

D.C Circuits

Question Paper

Level	O Level
Subject	Physics
Exam Board	Cambridge International Examinations
Unit	Electricity and Magnetism
Topic	D.C Circuits
Booklet	Question Paper

Time Allowed: 55 minutes

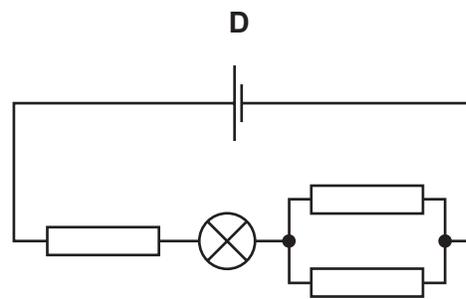
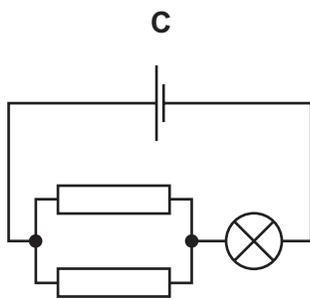
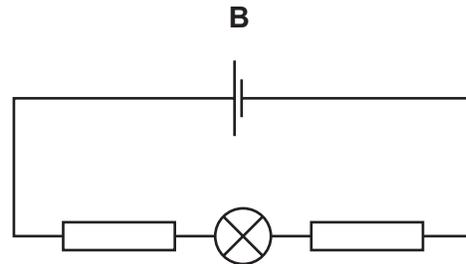
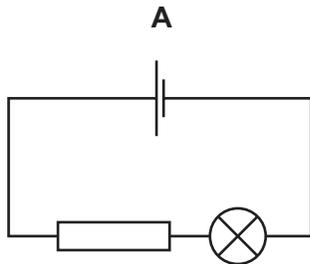
Score: /46

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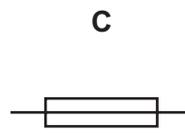
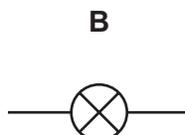
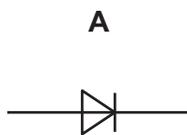
Grade Boundaries:

1 The cells, lamps and resistors in the circuits are identical.

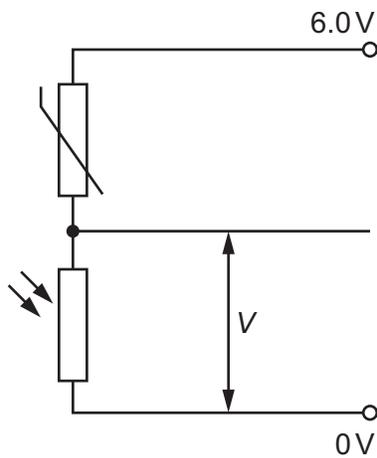
In which circuit is the lamp the brightest?



2 Which component, when used in a circuit, allows current to pass in only one direction?



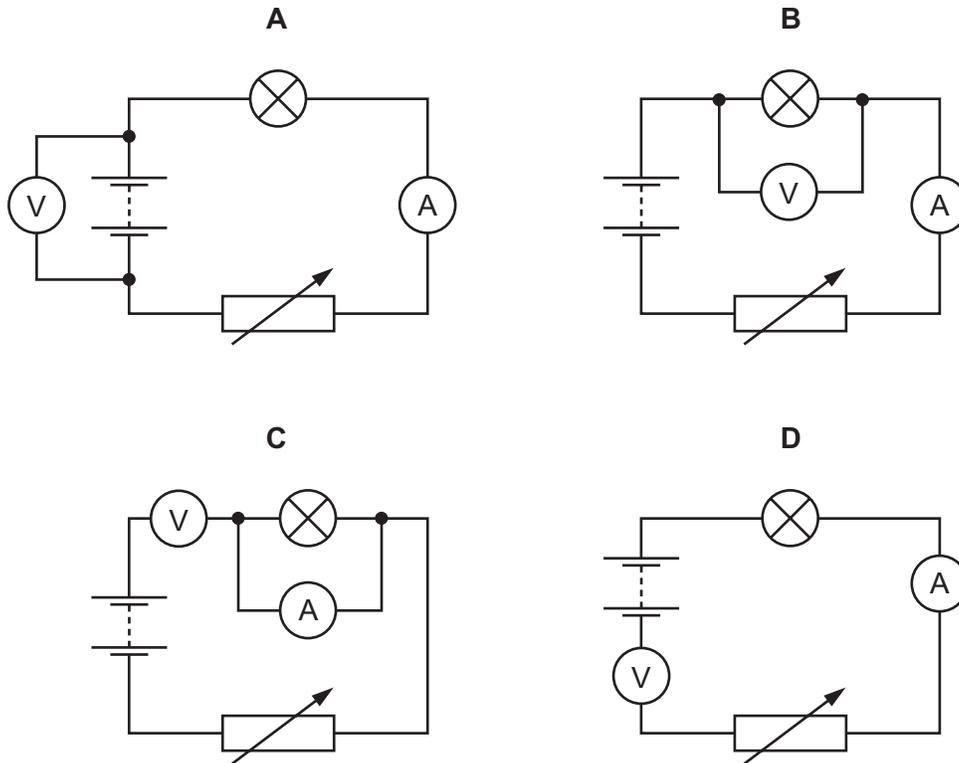
- 3 A potential divider consists of a thermistor and a light-dependent resistor (LDR).



Which conditions give the smallest voltage V across the LDR?

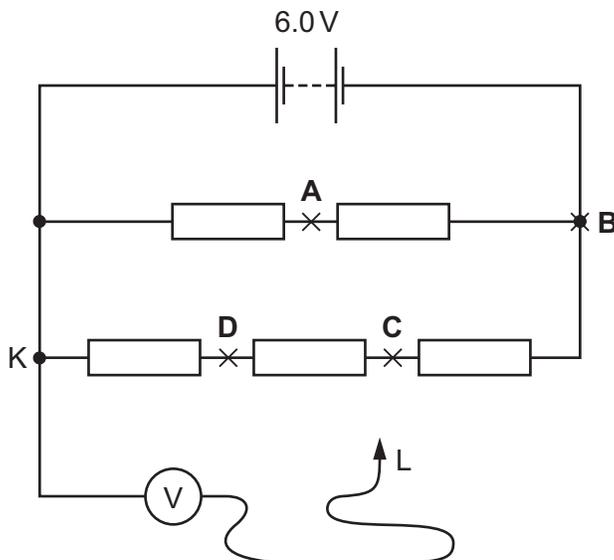
- A cold and dark
- B cold and light
- C hot and dark
- D hot and light

- 4 Which diagram shows the arrangement of the ammeter and voltmeter to obtain readings to find the power of a lamp?

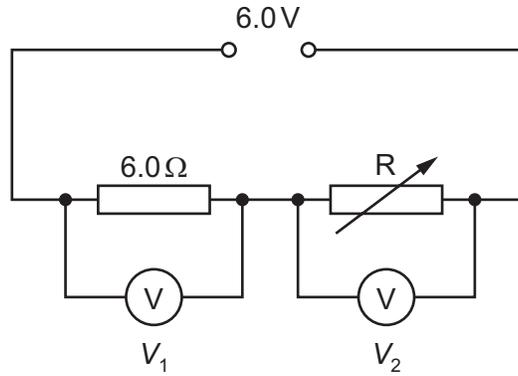


- 5 A 6.0V battery is connected to a network containing five identical resistors. A voltmeter has one lead connected to point K as shown.

