4.3 Electric Circuits

Question Paper 1

Level	IGCSE
Subject	Physics (0625)
Exam Board	Cambridge International Examinations(CIE)
Topic	Electricity and Magnetism
Sub Topic	4.3 Electric Circuits
Booklet	Question Paper 1

Time Allowed: **48 minutes**

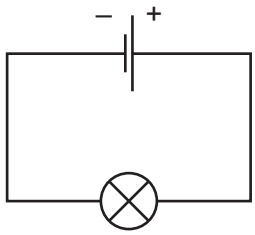
Score: **/40**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1 A cell is connected to a lamp, as shown.



A charge of 4.0 C flows through the lamp in 2.0 s.

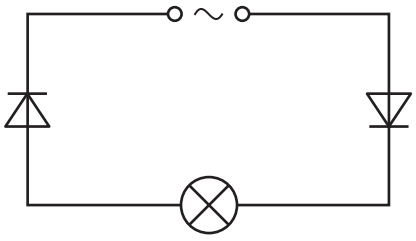
What is the direction of the electron flow in the lamp and what is the current in the lamp?

	direction of electron flow in lamp	current / A
A	from left to right	2.0
B	from left to right	8.0
C	from right to left	2.0
D	from right to left	8.0

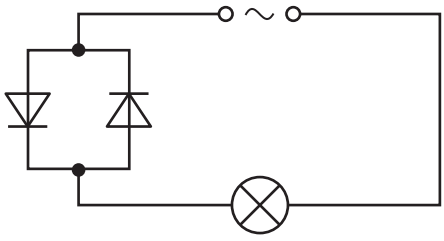
2 The four circuits shown all include an a.c. power supply, two diodes and a lamp.

In which circuit is there a rectified current in the lamp?

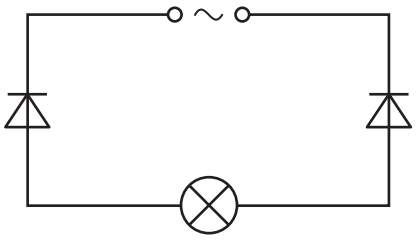
A



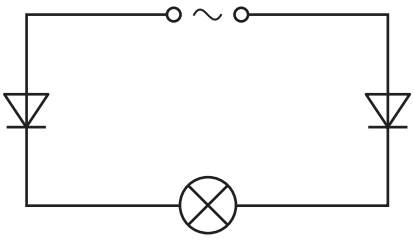
B



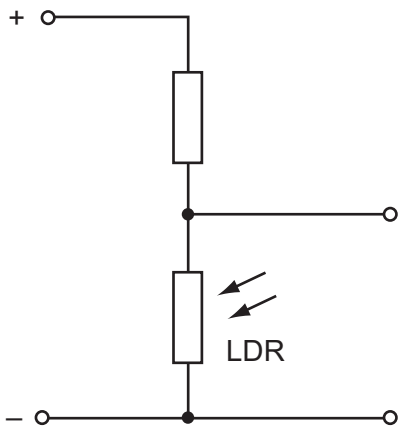
C



D



3 The diagram shows part of a circuit used to switch street lamps on and off automatically.



In the evening it gets dark.

Which row shows the effect on the resistance of the light-dependent resistor (LDR) and on the potential difference (p.d.) across it?

	resistance of LDR	p.d. across LDR
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

4 A domestic circuit includes a 30 A fuse. This protects the wiring if there is too much current in the circuit.

In which wire is the 30 A fuse positioned, and what does it do when it operates?

	position	operation
A	live wire	disconnects the circuit
B	live wire	reduces the current to 30 A
C	neutral wire	disconnects the circuit
D	neutral wire	reduces the current to 30 A

5 A wire has a certain electrical resistance.

The diameter and length of the wire may be changed.

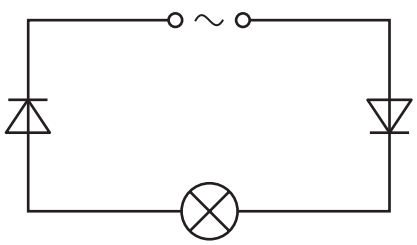
Which pair of changes **must** cause the resistance of the wire to increase?

	change of diameter	change of length
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

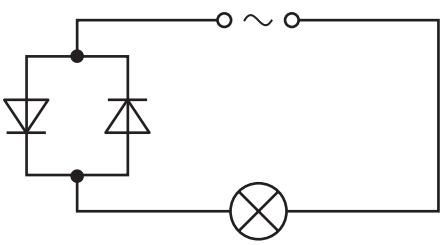
6 The four circuits shown all include an a.c. power supply, two diodes and a lamp.

