

Electricity

- 1) Fig. 8.1 shows two resistors forming part of a circuit.

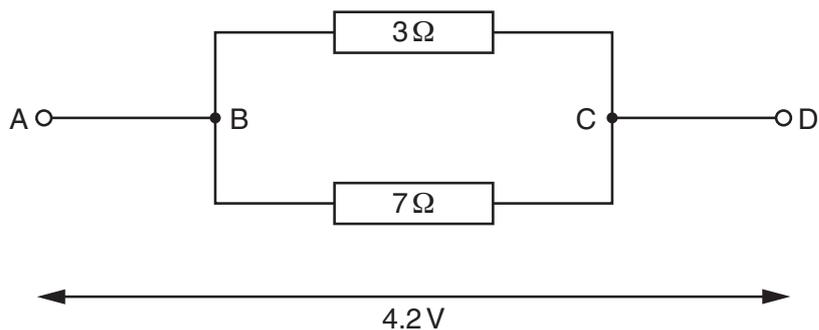


Fig. 8.1

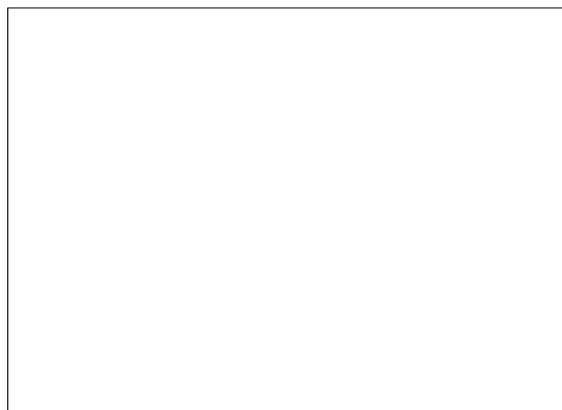
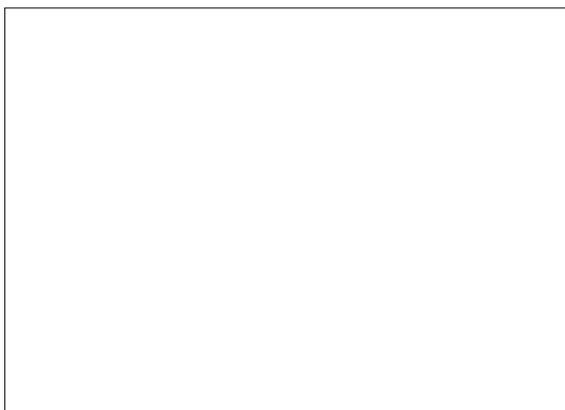
- (a) (i)** Complete the following sentence about the two resistors connected between A and D.
 The two resistors are connected in [1]
- (ii)** The potential difference between A and D is 4.2V .
 State the value of the potential difference between B and C.
 potential difference =V [1]
- (iii)** Calculate the current in the 3Ω resistor.
 current = [4]
- (iv)** State how the current in AB compares with
1. the current in each of the two resistors,

 2. the current in CD.
 [2]

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- (b) In the boxes below, draw two circuit diagrams, each containing a battery and three identical resistors. Arrange each circuit so that all the resistors in the circuit carry the same current.

Draw one circuit in each box.



[2]

[Total: 10]

- 2) (a) A car headlamp circuit consists of a 12V battery, a switch, two 12V headlamps and a 12V indicator lamp (inside the car).

Fig. 9.1 shows the symbols of these components.

