4. Electricity and magnetism

4.3 Electric circuits

Paper 1 and 2

Question Paper

Paper 1

Questions are applicable for both core and extended candidates

1 What is a thermistor?

A a container to keep a hot liquid warm

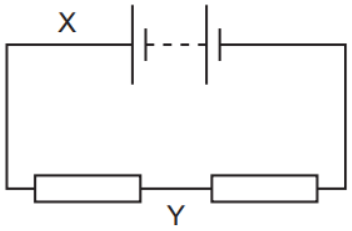
B a circuit to control room temperature

C a temperature-dependent resistor

D a heater for a room

2 The diagram shows a circuit containing two identical resistors connected to a battery.

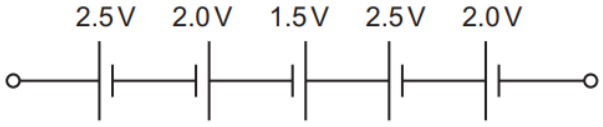
The current is measured at X and at Y.



Which row is correct?

	arrangement of resistors	current at Y compared with current at X
A	parallel	less than X
B	parallel	equal to X
C	series	less than X
D	series	equal to X

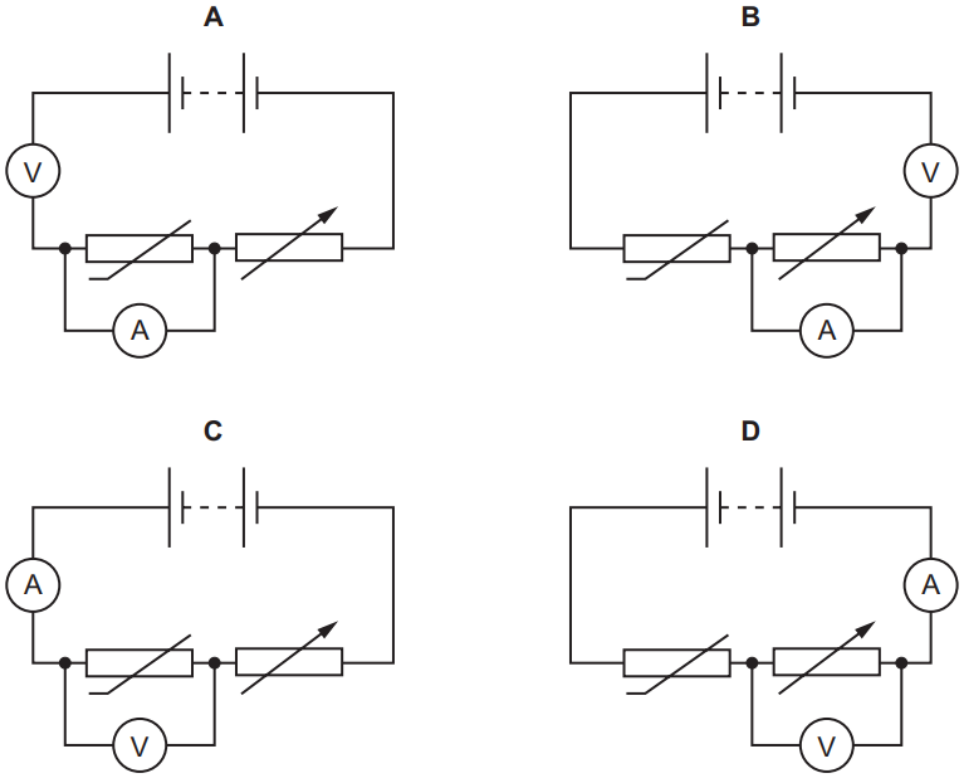
3 A student makes a battery by connecting five cells, as shown.



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

A 1.0 V **B** 2.1 V **C** 3.5 V **D** 10.5 V

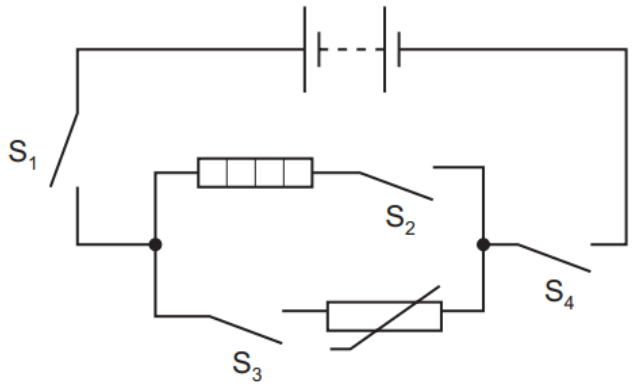
4 Which circuit enables the resistance of the thermistor to be determined?



5 What is an electric current and how is an ammeter positioned in a circuit to measure the current in a resistor?

	what is an electric current?	positioning of an ammeter
A	a flow of charge	in parallel with the resistor
B	a flow of charge	in series with the resistor
C	a flow of voltage	in parallel with the resistor
D	a flow of voltage	in series with the resistor

6 The circuit in the diagram contains four switches, S_1, S_2, S_3 and S_4.



Which three switches must be closed for the heater to work?

A S_1, S_2 and S_3

B S_1, S_2 and S_4

C S_1, S_3 and S_4

D S_2, S_3 and S_4

7 Diagram 1 shows a resistor connected in a circuit. Diagram 2 shows an identical resistor connected in parallel with the first resistor.

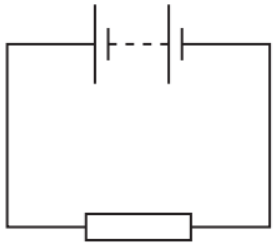


diagram 1

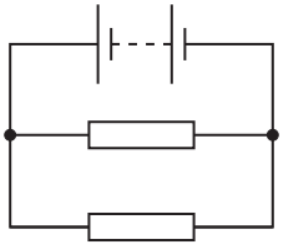


diagram 2

What is the combined resistance of the two resistors in diagram 2?

A greater than in the circuit of diagram 1

B less than in the circuit of diagram 1, but greater than zero

C the same as in the circuit of diagram 1

D zero

8 Two 2.0 Ω resistors are connected in parallel.

What is the combined resistance of the resistors?

A less than 2.0 Ω

B exactly 2.0 Ω

C more than 2.0 Ω, but less than 4.0 Ω

D exactly 4.0 Ω

9 In which heating system circuit would thermistors **not** be useful?

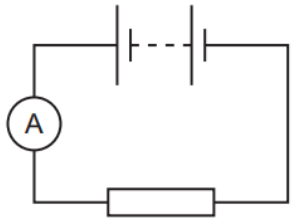
A to keep different rooms at different temperatures

B to turn an alarm on if the system overheats

C to turn a heating system off at a particular temperature

D to turn a heating system on when a sound is detected

10 A battery is connected to an ammeter and a resistor.



The ammeter reading is 0.20 A.

An electrical insulator is connected in parallel with the resistor.

What is the ammeter reading?

A 0 A

B between 0 A and 0.20 A

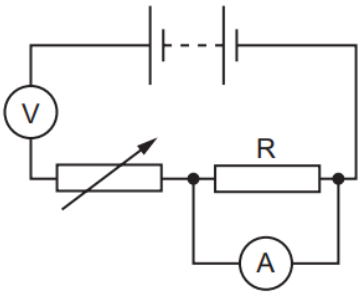
C 0.20 A

D greater than 0.20 A

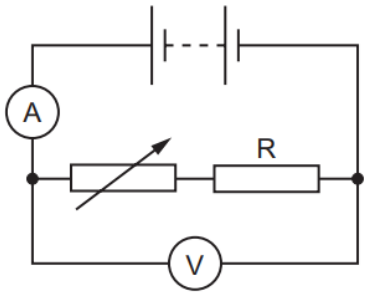
11 Four students draw a circuit diagram of the apparatus used to measure the resistance of resistor R.

Which circuit is correct?

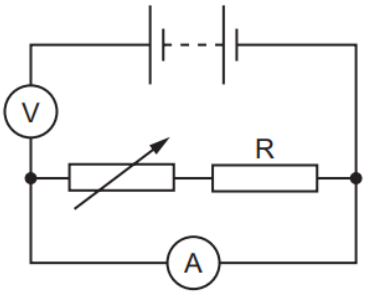
A



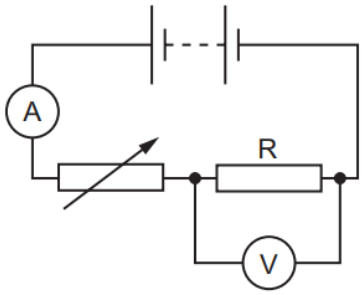
B



C

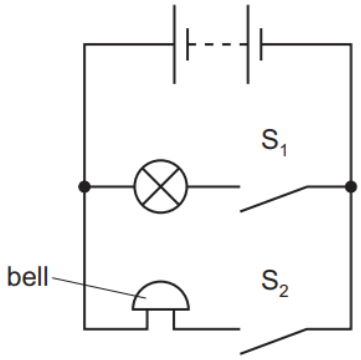


D



12 The battery on a bicycle is connected in parallel to its lamp and bell.

The circuit includes two switches, S_1 and S_2.



The cyclist closes S_1 to light the lamp.

She then also closes S_2 to sound the bell.

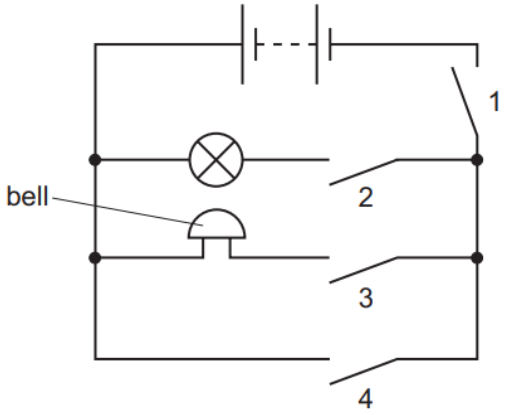
What happens to the current in the battery and the power output from the battery when the cyclist closes S_2?

	current in the battery	power output from the battery
A	increases	increases
B	increases	stays the same
C	stays the same	increases
D	stays the same	stays the same

13 Which symbol represents an electric heater?

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

14 A student connects the circuit shown.

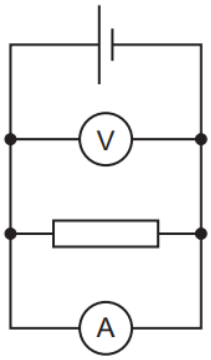


Which switches must be closed for the bell to ring without lighting the lamp?