In which circuit is there a rectified current in the lamp?

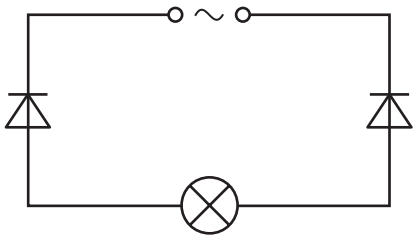
A



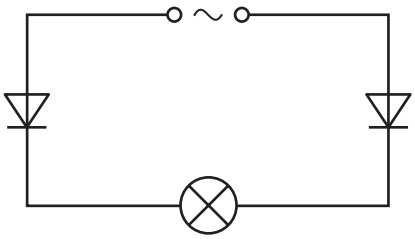
B



C



D



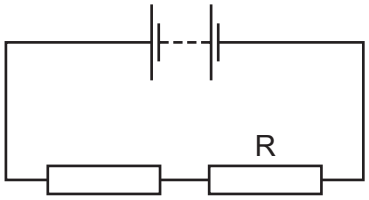
7 P and Q are the circuit symbols for two electrical components.

P Q

Which components are represented by P and by Q?

	P	Q
A	thermistor	fuse
B	thermistor	relay
C	variable resistor	fuse
D	variable resistor	relay

8 The diagram shows a battery connected to two resistors.



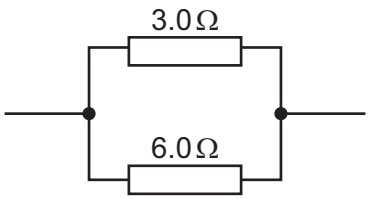
Four students separately measure the electromotive force (e.m.f.) of the battery, the current in the resistors, and the potential difference (p.d.) across resistor R.

Their results are shown in the table below.

Which row shows values with their correct units?

	e.m.f.	current	p.d.
A	3.0 A	0.30 V	1.5 A
B	3.0 A	0.30 A	1.5 V
C	3.0 V	0.30 V	1.5 A
D	3.0 V	0.30 A	1.5 V

9 A 3.0 Ω resistor and a 6.0 Ω resistor are connected in parallel.

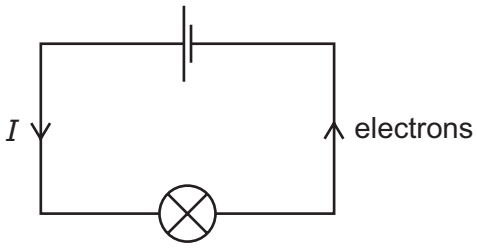


What is their combined resistance?

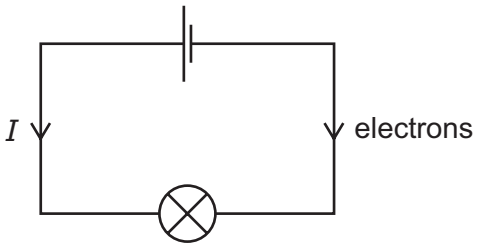
A 0.50 Ω **B** 2.0 Ω **C** 4.5 Ω **D** 9.0 Ω

10 Which circuit shows the directions of the conventional current I and the flow of electrons?

A



B



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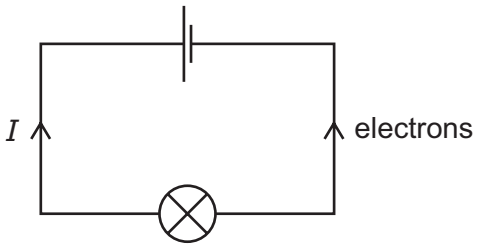
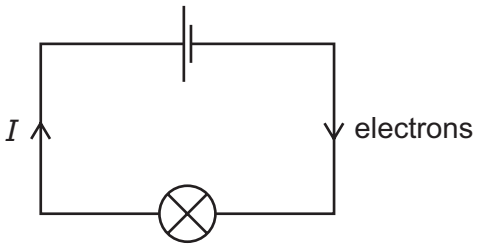