At which point should lead L be connected so that the voltmeter reads 3.0V?



6 A potential divider is connected across the terminals of a 6.0 V supply.

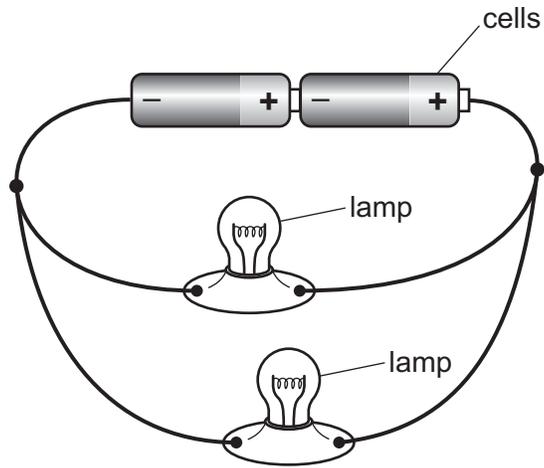


When R is adjusted to 6.0 Ω, the voltmeter readings V₁ and V₂ are equal.

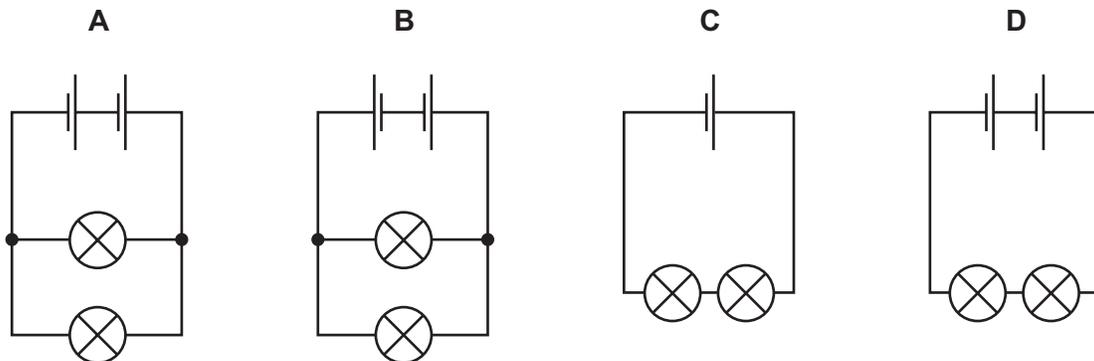
What happens to the readings when the resistance of R is then increased?

	V ₁	V ₂
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

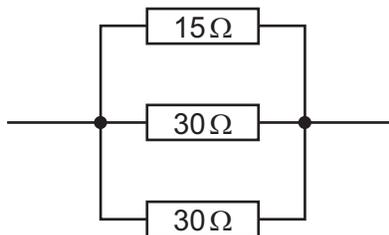
7 The diagram shows a circuit.



Which circuit diagram shows this circuit?



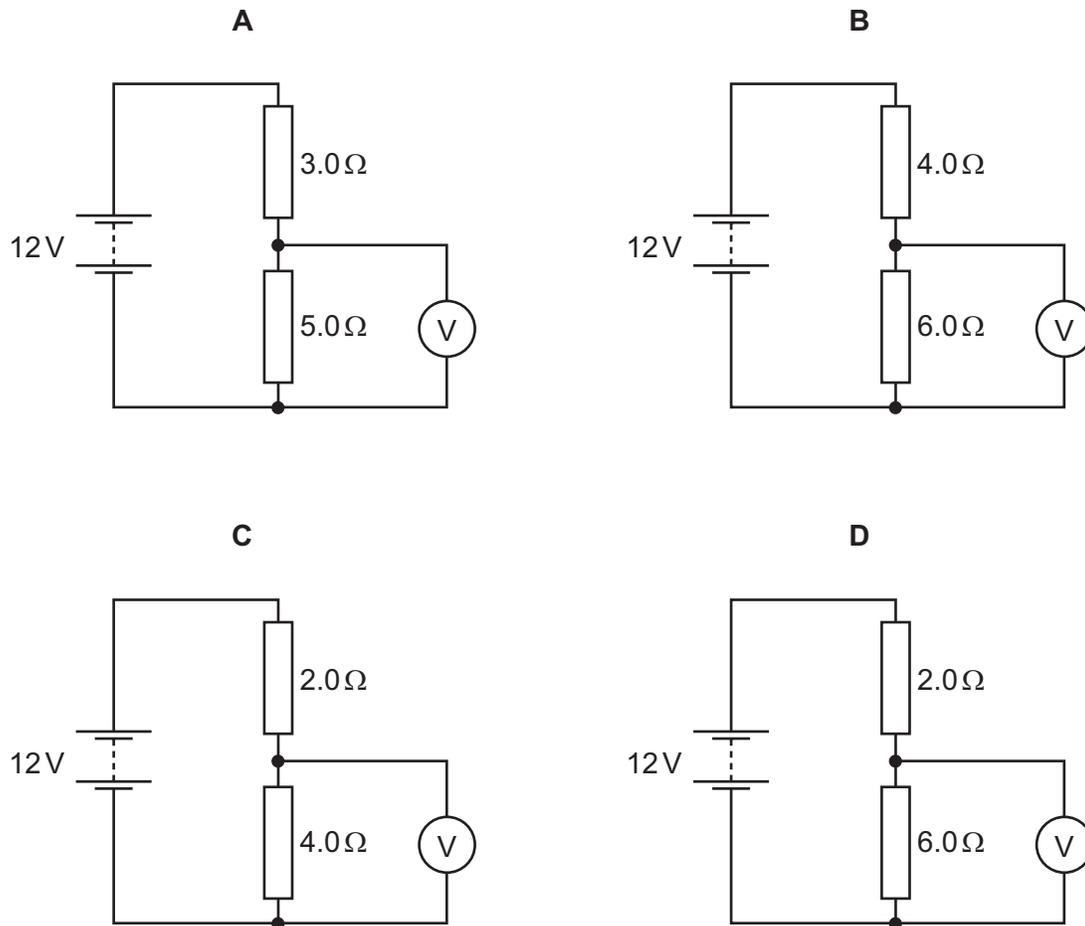
8 The diagram shows three resistors in parallel.



What is the combined resistance?

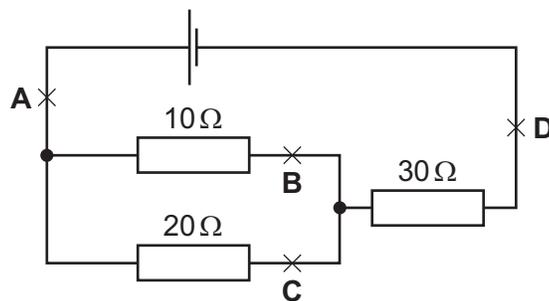
- A** $7.5\ \Omega$ **B** $15\ \Omega$ **C** $30\ \Omega$ **D** $75\ \Omega$

9 In which circuit is the voltmeter reading 7.2 V?

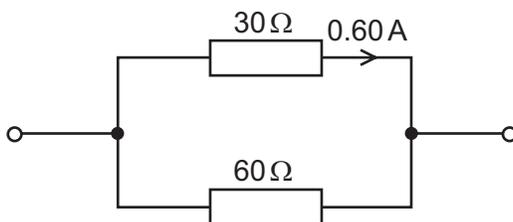


10 The diagram shows a circuit.

Where must an ammeter be connected to measure the smallest current?

