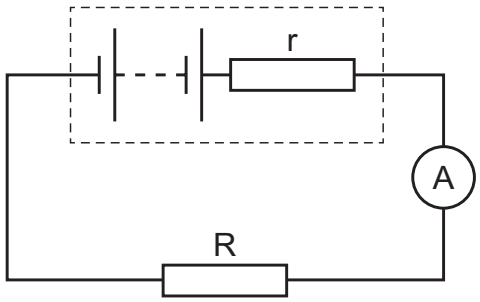
35 The diagram shows a circuit with a battery connected to a resistor R. The battery has an internal resistance represented by resistor r.



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

34 A cell of electromotive force (e.m.f.) E delivers a charge Q to an external circuit.

Which statement is correct?

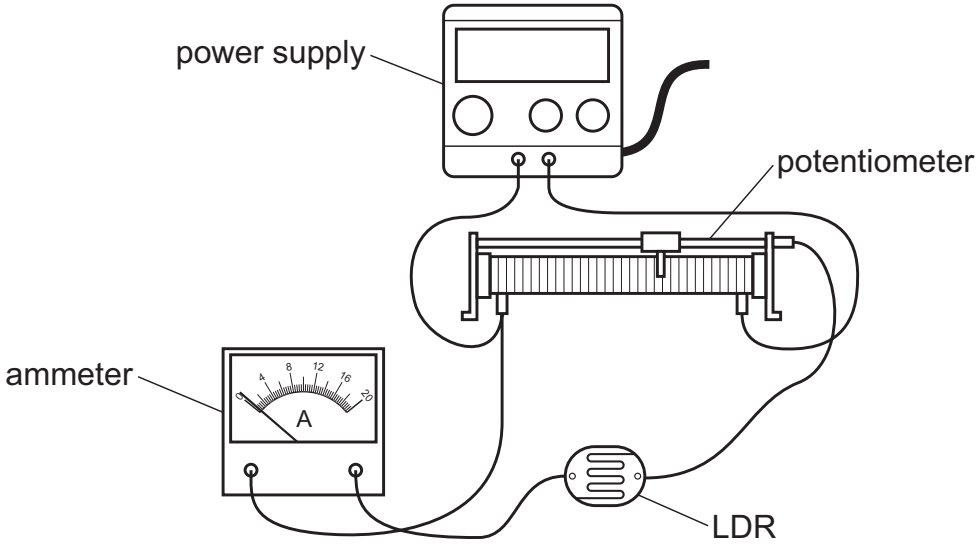
A The energy dissipated in the external circuit is EQ.

B The energy dissipated within the cell is EQ.

C The external resistance is EQ.

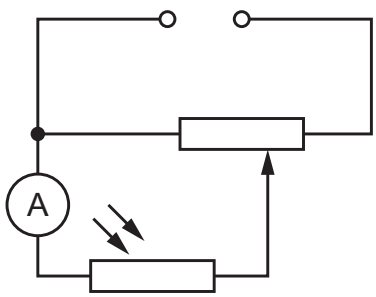
D The total energy dissipated in the cell and the external circuit is EQ.

33 The diagram shows an electrical circuit containing a light-dependent resistor (LDR).

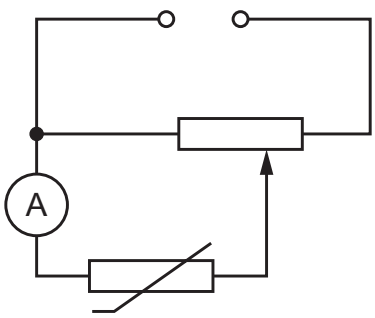


What is the circuit diagram for this circuit?