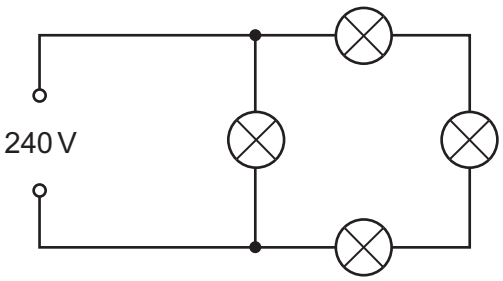
D



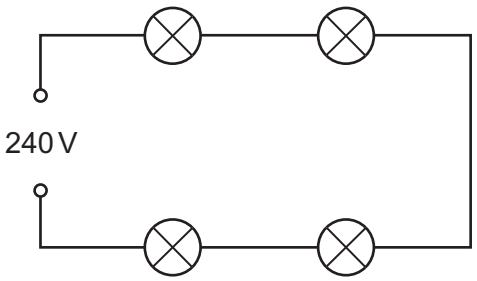
11 Four lamps are each labelled 240 V.

In which circuit do all four lamps have normal brightness?

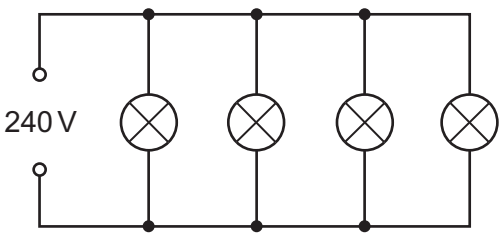
A



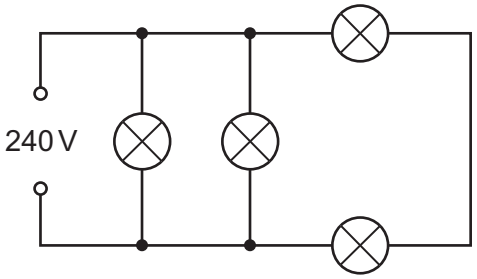
B



C



D



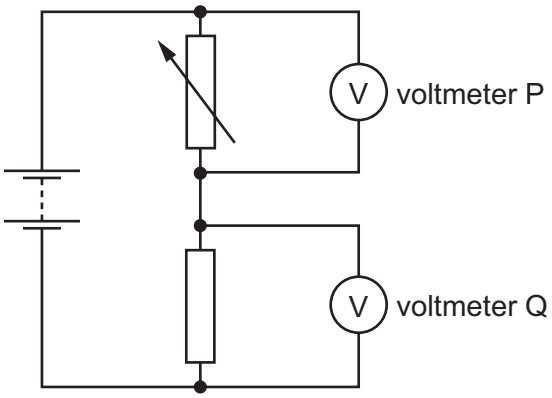
12 A battery charger plugs into a 230 V a.c. supply. The charger is used to charge a 6.0 V d.c. battery.

The charger contains diodes and a transformer.

What is the purpose of these components?

	diodes	transformer
A	rectify the a.c.	steps down the voltage
B	rectify the a.c.	steps up the voltage
C	step down the voltage	rectifies the a.c.
D	step up the voltage	rectifies the a.c.

13 The diagram shows a potential divider connected to two voltmeters P and Q.

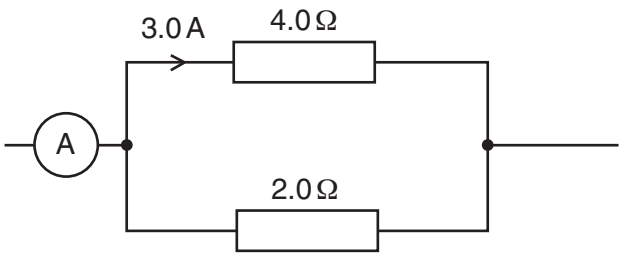


The resistance of the variable resistor is decreased.

Which row shows what happens to the reading on each voltmeter?

	reading on voltmeter P	reading on voltmeter Q
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

14 The diagram shows part of an electrical circuit.



The current in the 4.0 Ω resistor is 3.0 A.

What is the current in the ammeter?

