Q1.

The current in a circuit is 0.33 A.

How many electrons pass a point in the circuit in 7.0 minutes?

A 1.4×10^{19} ⬭

B 1.2×10^{20} ⬭

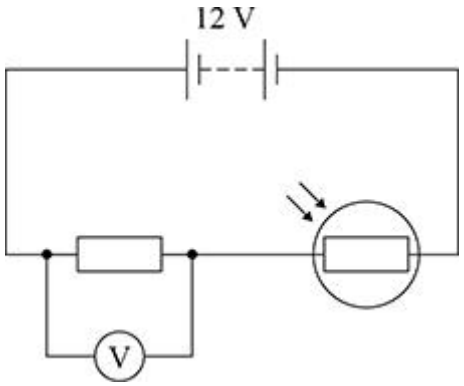
C 8.7×10^{20} ⬭

D 8.0×10^{21} ⬭

(Total 1 mark)

Q2.

A circuit contains a battery with an emf of 12 V and negligible internal resistance.



At a certain light intensity, the LDR has a resistance of 480 Ω and the voltmeter reading is 2.0 V.

At a different light intensity, the resistance of the LDR is R and the voltmeter reading is now 8.0 V.

What is R?

A 48 Ω ⬭

B 96 Ω ⬭

C 120 Ω ⬭

D 160 Ω ⬭

(Total 1 mark)

Q3.

A current of 4.0 A in a resistor produces a power of 8.0 W.

What is the potential difference across this resistor when the power is 32 W?

A 2.0 V ○

B 4.0 V ○

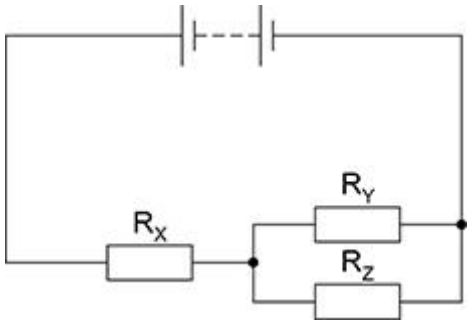
C 8.0 V ○

D 16 V ○

(Total 1 mark)

Q4.

A circuit contains a battery and three identical resistors R_X, R_Y and R_Z.



What is $\frac{\text{power in } R_X}{\text{power in } R_Y}$?

A 0.25 ○

B 0.5 ○

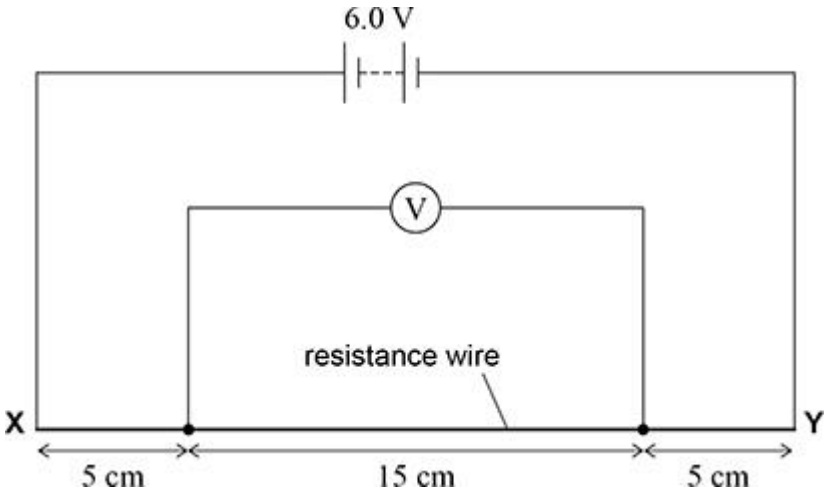
C 2 ○

D 4 ○

(Total 1 mark)

Q5.

A resistance wire **XY** of length 25 cm has constant cross-section.
The wire is connected to a battery of emf 6.0 V and negligible internal resistance.



What is the reading on the voltmeter?

A 1.8 V ○

B 2.4 V ○

C 3.6 V ○

D 4.5 V ○

(Total 1 mark)

Q6.