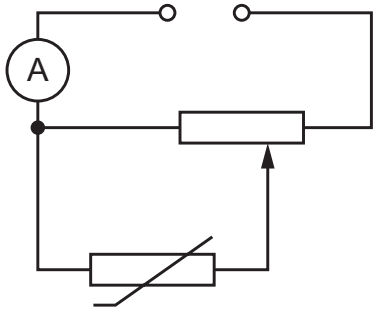
A



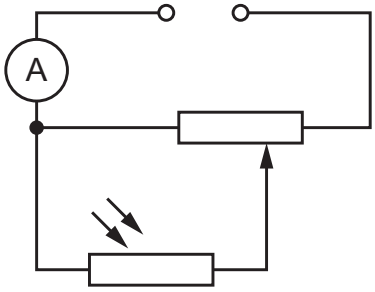
B



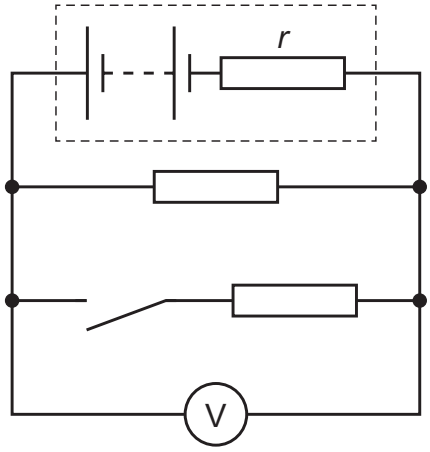
C



D



37 The circuit diagram shows a battery with internal resistance *r*, two resistors, a switch and a voltmeter. The switch is open.



The switch is now closed.

What happens to the current in the battery, and what happens to the reading on the voltmeter, when the switch is closed?

	current in battery	reading on voltmeter
A	increases	decreases
B	increases	remains the same
C	remains the same	decreases
D	remains the same	remains the same

