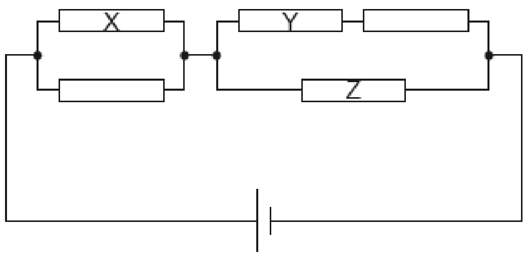
SL Paper 1

Five resistors of equal resistance are connected to a cell as shown.



What is correct about the power dissipated in the resistors?

A. The power dissipated is greatest in resistor X.

B. The power dissipated is greatest in resistor Y.

C. The power dissipated is greatest in resistor Z.

D. The power dissipated is the same in all resistors.

The electromotive force (emf) of a cell is defined as

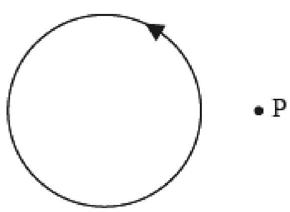
A. the power supplied by the cell per unit current from the cell.

B. the force that the cell provides to drive electrons round a circuit.

C. the energy supplied by the cell per unit current from the cell.

D. the potential difference across the terminals of the cell.

A current is established in a coil of wire in the direction shown.



The direction of the magnetic field at point P is

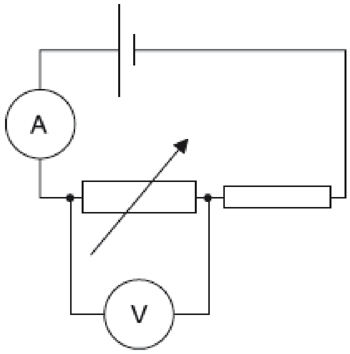
A. out of the plane of the paper.

B. into the plane of the paper.

C. to the left.

D. to the right.

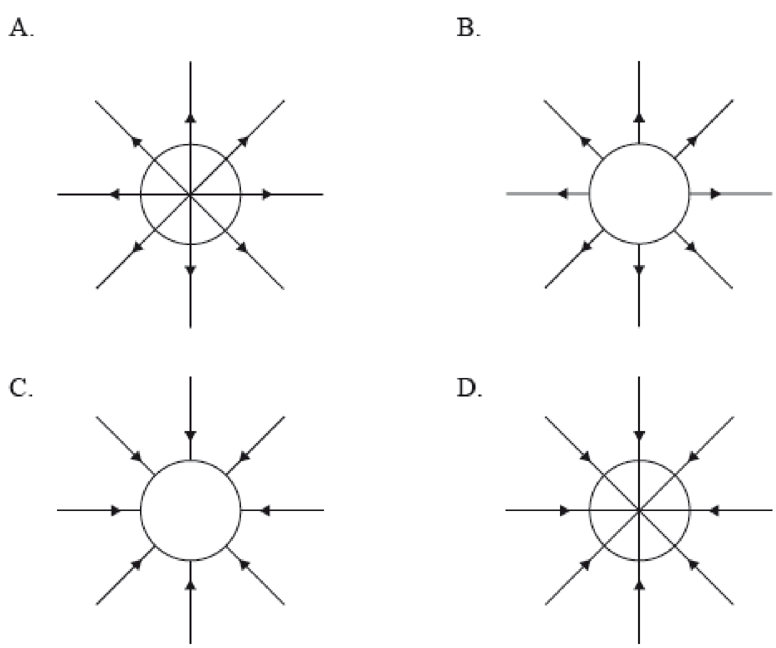
A cell with negligible internal resistance is connected as shown. The ammeter and the voltmeter are both ideal.



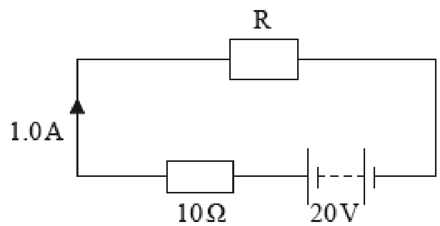
What changes occur in the ammeter reading and in the voltmeter reading when the resistance of the variable resistor is increased?

	Change in ammeter reading	Change in voltmeter reading
A.	increases	increases
B.	increases	decreases
C.	decreases	increases
D.	decreases	decreases

Which diagram best represents the electric field due to a negatively charged conducting sphere?



The circuit shows a resistor R connected in series with a battery and a resistor of resistance $10\ \Omega$. The emf of the battery is 20 V and it has negligible internal resistance. The current in the circuit is 1.0 A.



Which of the following is the resistance of R?

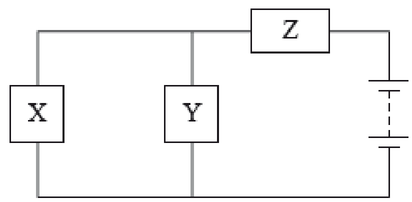
A. 1.0 Ω

B. 2.0 Ω

C. 10 Ω

D. 20 Ω

Three identical resistors are connected to a battery as shown.



Which of the following is a correct statement?

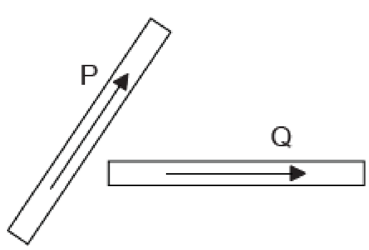
A. The current through X is greater than that through Z.

B. The potential difference across Z is greater than that across Y.

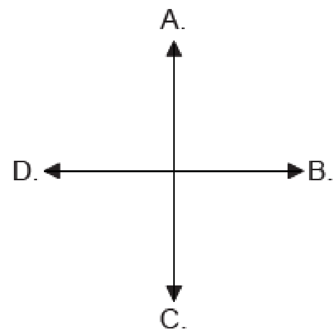
C. The potential difference across resistor X and Y together is the same as that across Z.

D. The current through Z is less than the total current through X and Y.

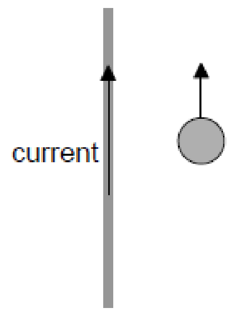
The diagram shows two current-carrying wires, P and Q, that both lie in the plane of the paper. The arrows show the conventional current direction in the wires.



The electromagnetic force on Q is in the same plane as that of the wires. What is the direction of the electromagnetic force acting on Q?



A positively-charged particle moves parallel to a wire that carries a current upwards.



What is the direction of the magnetic force on the particle?

A. To the left

B. To the right

C. Into the page

D. Out of the page

An electron travelling at speed v perpendicular to a magnetic field of strength B experiences a force F.

What is the force acting on an alpha particle travelling at $2v$ parallel to a magnetic field of strength $2B$?

A. 0

B. $2F$

C. $4F$

D. $8F$

An electron is accelerated through a potential difference of 2.5 MV. What is the change in kinetic energy of the electron?

A. 0.4μJ

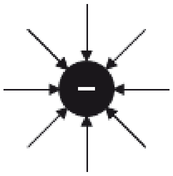
B. 0.4 nJ

C. 0.4 pJ

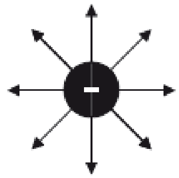
D. 0.4 fJ

Which of the following diagrams illustrates the electric field pattern of a negatively charged sphere?

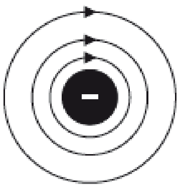
A.



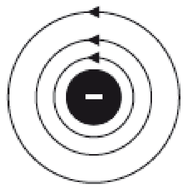
B.



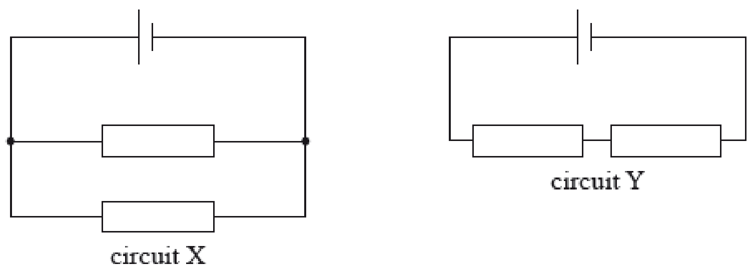
C.



D.



In the circuits below the cells have the same emf and zero internal resistance. The resistors all have the same resistance.



Which of the following gives the ratio $\frac{\text{power dissipated in X}}{\text{power dissipated in Y}}$?

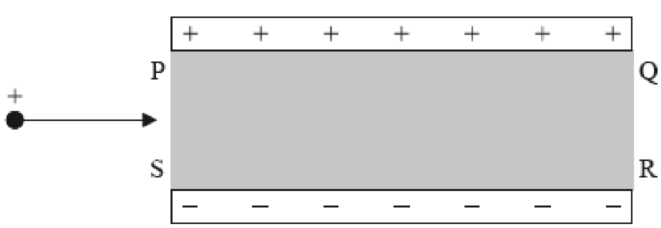
A. $\frac{1}{4}$

B. $\frac{1}{2}$

C. 2

D. 4

A positively charged particle enters the space between two charged conducting plates, with a constant velocity directed parallel to the plates, as shown.



The top plate is positively charged and the bottom plate is negatively charged. There is a magnetic field in the shaded region PQRS. The particle continues to move in a horizontal straight line between the plates. Which of the following correctly describes the magnetic field direction?

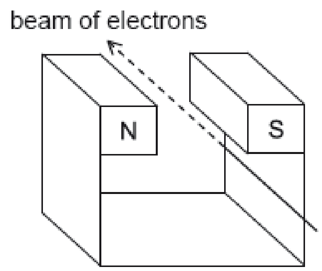
A. Into plane of paper

B. Out of plane of paper

C. Up

D. Down

A beam of electrons moves between the poles of a magnet.



What is the direction in which the electrons will be deflected?

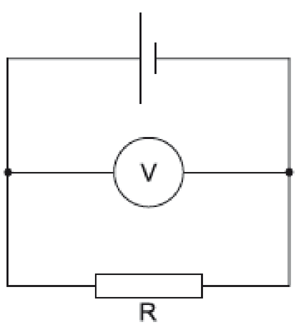
A. Downwards

B. Towards the N pole of the magnet

C. Towards the S pole of the magnet

D. Upwards

A cell has an emf of 4.0 V and an internal resistance of 2.0 Ω. The ideal voltmeter reads 3.2 V.



What is the resistance of R?

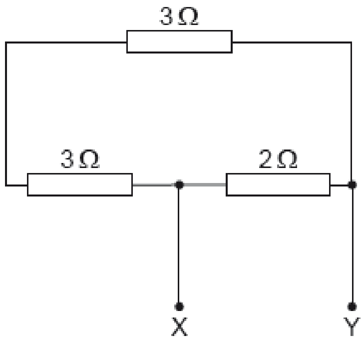
A. 0.8 Ω

B. 2.0 Ω

C. 4.0 Ω

D. 8.0 Ω

Three resistors are connected as shown. What is the value of the total resistance between X and Y?



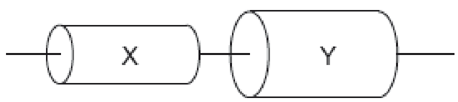
A. 1.5 Ω

B. 1.9 Ω

C. 6.0 Ω

D. 8.0 Ω

Two resistors X and Y are made of uniform cylinders of the same material. X and Y are connected in series. X and Y are of equal length and the diameter of Y is twice the diameter of X.



The resistance of Y is *R*.

What is the resistance of this series combination?