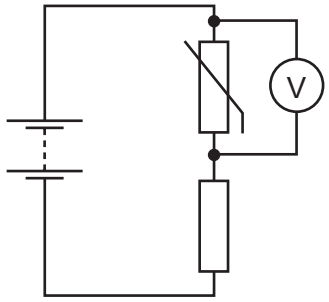
A 4.5 A

B 6.0 A

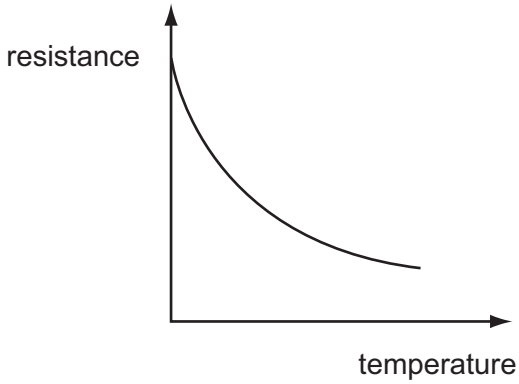
C 9.0 A

D 12.0 A

15 The circuit diagram shows a thermistor in a potential divider. A voltmeter is connected across the thermistor.



The graph shows how the resistance of the thermistor changes with temperature.



As the thermistor becomes warmer, what happens to its resistance and what happens to the reading on the voltmeter?

	resistance	voltmeter reading
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

16 What is the unit of electromotive force (e.m.f.)?

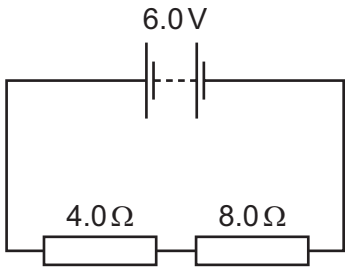
A ampere

B joule

C volt

D watt

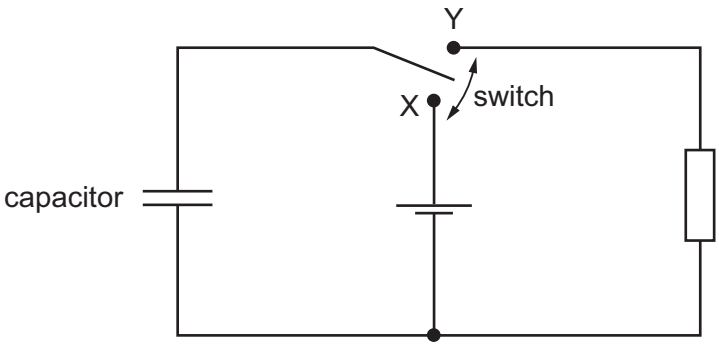
17 The circuit diagram shows a 4.0 Ω resistor and an 8.0 Ω resistor connected to a 6.0 V battery.



What is the current in the battery?

A 0.50 A **B** 0.75 A **C** 1.5 A **D** 2.0 A

18 The diagram shows a circuit which includes an uncharged capacitor and a switch.

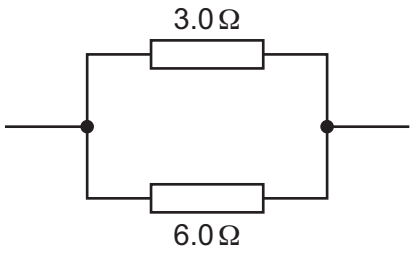


The switch can be moved between position X and position Y.

What happens to the capacitor when the switch is moved to position X, and what happens when the switch is then moved to position Y?

	switch at X	switch at Y
A	capacitor charges	capacitor charges
B	capacitor charges	capacitor discharges
C	capacitor discharges	capacitor charges
D	capacitor discharges	capacitor discharges

19 The diagram shows a 3.0 Ω resistor and a 6.0 Ω resistor connected in parallel.



What is the total resistance of this arrangement?