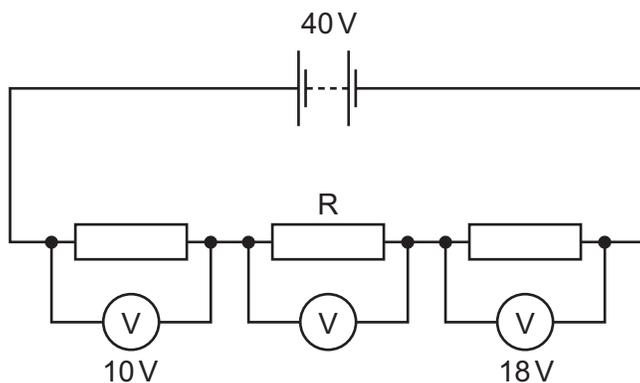


- 11 Two resistors of resistances $30\ \Omega$ and $60\ \Omega$ are arranged in parallel. The current in the $30\ \Omega$ resistor is $0.60\ \text{A}$.



What is the potential difference across the $60\ \Omega$ resistor?

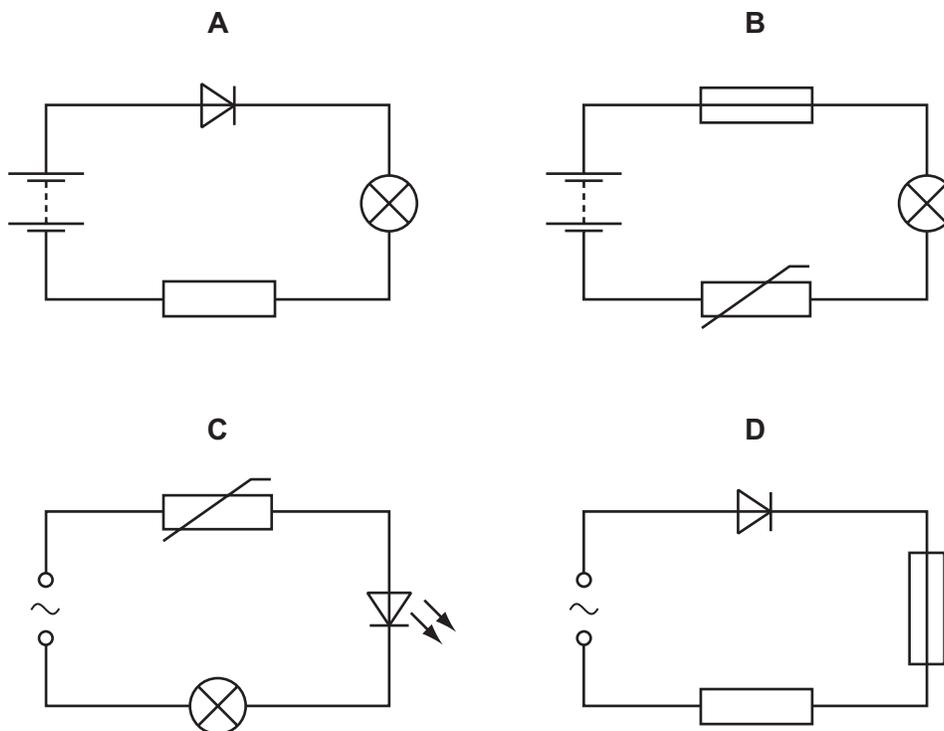
- A** $9.0\ \text{V}$ **B** $18\ \text{V}$ **C** $36\ \text{V}$ **D** $54\ \text{V}$
- 12 The circuit shows three resistors in series connected to a battery. Each resistor has a voltmeter across it and two of the voltages are shown.



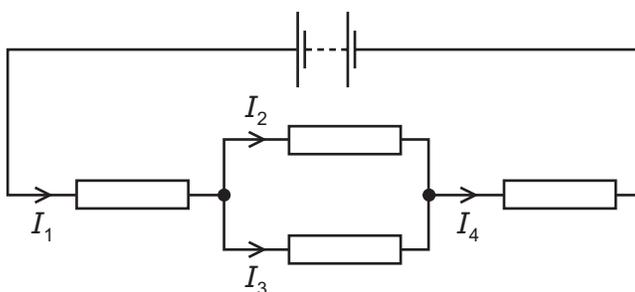
What is the potential difference (p.d.) across the resistor R ?

- A** $12\ \text{V}$ **B** $22\ \text{V}$ **C** $30\ \text{V}$ **D** $68\ \text{V}$

13 Which circuit contains a fuse and a diode?



14 Four resistors of unequal resistances are connected to a power supply as shown.



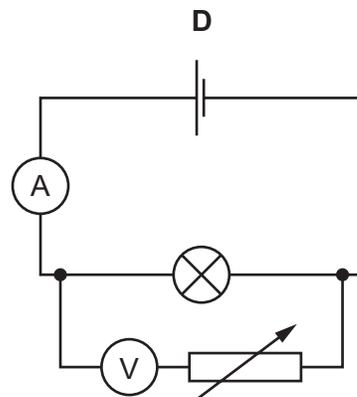
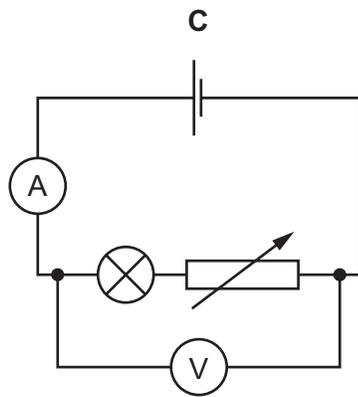
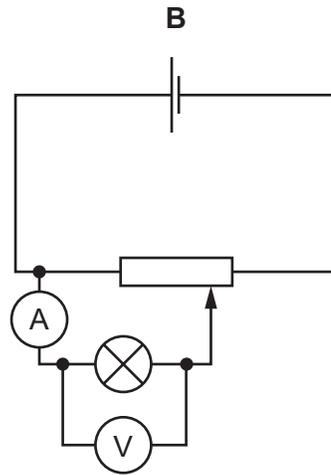
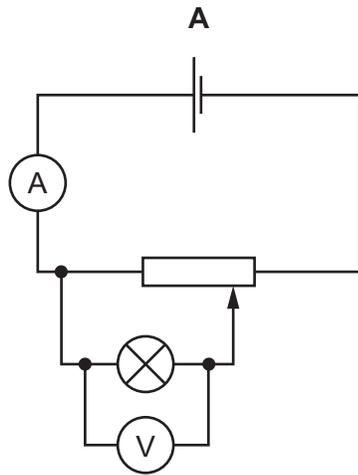
The currents in the four resistors are I_1 , I_2 , I_3 and I_4 .

Which equation is correct?