A. $\frac{5R}{4}$

B. $\frac{3R}{2}$

C. 3*R*

D. 5*R*

A metal wire X with length *L* and radius *r* has a resistance *R*. A wire Y of length 4*L* made from the same material as X has the same resistance *R*. What is the radius of Y?

A. 2*r*

B. 4*r*

C. $\frac{r}{2}$

D. $\frac{r}{4}$

A cylindrical resistor of length l is made from a metal of mass m. It has a resistance R.

Two resistors, each of length $2l$ and mass $\frac{m}{2}$, are then created from the same volume of the metal.

What is the resistance of the two resistors when connected in parallel?

A. R

B. $2R$

C. $4R$

D. $8R$

Two rectangular blocks, X and Y, of the same material have different dimensions but the same overall resistance. Which of the following equations is correct?

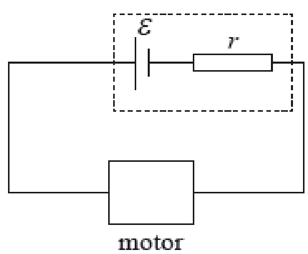
A. resistivity of $X \times \text{length of } X = \text{resistivity of } Y \times \text{length of } Y$

B. $\frac{\text{length of } X}{\text{cross sectional area of } X} = \frac{\text{length of } Y}{\text{cross sectional area of Y}}$

C. resistivity of $X \times \text{cross sectional area of } X = \text{resistivity of } Y \times \text{cross sectional area of } Y$

D. $\frac{\text{length of } X}{\text{cross sectional area of } Y} = \frac{\text{length of } Y}{\text{cross sectional area of } X}$

A cell of $\text{emf } \varepsilon$ and internal resistance r delivers current to a small electric motor.



450 C of charge flows through the motor and 9000 J of energy are converted in the motor. 1800 J are dissipated in the cell. The emf of the cell is

A. 4.0 V.

B. 16 V.

C. 20 V.

D. 24 V.

A resistor of resistance $12\ \Omega$ is connected in series with a cell of negligible internal resistance. The power dissipated in the resistor is P. The resistor is replaced with a resistor of resistance $3.0\ \Omega$. What is the power dissipated in this resistor?

A. $0.25\ P$

B. P

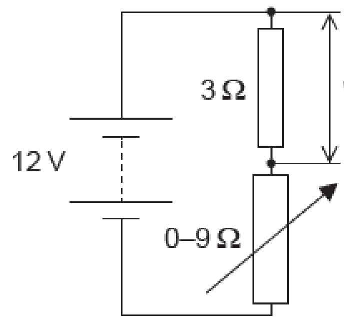
C. $2.0\ P$

D. $4.0\ P$

A proton is accelerated from rest through a potential difference of 1000 V. What is the potential difference through which an alpha particle must be accelerated to gain the same kinetic energy as the accelerated proton?

A. 4000 V
B. 2000 V
C. 500 V
D. 250 V

In the circuit shown, the fixed resistor has a value of 3 Ω and the variable resistor can be varied between 0 Ω and 9 Ω.



The power supply has an emf of 12 V and negligible internal resistance. What is the difference between the maximum and minimum values of voltage *V* across the 3 Ω resistor?

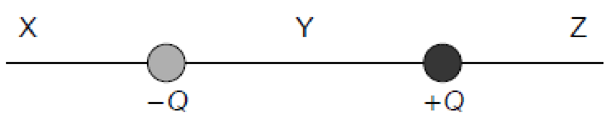
A. 3 V

B. 6 V

C. 9 V

D. 12 V

The diagram shows two equal and opposite charges that are fixed in place.



At which points is the net electric field directed to the right?

A. X and Y only

B. Z and Y only

C. X and Z only

D. X, Y and Z

A wire carrying a current I is at right angles to a uniform magnetic field of strength *B*. A magnetic force *F* is exerted on the wire. Which force acts when the same wire is placed at right angles to a uniform magnetic field of strength 2*B* when the current is $\frac{I}{4}$?

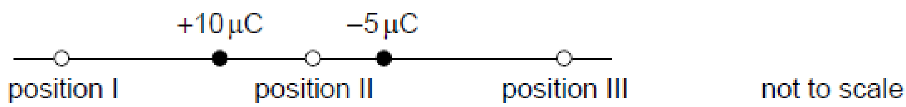
A. $\frac{F}{4}$

B. $\frac{F}{2}$

C. F

D. $2F$

A –5μC charge and a +10μC charge are a fixed distance apart.

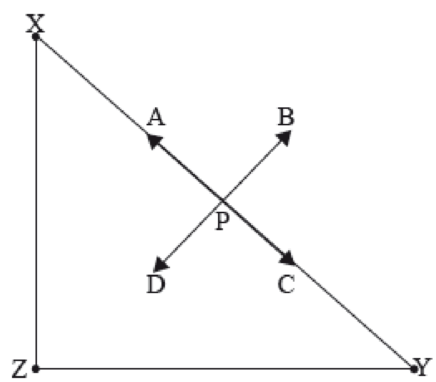


Where can the electric field be zero?

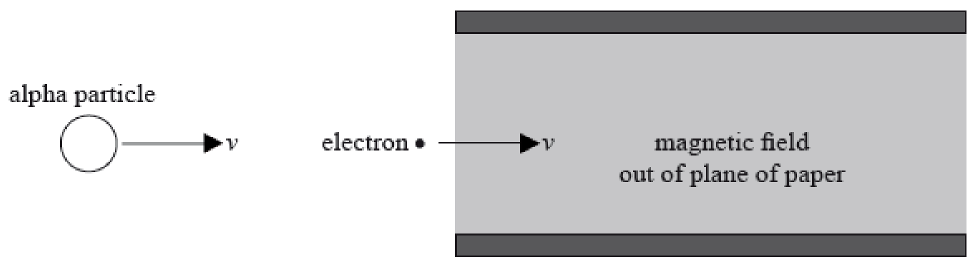
A. position I only
B. position II only
C. position III only
D. positions I, II and III

Three positive point charges of equal magnitude are held at the corners X, Y and Z of a right-angled triangle. The point P is at the midpoint of XY.

Which of the arrows shows the direction of the electric field at point P?



An electron enters the vacuum between two oppositely charged plates with velocity v. The electron is followed by an alpha particle moving with the same initial velocity as the electron. A uniform magnetic field is directed out of the plane of the paper.



The electron’s path is undeflected. The path of the alpha particle will be

A. deflected out of the plane of the paper.

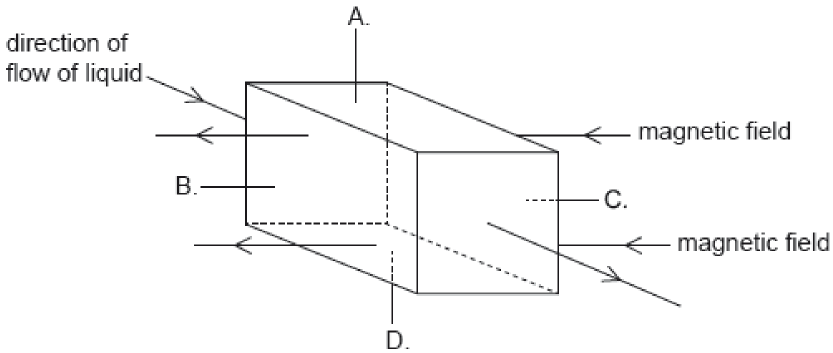
B. undeflected.

C. deflected upward.

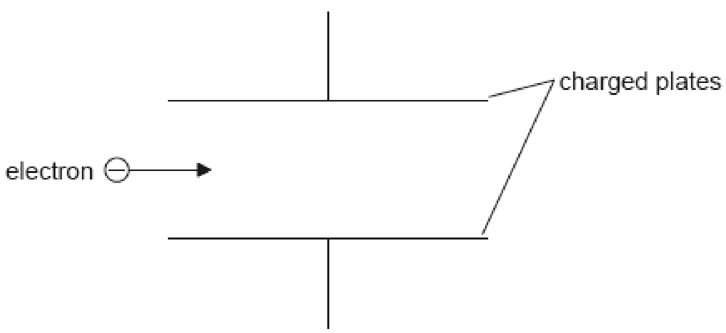
D. deflected downward.

A liquid that contains negative charge carriers is flowing through a square pipe with sides A, B, C and D. A magnetic field acts in the direction shown across the pipe.

On which side of the pipe does negative charge accumulate?



An electron enters the region between two charged parallel plates initially moving parallel to the plates.



The electromagnetic force acting on the electron

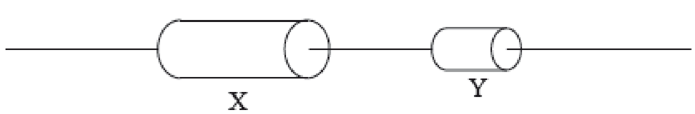
A. causes the electron to decrease its horizontal speed.

B. causes the electron to increase its horizontal speed.

C. is parallel to the field lines and in the opposite direction to them.

D. is perpendicular to the field direction.

Two resistors, made of the same material, are connected in series to a battery. The length of resistor X is twice that of resistor Y, and X has twice the cross-sectional area of Y.



Which of the following gives $\frac{\text{resistance of X}}{\text{resistance of Y}}$?

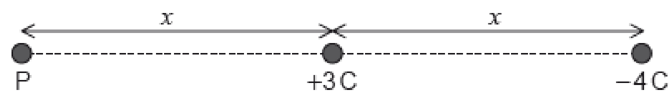
A. $\frac{1}{4}$

B. $\frac{1}{2}$

C. 1

D. 4

A $+3\text{ C}$ charge and a -4 C charge are a distance x apart. P is a distance x from the $+3\text{ C}$ charge on the straight line joining the charges.



What is the magnitude of the electric field strength at P?

A. $\frac{1}{\pi\varepsilon_0 x^2}$

B. $\frac{1}{2\pi\varepsilon_0 x^2}$

C. $\frac{1}{4\pi\varepsilon_0 x^2}$

D. $\frac{1}{7\pi\varepsilon_0 x^2}$

What is the definition of electric current?

A. The ratio of potential difference across a component to the resistance of the component

B. The power delivered by a battery per unit potential difference

C. The rate of flow of electric charge

D. The energy per unit charge dissipated in a power supply

The magnetic field produced by a current in a straight wire is in

A. the same direction as the current.
B. the opposite direction to the current.
C. the same plane as the wire.
D. any plane perpendicular to the wire.

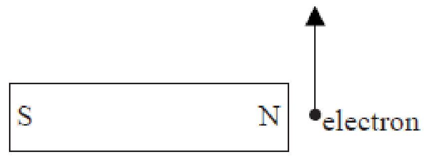
Which of the following will **not** give rise to a magnetic field?

A. A moving electron
B. A moving neutron
C. A proton and electron moving away from each other
D. A proton and electron moving towards each other

One electronvolt is equal to

A. 1.6×10^{-19} C.
B. 1.6×10^{-19} J.
C. 1.6×10^{-19} V.
D. 1.6×10^{-19} W.

An electron passes the north pole of a bar magnet as shown below.



What is the direction of the magnetic force on the electron?

A. Into the page
B. Out of the page
C. To the left
D. To the right

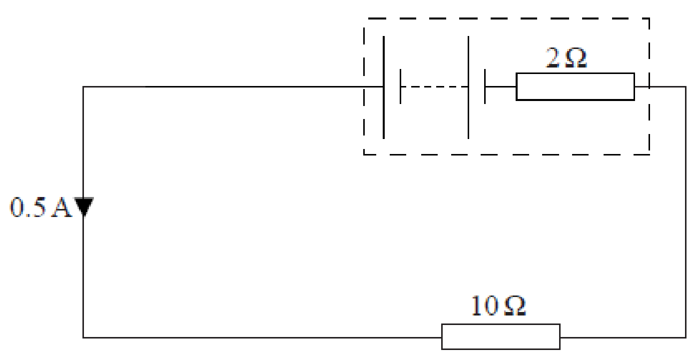
Two electrodes, separated by a distance d, in a vacuum are maintained at a constant potential difference. An electron, accelerated from one electrode to the other, gains kinetic energy E_k.