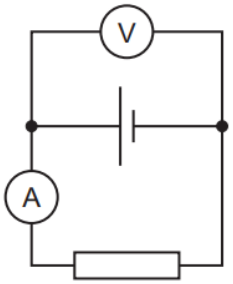
A 1 and 2 only **B** 1 and 3 only **C** 1, 3 and 4 **D** 2, 3 and 4

15 Which circuit can be used to measure the resistance of a resistor?

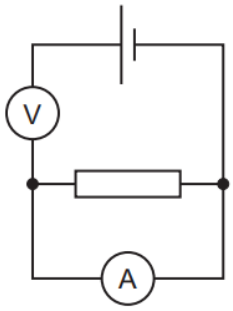
A



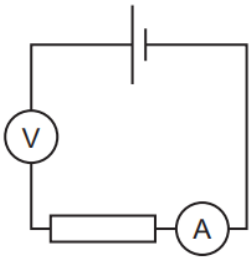
B



C

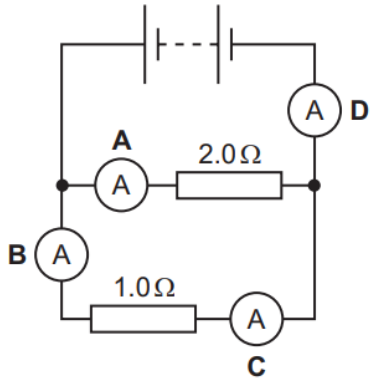


D

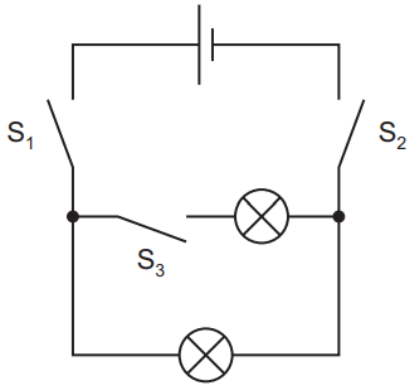


16 The circuit diagram shows a battery connected to two resistors. Four labelled ammeters are connected into the circuit.

Which ammeter shows the largest reading?



17 Two lamps are connected in parallel.



Which switches must be closed so that both lamps light?

A S_1 and S_2 only

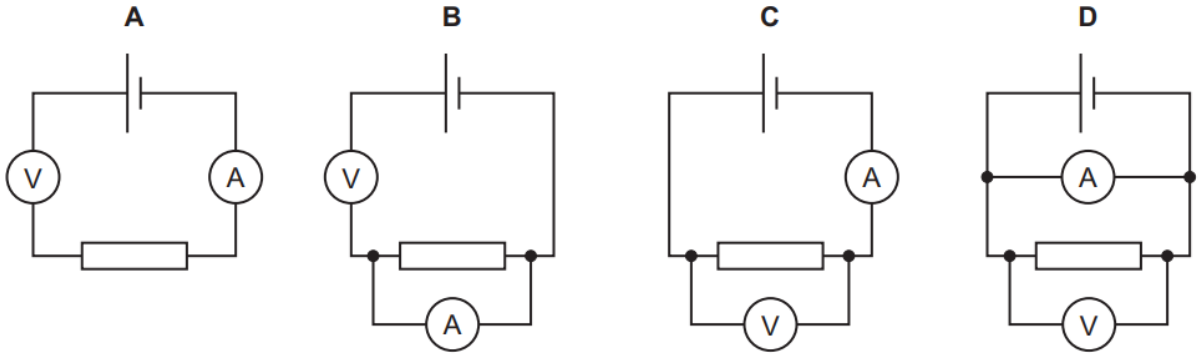
B S_1 and S_3 only

C S_2 and S_3 only

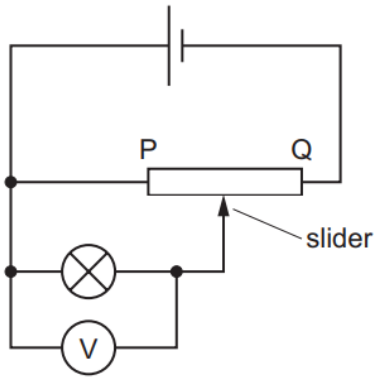
D S_1, S_2 and S_3

18 A student finds the resistance of a resistor.

Which circuit is used to measure the potential difference (p.d.) across the resistor and the current in it?



19 The circuit diagram shows a variable potential divider.

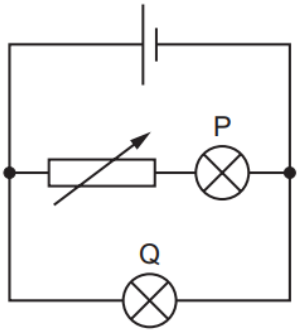


The slider is moved from P towards Q.

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

	reading on voltmeter	brightness of lamp
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

20 The diagram shows a circuit containing a cell, a variable resistor and two bulbs, P and Q.



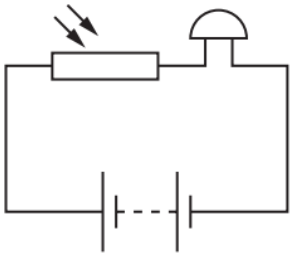
The resistance of the variable resistor is increased.

What happens to the brightness of each bulb?

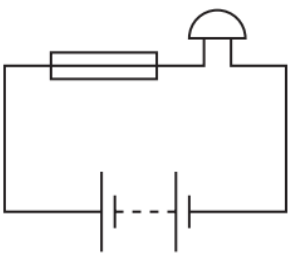
	brightness of bulb P	brightness of bulb Q
A	dimmer	dimmer
B	dimmer	remains the same
C	remains the same	dimmer
D	remains the same	remains the same

21 Which diagram shows a circuit containing a battery, a fuse and a buzzer?

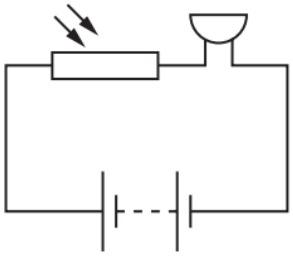
A



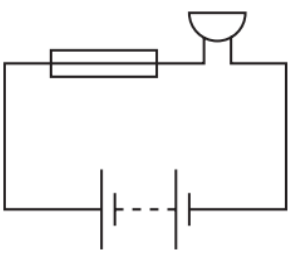
B



C



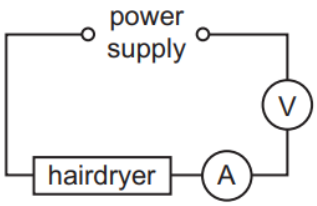
D



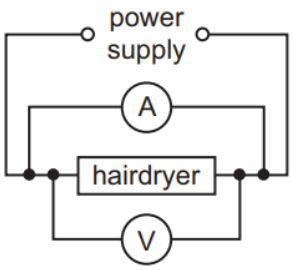
22 An electric hairdryer is rated 230 V, 2 A.

Which circuit could be used to check that these ratings are correct?

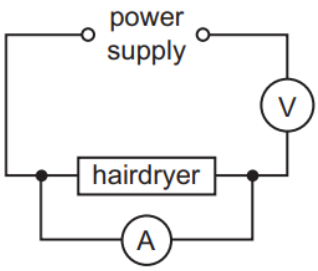
A



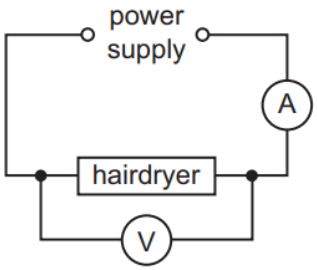
B



C



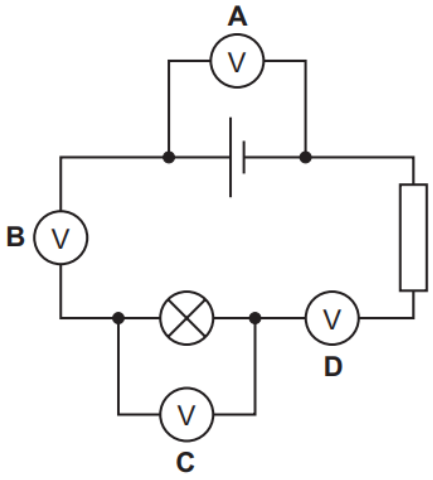
D



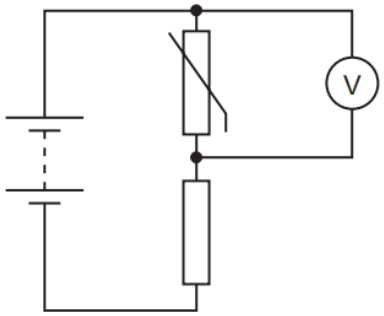
23 A circuit containing a cell, a resistor and a lamp is set up as shown.

A student connects a voltmeter to the circuit in one of the positions shown.

In which position does the voltmeter measure the potential difference (p.d.) across the lamp?



24 The diagram shows a potential divider circuit.



The temperature of the thermistor increases.

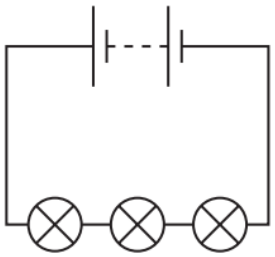
What happens to the resistance of the thermistor, and what happens to the reading on the voltmeter?

