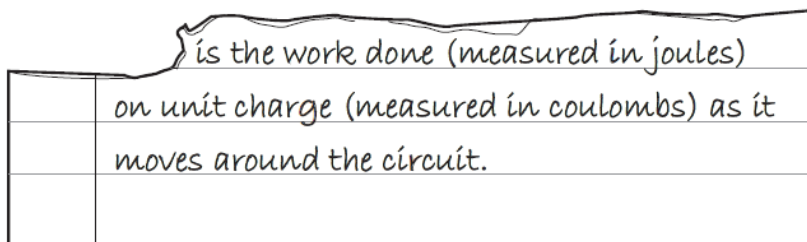


Current Electricity – 2021 O Level 5054**1. Nov/2021/Paper_11/No.29**

A piece of paper torn out of an exercise book is shown.

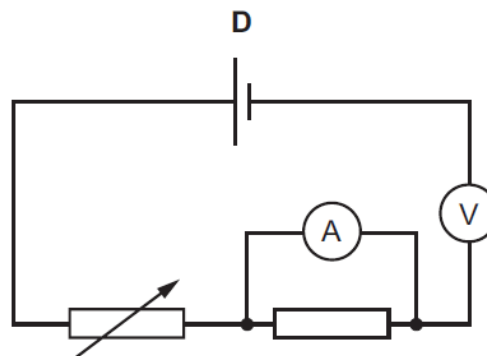
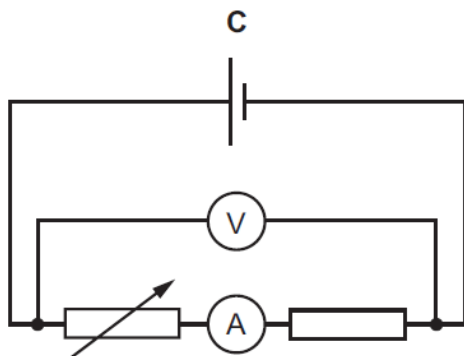
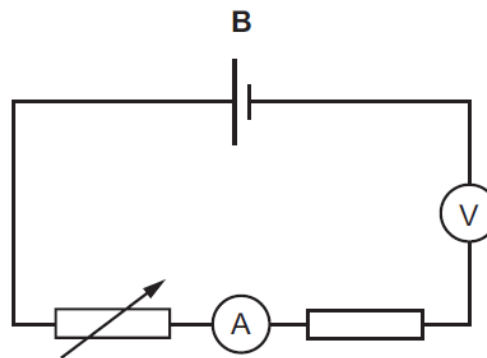
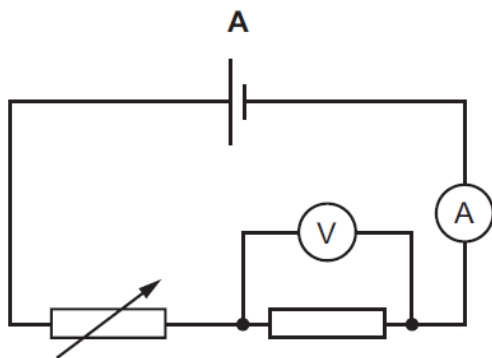


What is being defined?

- A electrical resistance
- B electric current
- C electrical power
- D electromotive force

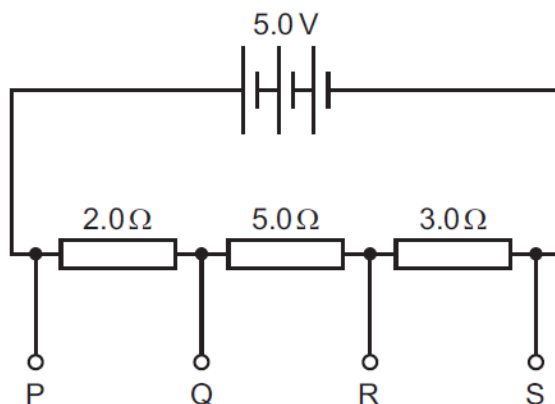
2. Nov/2021/Paper_11/No.30

Which circuit is connected to measure the current in the fixed resistor and the potential difference (p.d.) across the same resistor?



