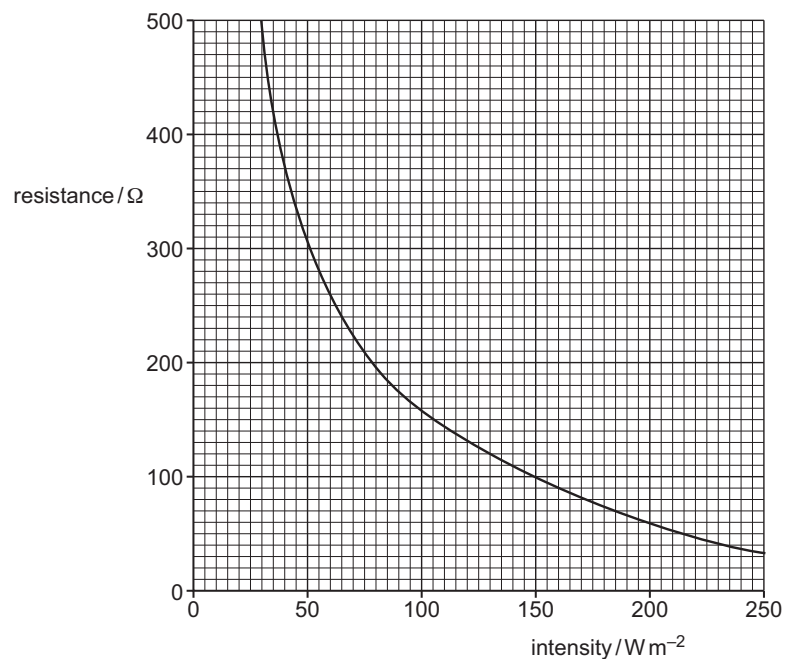


Fig. 5.2

- (a) State Kirchhoff's first law.

.....
 [1]

- (b) The intensity of light incident on Z is 130 W m^{-2} . The current in the battery is 38 mA.

- (i) Show that the terminal potential difference of the battery is 4.8 V.

[2]

- (ii) Calculate the current I_2 in Y.

$I_2 = \dots\dots\dots \text{ A}$ [3]

- (iii) Calculate the power dissipated in Y.

power = $\dots\dots\dots \text{ W}$ [2]

- (iv) The intensity of the light incident on Z decreases.

State and explain the effect on the terminal potential difference of the battery.

.....

 [3]

1 Fig. 1.1 shows a model wind turbine with blades, each of length L , placed in moving air.

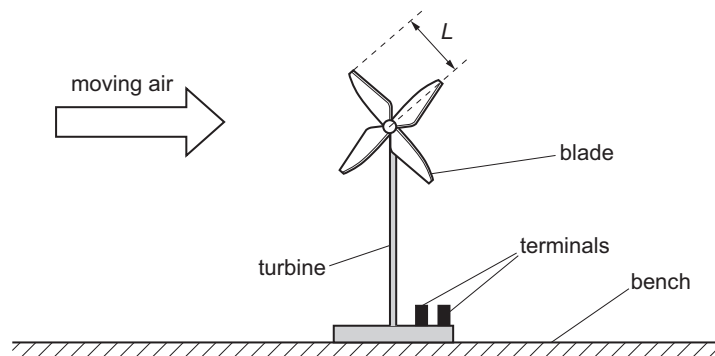


Fig. 1.1

The area of the circle swept by the blades of the turbine is A .

The output of the turbine has two terminals. The turbine is connected to a resistor of resistance R . At a speed v of the moving air, the current in the resistor is I .

The atmospheric pressure is P and the thermodynamic temperature of the air is T .

It is suggested that I is related to v by the relationship

$$\frac{I^2 R}{Q} = \frac{APv^3}{2T}$$

where Q is a constant.

Plan a laboratory experiment to test the relationship between I and v .

Draw a diagram showing the arrangement of your equipment.

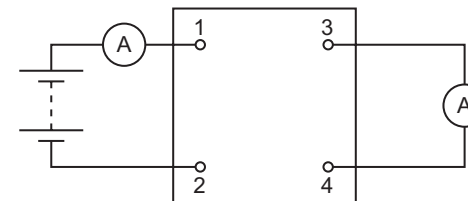
Explain how the results could be used to determine a value for Q .

In your plan you should include:

- the procedure to be followed
- the measurements to be taken
- the control of variables
- the analysis of the data
- any safety precautions to be taken.

Diagram

36 The diagram shows a four-terminal box connected to a battery and two ammeters.



The currents in the two ammeters are identical.

Which circuit, within the box, gives this result?