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

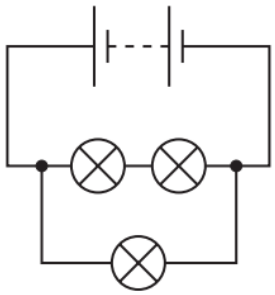
25 A student sets up four circuits using identical batteries and three identical lamps.

In which circuit will all the lamps be the brightest?

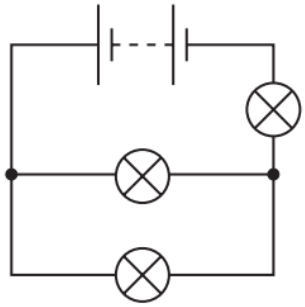
A



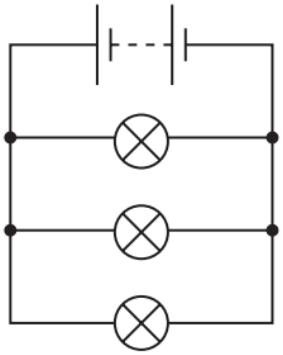
B



C



D



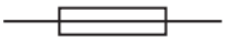
26 Which diagram shows the circuit symbol for a fuse?

A

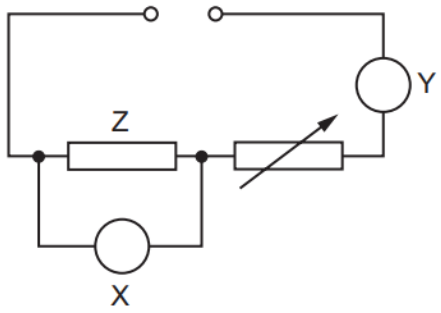
B

C

D



27 The circuit shown is being used to measure the resistance of resistor Z.



What is the correct combination of meters to determine the resistance of resistor Z?

	meter X	meter Y
A	ammeter	ammeter
B	ammeter	voltmeter
C	voltmeter	ammeter
D	voltmeter	voltmeter

28 The diagram shows the circuit diagram symbol of an electrical component.

Which component does the symbol represent?

A light-dependent resistor

B relay coil

C thermistor

D variable resistor

29 What is the advantage of connecting lamps in parallel in a lighting circuit?

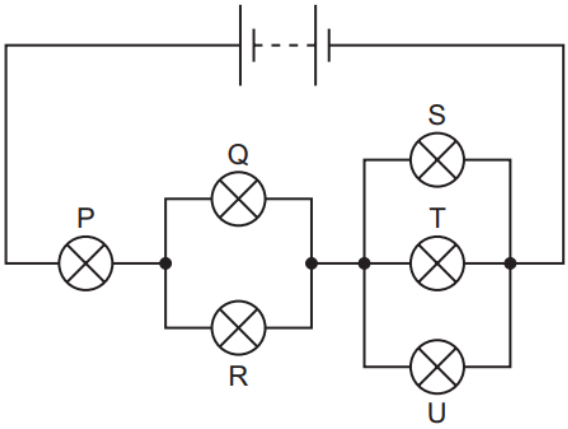
A A smaller fuse is needed to protect the lamps.

B If the filament of one lamp breaks, the remaining lamps stay lit.

C The current taken from the supply is less.

D The lamps use less power.

30 The diagram shows a circuit of six identical lamps connected to a battery.



Which lamps are brightest?

A P only

B Q and R only

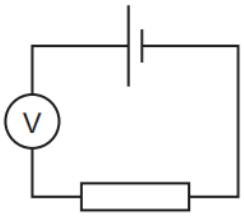
C S, T and U only

D P, Q, R, S, T and U are equally bright

31 Four circuits are set up.

In which circuit does the meter measure the potential difference (p.d.) across the resistor?

A



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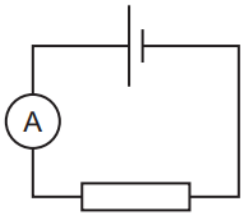

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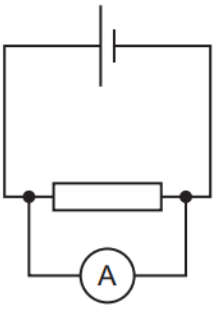

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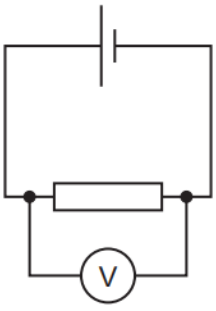
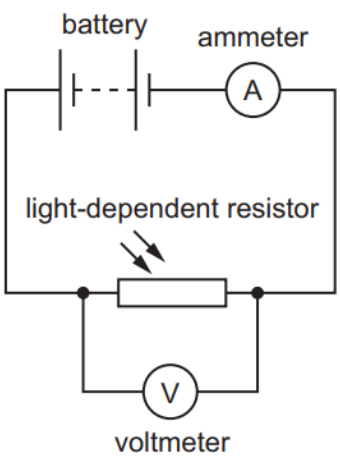
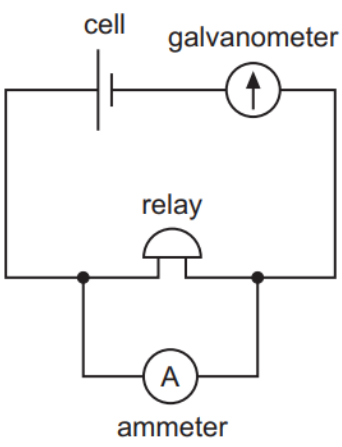


32 Which circuit is correctly labelled?

A



B



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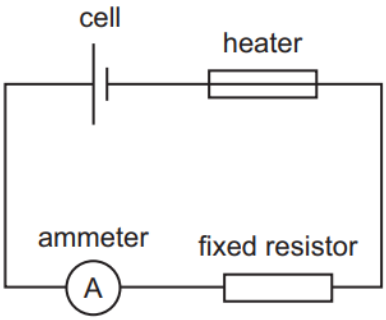
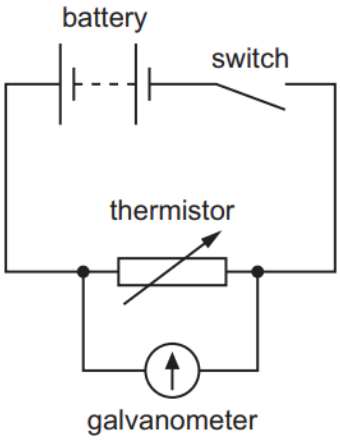
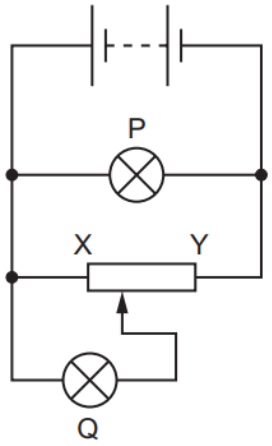


D



33 The diagram shows a battery connected to a potential divider and to two lamps, P and Q.



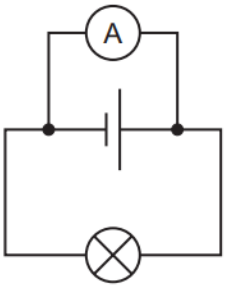
The slider on the potential divider is moved from end X to end Y of the resistor.

Which row shows the effect on the brightness of each lamp?

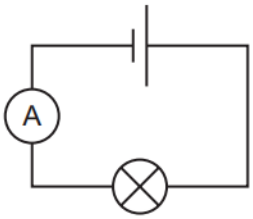
	brightness of P	brightness of Q
A	brighter	brighter
B	brighter	dimmer
C	unchanged	brighter
D	unchanged	dimmer

34 In which circuit is the ammeter measuring the flow of charge through the lamp?

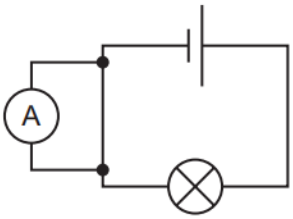
A



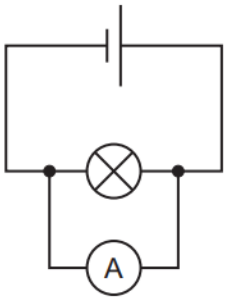
B



C

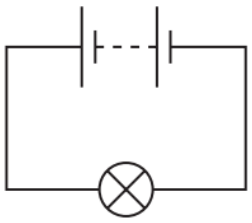


D

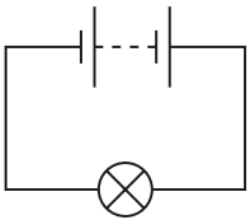


35 In circuit 1, a negative charge flows in a clockwise direction. The bulb is bright.

In circuit 2, the battery is reversed as shown. The bulb is equally bright.



circuit 1

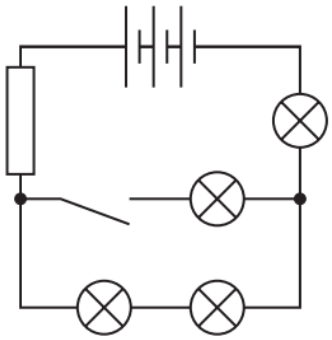


circuit 2

Which charge flows in circuit 2 and in which direction?

	charge	direction
A	negative	anticlockwise
B	negative	clockwise
C	positive	anticlockwise
D	positive	clockwise

36 The diagram shows an electric circuit.

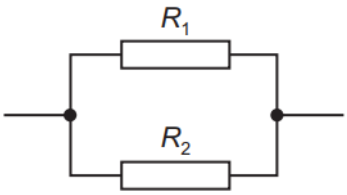


Which row correctly shows the numbers of different components in the circuit?

	cells	lamps	switches
A	1	1	4
B	1	4	1
C	3	1	4
D	3	4	1

37 Two resistors, with resistances R_1 and R_2, are connected in parallel.

The resistance R_1 is greater than the resistance R_2.



What is the resistance of the parallel combination?