3. Nov/2021/Paper_11/No.31

The diagram shows a circuit with a 5.0 V power supply, three resistors and four output terminals P, Q, R and S.

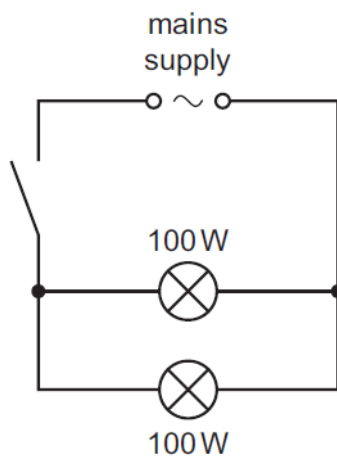


Between which pair of terminals is there a potential difference of 1.5 V?

- A** PQ **B** PR **C** QS **D** RS

4. Nov/2021/Paper_11/No.32

Two 100 W lamps are connected in parallel to the mains supply, as shown.



How much electrical energy is supplied by the mains when the switch is closed for 36 minutes?

- A** 0.030 kWh **B** 0.060 kWh **C** 0.12 kWh **D** 7.2 kWh

5. Nov/2021/Paper_11/No.33

The cost of electricity is 9.0 cents /kWh.

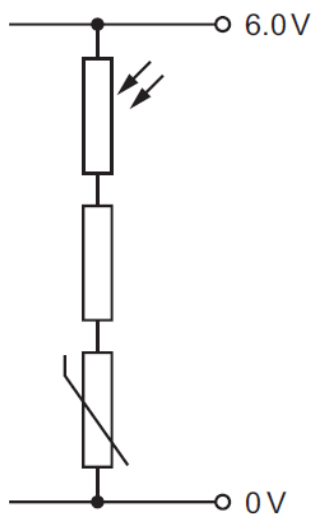
It takes 0.060 hours and costs 1.2 cents to boil the water in a kettle.

What is the power rating of the kettle?

- A** 0.45 kW **B** 0.65 kW **C** 2.2 kW **D** 130 kW

6. Nov/2021/Paper_11/No.37

A student connects two components whose resistances can change and a fixed resistor across a 6.0 V supply.

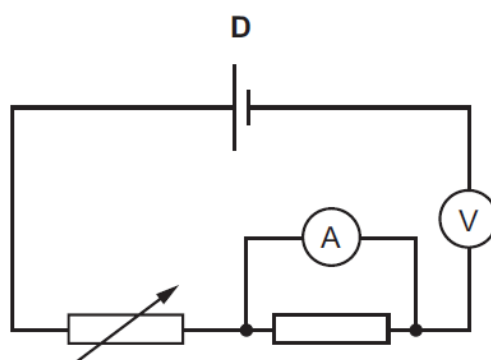
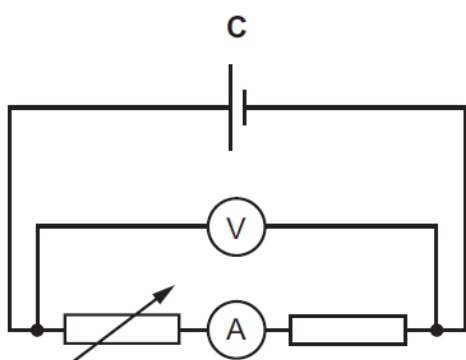
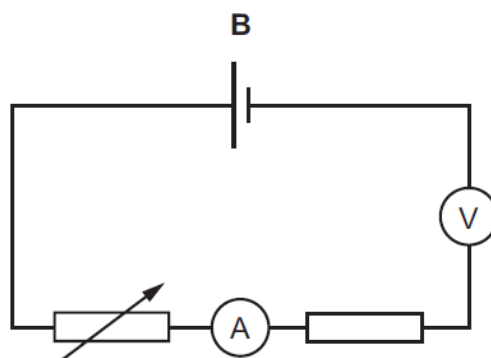
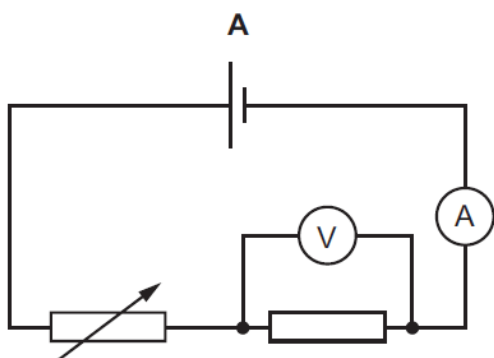