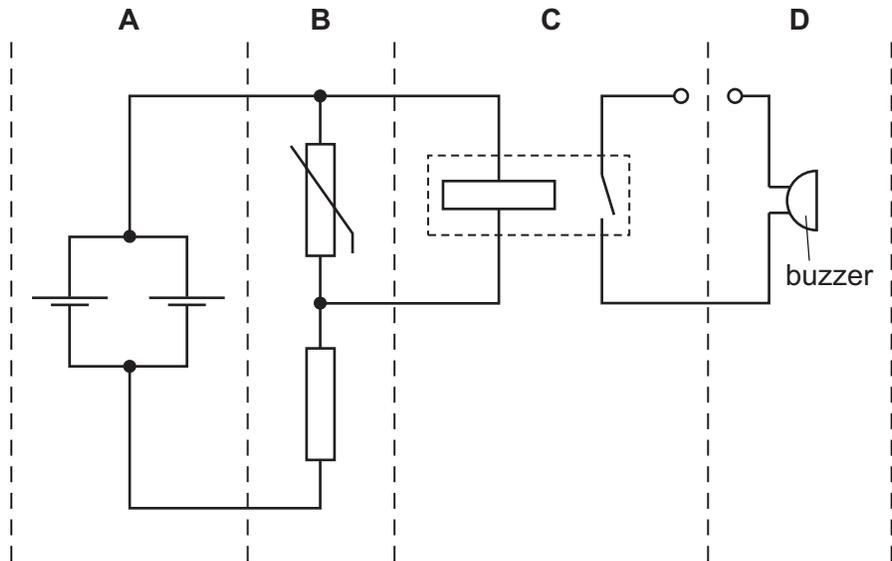
- A $I_1 = I_2 - I_3$
- B $I_2 = I_1 + I_4$
- C $I_3 = I_4 - I_1$
- D $I_4 = I_2 + I_3$

15 An experiment is set up to investigate how the current in a filament lamp changes with the potential difference across it.

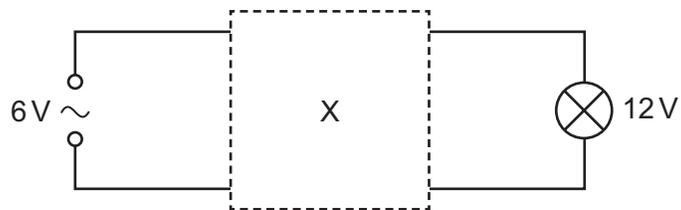
Which circuit is correct?



16 Which section of the circuit contains a potential divider?



17 The diagram shows an electrical device X connected between a 6V a.c. supply and a 12V lamp

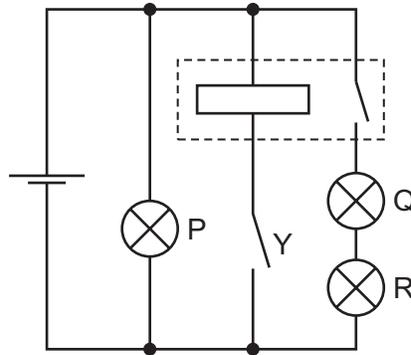


The lamp is seen to glow with normal brightness.

What is X?

- A a capacitor
- B a potential divider
- C a relay
- D a transformer

18 In the circuit shown, all lamps are identical. Lamp P lights with normal brightness.

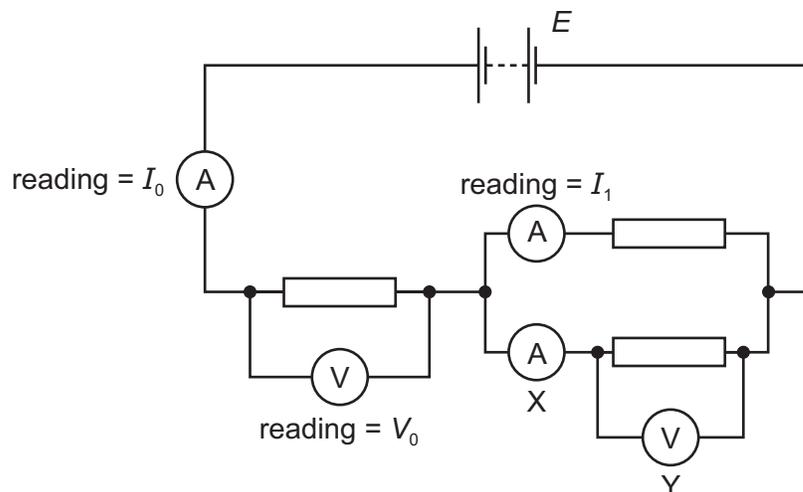


Switch Y is closed and lamps come on.

Which row indicates the brightness of the lamps?

	P	Q	R
A	dim	dim	dim
B	normal	dim	dim
C	normal	off	off
D	off	normal	normal

19 A battery of e.m.f. E is connected in a circuit containing three resistors.

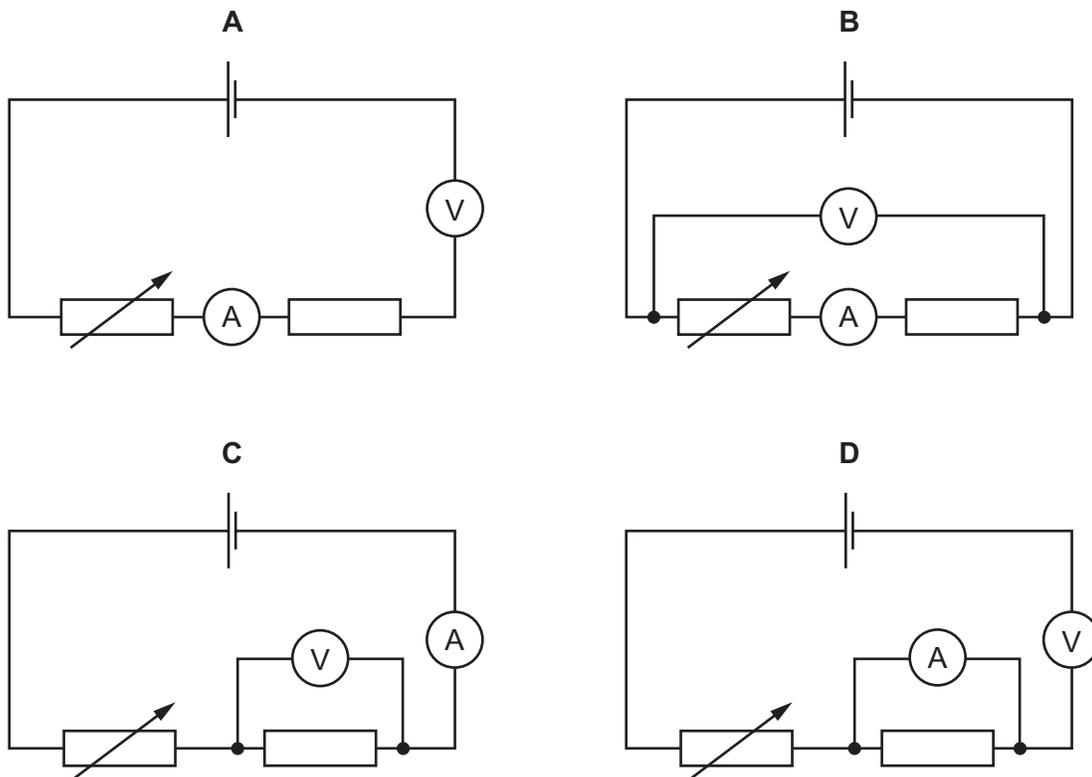


The readings of two ammeters and a voltmeter are shown.

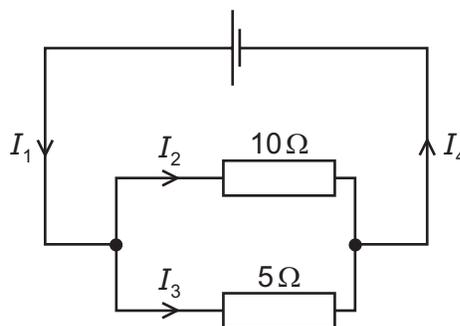
Which readings are shown on ammeter X and on voltmeter Y?