The electric motor of a lift raises a load of 750 N at a constant speed. The load moves through a vertical distance of 3.0 m in 1.5 s. As the load is being raised, the current in the motor is 12 A and the potential difference across the motor is 200 V.

What is the efficiency of the lift?

A 16% ○

B 63% ○

C 88% ○

D 94% ○

(Total 1 mark)

Q7.

An aluminium wire has a length of 12 cm and a volume of 3.7×10^{-4} m^3. The resistivity of aluminium is 2.7×10^{-8} Ω m.

What is the resistance of the wire?

A 1.1×10^{-6} Ω ⬭

B 8.8×10^{-6} Ω ⬭

C 1.1×10^{-2} Ω ⬭

D 8.8×10^{-2} Ω ⬭

(Total 1 mark)

Q8.

A student investigates the characteristics of a power supply.
The experimental data are plotted on a graph with:

- pd (potential difference) across the power supply plotted on the y-axis
- current in the power supply plotted on the x-axis.

The axes intersect at (0,0).
What feature of the graph represents the emf of the power supply?

A the area enclosed by the line and the x-axis ⬭

B the magnitude of the gradient of the line ⬭

C the intercept on the x-axis ⬭

D the intercept on the y-axis ⬭

(Total 1 mark)

Q9.

A 12 Ω resistor is connected across the terminals of a battery of emf 2.0 V and internal resistance 4.0 Ω.

What is the pd across the resistor?

A 0.25 V ⬭

B 0.75 V ⬭

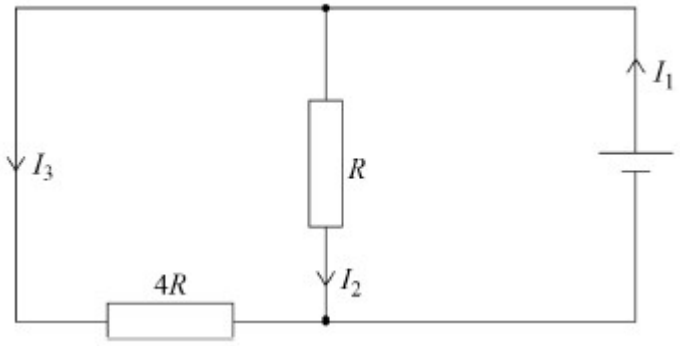
C 1.30 V ⬭

D 1.50 V ⬭

(Total 1 mark)

Q10.

A cell with negligible internal resistance is connected to two resistors of resistance $4R$ and R.
The currents I_1, I_2 and I_3 in the circuit are shown.



Which equation is correct for this circuit?

A $I_1 = 4I_2$ ⬭

B $I_1 = 4I_3$ ⬭

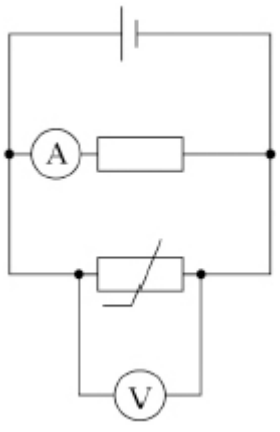
C $I_2 = 4I_3$ ⬭

D $I_3 = 4I_1$ ⬭

(Total 1 mark)

Q11.

A circuit contains a thermistor and a resistor in parallel. The internal resistance of the cell is negligible.



The temperature of the thermistor is increased.
The temperature of the resistor is kept constant.

What is observed on the voltmeter and the ammeter?

	Voltmeter reading	Ammeter reading	
A	decreases	increases	⬭
B	increases	increases	⬭
C	no change	increases	⬭
D	no change	no change	⬭

(Total 1 mark)

Q12.

The table shows the lengths and cross-sectional areas of two wires **X** and **Y** of the same metal.

Wire	Length / cm	Cross-sectional area / mm^2
X	47	0.10
Y	23	0.40

The resistance of **X** is 6.0 Ω.
The temperature of **Y** is the same as the temperature of **X**.

What is the resistance of **Y**?