Under which conditions is the voltage across the fixed resistor the greatest?

- A** cold and dark
B cold and bright
C warm and dark
D warm and bright

7. Nov/2021/Paper_12/No.32

Which circuit is connected to measure the current in the fixed resistor and the potential difference (p.d.) across the same resistor?



8. Nov/2021/Paper_12/No.33

Quantity X and quantity Y have the same unit Z.

X is the energy dissipated by a battery in driving unit charge round the complete circuit.

Y is the work done in a component in driving unit charge through the component.

What are X, Y and Z?

	X	Y	Z
A	electromotive force	potential difference	coulomb
B	electromotive force	potential difference	volt
C	potential difference	electromotive force	coulomb
D	potential difference	electromotive force	volt

9. Nov/2021/Paper_21/No.6

A circuit contains a battery of electromotive force (e.m.f.) 4.5V, a 28Ω resistor and a variable resistor. Fig. 6.1 is the circuit diagram.

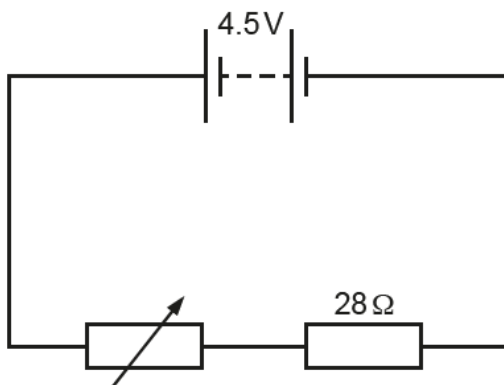


Fig. 6.1

(a) The battery consists of three identical cells in series.

Determine the e.m.f. of each cell.

e.m.f. of each cell = [1]

(b) The potential difference (p.d.) across the variable resistor is 2.5V.

(i) State what is meant by *potential difference*.

.....

 [2]

(ii) Calculate the resistance of the variable resistor.

resistance = [3]

[Total: 6]

10. Nov/2021/Paper_22/No.4

A washing machine is working normally with both the water heater and the motor switched on. The washing machine is connected to the mains supply by a cable.

(a) The current in the live wire in the cable is 13A.

State the size of the current in:

(i) the neutral wire in the cable

current in neutral wire = [1]

(ii) the earth wire in the cable.

current in earth wire = [1]

(b) The insulation on the mains cable is now damaged and, as the washing machine vibrates, the live wire touches the metal casing.

(i) Explain how the earth wire and the fuse together prevent any more damage.

.....
.....
.....
.....
..... [3]

(ii) Explain why it is the live wire into which the fuse is connected.

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

[Total: 7]

11. Nov/2021/Paper_22/No.5(either)

Fig. 5.1 shows a circuit that contains a direct current (d.c.) power supply, a light-dependent resistor (LDR), two fixed resistors, M and N, and two ammeters.

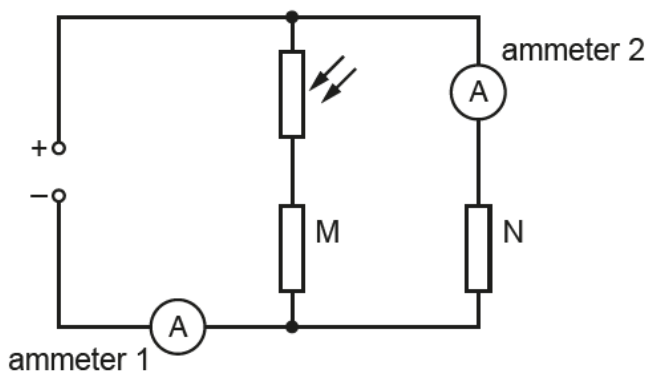


Fig. 5.1

(a) The reading on ammeter 1 is 1.6 mA.