	X	Y
A	$I_0 - I_1$	$E - V_0$
B	$I_0 - I_1$	$E + V_0$
C	$I_0 + I_1$	$E + V_0$
D	$I_0 + I_1$	$E - V_0$

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



21 The currents in different parts of the circuit are I_1 , I_2 , I_3 and I_4 .

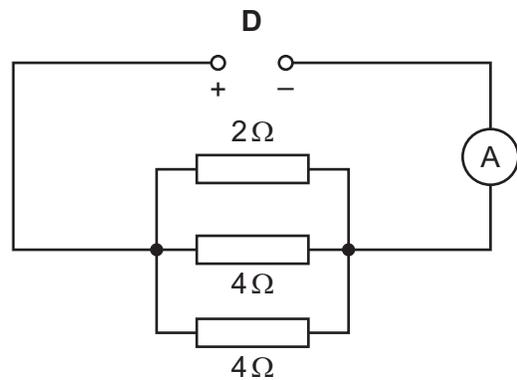
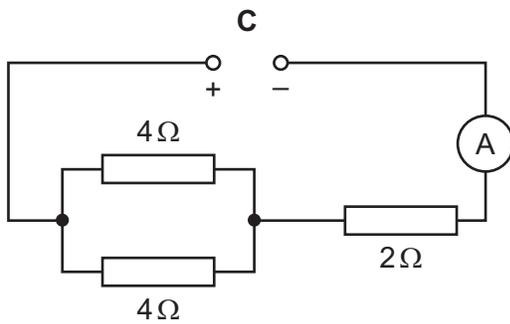
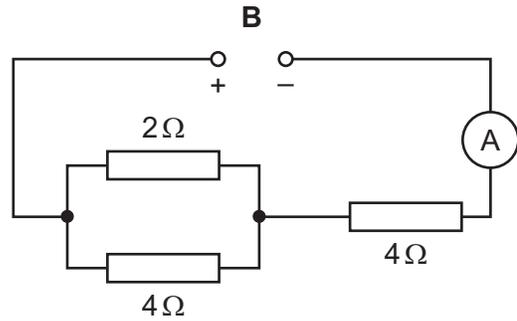
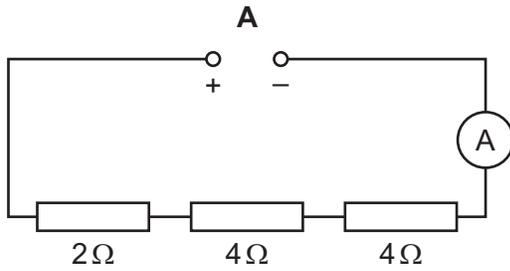


Which statement is correct?

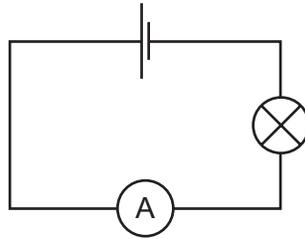
- A $I_1 = I_4$ and I_2 is greater than I_3 .
- B $I_1 = I_4$ and I_3 is greater than I_2 .
- C I_2 is greater than I_1 and less than I_3 .
- D I_2 is greater than I_1 and greater than I_3 .

22 An ammeter is connected to three resistors and a power supply.

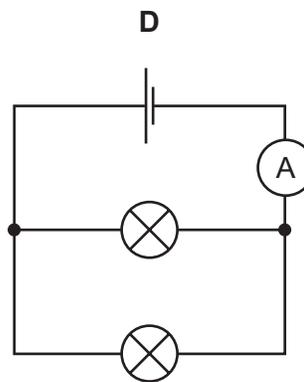
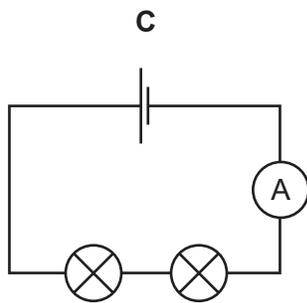
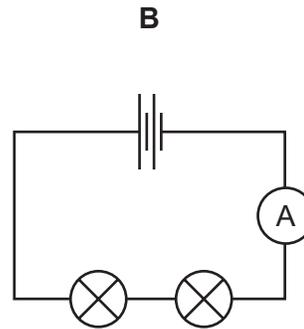
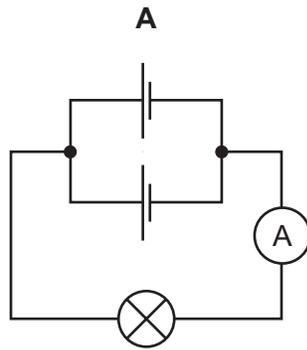
Which arrangement of resistors gives the greatest ammeter reading?



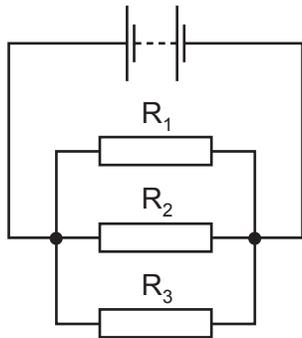
23 A cell is connected in series with an ammeter and a lamp. The reading on the ammeter is 1 A.



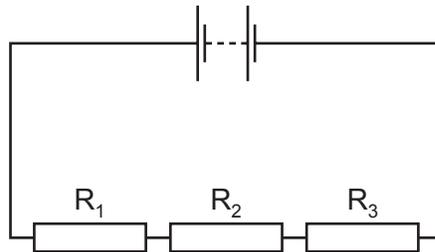
In which circuit, using identical lamps, ammeters and cells, is the reading on the ammeter 2 A?



24 In the circuits P and Q below, resistors R_1 , R_2 and R_3 have different resistances.



circuit P

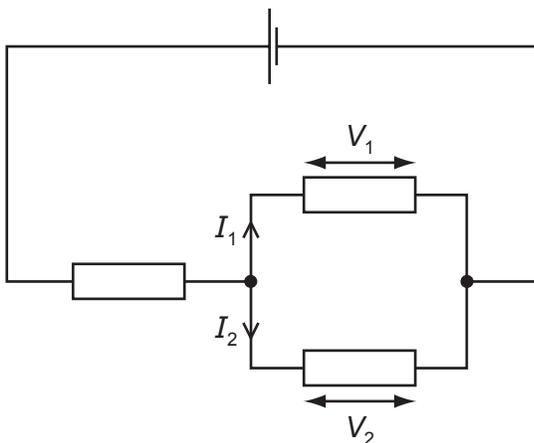


circuit Q

In which circuit are the currents in the resistors equal and in which circuit are the potential differences across the resistors equal?

	currents equal	potential differences equal
A	P	P
B	P	Q
C	Q	P
D	Q	Q

25 The circuit shows three resistors connected to a cell.



The resistors have different values of resistance.

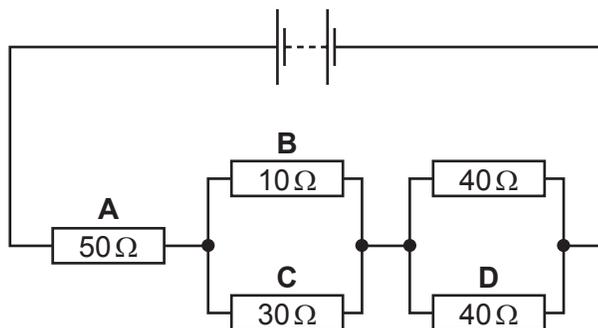
V_1 and V_2 are potential differences and I_1 and I_2 are currents as shown.

Which pair of relationships is correct?