A less than either R_1 or R_2

B equal to R_1

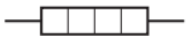
C equal to R_2

D the average of R_1 and R_2

38 Which circuit symbol represents a component used to measure electric current?

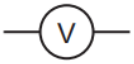
A

B



C

D



39 Which device is used to measure the flow of charge in an electrical circuit?

A ammeter

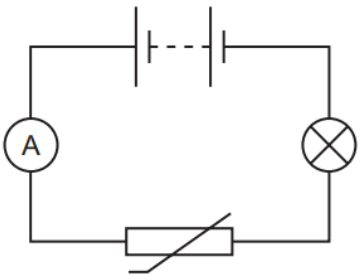
B voltmeter

C battery

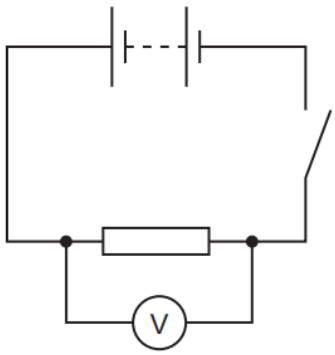
D newton meter

40 Which circuit contains a fuse?

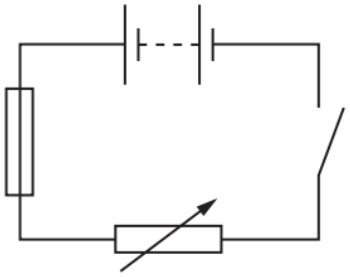
A



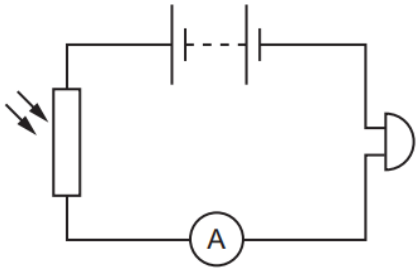
B



C

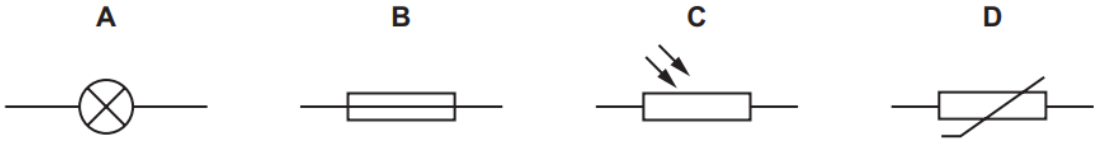


D

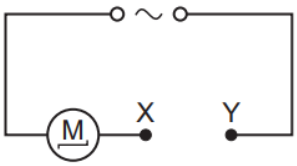


41 A student designs a circuit to turn on a fan when the temperature increases.

Which component does the student need to use in her circuit?



42 The diagram shows a motor connected to an a.c. supply. The circuit is incomplete.



Which device needs to be connected between point X and point Y to prevent the wires from overheating if a fault in the motor causes the current to get too high?

A an ammeter

B a fuse

C a transformer

D a length of thick copper wire

43 Diagram 1 shows a resistor connected in a circuit. Diagram 2 shows an identical resistor connected in parallel with the first one.

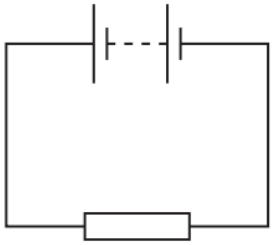


diagram 1

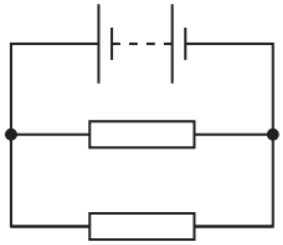


diagram 2

What is the combined resistance of the two resistors?

A greater than in the circuit of diagram 1

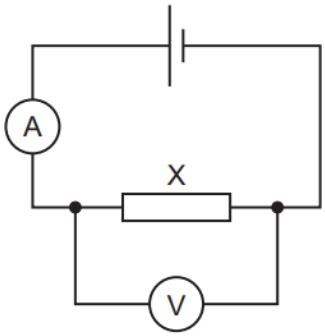
B less than in the circuit of diagram 1

C the same as in the circuit of diagram 1

D zero

44 A student connects a circuit with a resistor X. The reading on the ammeter is 2.0 A.

The reading on the voltmeter is 6.0 V.

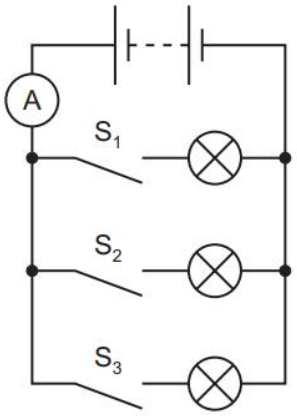


She needs to produce a circuit with a total resistance of 10 Ω.

Which resistor should she add in series to the circuit?

A 2Ω **B** 3Ω **C** 7Ω **D** 10Ω

45 The diagram shows a circuit containing a battery, an ammeter, three switches, S_1, S_2 and S_3, and three identical lamps.



With only switch S_1 closed, the reading on the ammeter is 0.04 A.

Which row states the **incorrect** ammeter reading for the switch conditions given?

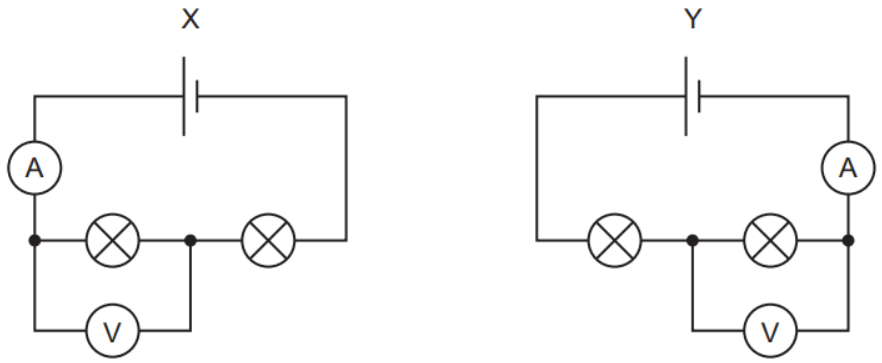
	switch S_1	switch S_2	switch S_3	ammeter reading / A
A	open	open	open	0.00
B	open	closed	open	0.04
C	open	open	closed	0.08
D	closed	closed	closed	0.12

46 Two 10 Ω resistors are connected in series and then in parallel.

What is the combined resistance in each case?

	resistance in series / Ω	resistance in parallel / Ω
A	10	5
B	10	10
C	20	5
D	20	10

47 A circuit X is set up with two identical lamps. Circuit Y is then set up, changing the positions of the meters.



On which meters do the readings change?

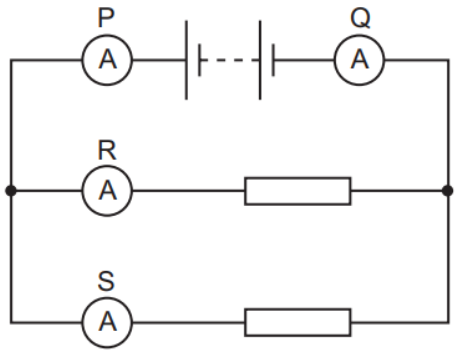
A both the ammeter and the voltmeter

B the ammeter only

C the voltmeter only

D neither the ammeter nor the voltmeter

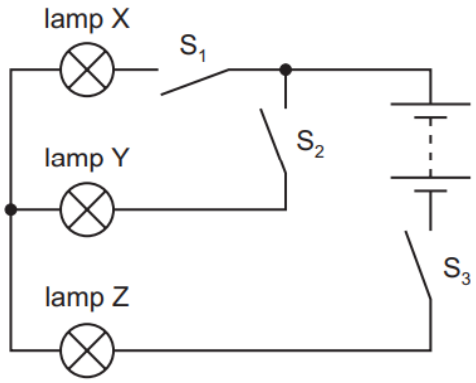
48 A student uses four ammeters P, Q, R and S to measure the current in different parts of the circuit shown.



Which two ammeters read the largest current?

A P and Q **B** P and R **C** R and Q **D** R and S

49 The circuit shown includes a battery, three lamps X, Y and Z and three switches S_1, S_2 and S_3.



Lamp X is off but lamps Y and Z are lit.

Which switches are closed?

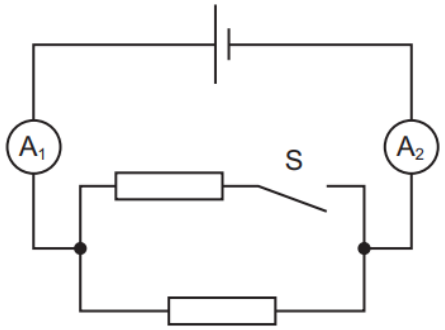
A S_1 and S_2 only

B S_1 and S_3 only

C S_2 and S_3 only

D S_1, S_2 and S_3

50 In the circuit shown, A_1 and A_2 are ammeters.



Switch S is closed.

Which row is correct?

	the resistance of the whole circuit	reading of A_1	reading of A_2
A	decreases	stays the same	increases
B	decreases	increases	increases
C	increases	stays the same	stays the same
D	increases	decreases	decreases

51 What happens to the resistance of an LDR when the brightness of light falling on it increases?

A Its resistance decreases.

B Its resistance increases.