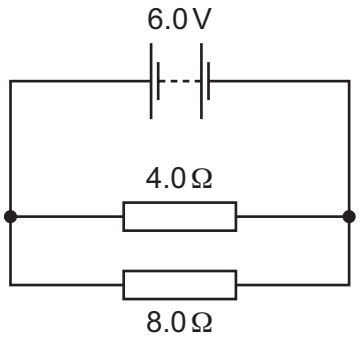
A less than 3.0 Ω

B 3.0 Ω

C 4.5 Ω

D more than 6.0 Ω

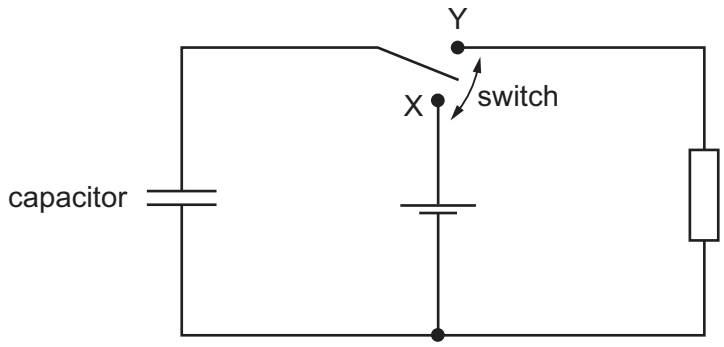
20 The circuit diagram shows a 4.0 Ω resistor and an 8.0 Ω resistor connected to a 6.0 V battery.



What is the potential difference (p.d.) across the 4.0 Ω resistor?

A 0.5 V **B** 2.0 V **C** 4.0 V **D** 6.0 V

21 The diagram shows a circuit which includes an uncharged capacitor and a switch.

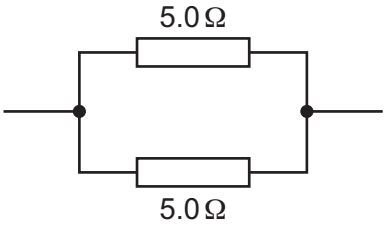


The switch can be moved between position X and position Y.

What happens to the capacitor when the switch is moved to position X, and what happens when the switch is then moved to position Y?

	switch at X	switch at Y
A	capacitor charges	capacitor charges
B	capacitor charges	capacitor discharges
C	capacitor discharges	capacitor charges
D	capacitor discharges	capacitor discharges

22 Two 5.0 Ω resistors are connected as shown in the diagram.



What is the total resistance of this combination?

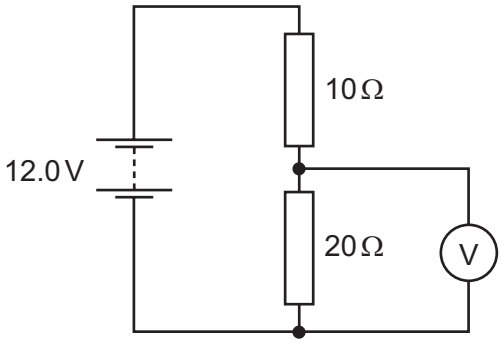
A less than 5.0 Ω

B 5.0 Ω

C more than 5.0 Ω but less than 10.0 Ω

D 10.0 Ω

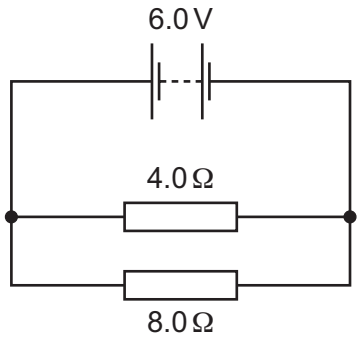
23 The diagram shows a 10 Ω resistor and a 20 Ω resistor connected in a potential divider circuit.



What is the reading on the voltmeter?

A 4.0 V **B** 6.0 V **C** 8.0 V **D** 12.0 V

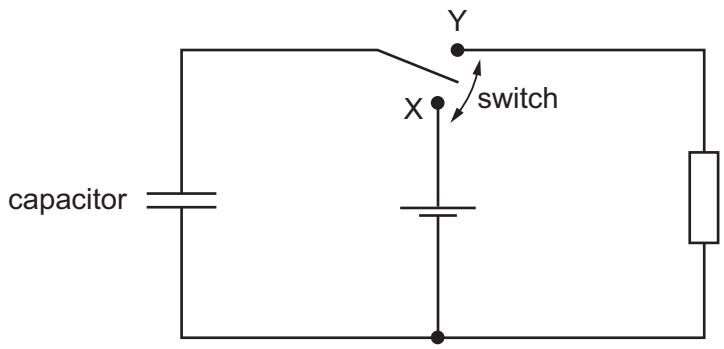
24 The circuit diagram shows a 4.0 Ω resistor and an 8.0 Ω resistor connected to a 6.0 V battery.