The distance between the electrodes is now changed to $\frac{1}{3}d$.

What is the gain in kinetic energy of an electron that is accelerated from one electrode to the other?

A. $\frac{E_k}{3}$
B. E_k
C. $3E_k$
D. $9E_k$

A battery of internal resistance 2 Ω is connected to an external resistance of 10 Ω. The current is 0.5 A.



What is the emf of the battery?

A. 1.0 V
B. 5.0 V
C. 6.0 V
D. 24.0 V

A battery of emf 6.0V is connected to a 2.0Ω resistor. The current in the circuit is 2.0A. The internal resistance of the battery is

A. zero.

B. 1.0 Ω.

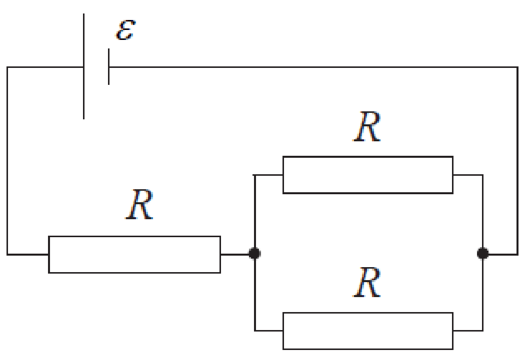
C. 3.0 Ω.

D. 4.0 Ω.

Coulomb's law refers to electric charges that are

A. on any charged objects.
B. charged hollow spheres.
C. charged solid spheres.
D. point charges.

An electric circuit consists of three identical resistors of resistance *R* connected to a cell of emf ε and negligible internal resistance.



What is the magnitude of the current in the cell?

A. $\frac{\varepsilon}{3R}$

B. $\frac{2\varepsilon}{3R}$

C. $\frac{3\varepsilon}{2R}$

D. $\frac{3\varepsilon}{R}$

Three resistors of resistance R are connected in parallel across a cell of electromotive force (emf) V that has a negligible internal resistance. What is the rate at which the cell supplies energy?

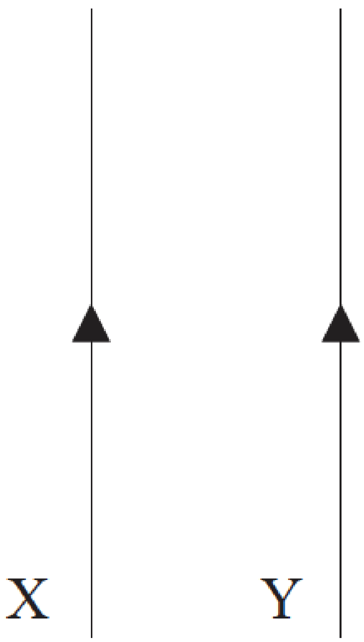
A. $\frac{V^2}{3R}$

B. $\frac{V^2}{9R}$

C. $\frac{9V^2}{R}$

D. $\frac{3V^2}{R}$

The diagram shows two long wires X and Y carrying identical currents in the same direction.



The direction of the force experienced by Y is

A. to the left.
B. to the right.
C. into the plane of the page.
D. out of the plane of the page.

A copper wire with length *L* and radius *r* has a resistance *R*.

What is the radius of a copper wire with length $\frac{L}{2}$ and resistance *R*?

A. 2*r*

B. $\sqrt{2}r$

C. $\frac{r}{\sqrt{2}}$

D. $\frac{r}{2}$

The ampere is defined in terms of

A. power dissipated in a wire of known length, cross-sectional area and resistivity.

B. potential difference across a resistance of known value.

C. number of electrons flowing past a point in a circuit in a given time.

D. force per unit length between parallel current-carrying conductors.

An electron has a kinetic energy of 4.8×10^{-10}J. What is the equivalent value of this kinetic energy?

A. 3.0 eV
B. 3.0 keV
C. 3.0 MeV
D. 3.0 GeV

A cell is connected in series with a resistor and supplies a current of 4.0 A for a time of 500 s. During this time, 1.5 kJ of energy is dissipated in the cell and 2.5 kJ of energy is dissipated in the resistor.

What is the emf of the cell?

A. 0.50 V

B. 0.75 V

C. 1.5 V

D. 2.0 V

Which of the following is a statement of Ohm's law?

A. The resistance of a conductor is constant.

B. The current in a conductor is inversely proportional to the potential difference across the conductor provided the temperature is constant.

C. The resistance of a conductor is constant provided that the temperature is constant.

D. The current in a conductor is proportional to the potential difference across it.

A cylindrical conductor of length l, diameter D and resistivity ρ has resistance R. A different cylindrical conductor of resistivity 2ρ, length $2l$ and diameter $2D$ has a resistance

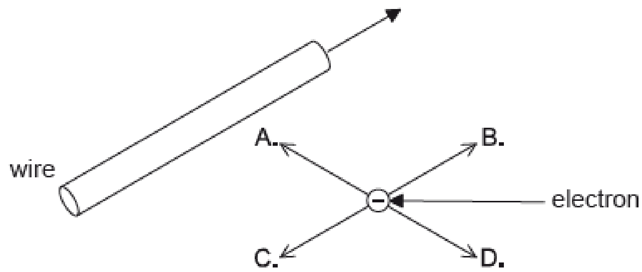
A. $2R$

B. R

C. $\frac{R}{2}$

D. $\frac{R}{4}$

An electron is moving parallel to a straight current-carrying wire. The direction of conventional current in the wire and the direction of motion of the electron are the same. In which direction is the magnetic force on the electron?



A resistor X of resistance *R* is made of wire of length *L* and cross-sectional area *A*. Resistor Y is made of the same material but has a length 4*L* and a cross-sectional area 2*A*. X and Y are connected in series. What is the total resistance of the combination?

A. 1.5*R*
B. 2*R*
C. 3*R*
D. 9*R*

A cylindrical resistor of volume *V* and length *l* has resistance *R*. The resistor has a uniform circular cross-section. What is the resistivity of the material from which the resistor is made?

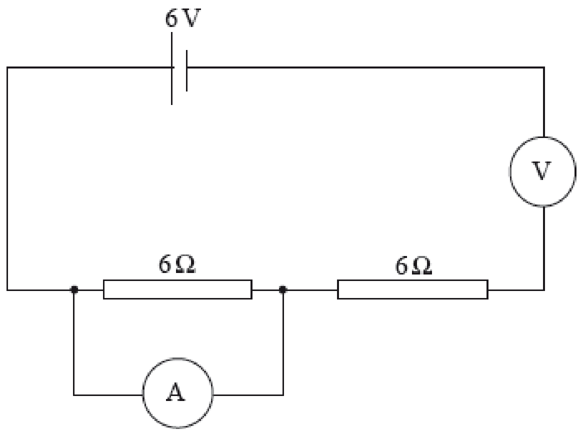
A. $\frac{V}{Rl^2}$

B. $\frac{V^2R}{l}$

C. $\frac{VR}{l^2}$

D. $\frac{V^2}{Rl}$

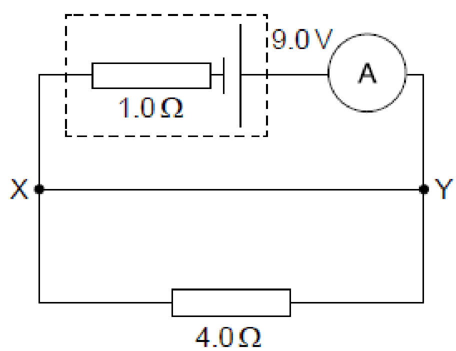
Two $6\ \Omega$ resistors are connected in series with a 6 V cell. A student **incorrectly** connects an ammeter and a voltmeter as shown below.



The readings on the ammeter and on the voltmeter are

	Ammeter reading / A	Voltmeter reading / V
A.	0.0	0.0
B.	0.0	6.0
C.	1.0	0.0
D.	1.0	6.0

A circuit contains a cell of electromotive force (emf) 9.0 V and internal resistance 1.0 Ω together with a resistor of resistance 4.0 Ω as shown. The ammeter is ideal. XY is a connecting wire.



What is the reading of the ammeter?

A. 0 A

B. 1.8 A

C. 9.0 A

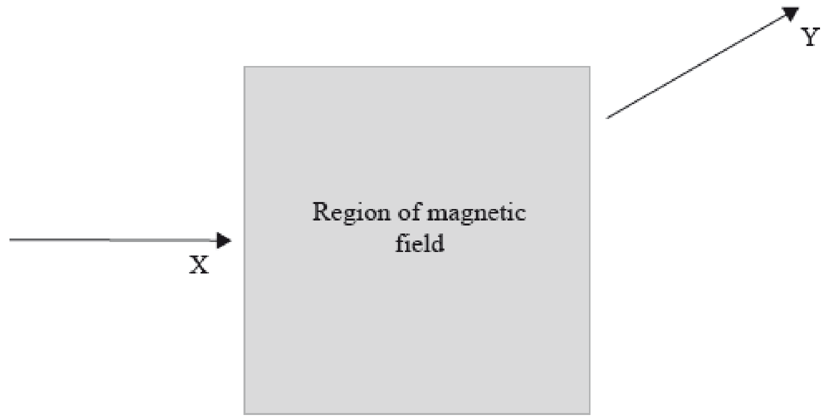
D. 11 A

Which of the following is the SI unit of gravitational field strength?

A. N
B. N m
C. Nkg^{-1}

D. Nm^2kg^{-2}

An electron travelling in the direction shown by the arrow X, enters a region of uniform magnetic field. It leaves the region of field in the direction shown by the arrow Y.



The direction of the magnetic field is

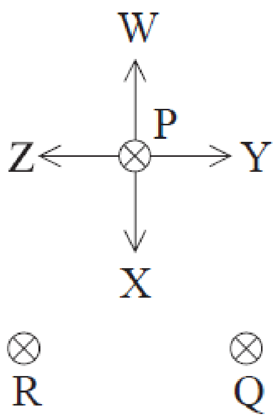
A. in the direction of X.

B. into the plane of the paper.

C. in the opposite direction to X.

D. out of the plane of the paper.

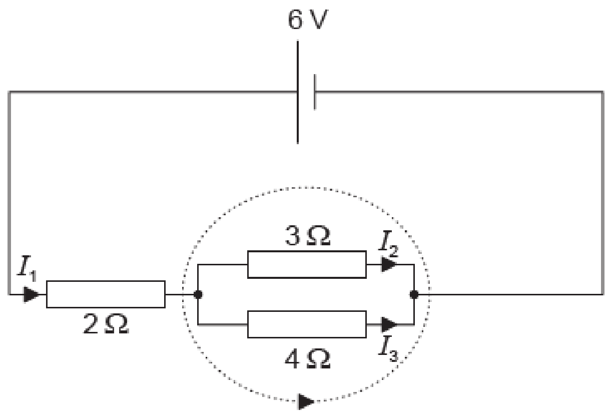
Three wires, P, Q and R, carry equal currents directed into the plane of the paper.



Which arrow correctly identifies the direction of the magnetic force on wire P?

A. W
B. X
C. Y
D. Z

Kirchhoff's laws are applied to the circuit shown.



What is the equation for the dotted loop?