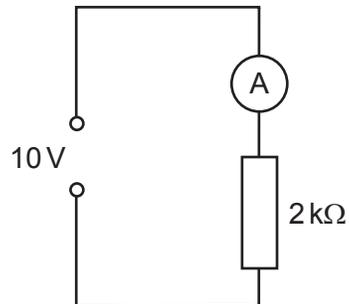
- A $I_1 = I_2$ and $V_1 = V_2$
- B $I_1 = I_2$ and $V_1 \neq V_2$
- C $I_1 \neq I_2$ and $V_1 = V_2$
- D $I_1 \neq I_2$ and $V_1 \neq V_2$

26 The diagram shows a circuit containing five resistors connected to a battery.

In which resistor is the current the smallest?



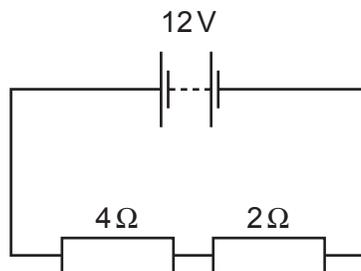
27 The diagram shows an ammeter connected in a circuit.



What is the current in the ammeter?

- A** 5 mA **B** 20 mA **C** 0.2 A **D** 5 A

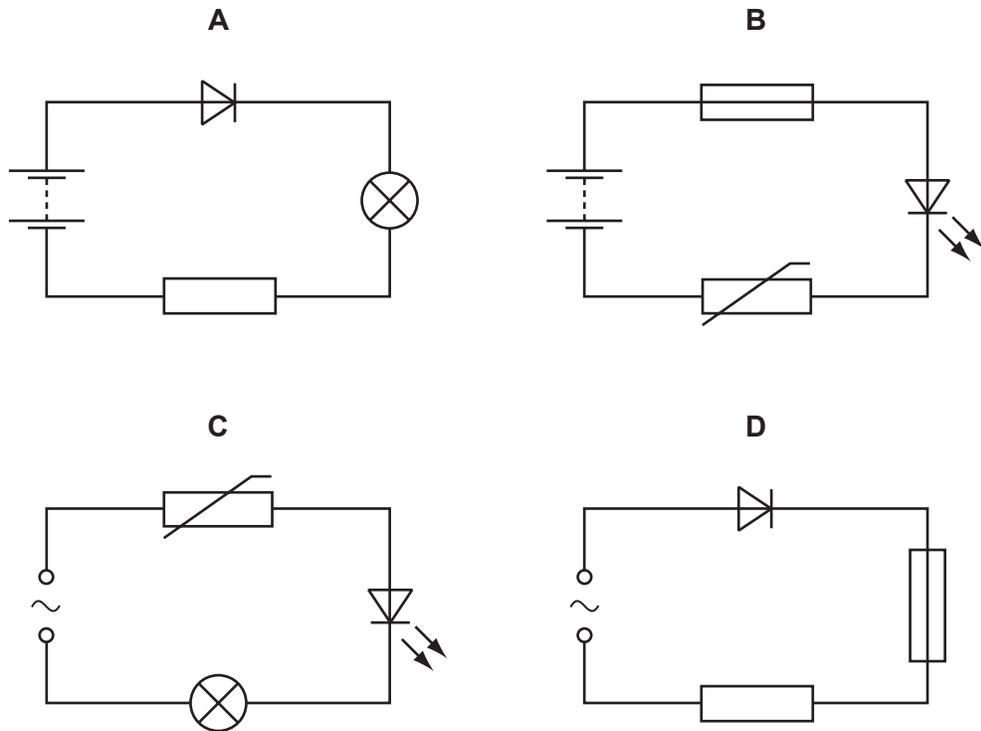
28 In the circuit shown, the potential difference (p.d.) across the 4 Ω resistor is 8 V.



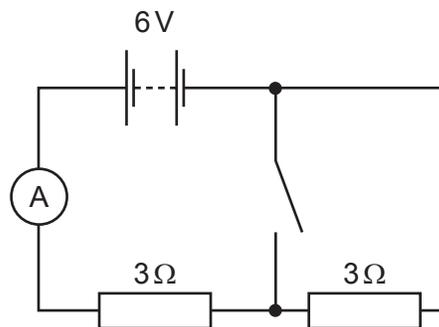
What is the p.d. across the 2 Ω resistor?

- A** 4 V **B** 6 V **C** 8 V **D** 16 V

29 Which circuit contains a fuse and a rectifying diode?



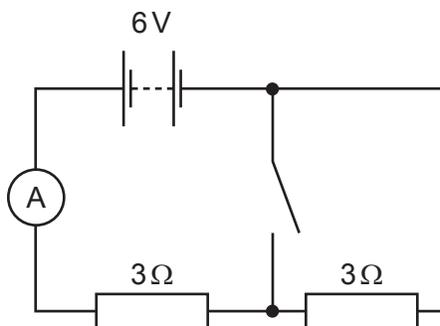
30 The diagram shows a circuit.



What is the reading on the ammeter when the switch is open, and the reading when it is closed?

	ammeter reading when open / A	ammeter reading when closed / A
A	1	1
B	1	2
C	2	1
D	2	2

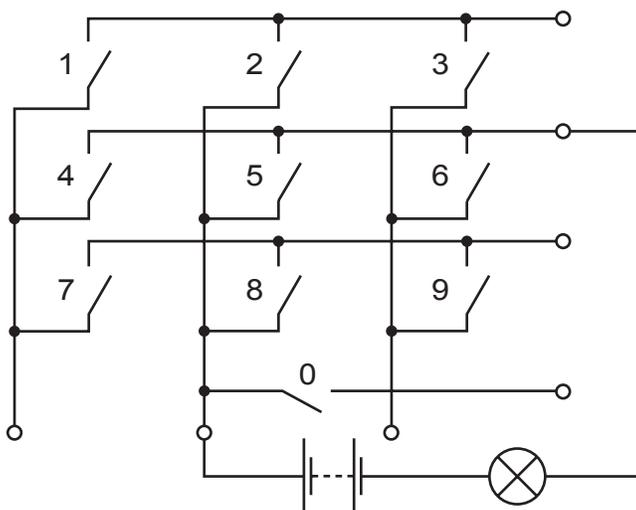
31 The diagram shows a circuit.



What is the reading on the ammeter when the switch is open, and the reading when it is closed?

	ammeter reading when open / A	ammeter reading when closed / A
A	1	1
B	1	2
C	2	1
D	2	2

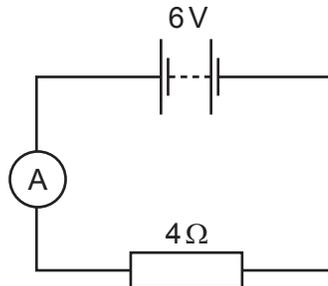
32 A student tests the circuit of a press-button telephone with a lamp and a battery.



Which single switch can be pressed to make the lamp light?

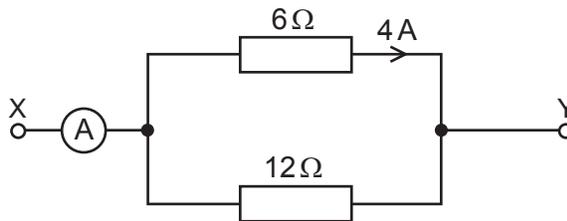
- A** 0 **B** 1 **C** 5 **D** 6

- 33 A 6V supply is connected in series with an ammeter and a 4Ω resistor.



What is the reading on the ammeter?