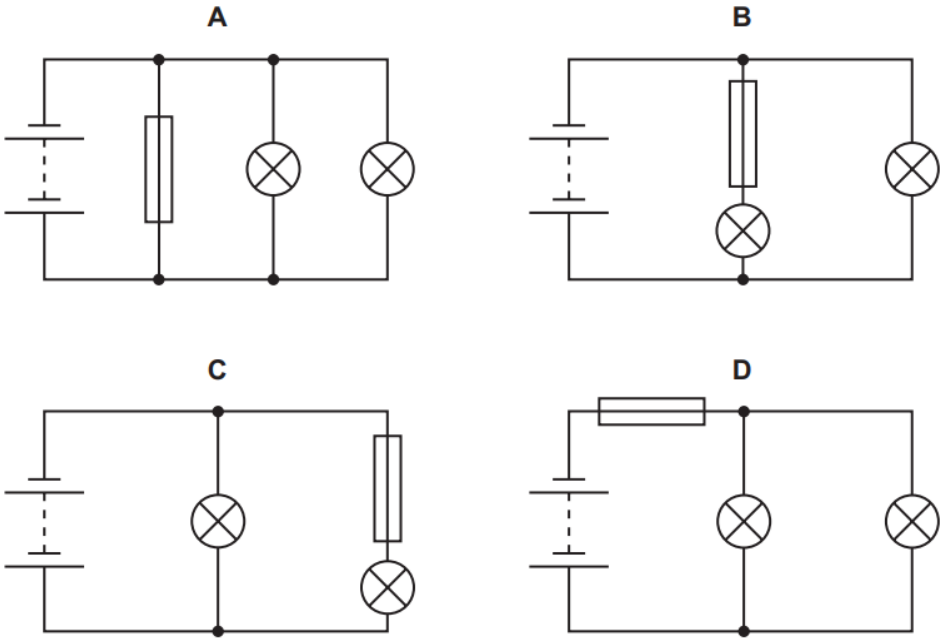
C Its resistance increases then decreases.

D Its resistance stays the same.

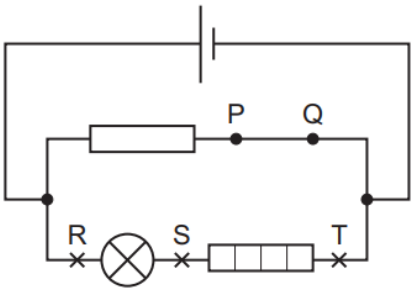
52 A student constructs four circuits, each containing a fuse.

The fuse blows in one circuit and both lamps in the circuit go out.

In which circuit does the fuse blow and both lamps go out?



53 The diagram shows a circuit. The wire between P and Q can be removed and replaced by a circuit component.



Where should a voltmeter be connected to measure the potential difference (p.d.) across the lamp?

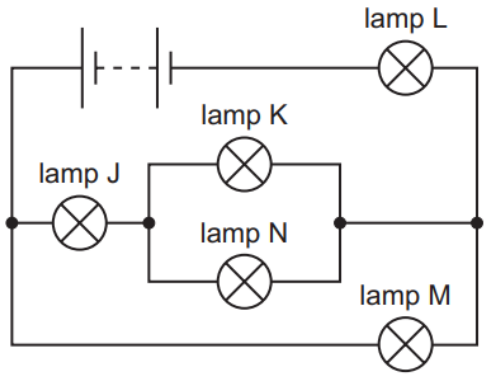
A between P and Q in place of the wire

B in parallel with R and S

C in parallel with R and T

D in parallel with S and T

54 The circuit shown contains five lamps J, K, L, M and N. All the lamps are glowing.



One lamp is removed and two other lamps go out.

Which lamp is removed?

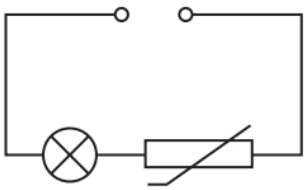
A lamp J

B lamp K

C lamp L

D lamp M

55 The diagram shows a control circuit. The lamp is lit.



The temperature of the surroundings increases.

What will happen to the brightness of the lamp?

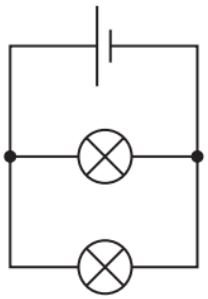
A It will be brighter.

B It will be less bright.

C It will not change.

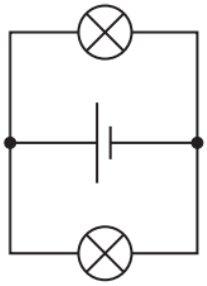
D It will become brighter and then less bright.

56 The circuit shows two lamps connected to a d.c. supply.

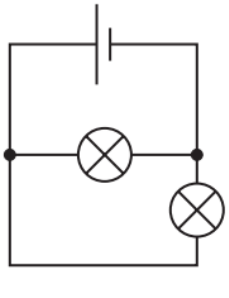


The same lamps and power supply are arranged in different ways, as shown.

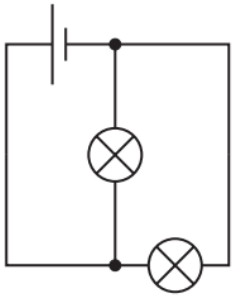
P



Q



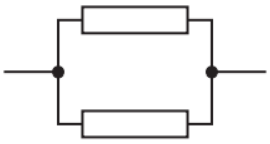
R



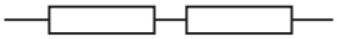
In which circuits will the lamps be the same brightness as in the original circuit?

A Q only **B** P and Q only **C** P and R only **D** P, Q and R

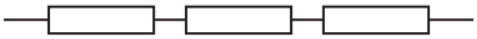
57 Identical resistors are connected together to form arrangements X, Y and Z.



X



Y



Z

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

A X → Y → Z

B Y → X → Z

C Z → X → Y

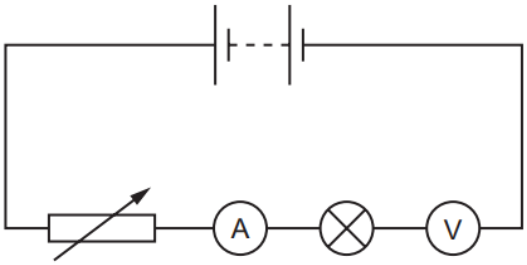
D Z → Y → X

58 A student determines the resistance of an electric lamp.

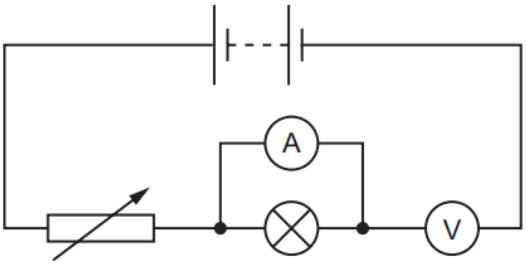
He measures the current in the lamp and the potential difference (p.d.) across it.

Which circuit did he use?

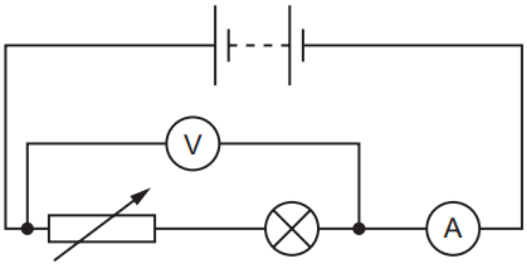
A



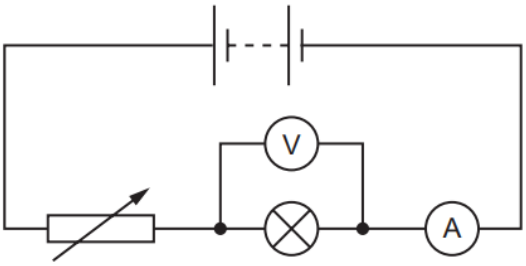
B



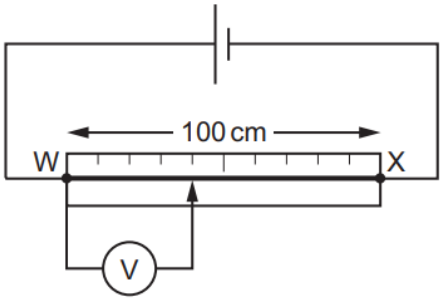
C



D



59 The circuit shows a wire WX connected to a cell.



The potential difference (p.d.) between W and X is 1.5 V.

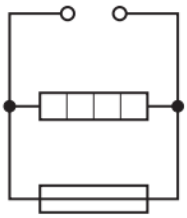
What is the reading on the voltmeter?

A 0.4 V **B** 0.6 V **C** 0.9 V **D** 4.0 V

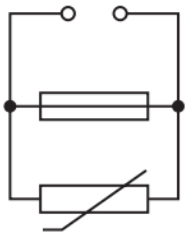
60 A student sets up four circuits.

In which circuit is there a heater in series with a fuse?

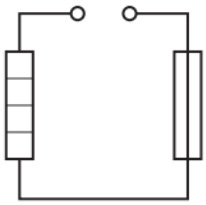
A



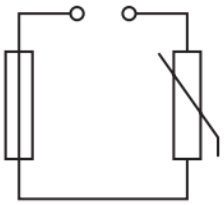
B



C



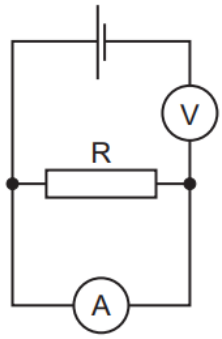
D



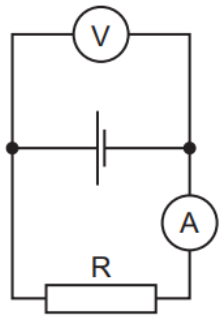
61 An ammeter and a voltmeter are used to determine the resistance of a resistor.

Which circuit diagram shows the ammeter and the voltmeter correctly connected?