A 0.12 Ω ⬭

B 0.73 Ω ⬭

C 1.2 Ω ⬭

D 3.1 Ω ⬭

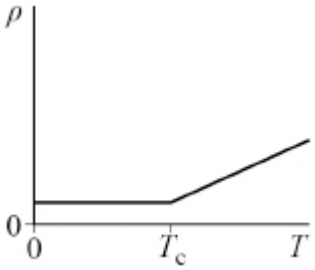
(Total 1 mark)

Q13.

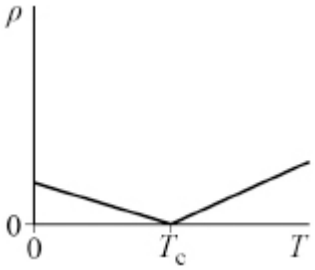
A superconducting material has a critical temperature T_c.

Which graph shows the variation of resistivity ρ with temperature T ?

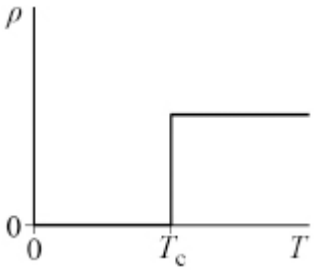
A



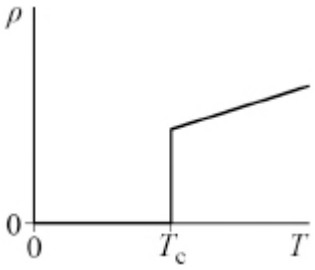
B



C



D

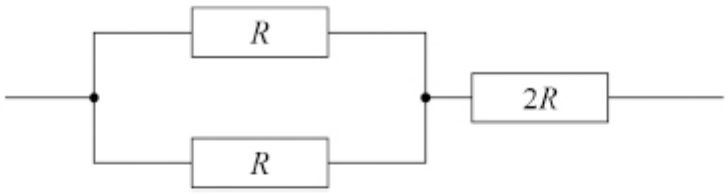


(Total 1 mark)

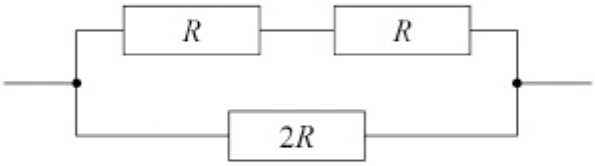
Q14.

X, **Y** and **Z** are three networks of resistors.

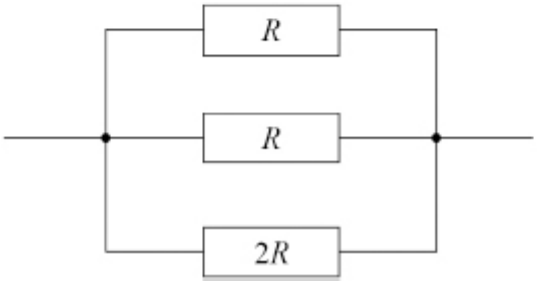
X



Y



Z



Which gives the networks in order of largest total resistance to smallest total resistance?

A **X**, **Y**, **Z** ⬭

B **Y**, **X**, **Z** ⬭

C **Z**, **X**, **Y** ⬭

D **Z**, **Y**, **X** ⬭

(Total 1 mark)

Q15.

Which row shows the resistance of an ideal ammeter and of an ideal voltmeter?

	Resistance of ammeter	Resistance of voltmeter	
A	zero	zero	⬭
B	zero	infinite	⬭
C	infinite	zero	⬭
D	infinite	infinite	⬭

(Total 1 mark)

Q16.

The current in a resistor is 15 mA.

How many electrons pass through the resistor in 3 minutes?