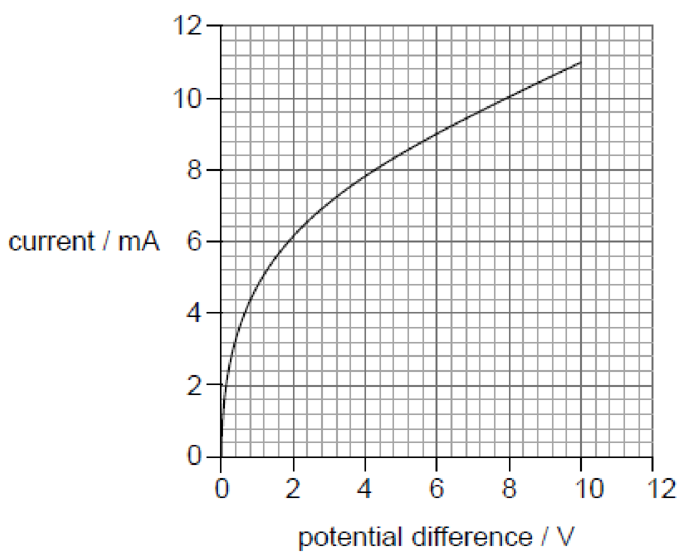
A. $0 = 3I_2 + 4I_3$

B. $0 = 4I_3 - 3I_2$

C. $6 = 2I_1 + 3I_2 + 4I_3$

D. $6 = 3I_2 + 4I_3$

The graph shows the variation of current with potential difference for a filament lamp.



What is the resistance of the filament when the potential difference across it is 6.0 V?

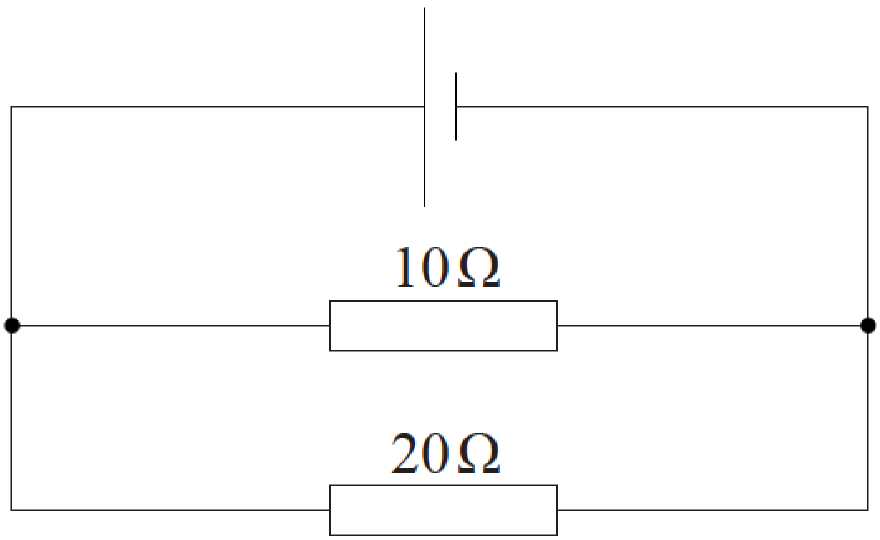
A. 0.5 mΩ

B. 1.5 mΩ

C. 670 Ω

D. 2000 Ω

Two resistors of resistance 10 Ω and 20 Ω are connected in parallel to a cell of negligible internal resistance.



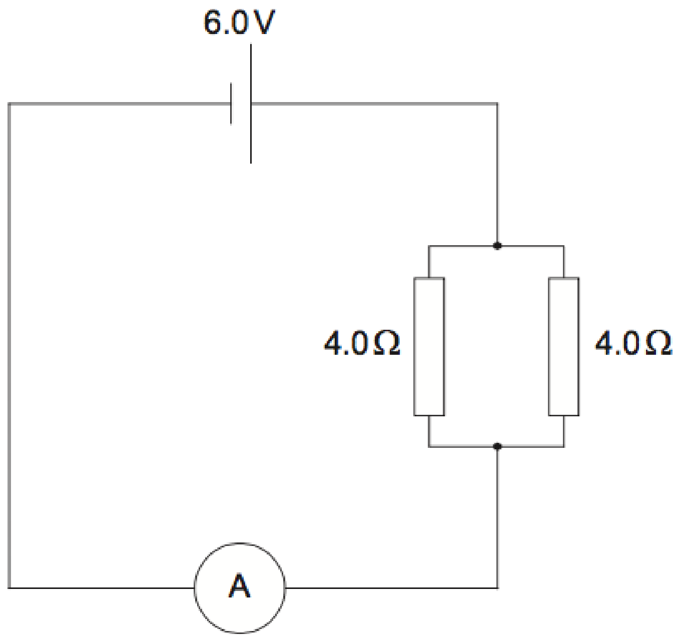
The energy dissipated in the 10 Ω resistor in one second is Q. What is the energy dissipated in one second in the 20 Ω resistor?

A. $\frac{Q}{4}$
B. $\frac{Q}{2}$
C. 2Q
D. 4Q

With reference to internal energy conversion and ability to be recharged, what are the characteristics of a primary cell?

	Internal energy conversion	Ability to be recharged
A.	chemical to electrical	rechargeable
B.	chemical to electrical	not rechargeable
C.	electrical to chemical	rechargeable
D.	electrical to chemical	not rechargeable

A circuit consists of a cell of electromotive force (emf) 6.0V and negligible internal resistance connected to two resistors of 4.0Ω.



The resistance of the ammeter is 1.0 Ω. What is the reading of the ammeter?

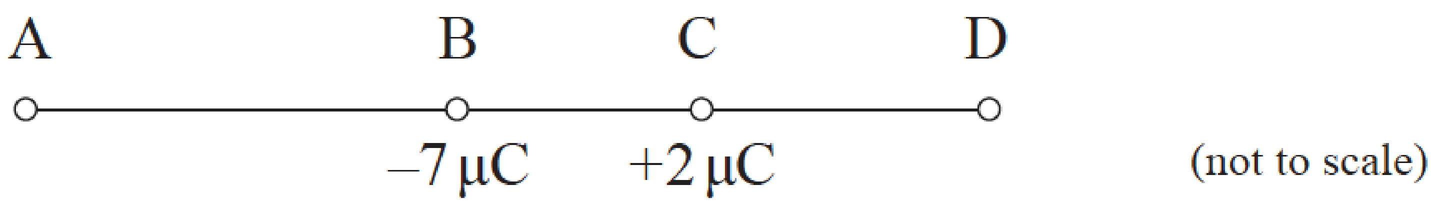
A. 2.0A

B. 3.0A

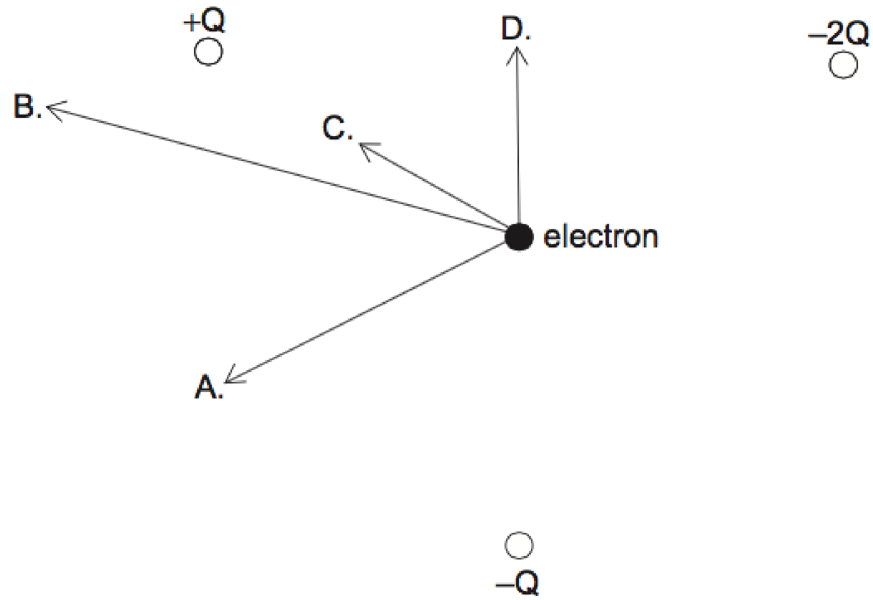
C. 4.5A

D. 6.0A

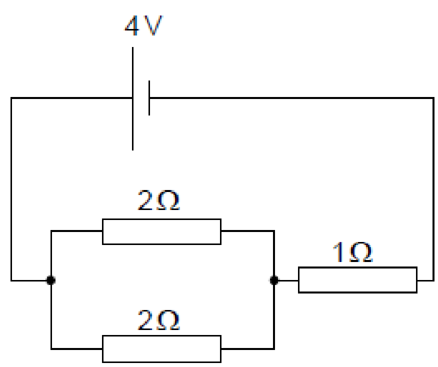
Two isolated point charges, -7 μC and +2 μC, are at a fixed distance apart. At which point is it possible for the electric field strength to be zero?



Three fixed charges, +Q, –Q and –2Q, are at the vertices of an equilateral triangle. What is the resultant force on an electron at the centre of the triangle?



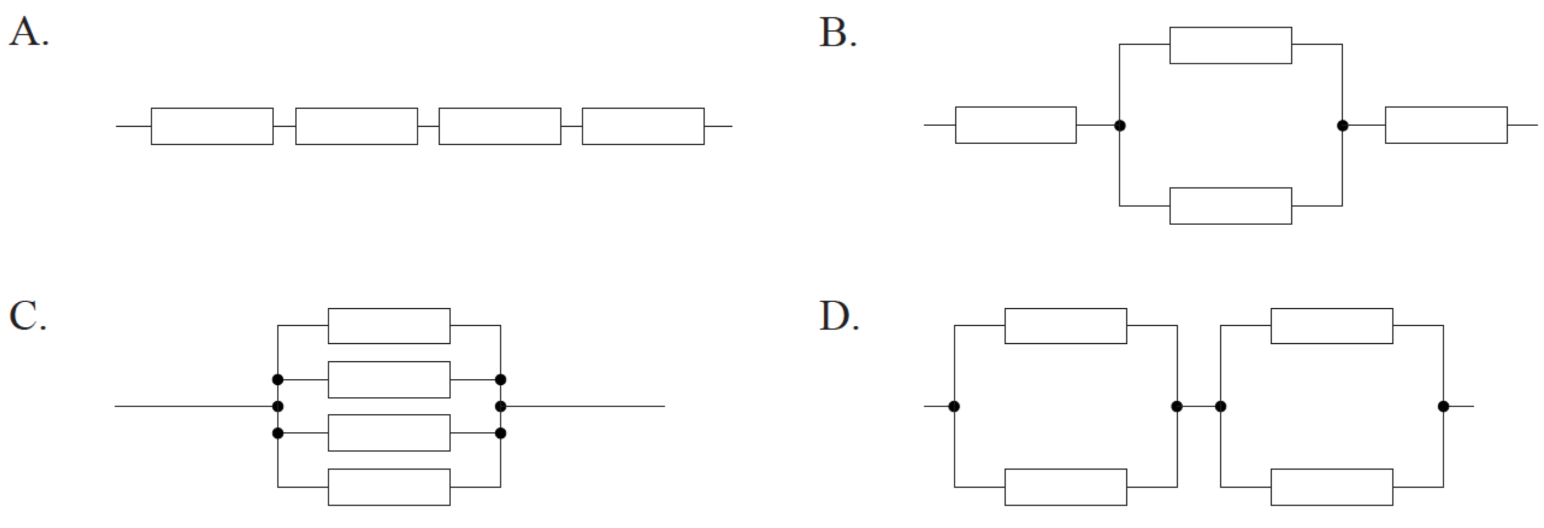
A cell of emf 4V and negligible internal resistance is connected to three resistors as shown. Two resistors of resistance 2Ω are connected in parallel and are in series with a resistor of resistance 1Ω.