A



B



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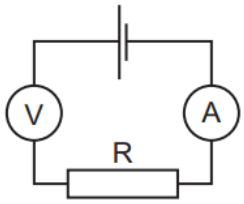
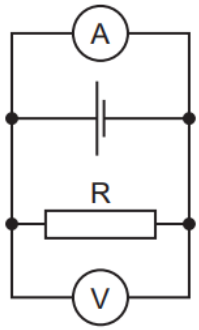
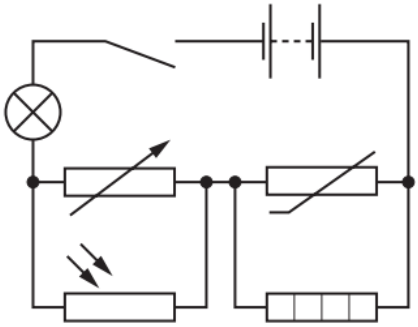


D



62 The diagram shows a circuit.



What is connected in parallel with the thermistor?

A heater

B lamp

C light-dependent resistor

D variable resistor

63 The resistance of a component in a circuit is found using an ammeter and a voltmeter.

How are the ammeter and the voltmeter connected?

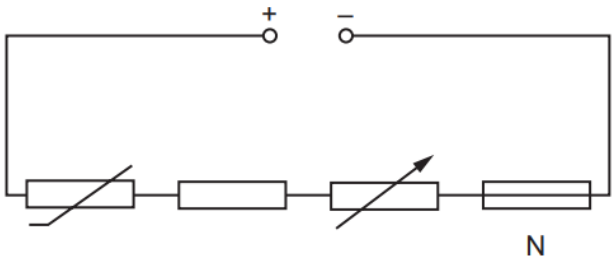
A the voltmeter and ammeter in parallel with the component

B the voltmeter and ammeter in series with the component

C the voltmeter in parallel with the component and the ammeter in series with the component

D the voltmeter in series with the component and the ammeter in parallel with the component

64 The diagram shows a circuit with a power supply and four components.



What is component N?

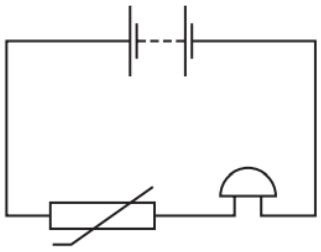
A fixed resistor

B fuse

C thermistor

D variable resistor

65 A student sets up this circuit.



What is the purpose of the circuit?

A to allow a lamp to be made dimmer or brighter as required

B to amplify the sound of a voice

C to light a lamp in the dark

D to sound a bell when the temperature rises

66 A student investigates the resistance of a lamp.

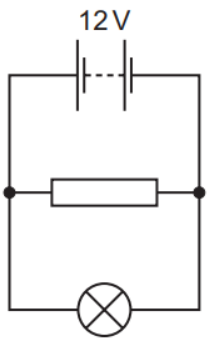
Which row states how the meters must be connected?

	ammeter	voltmeter
A	in parallel with the lamp	in parallel with the lamp
B	in parallel with the lamp	in series with the lamp
C	in series with the lamp	in parallel with the lamp
D	in series with the lamp	in series with the lamp

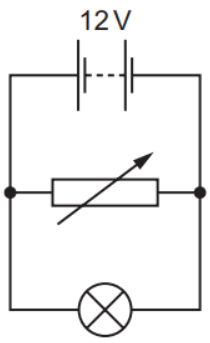
67 A lamp is connected into a circuit so that the potential difference across it can be varied from 0 to 12 V.

Which circuit is suitable?

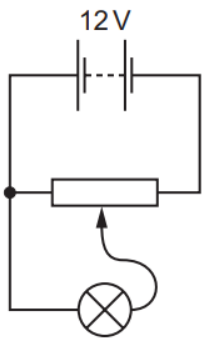
A



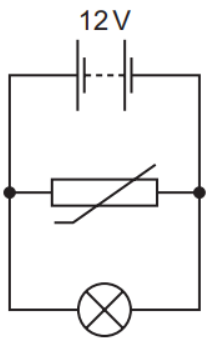
B



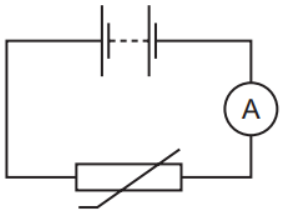
C



D



68 The diagram shows a circuit.



Which statement describes and explains how the circuit behaves?

A The ammeter reading decreases when the light intensity decreases.

B The ammeter reading decreases when the temperature decreases.

C The ammeter reading increases when the light intensity decreases.

D The ammeter reading increases when the temperature decreases.

69 Which component uses a small direct current (d.c.) in one circuit to switch on a much larger current in a second circuit?

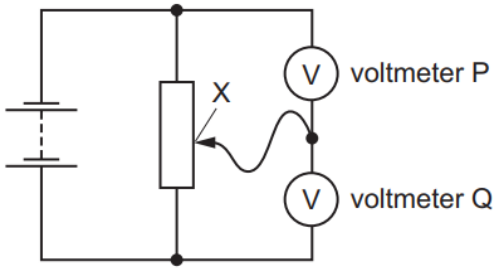
A potential divider

B relay

C transformer

D variable resistor

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



The sliding connection at point X is moved towards the top of the diagram.

What happens to the reading on P and to the reading on Q?

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

71 Which electrical component does the symbol represent?

A a fuse

B a relay coil

C a thermistor

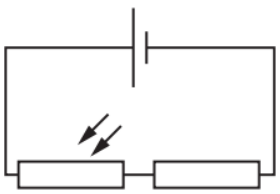
D a variable resistor

Paper 2

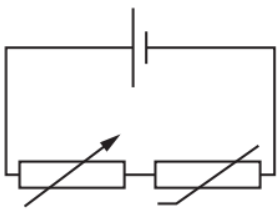
Questions are applicable for both core and extended candidates unless indicated in the question

72 Which circuit contains a diode connected in series with a fixed resistor? **(extended only)**

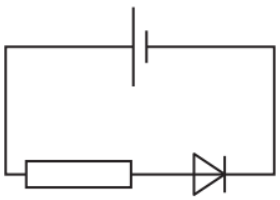
A



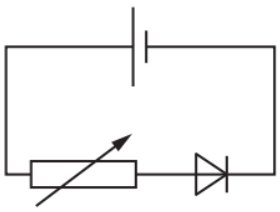
B



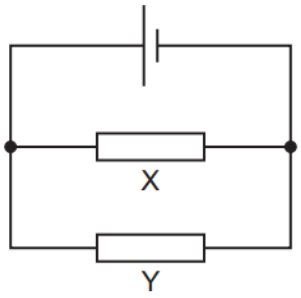
C



D



73 In the circuit shown, resistor X has twice the resistance of resistor Y. **(extended only)**



Which statement about the circuit is correct?

A The current in the cell is greater than the current in X.

B The current in X is greater than the current in Y.

C The potential difference (p.d.) across the cell is greater than the p.d. across X.

D The p.d. across X is greater than the p.d. across Y.

74 A 4 Ω resistor and an 8 Ω resistor are connected in series with a power supply. **(extended only)**

A voltmeter connected across the 8 Ω resistor reads 36 V.

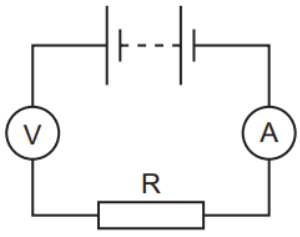
What is the voltmeter reading when it is connected across the 4 Ω resistor?

A 12 V **B** 18 V **C** 72 V **D** 108 V

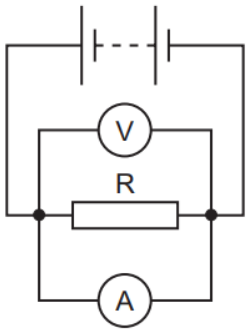
75 A student determines the resistance of resistor R. She uses a circuit including a voltmeter and an ammeter.

Which circuit does she use?

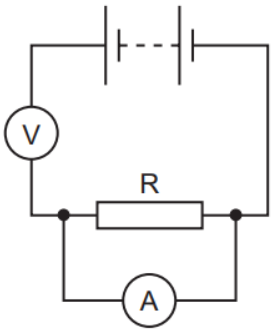
A



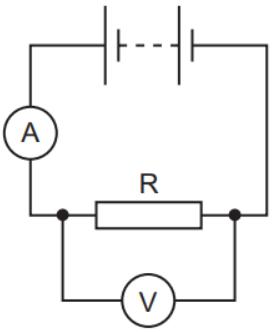
B



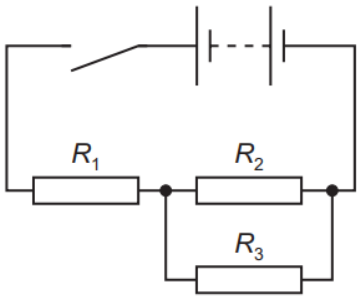
C



D



76 The diagram shows an arrangement of resistors in series and parallel. **(extended only)**



Which equation is used to calculate the combined resistance of the resistors?

A $R_1 + \dfrac{R_2 + R_3}{R_2 \times R_3}$

B $R_1 + \dfrac{R_2 \times R_3}{R_2 + R_3}$

C $R_1 + \dfrac{1}{R_2 + R_3}$

D $R_1 \times \dfrac{R_2 + R_3}{R_2 \times R_3}$

77 An electrical engineer has made a pair of components P and Q.

The resistance of P decreases as the temperature rises. The resistance of Q increases as the temperature rises.

The total resistance of P and Q in series remains constant when the temperature changes. The two components are connected in series with a power source supplying a constant current.

Which statement is correct?

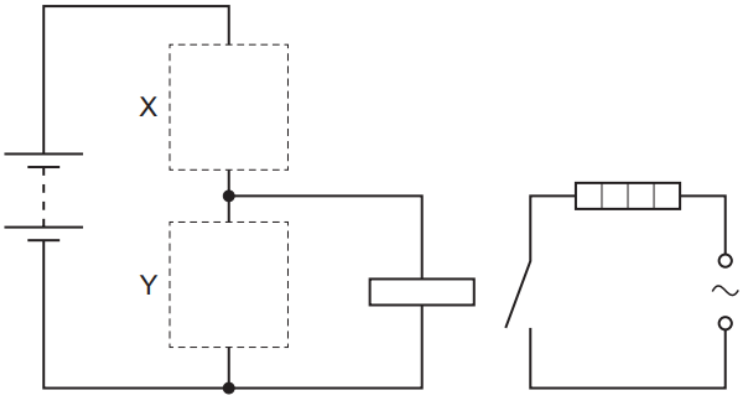
A If a temperature change causes the potential difference (p.d.) across P to double, the p.d. across Q will always halve.