A 2.8×10^{17} ⬭

B 1.7×10^{19} ⬭

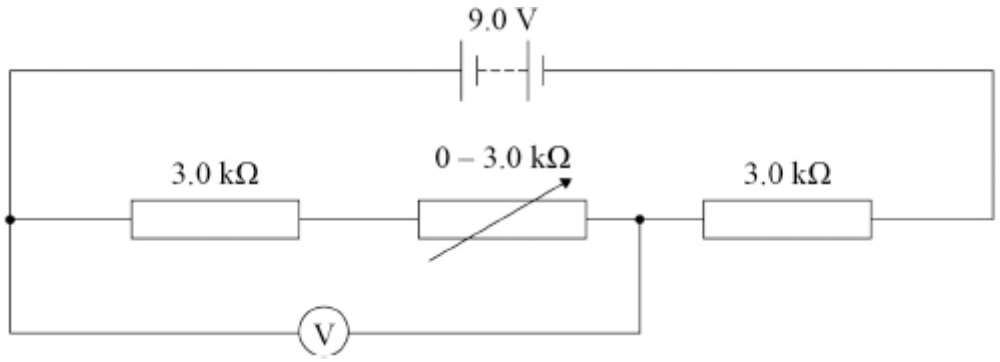
C 2.8×10^{20} ⬭

D 1.7×10^{22} ⬭

(Total 1 mark)

Q17.

Three resistors are connected in series with a 9.0 V battery of negligible internal resistance.



The resistance of the variable resistor is varied from 0 to 3.0 kΩ.

The range of potential difference observed on the voltmeter is

A 0 to 6.0 V ⬭

B 3.0 V to 6.0 V ⬭

C 4.5 V to 6.0 V ⬭

D 4.5 V to 9.0 V ⬭

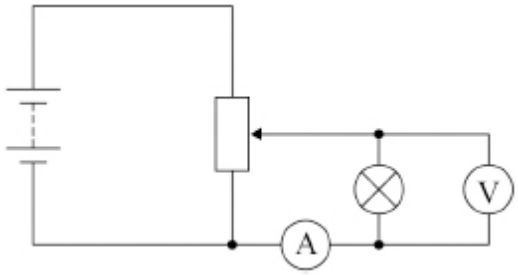
(Total 1 mark)

Q18.

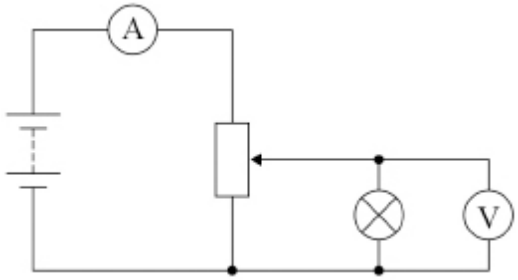
The current–voltage characteristic between 0 and 6.0 V is required for a filament lamp. The lamp is connected in a circuit with a battery of emf 6.0 V and negligible internal resistance.

Which circuit should be used?

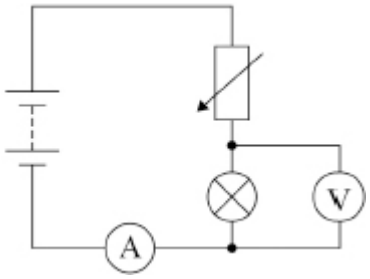
A



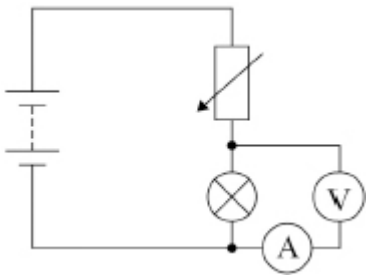
B



C



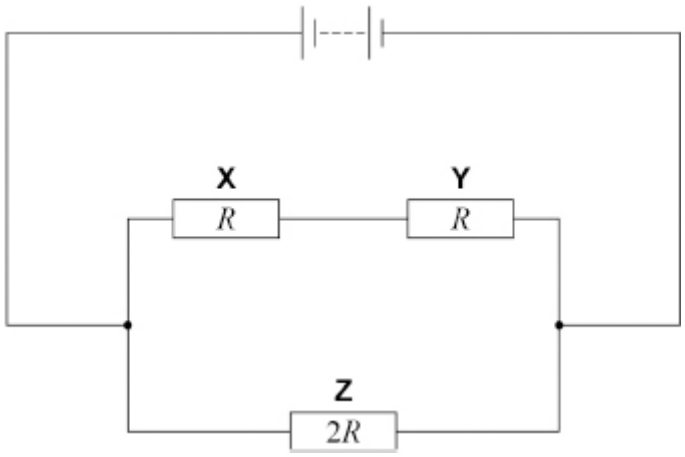
D



(Total 1 mark)

Q19.