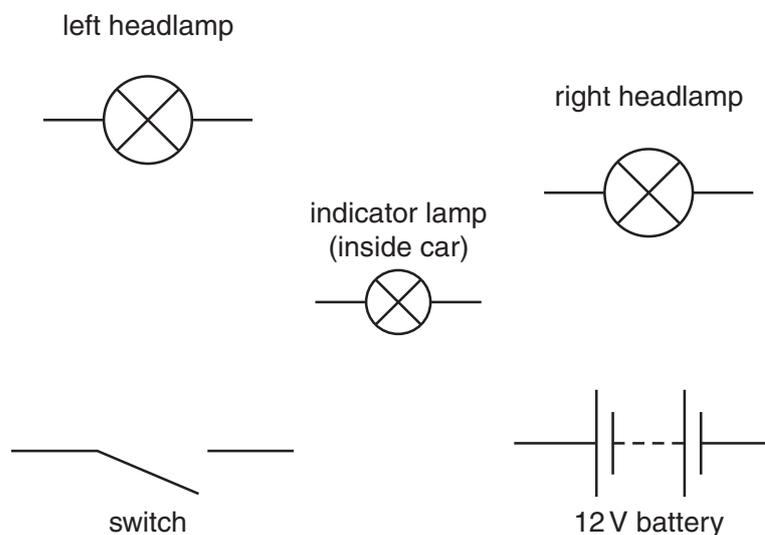


Fig. 9.1

Complete Fig. 9.1 to show the wiring necessary so that all three lamps light up at full brightness when the switch is closed. [2]

Electricity

3) (a) State what an electric current consists of.

..... [2]

(b) (i) What name do we give to materials in which it is easy to create an electric current?

.....

(ii) State one example of such a material.

..... [2]

(c) (i) What name do we give to materials in which it is difficult to create an electric current?

.....

(ii) State one example of such a material.

..... [2]

[Total: 6]

Electricity

4) The components in Fig. 8.1 are connected in a circuit.

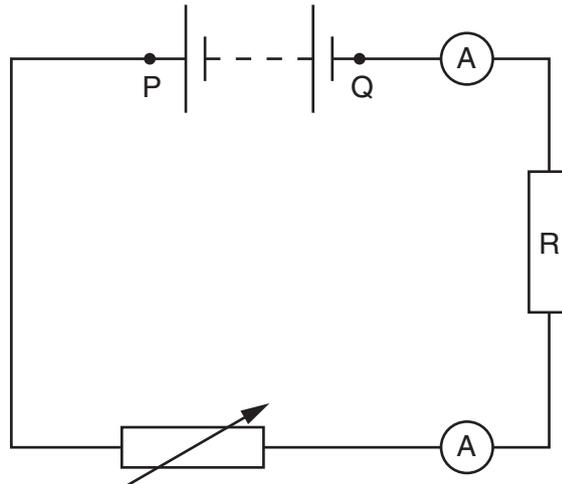


Fig. 8.1

(a) Complete the following sentence.

The components in the circuit of Fig. 8.1 are connected in with each other. [1]

(b) On Fig. 8.1, draw

- (i)** an arrow to show the direction of the conventional current in the circuit,
- (ii)** a voltmeter connected to measure the potential difference across R. [2]

(c) **(i)** State the name of the component represented by this symbol:



.....

(ii) What is the purpose of this component in the circuit?

.....
 [2]

(d) The top ammeter reads 1.5 A. The voltmeter reads 6.0 V.

- (i)** State the reading of the bottom ammeter. A [1]
- (ii)** Calculate the resistance of R.

resistance = [4]

(e) A piece of low resistance wire is carelessly allowed to connect P and Q.

State which component could be damaged when this happens.

..... [1]

[Total: 11]

Electricity

- 5) (a) A student tests to see whether certain materials conduct electricity. He uses the circuit in Fig. 8.1 and connects the materials in turn in the gap between P and Q.

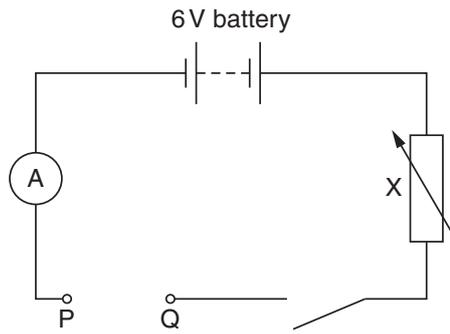


Fig. 8.1

- (i) What is the purpose of component X in the circuit?