B The difference between the p.d. across P and the p.d. across Q does not change with temperature.

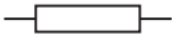
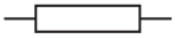
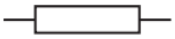
C The p.d. across component P increases as the temperature rises.

D The sum of the p.d. across P and the p.d. across Q does not change with temperature.

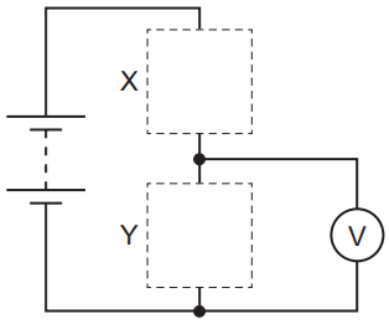
78 The diagram shows a circuit used to switch on a heater when the temperature drops below a certain value.



Which row shows the components that should be connected at X and at Y?

	X	Y
A		
B		
C		
D		

79 The circuit shown can be completed by inserting components at X and at Y. The completed circuit is a potential divider in which the potential difference across component Y increases when the temperature increases.

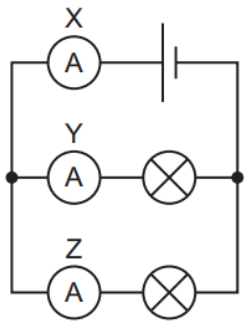


Which row shows the components X and Y?

	X	Y
A	light-dependent resistor	resistor
B	resistor	light-dependent resistor
C	resistor	thermistor
D	thermistor	resistor

80 The circuit diagram shows two identical lamps connected in parallel to a cell. Three ammeters, X, Y and Z, are also connected in the circuit, as shown.

(extended only)



Which statement about the current in X is correct?

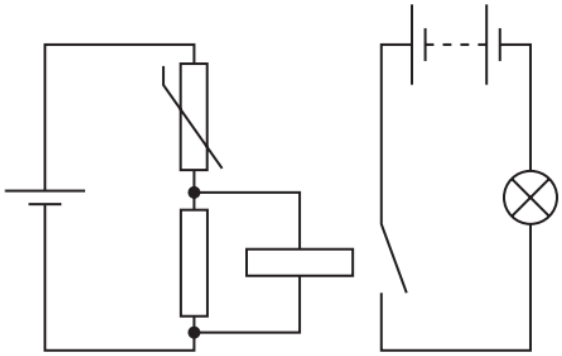
A It is equal to the current in Y and to the current in Z.

B It is less than either the current in Y or the current in Z.

C It is equal to the sum of the current in Y and the current in Z.

D It is equal to the difference between the current in Y and the current in Z.

81 The diagram shows a circuit that switches on a lamp when there is a change in the environment.



Which change in the environment causes the lamp to be switched on?

A a decrease in light intensity

B a decrease in temperature

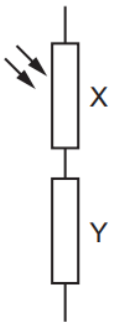
C an increase in light intensity

D an increase in temperature

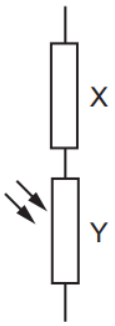
82 Each potential divider is placed in a circuit with a power supply.

Which potential divider makes the potential difference (p.d.) across component Y increase when the light intensity increases?

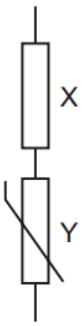
A



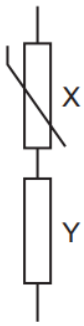
B



C



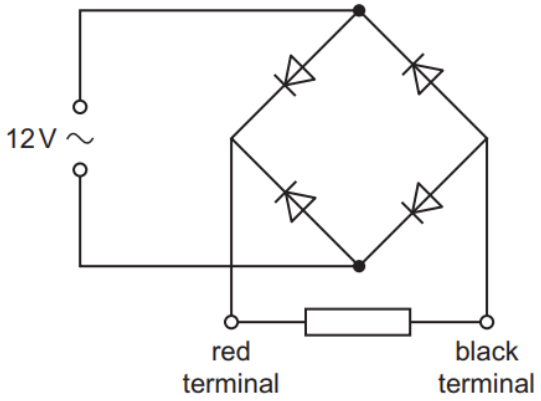
D



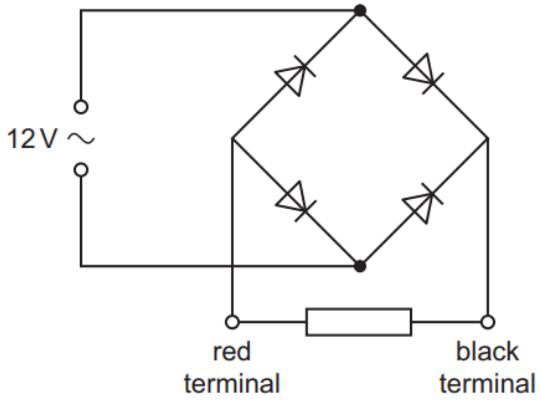
83 The four circuits shown each contain four diodes. **(extended only)**

In which circuit is the direction of the current in the resistor always from the red terminal to the black terminal?

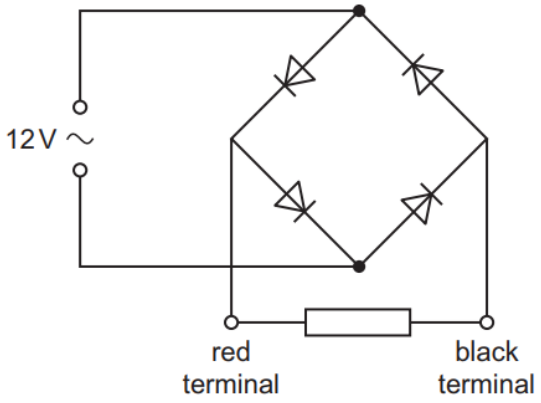
A



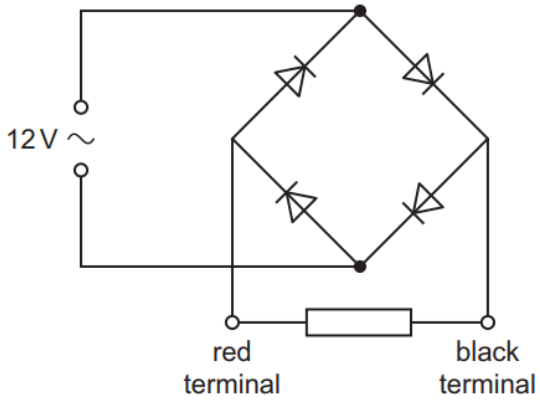
B



C

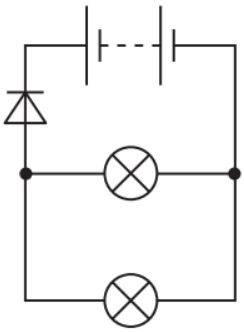


D

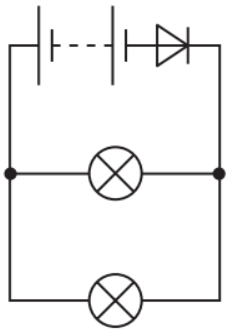


84 In which circuit do both lamps light? **(extended only)**

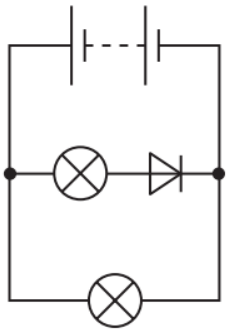
A



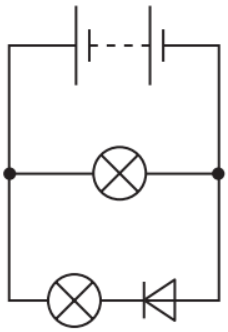
B



C

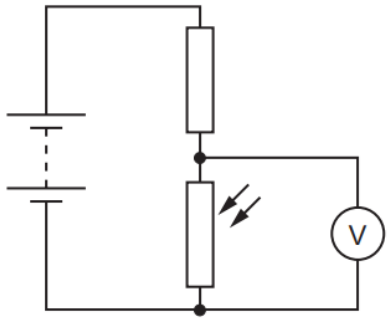


D



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

A voltmeter is connected across the LDR.

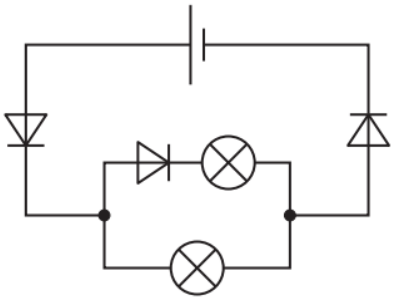


Which row shows the resistance of the LDR and the potential difference (p.d.) shown on the voltmeter at a specific light level?