Calculate the time taken for a charge of 7.2 C to pass through ammeter 1.

time = [2]

(b) Some time later, the brightness of the light incident on the LDR decreases.

Explain what happens to:

(i) the reading on ammeter 2

.....
 [1]

(ii) the time taken for a charge of 7.2 C to pass through ammeter 1.

.....

 [2]

[Total: 5]

12. Nov/2021/Paper_22/No.9

A filament lamp is connected to a 240V alternating current (a.c.) mains supply.

- (a) Describe how the output of an a.c. supply differs from the output of a direct current (d.c.) supply.

Sketch **two** voltage–time graphs in the blank space to help your explanation.

.....
 [3]

- (b) The lamp is rated at 60W and is designed to be used with a 240V supply.

- (i) Calculate the current in the lamp.

current = [2]

- (ii) Calculate the resistance of the lamp.

resistance = [2]

(iii) A room is lit by five of these filament lamps connected in parallel.

State **two** advantages of connecting the lamps in parallel rather than in series.

1.

.....

2.

.....

[2]

- (iv) The five lamps in (b)(iii) are lit for an average time of 5.5 hours a day for a year. Electricity costs \$0.15/kWh.

Calculate the cost of using these lamps for a year.

cost = [2]

- (c) A student takes the lamp in (b) to school and connects it in a circuit using a 1.5V cell, an ammeter and a voltmeter. The circuit is used to determine the resistance of the lamp.

- (i) In the blank space, draw the circuit diagram of the circuit used to determine the resistance of the lamp.

[2]

- (ii) The value of the resistance of the filament lamp in this circuit differs greatly from the value calculated in (b)(ii).

State how the resistance value in this circuit differs and explain why it differs.

.....

 [2]

[Total: 15]

13. June/2021/Paper_11/No.30

A 100 W lamp is switched on for five hours each day for three weeks.

The cost of one unit of electricity is \$0.24.

How much does it cost to run the lamp for this time?

A \$0.36

B \$0.84

C \$2.52

D \$25.20

14. June/2021/Paper_11/No.31

The information on the back of an electric room heater is shown.

rating 220–240 V
~50 Hz
4.2 A

What is a suitable fuse rating for this room heater?

- A** 4.0 A **B** 4.2 A **C** 5.0 A **D** 13.0 A

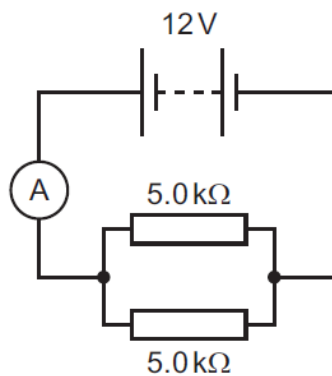
15. June/2021/Paper_11/No.33

Which energy transfer takes place in an electric kettle?

- A chemical to electrical
- B electrical to heat
- C electrical to chemical
- D heat to electrical

16. June/2021/Paper_12/No.32

The diagram shows a circuit.



The ammeter has four different range settings.

Which range setting gives a reading near the mid-point of the range?