.....
[1]

- (ii) State how the student can tell if a certain material conducts electricity.

.....
[1]

- (iii) Which of the following materials is a good conductor of electricity? Put a tick alongside each material that is a good conductor.

copper	<input type="checkbox"/>
glass	<input type="checkbox"/>
iron	<input type="checkbox"/>
nylon	<input type="checkbox"/>
perspex	<input type="checkbox"/>

[1]

- (b) The student now connects a small heater in the gap in the circuit, as shown in Fig. 8.2. He wishes to determine the resistance of the heater.

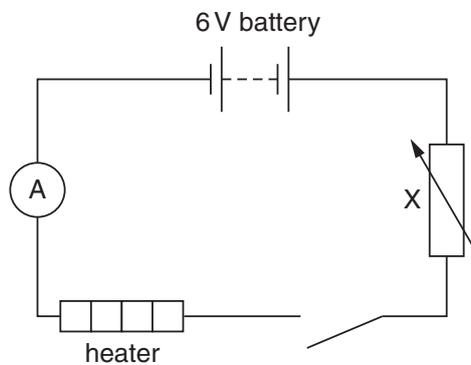


Fig. 8.2

- (i) What other meter must he connect in the circuit, in order to determine the resistance?

.....[1]

- (ii) On Fig. 8.2, draw this meter in the correct position in the circuit.

[1]

Electricity

6)

(a) A girl has two metal bars, 1 and 2.

(i) When the girl holds one end of bar 1 near a magnet, she finds that it attracts both the N pole and the S pole of the magnet.

What does this tell you about bar 1?

.....
.....[2]

(ii) When the girl holds one end of bar 2 near the magnet, it attracts the N pole of the magnet, but repels the S pole.

What does this tell you about bar 2?

.....
.....[1]

(b) In another experiment, the girl uses two table-tennis balls A and B. Each is coated with a thin layer of conducting material. Ball A is mounted on an insulating stand and ball B is suspended from a thin nylon thread. The arrangement is shown in Fig. 9.1.

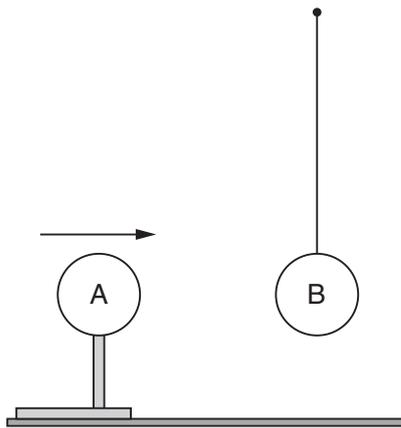


Fig. 9.1

Ball A is given a negative charge, and is slowly moved towards ball B until it touches.

Predict what is seen to happen.

.....
.....
.....
.....[2]

[Total: 5]

Electricity

7)

(a) Complete the following sentences.

(i) An electric current exists in a wire when are made to flow in the wire. [1]

(ii) The current in a wire may be measured using an instrument called [1]

(iii) The potential difference across a wire may be measured by connecting across the wire. [1]

(b) A length of resistance wire is connected in a simple series circuit.

The current in it is 0.8 A. The potential difference across it is 9.6 V.

Calculate the resistance of the wire.

resistance = [4]

(c) The resistance wire in (b) is replaced by a greater length of wire from the same reel.

Without further calculation, state the effect this has on

(i) the resistance in the circuit,

.....

(ii) the current in the new wire when there is a potential difference of 9.6 V across it, as before.

.....

[2]

[Total: 9]

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8)

Fig. 10.1 shows four different types of switch.

