Electricity – 2022 Nov O Level 5054

1. Nov/2022/Paper_11/No.28

Which expression gives the electromotive force (e.m.f.) of a battery?

A work done × time

B work done × charge

C $\frac{\text{work done}}{\text{time}}$

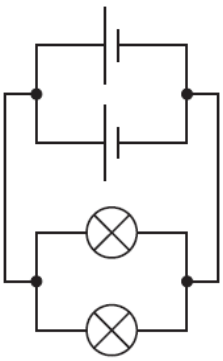
D $\frac{\text{work done}}{\text{charge}}$

2. Nov/2022/Paper_11/No.29

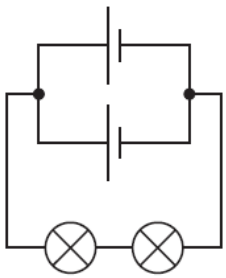
A circuit contains two cells and two lamps. The cells are new and are fully charged.

In which arrangement of the cells and lamps do the cells discharge the most quickly?

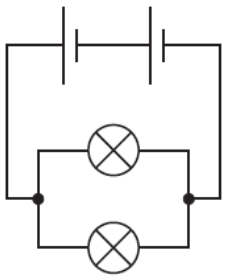
A



B



C



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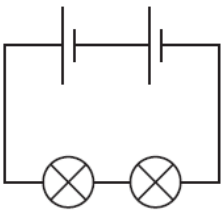
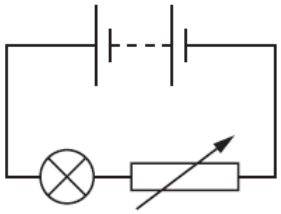


3. Nov/2022/Paper_11/No.30

A lamp is connected in series with a battery and a variable resistor. The resistance of the variable resistor is decreased gradually.



Which statement is correct?

A The current in the lamp increases.

B The current in the variable resistor decreases.

C The e.m.f. of the battery decreases.

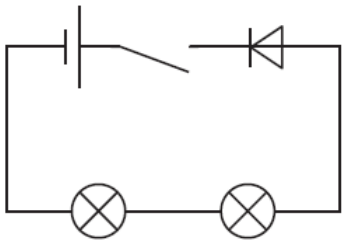
D The total resistance in the circuit increases.

4. Nov/2022/Paper_11/No.31

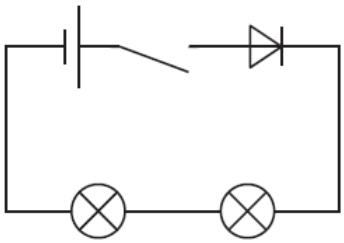
In the circuits shown all the cells are identical and all the lamps are identical. The switches are closed.

In which circuit are both lamps the brightest?

A



B



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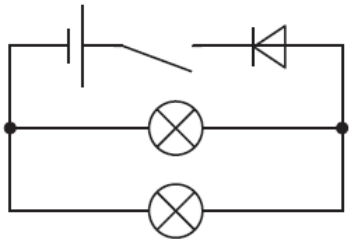

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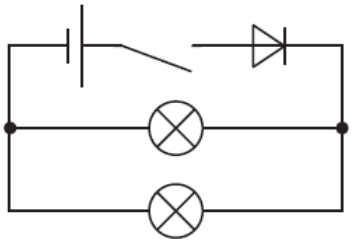

5. Nov/2022/Paper_11/No.32

Why is a fuse used in an electrical appliance?

A to earth the appliance

B to protect the appliance

C to change the power of the appliance

D to change the voltage supplied to the appliance

6. Nov/2022/Paper_12/No.32

A meter that measures the rate of flow of charge in a resistor is placed in a circuit.

What is the name of this meter and how is it connected to the resistor?

	name	connection
A	ammeter	in parallel
B	ammeter	in series
C	voltmeter	in parallel
D	voltmeter	in series

7. Nov/2022/Paper_12/No.33

Which device is used to convert electrical energy to kinetic energy?

A iron

B kettle

C lamp

D motor

8. Nov/2022/Paper_12/No.34

Why is a fuse used in an electrical appliance?

A to earth the appliance

B to protect the appliance

C to change the power of the appliance

D to change the voltage supplied to the appliance

9. Nov/2022/Paper_21/No.9

The power supply in an electric circuit is a battery of electromotive force (e.m.f.) 12 V.

(a) State **two** ways in which the e.m.f. of a battery differs from that of an alternating current (a.c.) power supply.

1 .....

2 .....

[2]

(b) The circuit includes three resistors and two open switches, S_1 and S_2.

Fig. 9.1 shows the circuit.

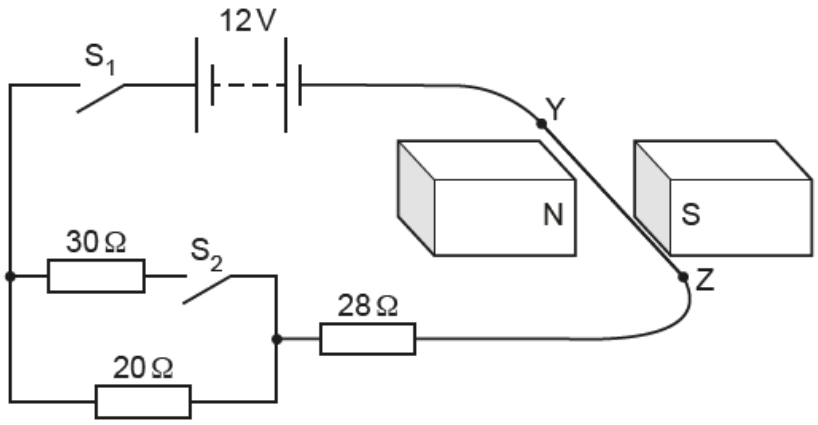

Fig. 9.1

YZ is a straight, horizontal section of connecting wire that lies between two magnets.