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

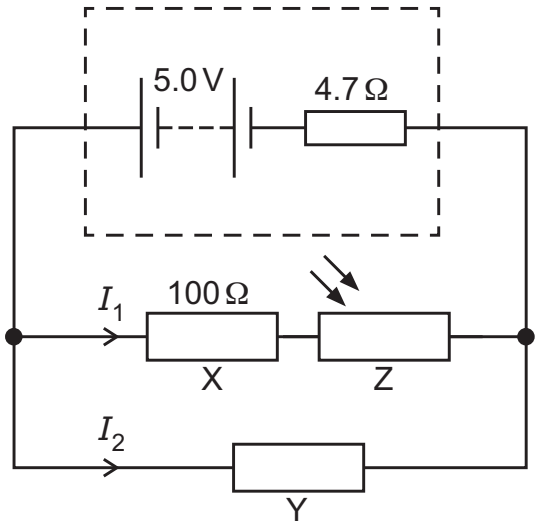


Fig. 5.1

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

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

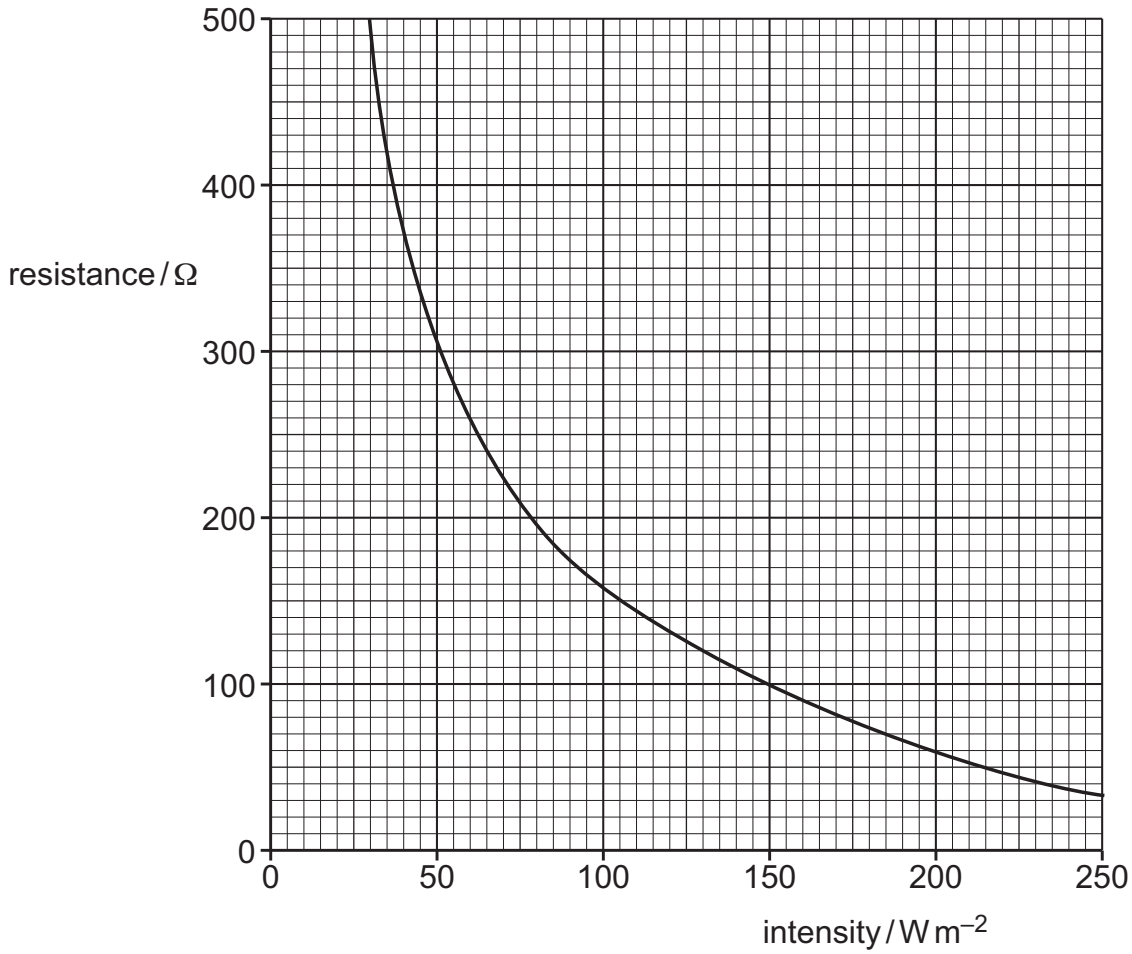


Fig. 5.2

(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 = ... A [3]

(iii) Calculate the power dissipated in Y.

power = ... 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.

.....

.....

.....

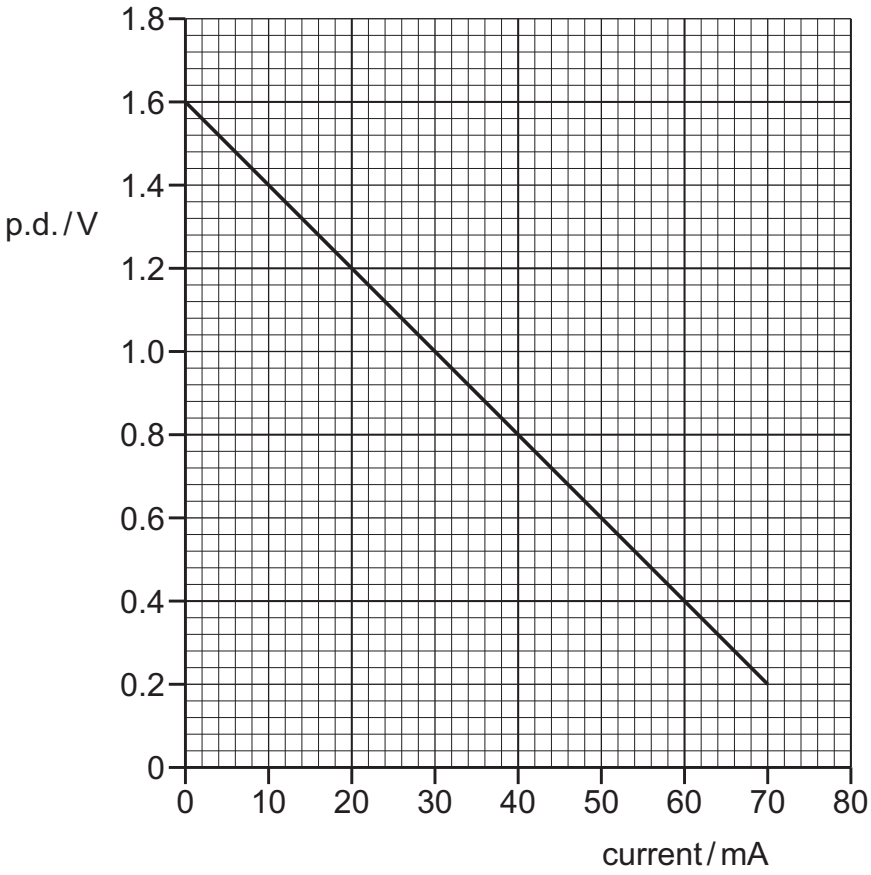
.....