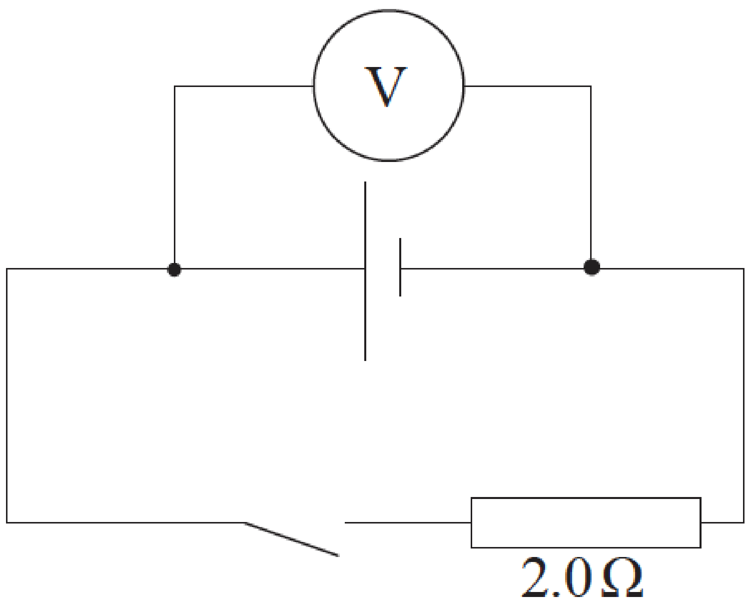
What power is dissipated in one of the 2Ω resistors and in the whole circuit?

	Power dissipated in 2Ω resistor / W	Power dissipated in whole circuit / W
A.	2	6
B.	1	6
C.	0.5	8
D.	2	8

Each of the resistors in the arrangements below has resistance *R*. Each arrangement is connected, in turn, to a power supply of constant emf and negligible internal resistance. In which arrangement is the current in the power supply greatest?



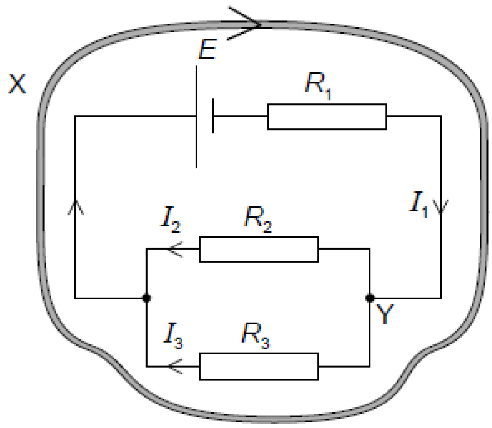
A cell is connected in series with a 2.0Ω resistor and a switch. The voltmeter is connected across the cell and reads 12V when the switch is open and 8.0V when the switch is closed.



What is the internal resistance of the cell?

A. 1.0 Ω
B. 2.0 Ω
C. 3.0 Ω
D. 4.0 Ω

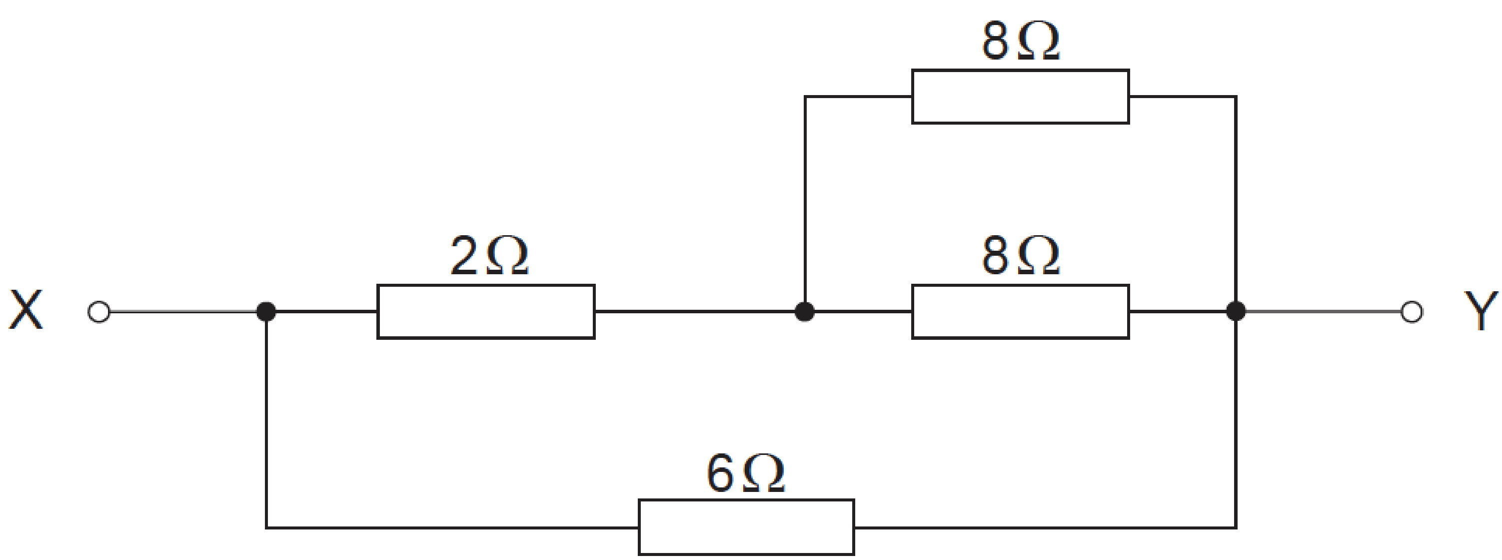
An electrical circuit is shown with loop X and junction Y.



What is the correct expression of Kirchhoff's circuit laws for loop X and junction Y?

	Loop X	Junction Y
A.	$-E=I_1R_1+I_3R_3$	$I_1=I_2+I_3$
B.	$-E=I_1R_1+I_3R_3$	$I_1+I_2=I_3$
C.	$E=I_1R_1-I_3R_3$	$I_1=I_2+I_3$
D.	$E=I_1R_1-I_3R_3$	$I_1+I_2=I_3$

Four resistors are connected as shown.



What is the total resistance between X and Y?

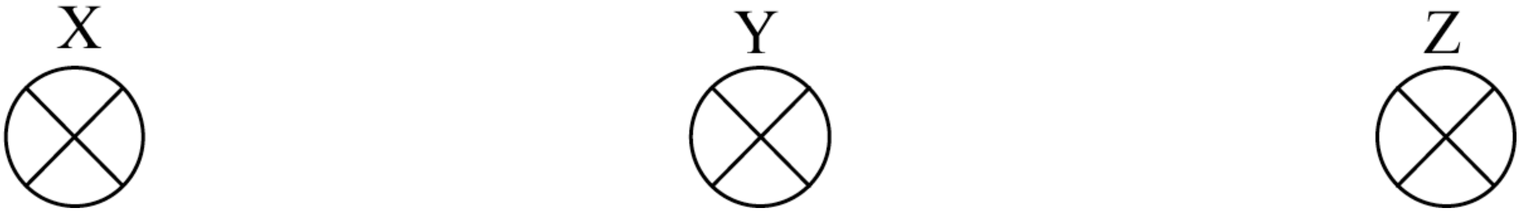
A. 3 Ω

B. 4 Ω

C. 6 Ω

D. 24 Ω

Three parallel wires, X, Y and Z, carry equal currents into the page.



Which arrow represents the direction of the magnetic force on wire Z?

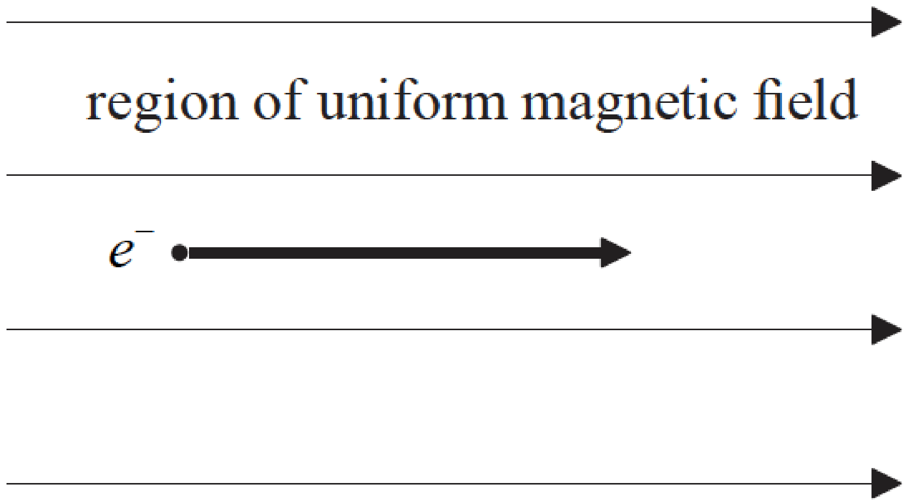
A. 

B. 

C. 

D. 

An electron is travelling in a region of uniform magnetic field. At the instant shown, the electron is moving parallel to the field direction.



The magnetic force on the electron is

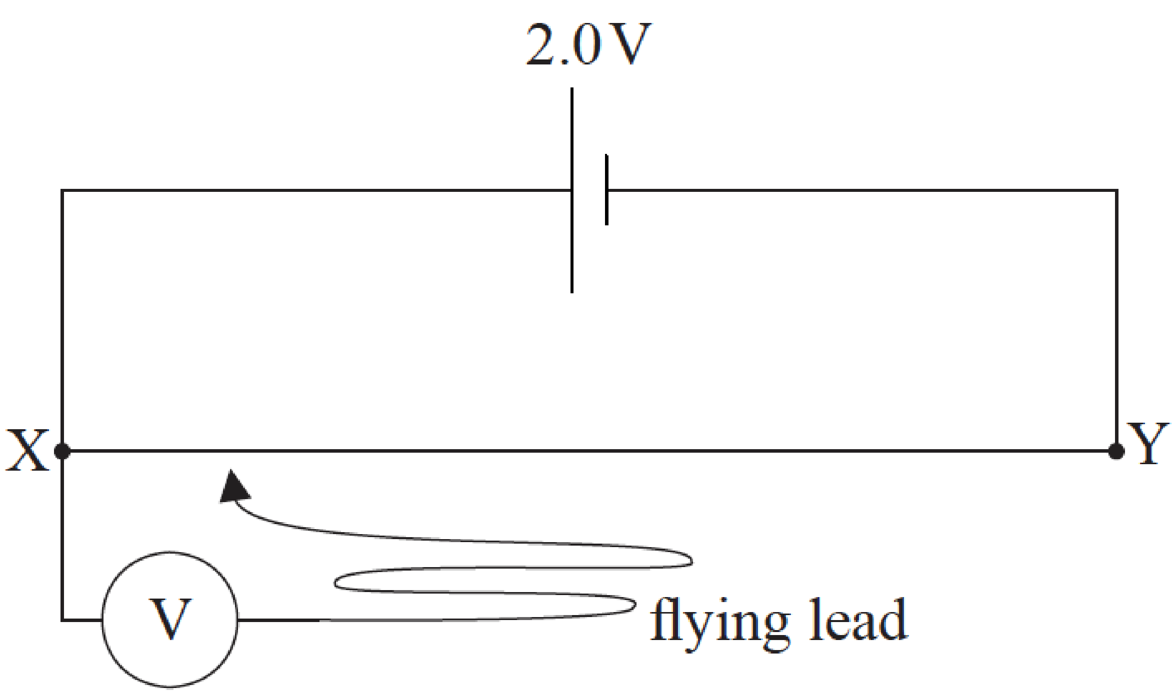
A. upwards.