What is the current in the 8.0 Ω resistor?

A 0 A **B** 0.50 A **C** 0.75 A **D** 1.0 A

25 The diagram shows a circuit which includes an uncharged capacitor and a switch.

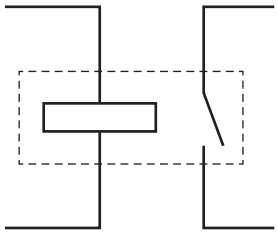


The switch can be moved between position X and position Y.

What happens to the capacitor when the switch is moved to position X, and what happens when the switch is then moved to position Y?

	switch at X	switch at Y
A	capacitor charges	capacitor charges
B	capacitor charges	capacitor discharges
C	capacitor discharges	capacitor charges
D	capacitor discharges	capacitor discharges

26 Which component is represented by this circuit symbol?



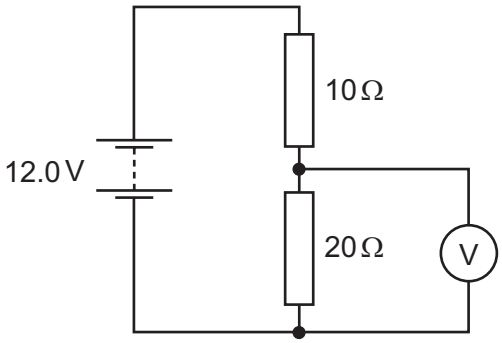
A a bell

B a fuse

C a relay

D a transformer

27 The diagram shows a 10 Ω resistor and a 20 Ω resistor connected in a potential divider circuit.



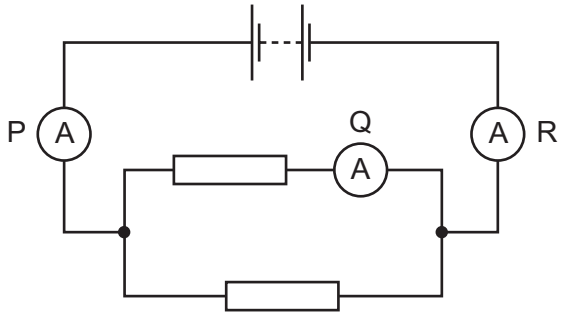
What is the reading on the voltmeter?

A 4.0 V **B** 6.0 V **C** 8.0 V **D** 12.0 V

28 What is the circuit symbol for a variable resistor?

A **B** **C** **D**

29 The diagram shows a circuit containing three ammeters P, Q and R.



Which statement about the readings on the ammeters is correct?

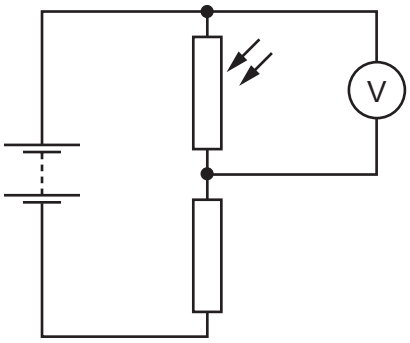
A The reading on P is equal to the reading on Q.

B The reading on P is equal to the reading on R.

C The reading on Q is greater than the reading on P.

D The reading on Q is greater than the reading on R.

30 The diagram shows a light-dependent resistor (LDR) connected in a potential divider circuit.



The brightness of the light falling on the LDR is increased.

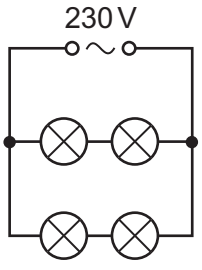
Which row shows what happens to the resistance of the LDR, and what happens to the reading on the voltmeter?

	resistance of LDR	reading on voltmeter
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

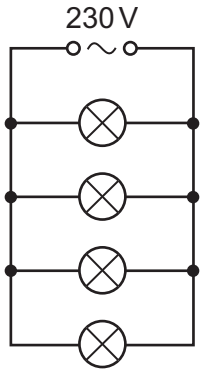
31 Four lamps are each labelled '60 W 230 V'.

In which circuit are the lamps connected so that they operate at normal brightness?