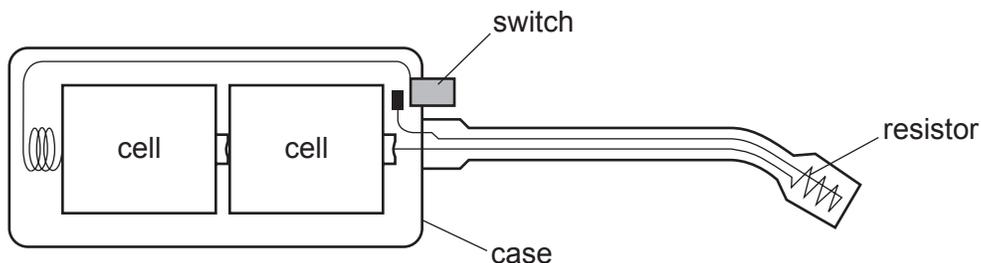
- A** 0.67 A **B** 1.5 A **C** 10 A **D** 24 A
- 34 Two resistors of 6Ω and 12Ω are arranged in parallel. A potential difference is connected across the terminals X and Y. The current in the 6Ω resistor is 4 A.



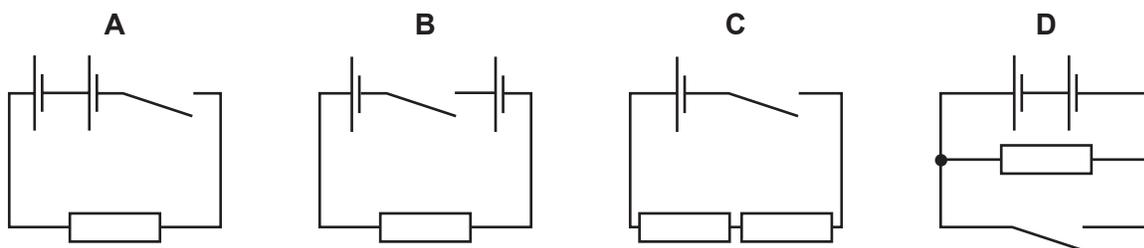
What is the current in the ammeter?

- A** 4 A **B** 6 A **C** 8 A **D** 12 A

35 The diagram shows the components of a lighter for a gas cooker.



Which circuit diagram is correct for this lighter?

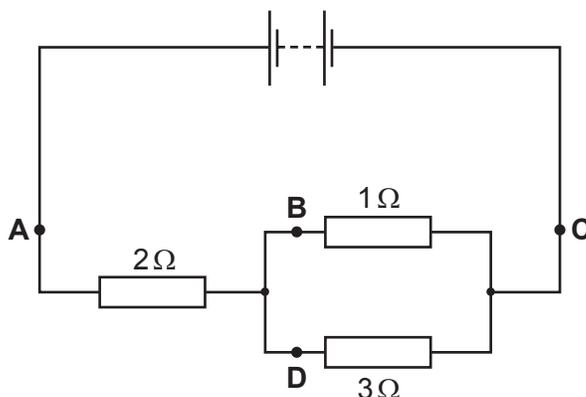


36 An electric heater is rated at 3kW. Electrical energy costs 20 cents per kWh.

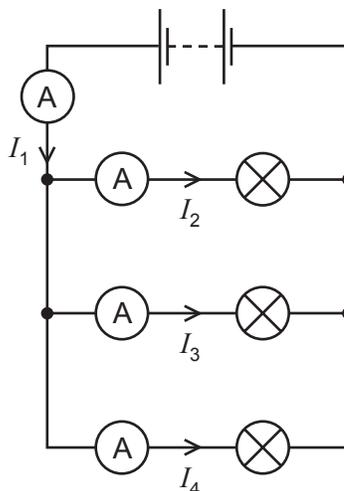
What is the cost of using the heater for five hours?

- A** 12 cents **B** 60 cents **C** 100 cents **D** 300 cents

37 At which point in the circuit is the current the smallest?



38 A student sets up the circuit shown.

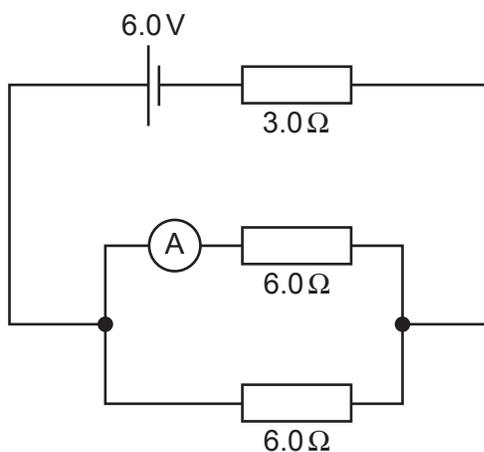


The currents measured with the ammeters are shown.

Which equation is correct?

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

39 The following circuit is set up.



What is the reading on the ammeter?

- A** 0.33A
- B** 0.50A
- C** 0.67A
- D** 1.0A

40 Diagram 1 shows a resistor connected to a battery, an ammeter and a voltmeter.

The ammeter reading is 0.5A and the voltmeter reading is 3.0V.

A second identical resistor is now connected in parallel with the first resistor, as shown in diagram 2.

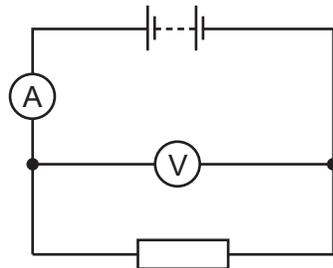


diagram 1

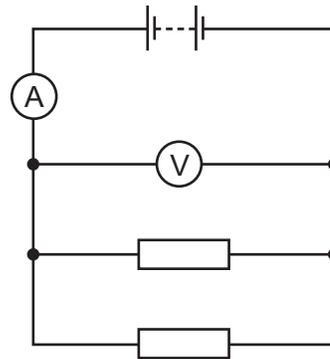
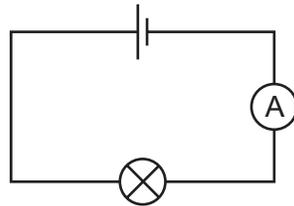


diagram 2

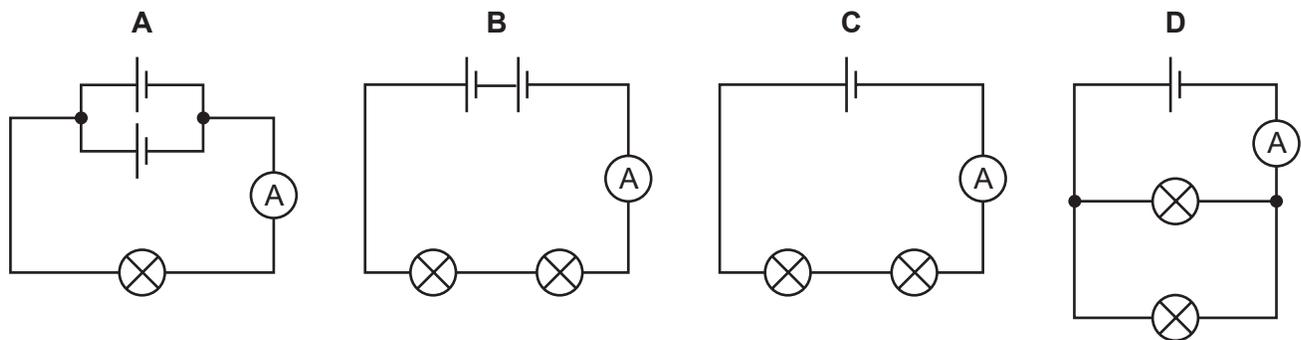
What are the ammeter and voltmeter readings in the circuit shown in diagram 2?