- A** 0–1 mA **B** 0–10 mA **C** 0–1.0 A **D** 0–10 A

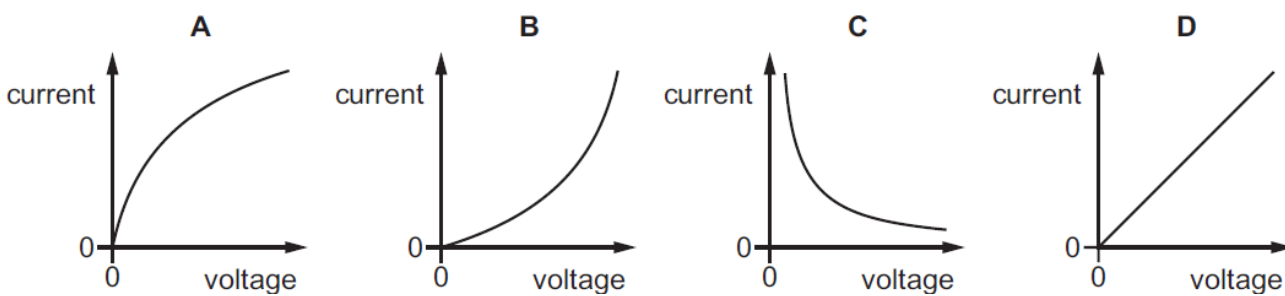
17. June/2021/Paper_12/No.33

In which example is the current 1.0 A?

- A** a charge of 0.10 C passes through a resistor in 100 ms
- B** a 10 V lamp with input power 0.10 W
- C** a resistor of resistance $0.50\ \Omega$ with a potential difference (p.d.) of 2.0 V across it
- D** two resistors with a current of 0.50 A connected in series

18. June/2021/Paper_12/No.34

Which graph shows the relationship between current and voltage for a filament lamp?



19. June/2021/Paper_12/No.35

A 100 W lamp is switched on for five hours each day for three weeks.

The cost of one unit of electricity is \$0.24.

How much does it cost to run the lamp for this time?

A \$0.36

B \$0.84

C \$2.52

D \$25.20

20. June/2021/Paper_12/No.36

A three-pin mains plug contains a fuse. A device with double insulation has a cable connected to the plug.

Which part of the plug is **not** connected to the cable?

- A earth pin
- B fuse
- C live pin
- D neutral pin

21. June/2021/Paper_21/No.7

(a) Fig. 7.1 shows two circuit components.

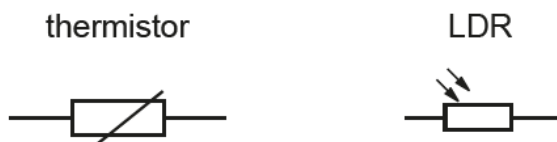


Fig. 7.1

For each of these components state what causes an **increase** in its resistance.

thermistor

.....

LDR

.....

[2]

(b) Fig. 7.2 shows a battery connected to a diode, an ammeter and a resistor.

Fig. 7.3 shows the current–voltage graph for the diode.

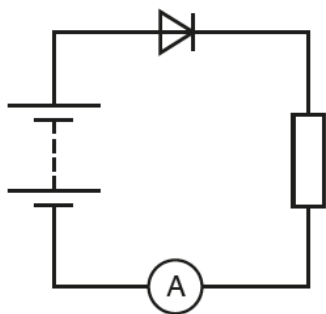


Fig. 7.2

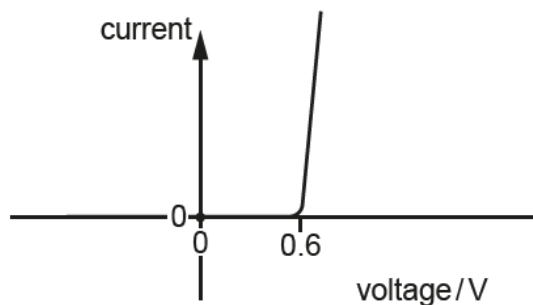


Fig. 7.3

The current in the resistor is 2.0A and the potential difference across the resistor is 5.4 V.

(i) State what is meant by the *electromotive force* (e.m.f.) of the battery.

.....

..... [1]

(ii) Explain why the e.m.f. of the battery must be greater than 5.4 V.

.....

.....

..... [2]

(iii) Calculate the electrical energy input to the resistor in 5.0 minutes.

energy input = [2]

(iv) The circuit is reconnected with the diode in the opposite direction, as shown in Fig. 7.4.