A



B



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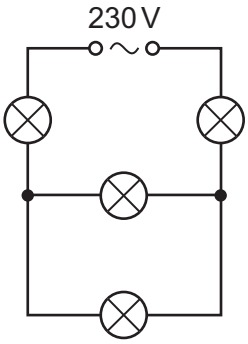
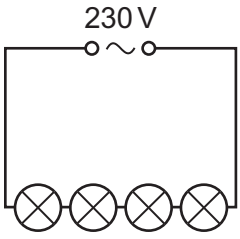
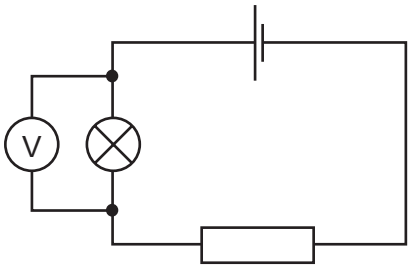


D

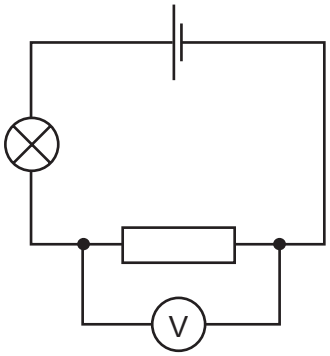


32 Which circuit shows a voltmeter measuring the p.d. across a resistor?

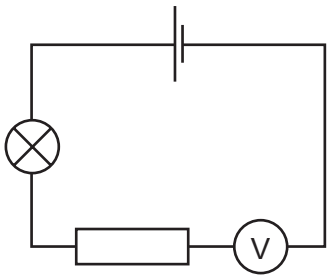
A



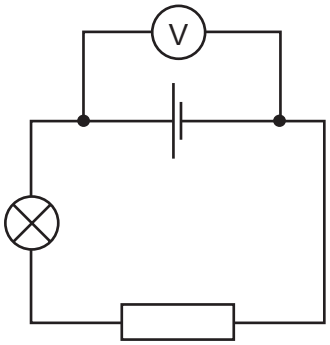
B



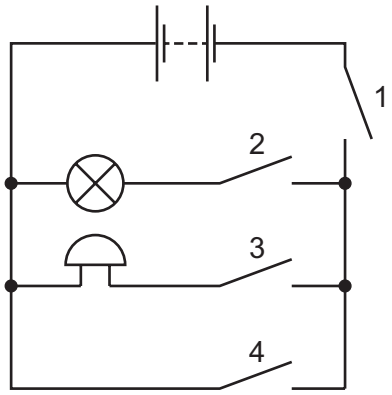
C



D



33 A student connects the circuit shown.



Which switches must be closed for both the bell to ring and the lamp to light?

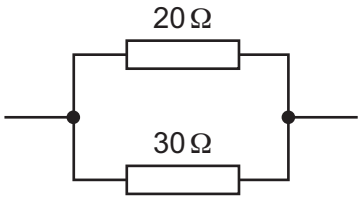
A 1 and 4 only

B 2 and 3 only

C **1**, 2 a

D **1**, 2

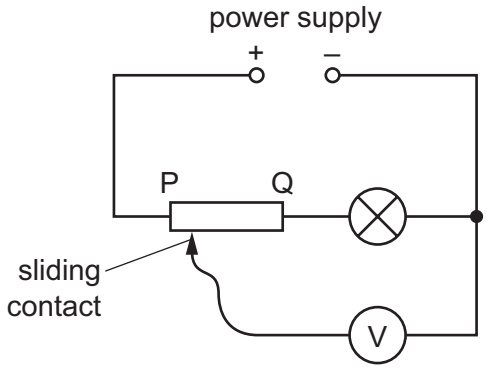
34 Two resistors are connected in parallel.



Which value could be the resistance of the combination?

A 12 Ω **B** 20 Ω **C** 25 Ω **D** 50 Ω

35 The circuit contains a variable potential divider PQ, a lamp and a voltmeter.



The sliding contact of the potential divider is moved towards end Q.

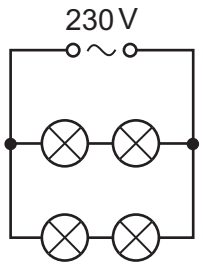
What happens to the brightness of the lamp and what happens to the voltmeter reading?

	brightness of lamp	voltmeter reading
A	becomes brighter	decreases
B	becomes brighter	increases
C	does not change	decreases
D	does not change	increases

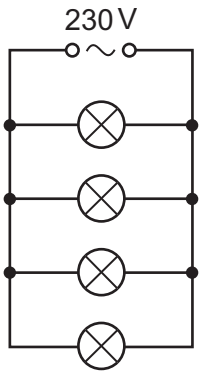
36 Four lamps are each labelled '60 W 230 V'.