	ammeter reading / A	voltmeter reading / V
A	1.0	3.0
B	1.0	1.5
C	0.5	6.0
D	0.5	3.0

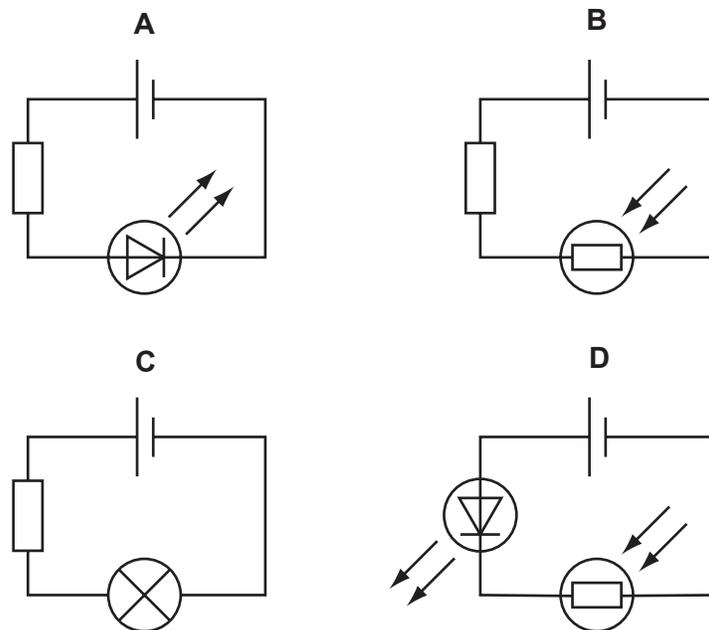
41 A cell is connected in series with an ammeter and a lamp. The current is 1 A.



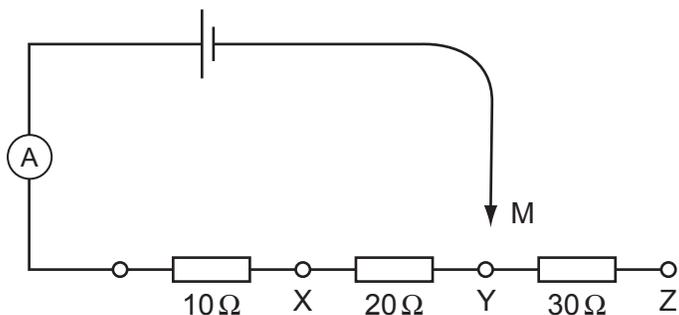
In which circuit, using identical cells, lamps and ammeters, is the current reading 2 A?



42 Which circuit contains a cell, a light-emitting diode and a fixed resistor?



- 43 The diagram shows a cell connected in series with an ammeter and three resistors (10Ω , 20Ω , 30Ω). The circuit can be completed by a moveable contact M.

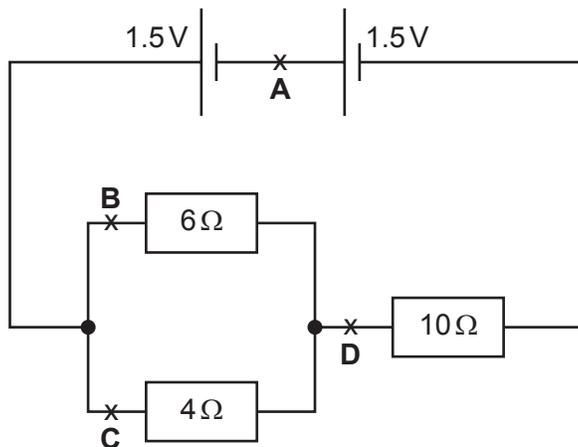


When M is connected to X, the ammeter reads 0.6A .

What is the ammeter reading when M is connected to Y?

- A** 0.1A **B** 0.2A **C** 0.3A **D** 0.6A

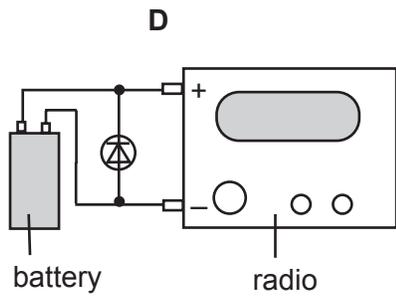
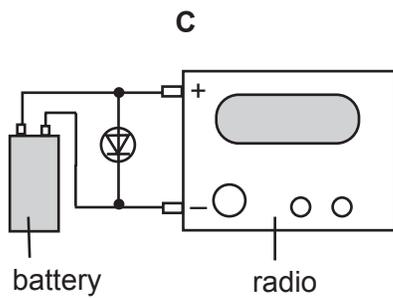
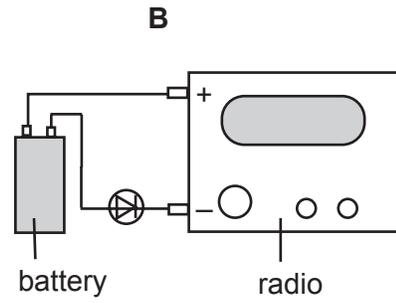
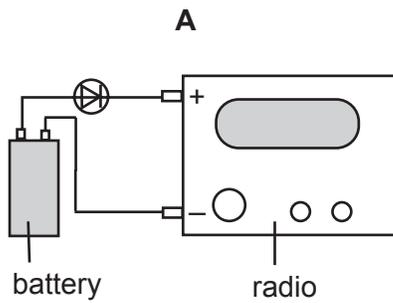
- 44 In the circuit shown, at which point is the current the smallest?



45 An electrical engineer connects a diode to a radio so that:

if the battery is connected the right way round the radio works,
if the battery is connected the wrong way there is no current.

Which diagram is correct?



46 Diagram 1 shows a resistor connected to a battery, an ammeter and a voltmeter.

The ammeter reading is 0.5 A and the voltmeter reading is 3.0 V.

A second identical resistor is now connected in parallel with the first resistor, as shown in diagram 2.

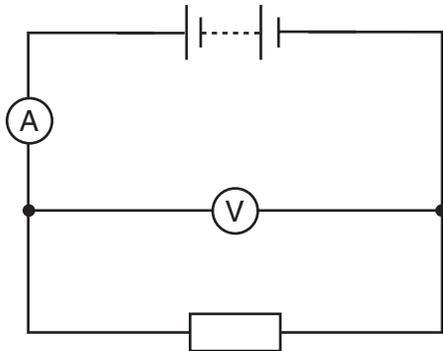


diagram 1

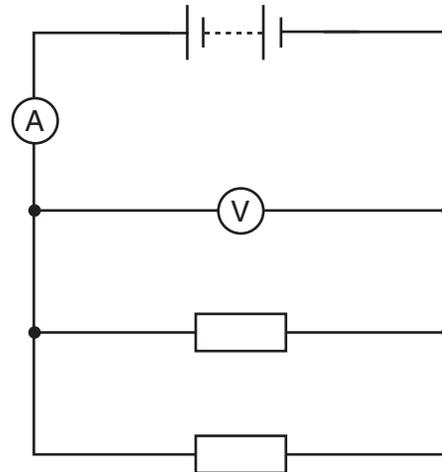


diagram 2

What are the ammeter and voltmeter readings in the circuit shown in diagram 2?

	ammeter reading / A	voltmeter reading / V
A	0.5	3.0
B	0.5	6.0
C	1.0	1.5
D	1.0	3.0