The diagram shows a circuit containing three resistors **X**, **Y** and **Z**.



X and **Y** each have resistance R.
Z has resistance $2R$.

What is $\frac{\text{power in X}}{\text{power in Z}}$?

A $\frac{1}{4}$ ⬭

B $\frac{1}{2}$ ⬭

C 2 ⬭

D 4 ⬭

(Total 1 mark)

Q20.

Which statement about a superconducting metal is correct?

A Its resistivity is small but not zero. ⬭

B A current in it causes no heating effect. ⬭

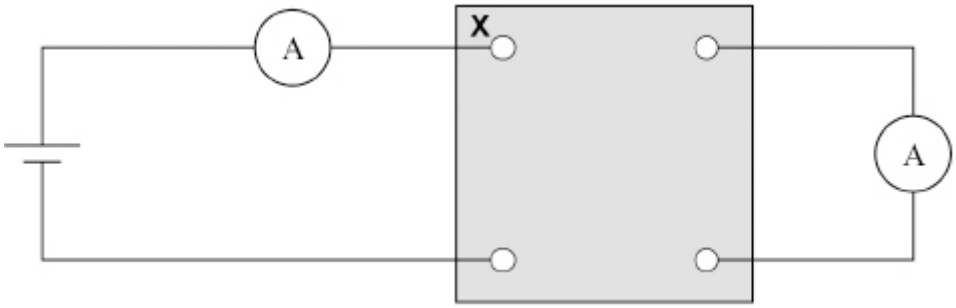
C Its critical temperature is independent of the metal it is made from. ⬭

D Keeping it cold makes it too expensive to use. ⬭

(Total 1 mark)

Q21.

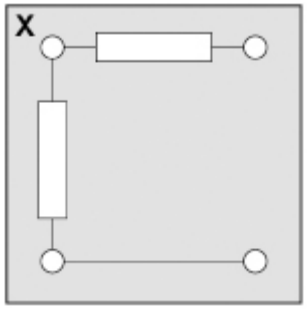
A box with four terminals is connected to a cell and two ammeters. The top left terminal is **X**.



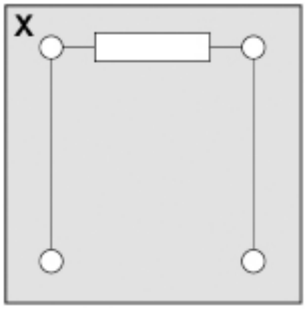
Each of the boxes **A** to **D** is connected into the circuit in turn. All the resistors have equal resistance.

Which box gives the same reading on both ammeters?

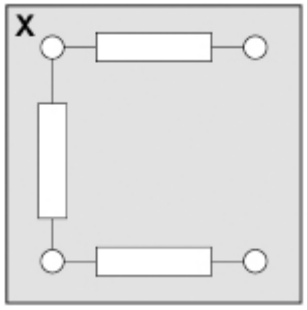
A



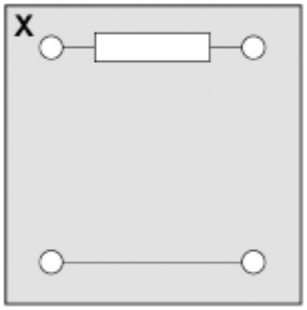
B



C



D



A ⬭

B ⬭

C ⬭

D ⬭

(Total 1 mark)

Q22.

A resistor dissipates 100 W when connected across a 25 V supply with negligible internal resistance.
The supply output is reduced to 20 V and the resistor is replaced so that the power dissipated is still 100 W.

What is the percentage decrease in resistance?

A 20 ⬭

B 36 ⬭

C 64 ⬭

D 80 ⬭

(Total 1 mark)

Q23.