In which circuit are the lamps connected so that they operate at normal brightness?

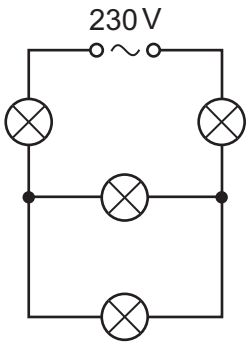
A



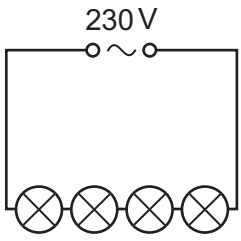
B



C



D



37 A student designs a circuit to switch on a lamp after a time delay.

Which components are used in a time-delay circuit?

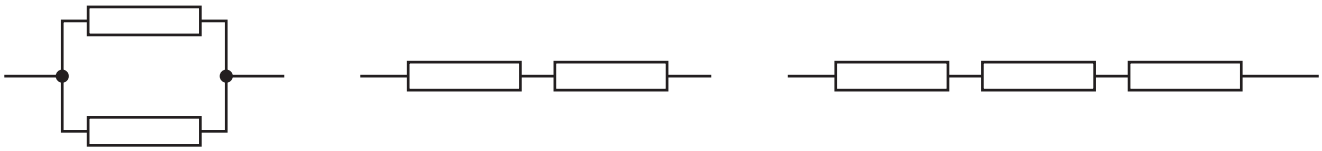
A a light-dependent resistor and a relay

B a resistor and a capacitor

C a resistor and a transformer

D a thermistor and a variable resistor

38 Identical resistors are connected together to form arrangements X, Y and Z.



arrangement X arrangement Y arrangement Z

What is the correct order of the resistances of the arrangements from the largest to the smallest?

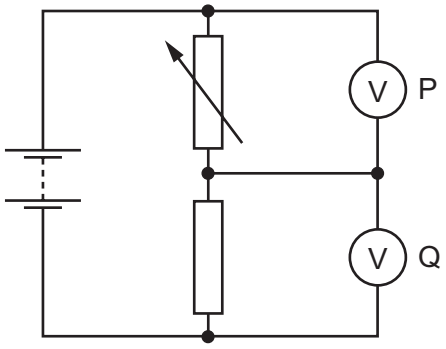
A $X \rightarrow Y \rightarrow Z$

B $Y \rightarrow X \rightarrow Z$

C $Z \rightarrow X \rightarrow Y$

D $Z \rightarrow Y \rightarrow X$

39 The diagram shows a potential divider circuit.



The resistance of the variable resistor is increased.

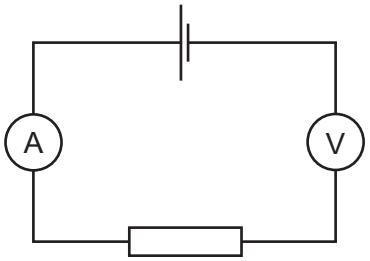
Which row shows what happens to the readings on voltmeter P and on voltmeter Q?

	reading on voltmeter P	reading on voltmeter Q
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

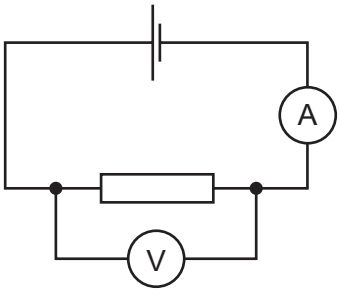
40 A student wishes to determine the resistance of a resistor. She uses an ammeter and a voltmeter in a circuit.

In which circuit are the ammeter and voltmeter connected correctly?

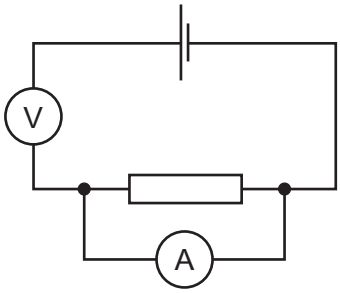
A



B



C



D