B. downwards.

C. to the right.

D. zero.

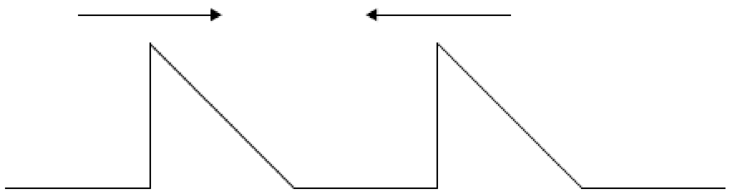
A cell with an emf of 2.0 V and negligible internal resistance is connected across a 1.00 m length of uniform resistance wire XY. The free end of the flying lead can be connected to any position on the wire.



What is the voltmeter reading when the flying lead is connected 0.25m from end X?

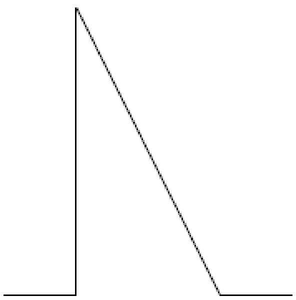
A. 0.00 V
B. 0.50 V
C. 1.50 V
D. 2.00 V

Two pulses are travelling towards each other.

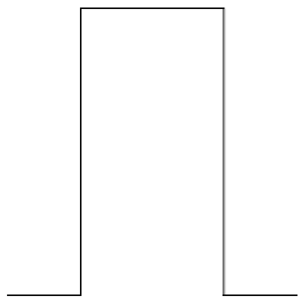


What is a possible pulse shape when the pulses overlap?

A.

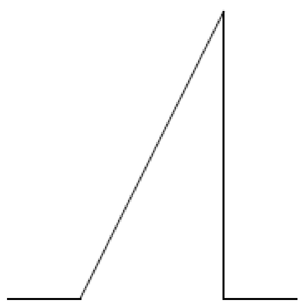


B.

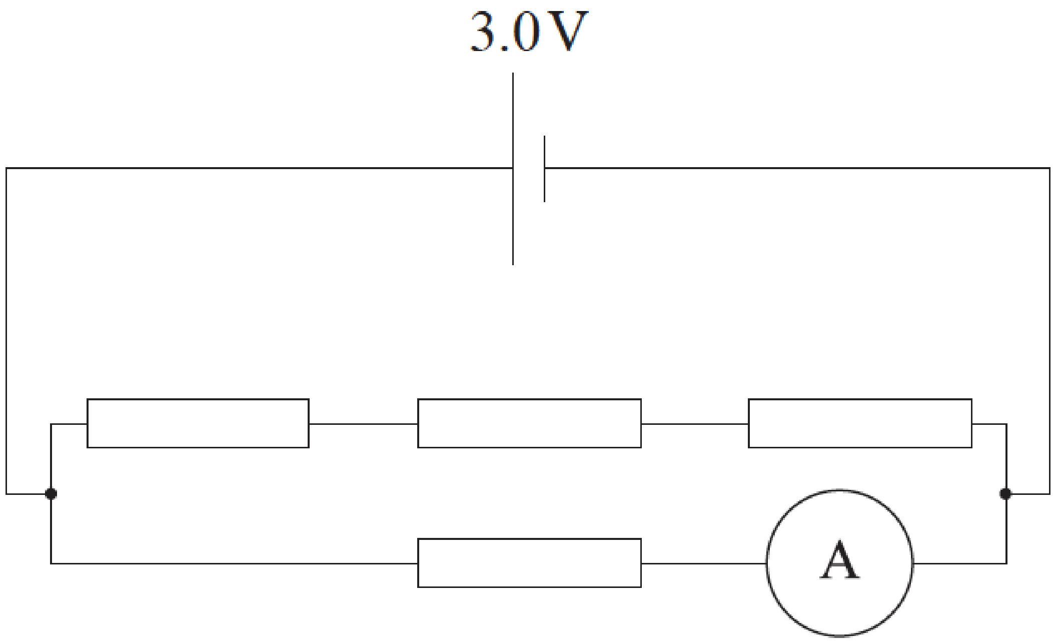


C.

D.



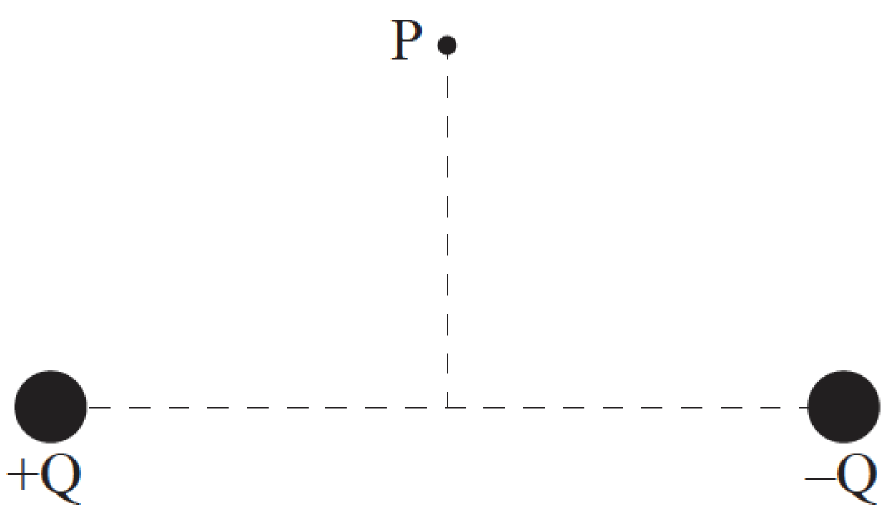
Each of the resistors in the circuit has a resistance of 2.0 Ω. The cell has an emf of 3.0 V and negligible internal resistance. The ammeter has negligible resistance.



What is the ammeter reading?

A. 0.4 A
B. 0.5 A
C. 1.5 A
D. 2.0 A

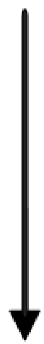
Point P is at the same distance from two charges of equal magnitude and opposite sign.

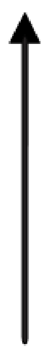


What is the direction of the electric field at point P?

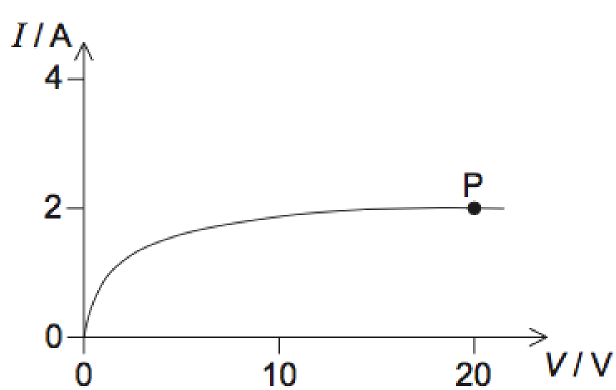
A. 

B. 

C. 

D. 

The graph shows the variation of current *I* in a device with potential difference *V* across it.



What is the resistance of the device at P?

A. zero

B. 0.1Ω

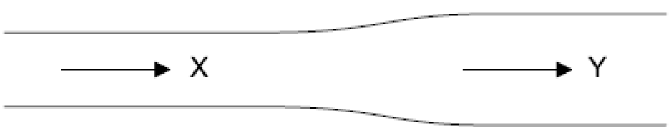
C. 10Ω

D. infinite

Which of the following gives the resistances of an ideal ammeter and an ideal voltmeter?

	Resistance of ideal ammeter	Resistance of ideal voltmeter
A.	infinite	infinite
B.	zero	infinite
C.	infinite	zero
D.	zero	zero

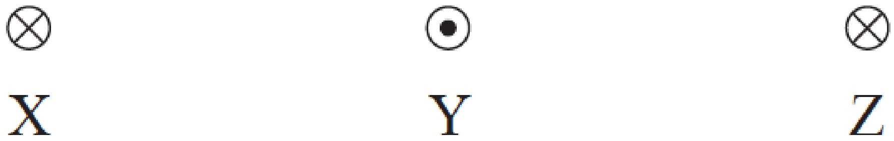
A wire has variable cross-sectional area. The cross-sectional area at Y is double that at X.



At X, the current in the wire is I and the electron drift speed is v. What is the current and the electron drift speed at Y?

	Current	Drift speed
A.	I	v
B.	I	$\frac{v}{2}$
C.	$2I$	v
D.	$2I$	$\frac{v}{2}$

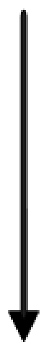
Three parallel wires, X, Y and Z, carry equal currents. The currents in X and Z are directed into the page. The current in Y is directed out of the page.

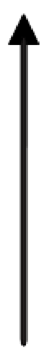


Which arrow shows the direction of the magnetic force experienced by wire Z?

A. 

B. 

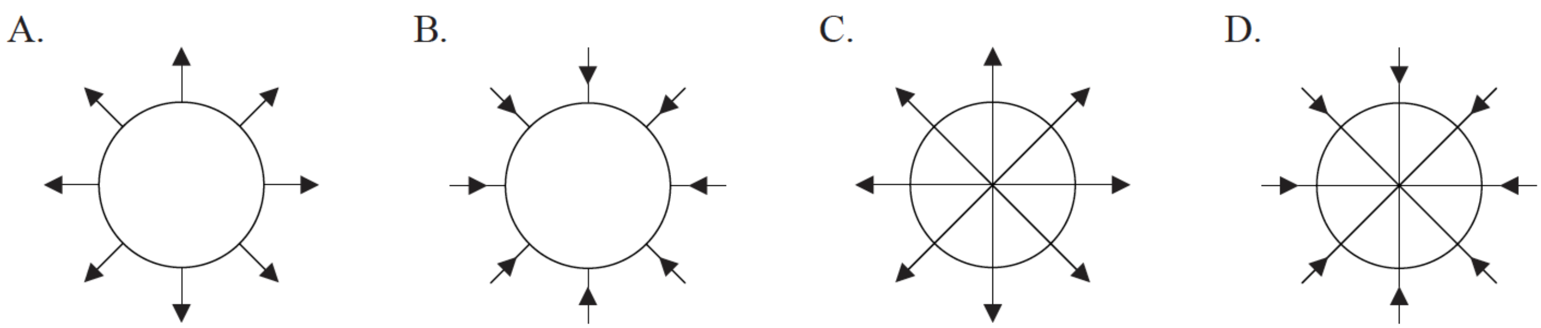
C. 

D. 

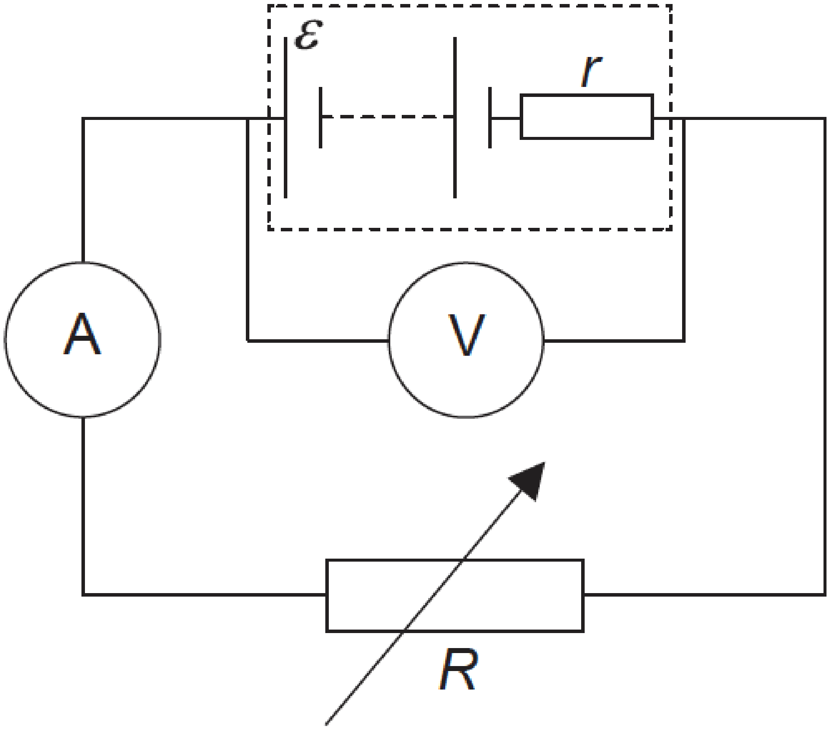
Which nucleons in a nucleus are involved in the Coulomb interaction and the strong short-range nuclear interaction?