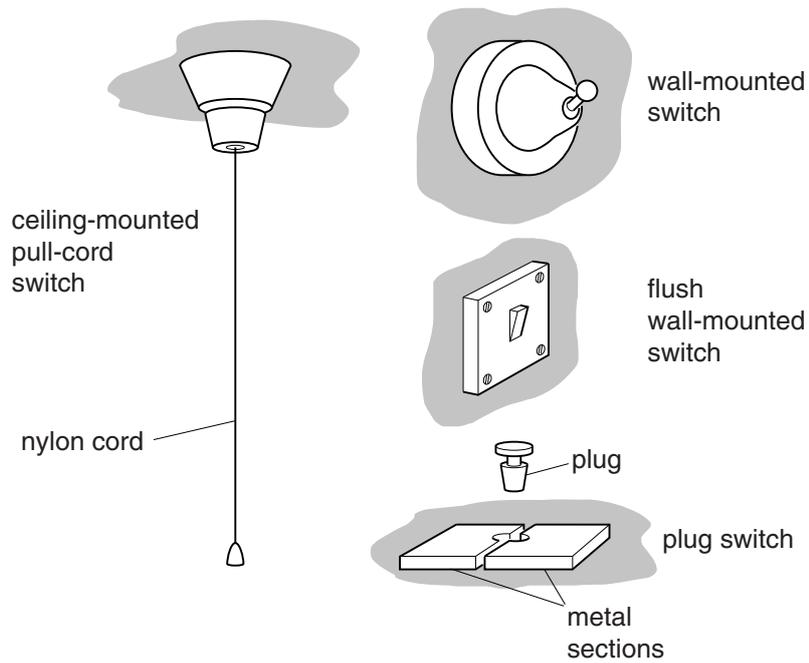


Fig. 10.1

(a) In the space below, draw the circuit symbol for a switch.

[1]

(b) (i) Which one of the switches is definitely dangerous to use with mains voltages?

.....

(ii) State the reason for your answer to **(b)(i)**.

.....

.....

[2]

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- (c) A laundry, where clothes are washed, is likely to have lots of steam and condensation.
- (i) Which switch is the most suitable for turning the lights on or off from within the laundry?

.....

- (ii) State the reason for your answer to (c)(i).

.....

.....

.....

[3]

- (d) The laundry is lit by three mains-voltage lamps. Fig. 10.2 shows the mains supply and the three lamps.

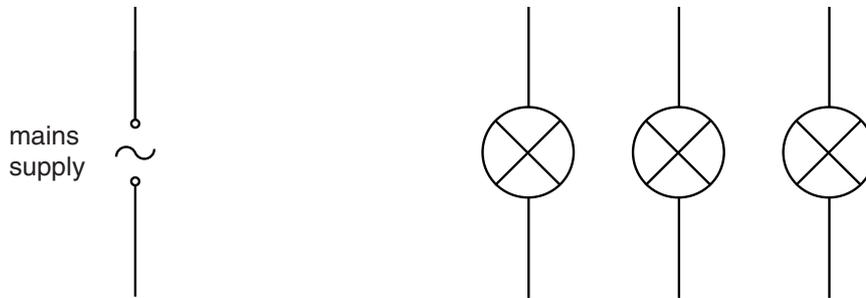


Fig. 10.2

Complete Fig. 10.2 by adding the switch and the wiring that will allow all three lamps to light at full brightness when the switch is on.

[2]

[Total: 8]

Electricity

9)

A length of bare uniform resistance wire is included in the circuit of Fig. 10.1. Contact C can be moved to any position along the resistance wire.

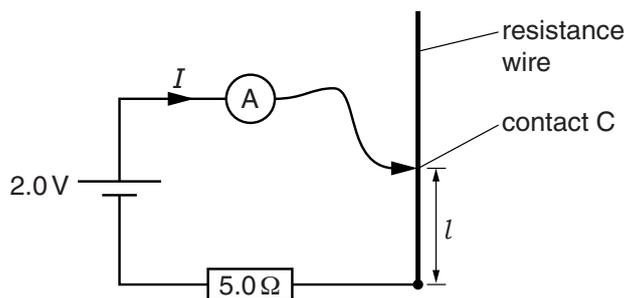


Fig. 10.1

(a) On the axes of Fig. 10.2, sketch the graph that relates the current I in the circuit to the length l of the resistance wire.