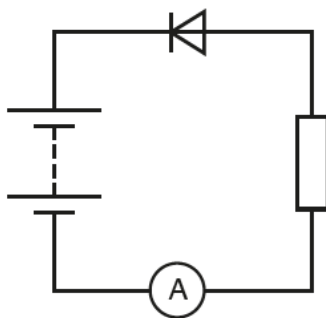


Fig. 7.4

Explain what is observed.

.....

 [1]

[Total: 8]

22. June/2021/Paper_21/No.9

Fig. 9.1 is the current–voltage graph for a filament lamp.

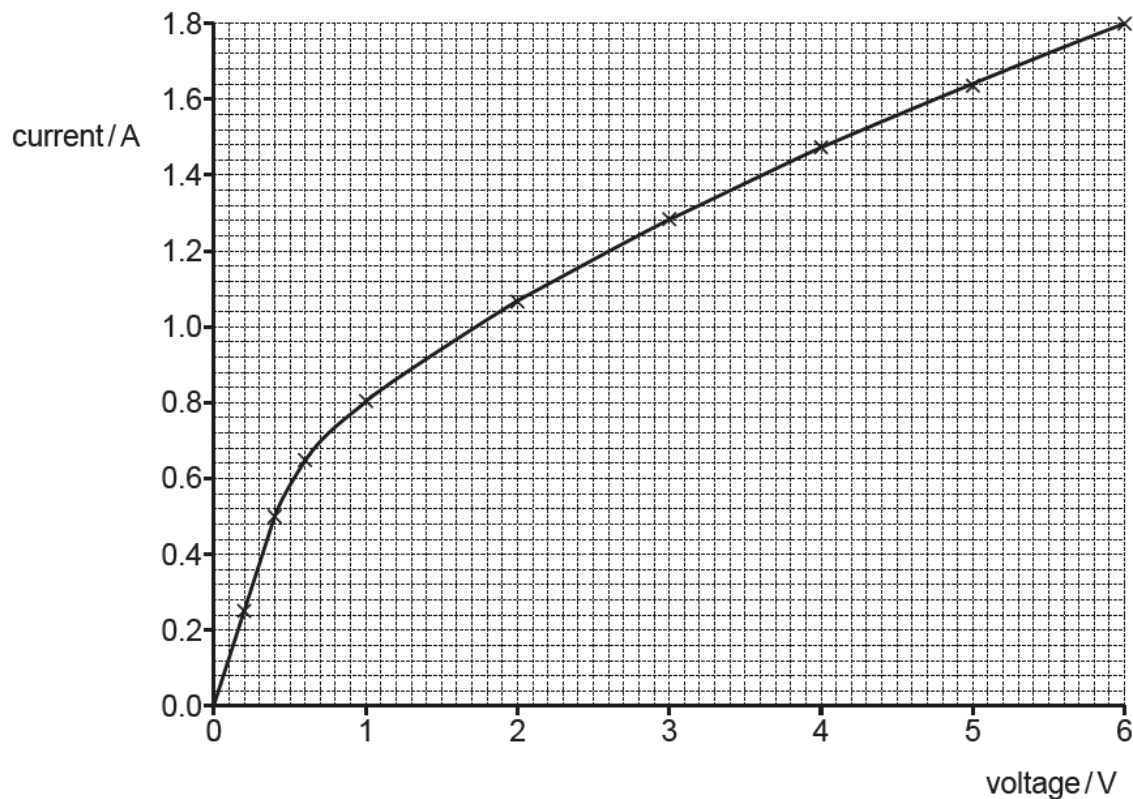


Fig. 9.1

- (a) Fig. 9.2 shows an incomplete circuit diagram of the circuit that a student uses to obtain the readings for the graph.

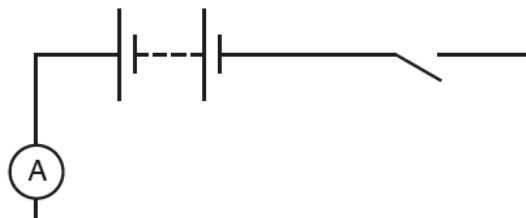


Fig. 9.2

Complete the circuit diagram using suitable circuit symbols for the lamp, a voltmeter and a variable resistor. [3]

(b) The ammeter used by the student has ranges 0–10A, 0–1A, 0–100 mA and 0–10 mA.