	Coulomb interaction	Strong short-range interaction
A.	protons	protons, neutrons
B.	protons	neutrons
C.	protons	protons
D.	protons, neutrons	neutrons

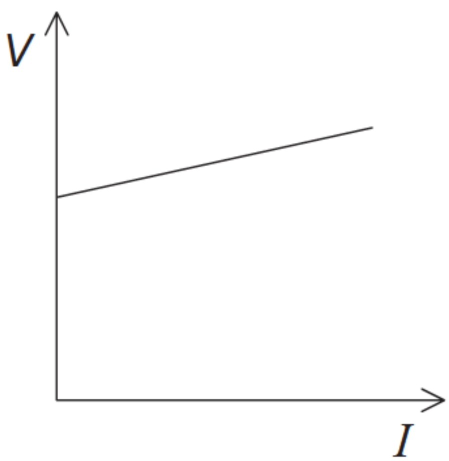
Which of the following is the best representation of the electric field lines around a negatively charged metal sphere?

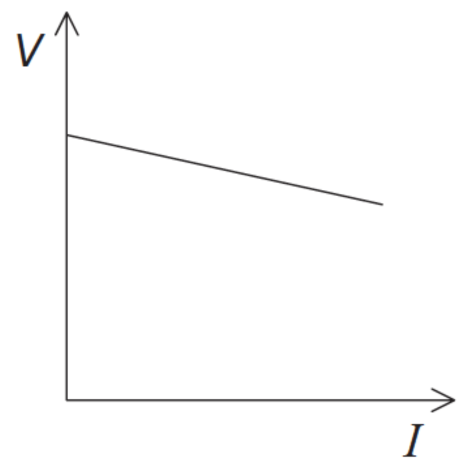


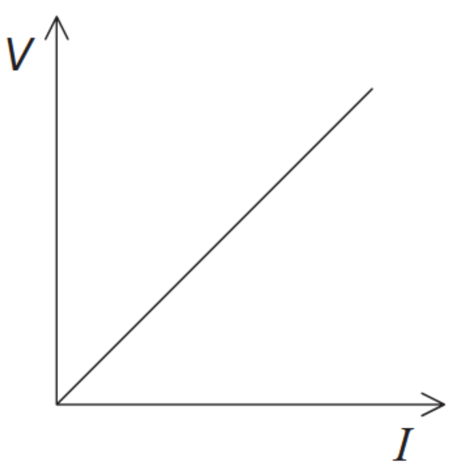
The diagram shows a circuit used to investigate internal resistance of a cell.

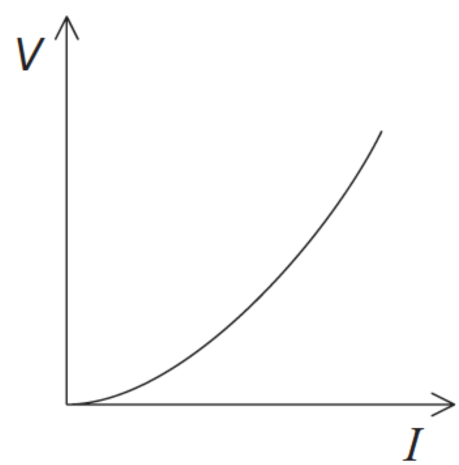


The variable resistor *R* is adjusted and the values of potential difference *V* across the cell and current *I* are recorded. Which graph shows the variation of *V* with *I*?

A.


B.


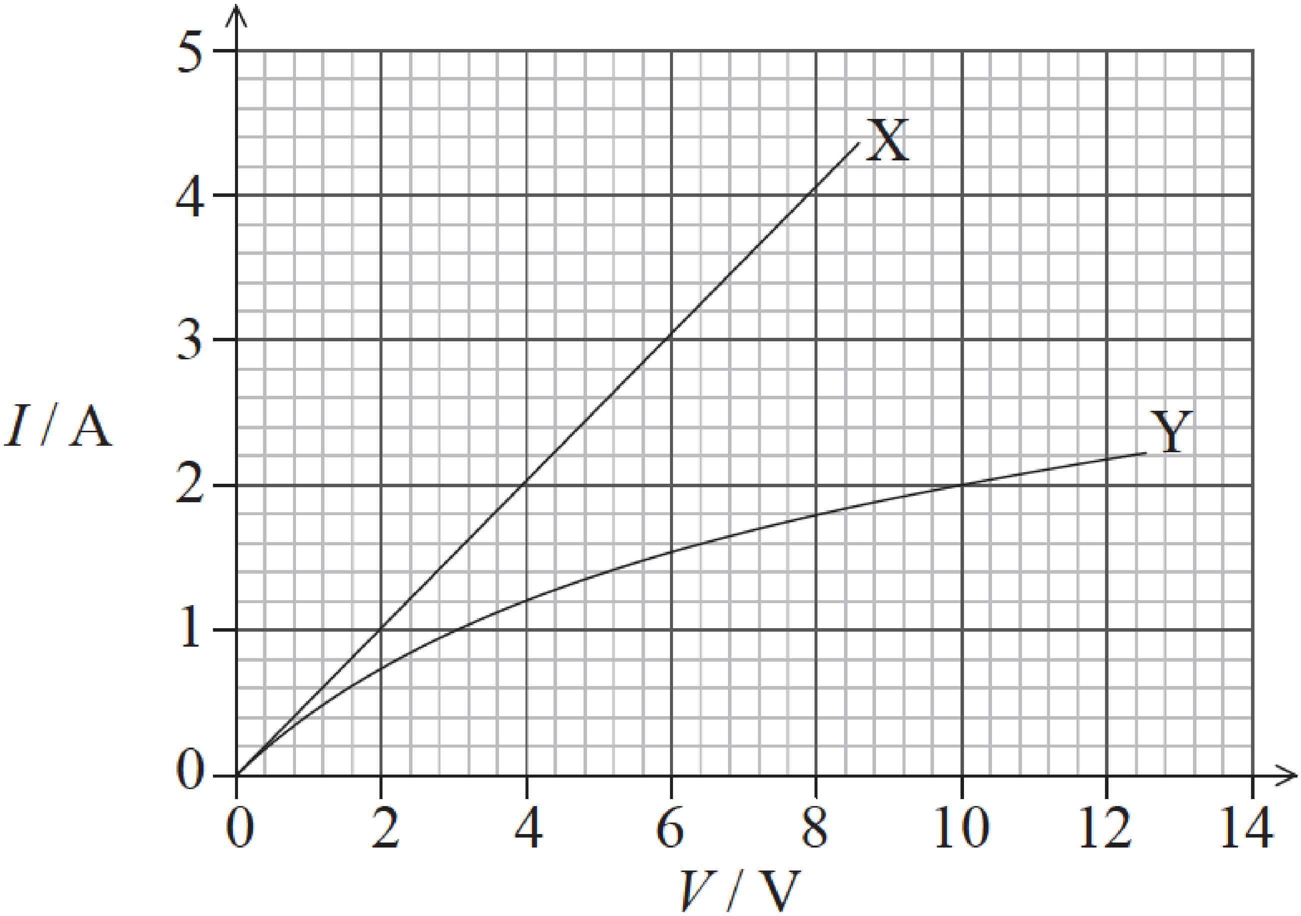
C.


D.


An ideal ammeter is used to measure the current in a resistor. Which of the following gives the resistance of an ideal ammeter and the way it is connected to the resistor?

	Resistance	Connection
A.	infinite	in parallel
B.	infinite	in series
C.	zero	in parallel
D.	zero	in series

The graph shows the *I*–*V* characteristics of two resistors.



When resistors X and Y are connected in series, the current in the resistors is 2.0 A. What is the resistance of the series combination of X and Y?

A. 7.0 Ω

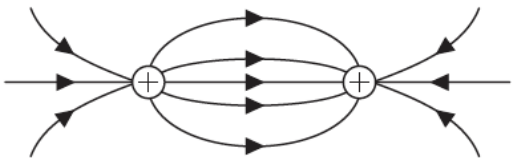
B. 1.3 Ω

C. 1.1 Ω

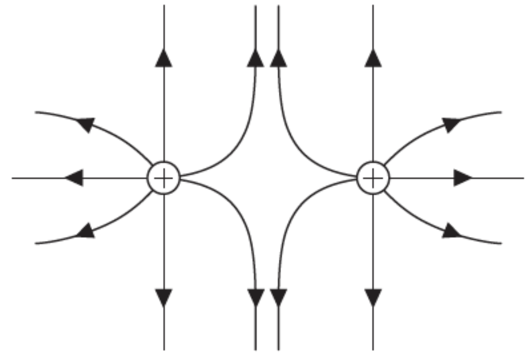
D. 0.14 Ω

Which diagram represents the pattern of electric field lines of two small positive point charges held at the positions shown?

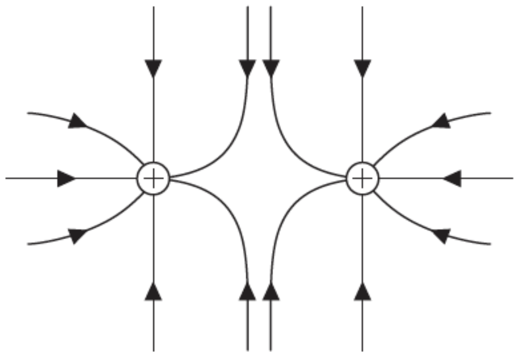
A.



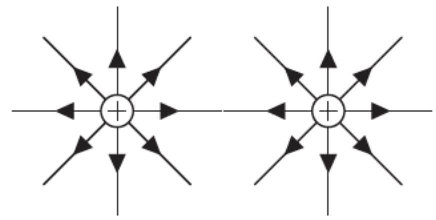
B.



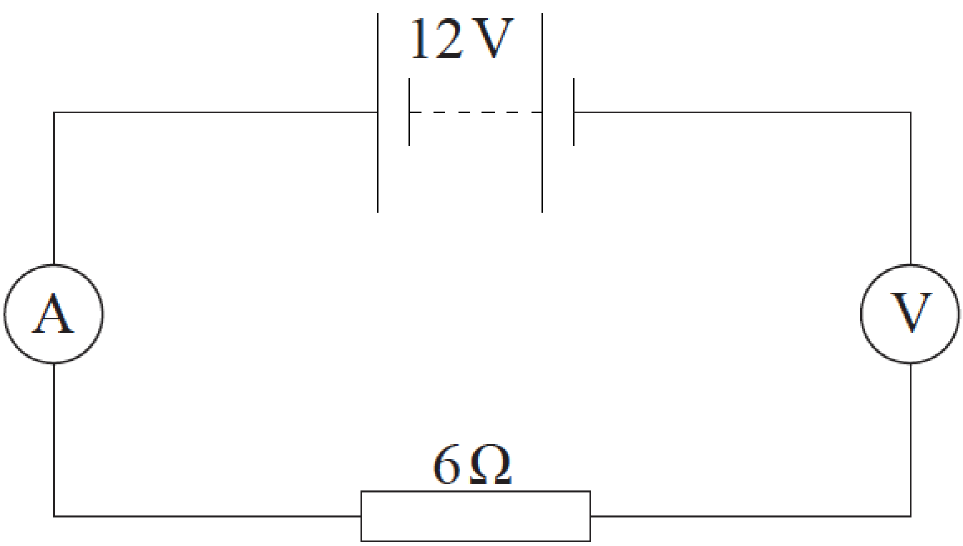
C.