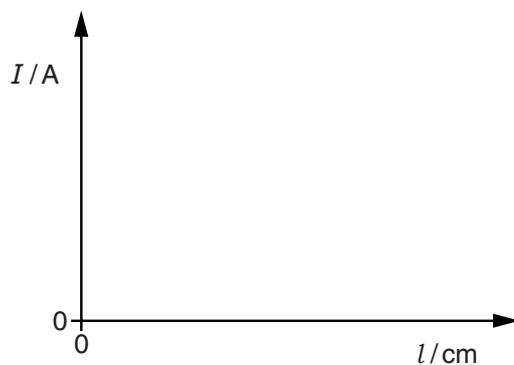


Fig. 10.2

[2]

(b) Calculate the reading on the ammeter when the length l is zero.

ammeter reading = A [3]

Electricity

- (c) Contact C is moved so that the resistance of the length l of the resistance wire is 15.0Ω .

Calculate

- (i) the total resistance of the circuit,

resistance = Ω

- (ii) the new ammeter reading.

ammeter reading = A
[2]

- (d) When $l = 25\text{ cm}$, the reading on the ammeter is half that found in (b).

Calculate the resistance of 25 cm of the resistance wire.

resistance = Ω [2]

- (e) Which of the following effects is caused by the current in the resistance wire?

Tick the boxes alongside **two** correct effects.

heating

light

sound

magnetism

[2]

[Total: 11]

Electricity

10)

A student has two wires A and B. She connects each in turn between the terminals P and Q in the circuit of Fig. 8.1.

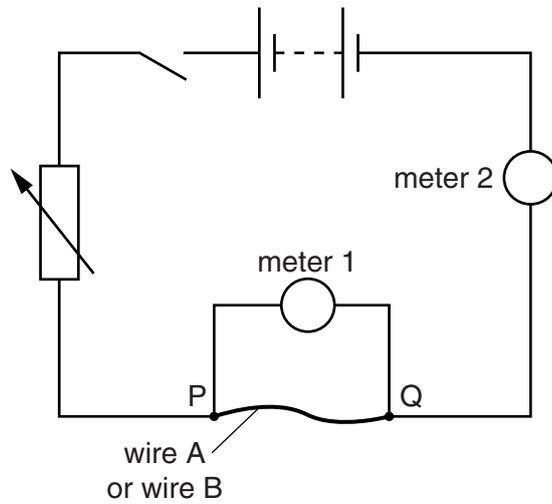


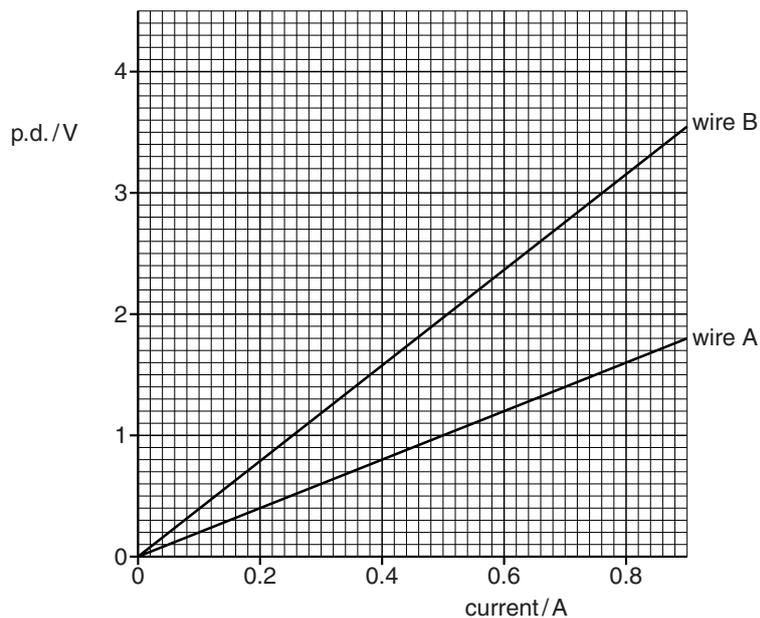
Fig. 8.1

For each wire, she measures the current in the wire when there are various potential differences across it.