..... [3]

[Total: 11]

37 A cell is connected in series with an ammeter and a variable resistor. A voltmeter is used to measure the p.d. across the variable resistor. The resistance of the variable resistor is varied, and the p.d. and the current are recorded.

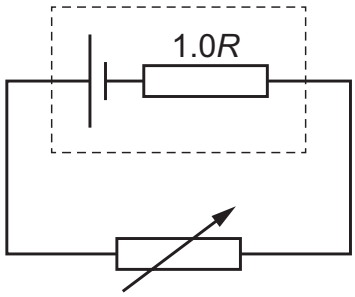
The graph shows the variation with current of the p.d. across the variable resistor.



What is the internal resistance of the cell?

A 0.050 Ω **B** 1.6 Ω **C** 20 Ω **D** 23 Ω

35 The diagram shows a cell of internal resistance 1.0R connected to a variable resistor.



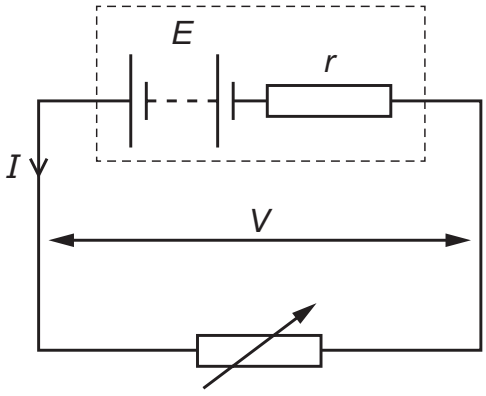
When the variable resistor has an initial resistance of 2.0R, the current in the cell is I_1 and the terminal potential difference (p.d.) across the cell is V_1.

The variable resistor is now adjusted to a new resistance of 4.0R.

What is the new current in the cell and the new terminal p.d. across the cell?

	current	terminal p.d.
A	$0.50I_1$	$1.0V_1$
B	$0.50I_1$	$1.2V_1$
C	$0.60I_1$	$1.0V_1$
D	$0.60I_1$	$1.2V_1$

36 A battery has an e.m.f. E and internal resistance r. The battery delivers a current I to a variable resistor and the p.d. across its terminals is V.



The variable resistor is adjusted so that I increases.

Why does V decrease?

A The e.m.f. E decreases.

B The internal resistance r increases.

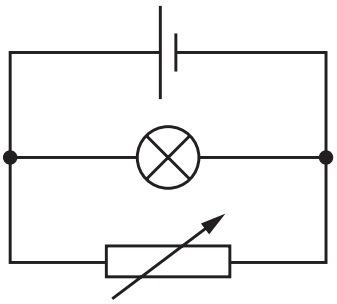
C The p.d. across r increases.

D The resistance of the variable resistor increases.

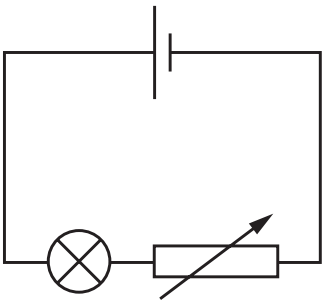
33 A cell of constant electromotive force (e.m.f.) and negligible internal resistance is separately connected into four different circuits.

In which circuit does the power dissipated by the lamp stay the same as the variable resistor is adjusted?