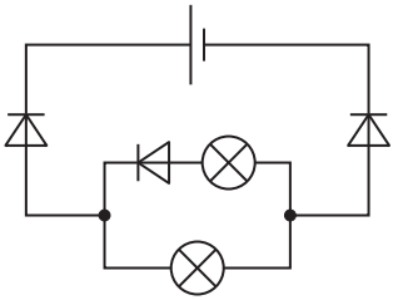
	light level	resistance of LDR	p.d. shown on the voltmeter
A	bright	low	high
B	bright	high	low
C	dim	high	high
D	dim	low	low

86 In which circuit is there just a single lamp lit? **(extended only)**

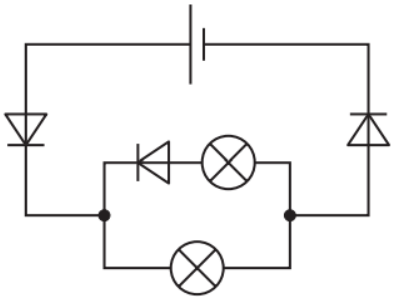
A



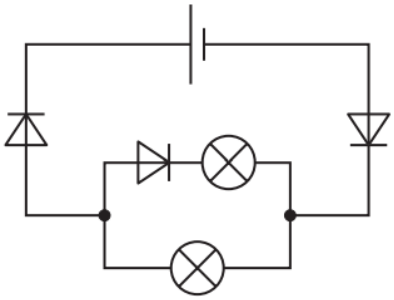
B



C

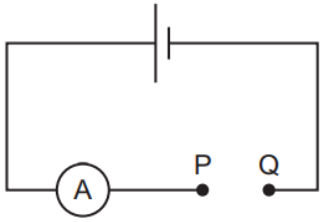


D



87 The diagram shows an incomplete circuit. The temperature and light levels around the circuit remain unchanged.

(extended only)



Four electrical components are connected in turn across PQ. The cell is reversed and the four electrical components are connected again in turn across PQ.

For which component is there a significant change in the magnitude of the current?

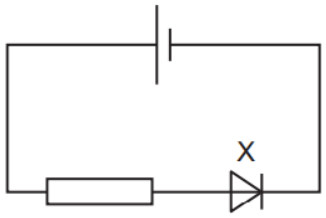
A diode

B light-dependent resistor

C resistor

D thermistor

88 The circuit diagram shows a cell connected in series to a resistor and a component X.



What is component X? **(extended only)**

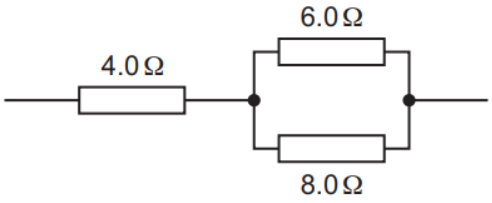
A bell

B diode

C heater

D thermistor

89 What is the effective resistance of the following combination of resistors? **(extended only)**



A 1.8Ω **B** 7.4Ω **C** 11Ω **D** 18Ω

90 Resistors of 1.0Ω, 2.0Ω and 3.0Ω are connected in parallel with a cell. **(extended only)**

Which statement is correct?

A The current in each resistor is different but the potential difference (p.d.) across each resistor is the same.

B The current in each resistor is the same but the potential difference across each resistor is different.

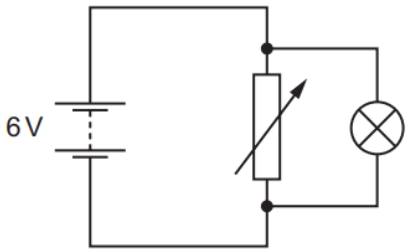
C The potential difference across the 3.0Ω is greater than the potential difference across the 1.0Ω resistor.

D The sum of the potential differences across each resistor is equal to the electromotive force (e.m.f.) of the cell.

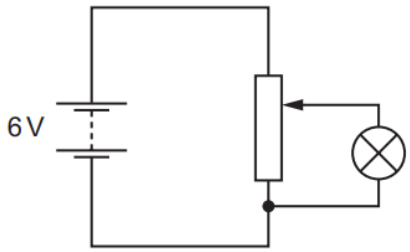
91 A lamp is to be connected in a circuit so that the potential difference (p.d.) across it can be varied from 0 to 6 V.

Which circuit would be most suitable?

A



B



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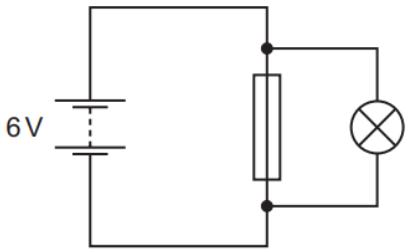
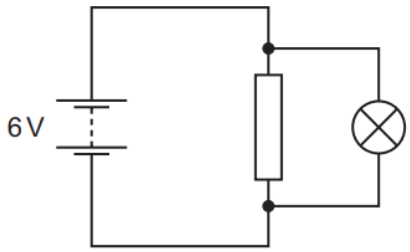


D



92 The diagram shows a circuit component. **(extended only)**

What is it used for?

A to allow current in one direction only

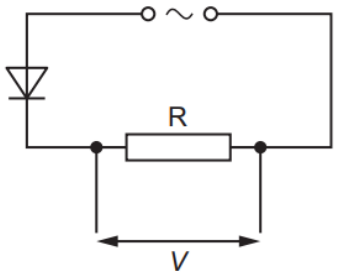
B to change the direction of the current

C to emit light when there is a current

D to increase the size of the current

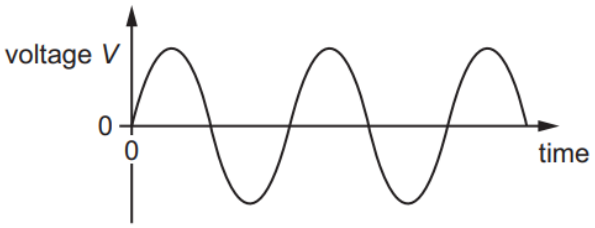
93 An alternating current (a.c.) power supply is connected in series with a resistor R and a diode.

(extended only)

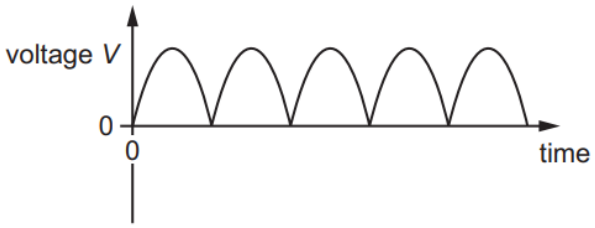


Which graph shows how the voltage *V* across the resistor R varies with time?

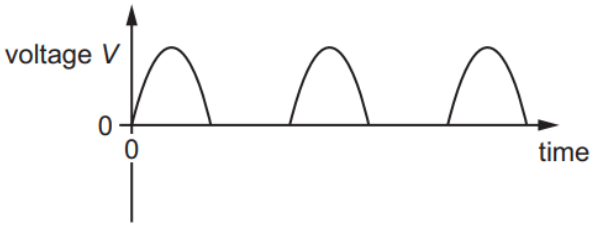
A



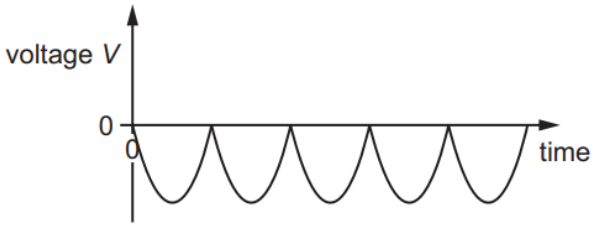
B



C

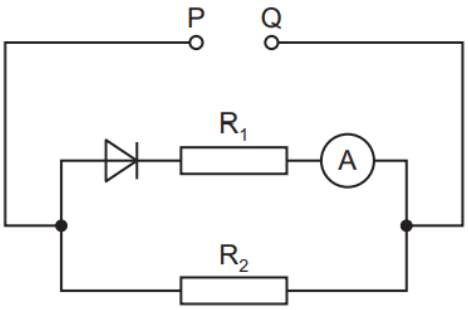


D



94 The circuit diagram shows a power supply connected to some circuit components.

In the diagram, P and Q are the terminals of the d.c. power supply. **(extended only)**



Under which circumstances does the ammeter show a reading other than zero?

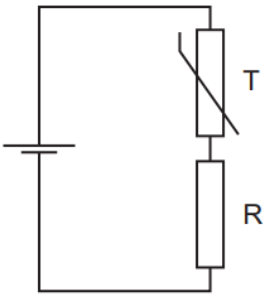
A when P is positive or negative

B the ammeter always shows a zero reading

C only when P is negative

D only when P is positive

95 The circuit diagram shows a fixed resistor R and a thermistor T used in a potential divider circuit.



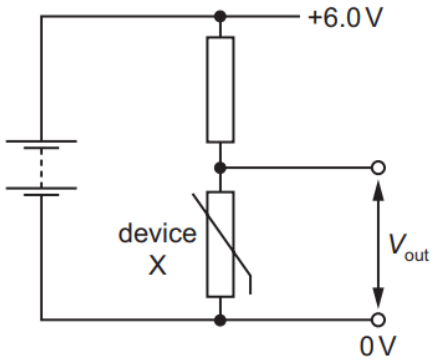
V_R and V_T are the potential differences across R and T respectively.

What happens to V_R and to V_T as the temperature of the thermistor decreases?

	V_R	V_T
A	decreases	increases
B	increases	decreases
C	stays the same	decreases
D	stays the same	increases

96 The circuit shown is used to change the voltage V_{out} as the temperature of device X changes.

(extended only)

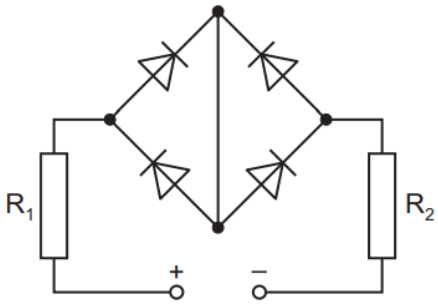


Which row is correct?

	name of this type of circuit	name of device X
A	potential divider	fuse
B	potential divider	thermistor
C	variable resistor	fuse
D	variable resistor	thermistor

97 The circuit diagram shows a d.c. power supply connected to two resistors R_1 and R_2 and four diodes.

(extended only)



Which statement is correct?

A There is a current in R_1 and a current in R_2.

B There is a current in R_1 but no current in R_2.

C There is no current in R_1 but a current in R_2.

D There is no current in R_1 and no current in R_2.

98 Which electrical symbol represents a diode? **(extended only)**

A

B

C

D