As the temperature of a copper wire increases, its resistance

A remains constant. ⬭

B increases. ⬭

C decreases. ⬭

D remains constant at first and then decreases. ⬭

(Total 1 mark)

Q24.

A 12 Ω resistor is connected across the terminals of a cell that has an emf of 2.0 V and an internal resistance of 4.0 Ω.

What is the terminal pd?

A 0.50 V ⬭

B 0.75 V ⬭

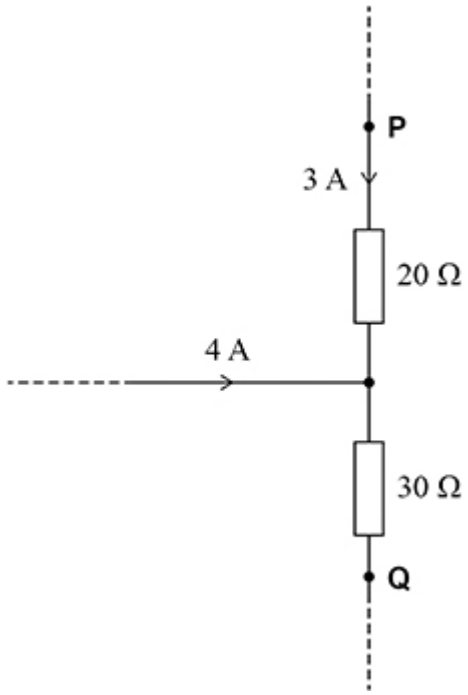
C 1.30 V ⬭

D 1.50 V ⬭

(Total 1 mark)

Q25.

The diagram shows the currents in part of a circuit.



What is the potential difference between points **P** and **Q**?

A 60 V ⬭

B 70 V ⬭

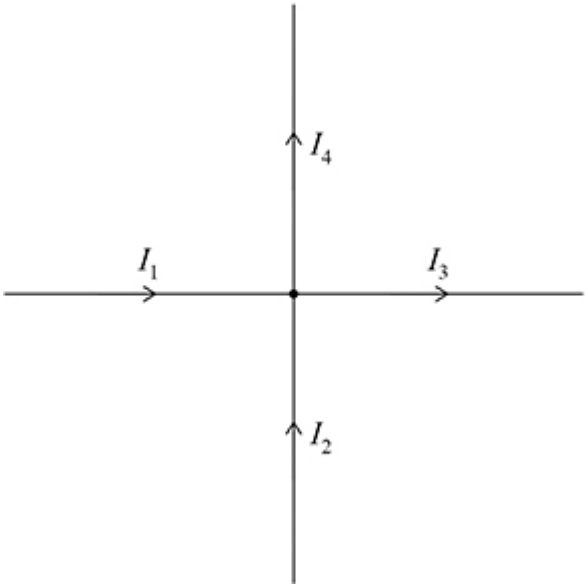
C 180 V ⬭

D 270 V ⬭

(Total 1 mark)

Q26.

The currents in the four wires obey the relationship $I_1 + I_2 + I_3 + I_4 = 0$



This relationship is an expression of the law of conservation of

A charge. ⬭

B energy. ⬭

C potential difference. ⬭

D power. ⬭

(Total 1 mark)

Q27.

A practical power supply provides a steady current I for a time t to an external circuit.

The emf of the power supply during t is equivalent to

A the energy dissipated in the external circuit. ⬭

B the energy dissipated in the whole circuit. ⬭

C the energy dissipated in the whole circuit, divided by the product It. ⬭

D the potential difference across the terminals of the power supply. ⬭

(Total 1 mark)

Q28.

The current in a metallic conductor is $1.5\ \text{mA}$.

How many electrons pass a point in the conductor in two minutes?

A 1.1×10^{18} ⬭

B 1.9×10^{19} ⬭

C 1.4×10^{20} ⬭

D 2.0×10^{29} ⬭

(Total 1 mark)

Q29.

Which value of resistance **cannot** be made by combining three $10\ \Omega$ resistors?

A $3.3\ \Omega$ ⬭

B $6.7\ \Omega$ ⬭

C $15\ \Omega$ ⬭

D $25\ \Omega$ ⬭

(Total 1 mark)