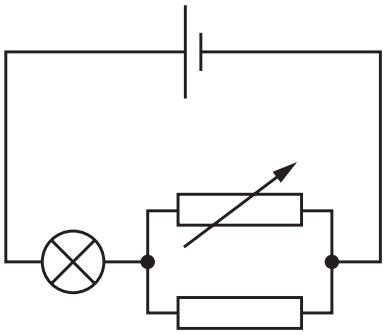
A



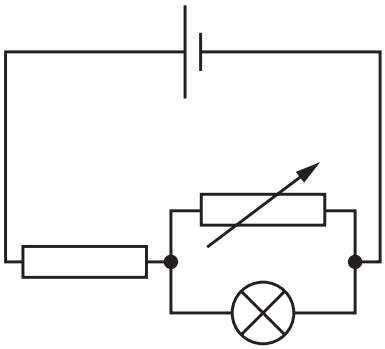
B



C



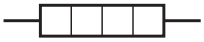
D



34 Which circuit symbol does **not** represent an electric component that is designed to emit sound waves?

A

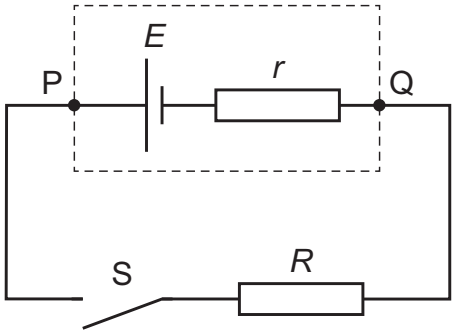
B



C

D

36 A cell of electromotive force (e.m.f.) *E* and internal resistance *r* is connected in series with a switch S and an external resistor of resistance *R*.



The potential difference (p.d.) between P and Q is *V*.

Which statement is correct when S is changed from open to closed?

A *V* increases because there is a p.d. across *R*.

B *V* decreases because there is a p.d. across *r*.

C *V* remains the same because the decrease of p.d. across *r* is balanced by the increase of p.d. across *R*.

D *V* remains the same because the sum of the p.d.s across *r* and *R* is still equal to *E*.

7 **(a)** Fig. 7.1 shows two resistors connected in series with a cell of electromotive force (e.m.f.) 1.50 V and internal resistance 0.28 Ω.

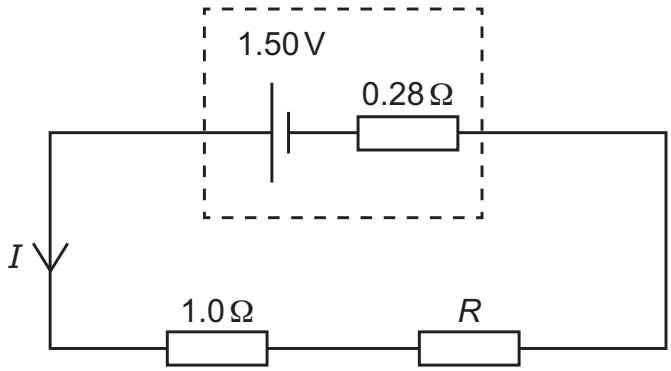


Fig. 7.1

One of the resistors has resistance 1.0 Ω. The other resistor has resistance *R*.
The terminal potential difference (p.d.) across the cell is 1.36 V.

(i) Show that the current I in the circuit is 0.50 A.

[2]

(ii) Calculate the combined resistance of the two resistors.

resistance = ... Ω [2]

(iii) Use your answer in **(a)(ii)** to determine resistance *R*.

R = ... Ω [1]

(b) The circuit in Fig. 7.1 is disconnected and the two resistors are reconnected to the cell, now in parallel with each other.

(i) On Fig. 7.2, complete the circuit diagram to show this arrangement.

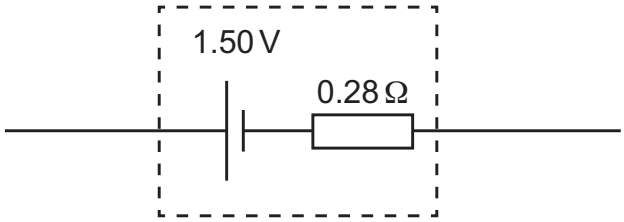


Fig. 7.2

[1]

(ii) Explain, without calculation, whether the terminal p.d. across the cell is now less than, equal to or greater than 1.36 V.

.....

.....

..... [2]

[Total: 8]