S_1 is now closed.

(i) Calculate the current in YZ.

current = ... [2]

(ii) Explain why YZ experiences a force.

.....

.....

..... [2]

(iii) Tick the box which describes the direction of the force on YZ.

towards N	☐	towards Z	☐
towards S	☐	downwards	☐
towards Y	☐	upwards	☐

[1]

(iv) Explain how the direction of the force on YZ is determined.

.....

.....

..... [2]

(c) Switch S_2 in the circuit in Fig. 9.1 is now also closed.

(i) Calculate the total resistance of the circuit.

resistance = ... [3]

(ii) Explain what happens to the force on YZ as switch S_2 is closed.

.....

.....

..... [2]

(iii) The current in the 20 Ω resistor is I_{20}. The current in the 30 Ω resistor is I_{30}.

State a value for the ratio I_{20}/I_{30}.

ratio I_{20}/I_{30} = ... [1]

[Total: 15]

10. Nov/2022/Paper_22/No.8

An uncharged plastic rod is rubbed with an uncharged woollen cloth.

As a result, the rod becomes negatively charged.

(a) Explain, in terms of particles, how the rod becomes charged and state what happens to the cloth.

.....

.....

.....

..... [2]

(b) Fig. 8.1 shows a metal sphere X on a plastic stand.

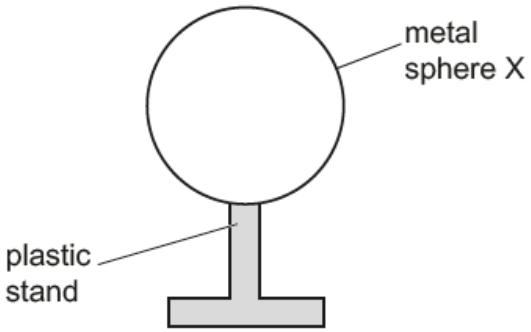

Fig. 8.1

Explain why metals are electrical conductors and why plastics are electrical insulators.

.....

.....

.....

..... [2]

(c) The negatively charged plastic rod is held above sphere X.

Fig. 8.2 shows that it does not touch the sphere.

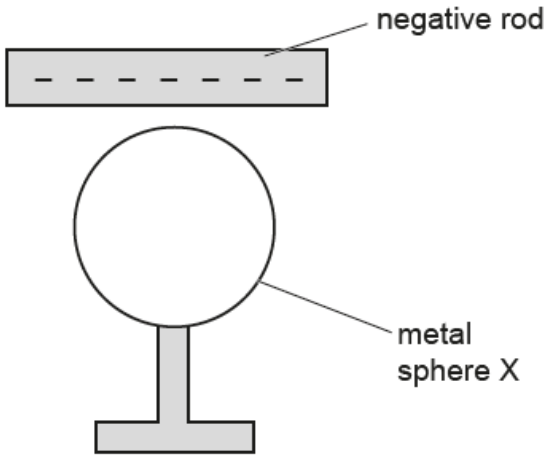

Fig. 8.2

(i) By drawing on Fig. 8.2, show the distribution of charge on X. [2]

(ii) An earth wire is now connected to the metal sphere as shown in Fig. 8.3.

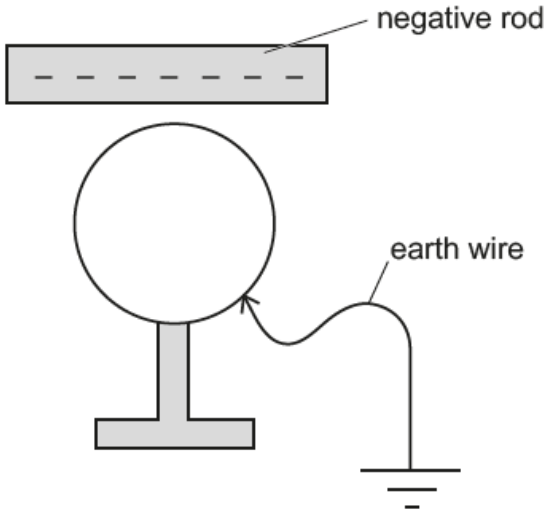

Fig. 8.3

State what happens to the charges on the sphere as the earth wire is connected.

.....

..... [1]

(iii) The earth wire in **(ii)** stays connected to the metal sphere.

Describe the distribution of charge on the sphere.

.....

.....

..... [2]

(iv) The earth wire is disconnected from the sphere and then the negatively charged rod is moved away from the sphere.

Explain what happens to the charges on the sphere as the charged rod is moved away.

.....

.....

..... [2]

(d) A second metal sphere Y is negatively charged.

There is an electric field surrounding Y.

(i) State what is meant by 'electric field'.

.....

..... [1]

(ii) Fig. 8.4 shows the negatively charged sphere Y. The negative charges are not shown.

Fig. 8.4

On Fig. 8.4, draw the pattern and mark the direction of the electric field lines surrounding sphere Y. [3]

[Total: 15]