Describe how the student uses the different ranges to obtain readings which allow all nine points to be plotted precisely on the graph while using the ammeter safely.

.....

.....

.....

..... [2]

(c) State how Fig. 9.1 shows that the lamp does **not** obey Ohm’s law.

.....

..... [1]

(d) Using Fig. 9.1, determine the resistance of the lamp when:

(i) the voltmeter reading is 0.40V

resistance =

(ii) the voltmeter reading is 6.0V.

resistance = [3]

(e) (i) Explain why the resistance of the lamp changes as the voltage changes.

.....

 [2]

(ii) State how the resistance of a wire depends upon its length and how it depends on its cross-sectional area.

length

 cross-sectional area
 [2]

(iii) The student obtains a long sample of the same type of wire as the filament in the lamp.

The wire he obtains has the same cross-sectional area as the filament.

He cuts a 1.0 m length of the wire and measures its resistance at room temperature.

He obtains the value 16Ω .

Using the appropriate resistance value from (d), estimate the length of the filament wire in the lamp.

length = [2]

[Total: 15]

23. June/2021/Paper_22/No.6

The power input to a filament lamp when connected to a 12V supply is 20W.

(a) State what is meant by *power*.

.....
 [1]

(b) Calculate:

(i) the current in the filament

current = [2]

(ii) the resistance of the filament.

resistance = [1]

(c) The filament in another lamp is made from thinner wire of the same length and made from the same material. Both lamps are connected to a 12V supply.

State and explain how using thinner wire in the filament affects the power input to the lamp.

.....

 [2]

[Total: 6]

24. June/2021/Paper_22/No.8a,8b(either)

Fig. 8.1 shows a potential divider circuit containing two resistors R_1 and R_2 .

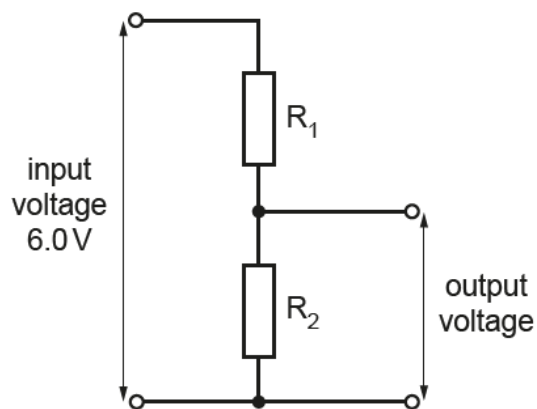


Fig. 8.1

(a) There is an input voltage of 6.0 V.

Complete Table 8.1 to show the output voltage for different values of the resistances of the two resistors.

Table 8.1

resistance of R_1/Ω	resistance of R_2/Ω	output voltage/V
8.0	8.0
800	1200

[3]

(b) In the circuit shown in Fig. 8.1, resistor R_1 is replaced by a light dependent resistor (LDR).

(i) In the space below, draw the circuit symbol for an LDR.

[1]

(ii) The LDR is moved from darkness into daylight.

State what happens to the resistance of the LDR and the output voltage.

resistance

output voltage

[1]

(iii) A potential divider circuit can also be used to produce an output voltage that changes with temperature.

State the name of the component that is used instead of the LDR.

..... [1]

25. June/2021/Paper_22/No.9a,9b

(a) Fig. 9.1 represents the conversion of energy in a mobile phone.



Fig. 9.1

(i) State the form of energy stored in the battery.

..... [1]

(ii) State the useful form of output energy from the battery.

..... [1]

(iii) State **two** useful forms of output energy from the mobile phone.

..... [2]

(b) When the battery is in use, the average current is 1.3 mA.

Determine the charge that passes through the battery in a time of 2.0 minutes.

charge = [2]