- (a) (i) Which of the two meters measures the current?
- (ii) Name this type of meter.
- (b) (i) Which of the two meters measures the potential difference (p.d.)?
- (ii) Name this type of meter.

[2]

- (c) When the student draws the graphs of p.d. against current for the two wires, she gets the lines shown in Fig. 8.2.



Electricity

- (i) From Fig. 8.2, find the p.d. across wire A when there is a current of 0.8A in it.

p.d. =V [1]

- (ii) Calculate the resistance of wire A when the current in it is 0.8A.

resistance = [4]

- (iii) From Fig. 8.2, how can you tell that the resistance of wire A remains constant during the experiment?

.....
.....
..... [1]

- (iv) How can you tell that the resistance of wire B is greater than the resistance of wire A?

.....
.....
..... [1]

- (v) Wires A and B are made of the same material and have the same thickness.

State, giving your reasons, which of the wires is the longer wire.

.....
.....
..... [1]

[Total: 10]

Electricity

11)

In the circuit of Fig. 9.1, a 12V car battery is connected to three identical lamps and two switches. The resistance of the battery is so small that it may be ignored.

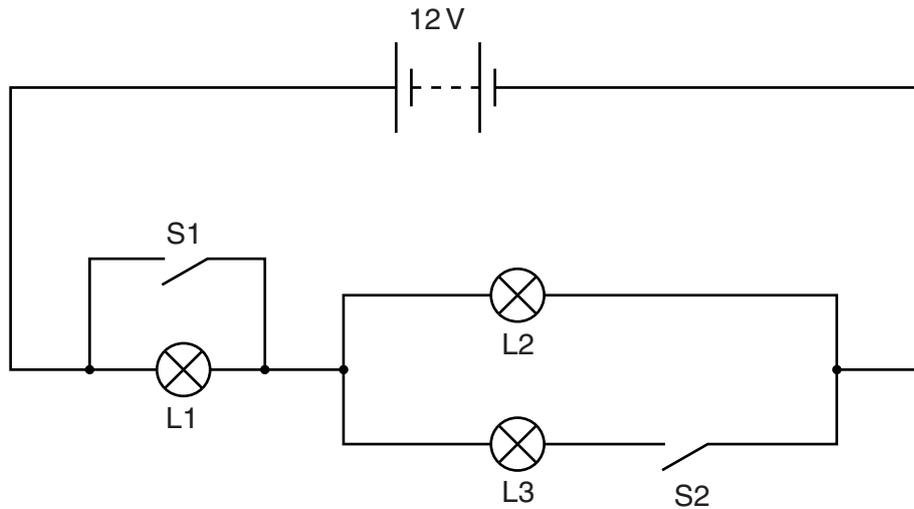


Fig. 9.1

(a) (i) When switches S1 and S2 are both open, which two lamps are in series?

..... and

(ii) When switches S1 and S2 are both closed, which two lamps are in parallel?

..... and

[2]

(b) Each of the three lamps glows with full brightness when there is a p.d. of 12V across the lamp.

With a smaller p.d., a lamp will glow with partial brightness.

With no p.d. across it, it will be off.

Complete the tables below, to show how the lamps glow with different switch combinations. Tick one box in each row.

Electricity

switch combination: S1 closed and S2 open			
	full brightness	partial brightness	off
L1			
L2			
L3			

[2]

switch combination: S1 open and S2 closed			
	full brightness	partial brightness	off
L1			
L2			
L3			

[2]

[Total: 6]