D.



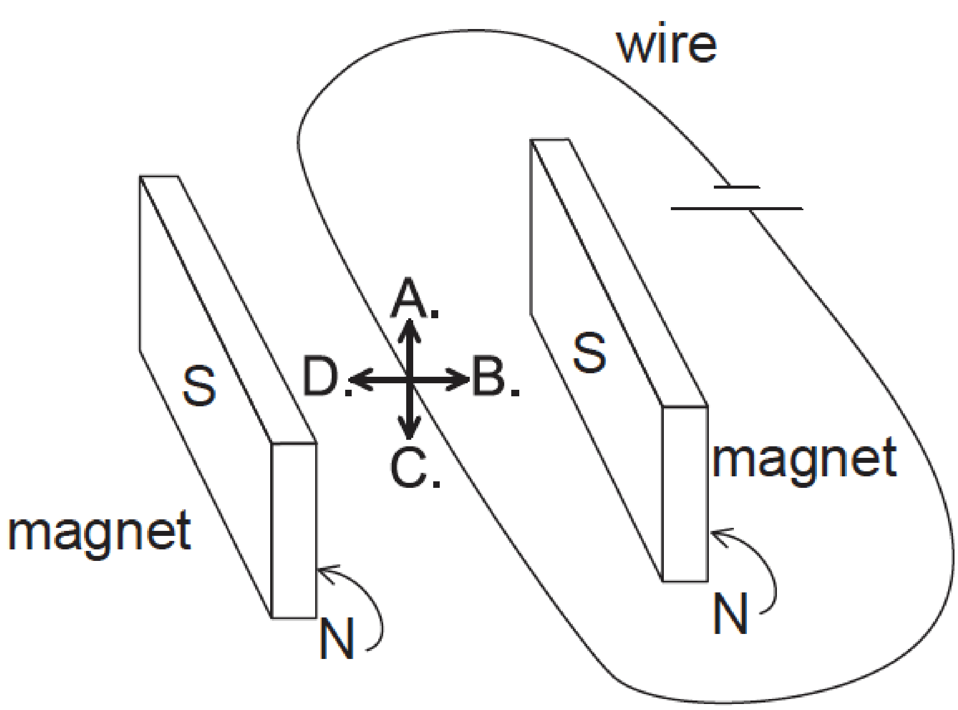
A battery of emf 12 V and negligible internal resistance is connected to a resistor of constant resistance 6 Ω, an ideal ammeter and an ideal voltmeter.



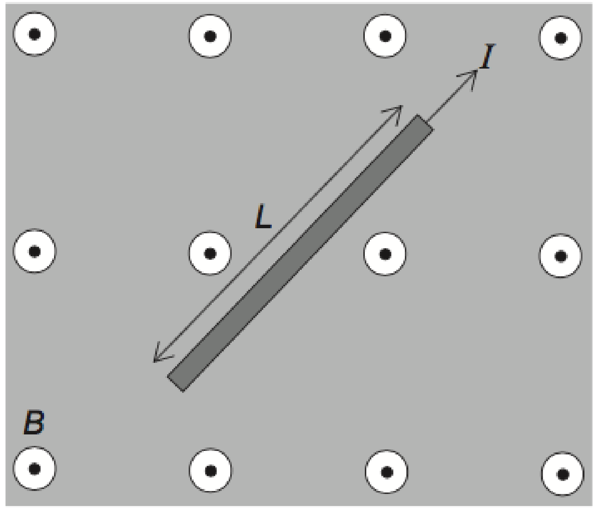
What is the reading on the ammeter and on the voltmeter?

	Ammeter reading / A	Voltmeter reading / V
A.	2.0	0
B.	2.0	12
C.	0	0
D.	0	12

A long, straight, current-carrying wire is placed between a pair of magnets as shown. What is the direction of the force on the wire?



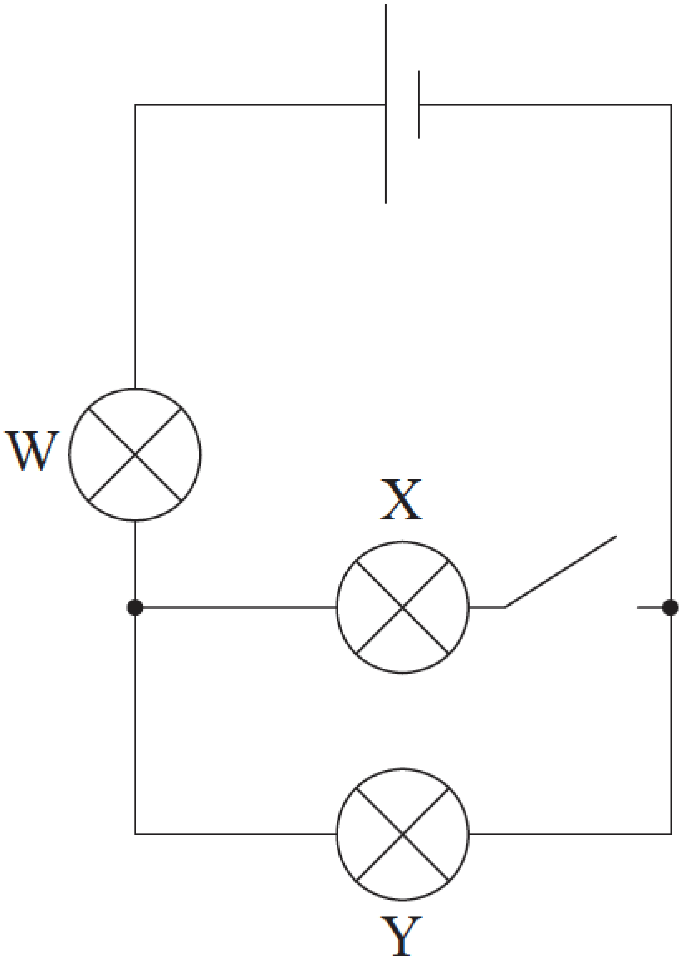
A wire carrying a current *I* is placed in a region of uniform magnetic field *B*, as shown in the diagram.



The direction of the field *B* is out of the page and the length of the wire is *L*. What is correct about the direction and magnitude of the force acting on the wire?

	Direction	Magnitude
A.	↘	equal to *BIL*
B.	↘	smaller than *BIL*
C.	↗	equal to *BIL*
D.	↗	smaller than *BIL*

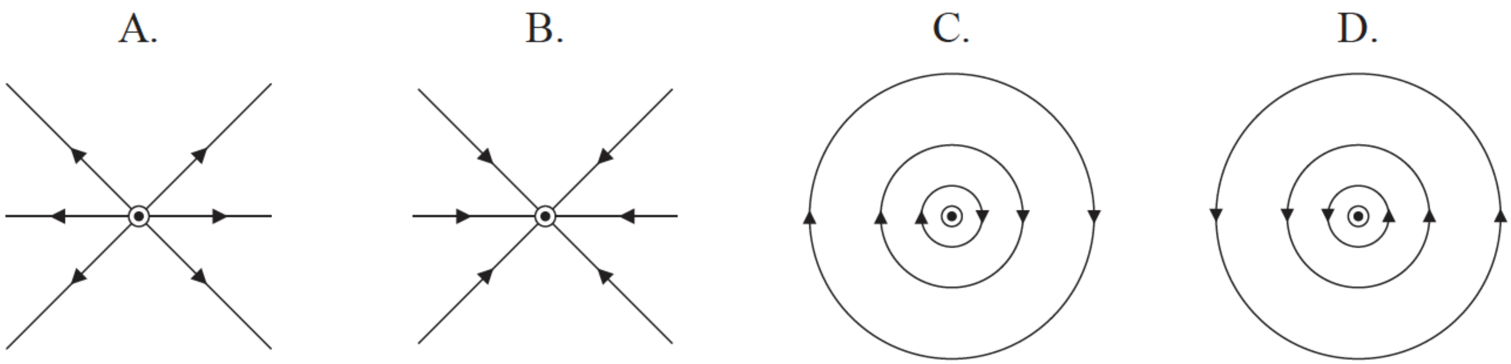
Three identical filament lamps W, X and Y are connected in the circuit as shown. The cell has negligible internal resistance.



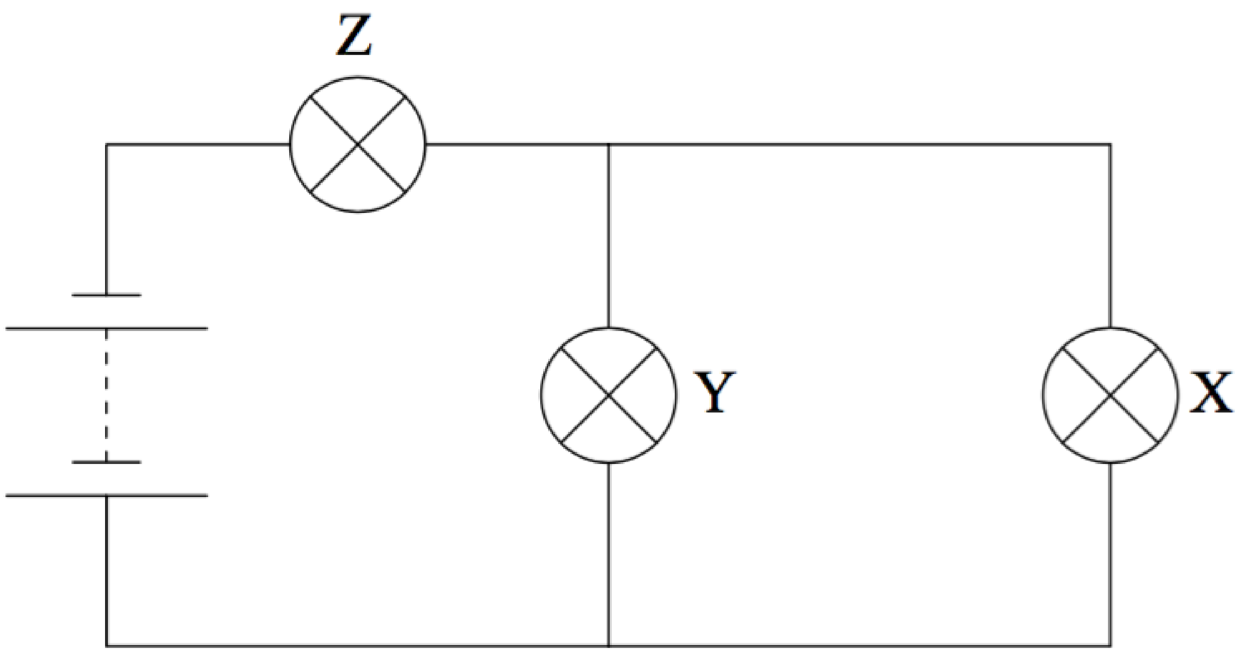
When the switch is closed, all the lamps light. Which of the following correctly describes what happens to the brightness of lamp W and lamp Y when the switch is opened?

	Lamp W	Lamp Y
A.	decreases	decreases
B.	increases	decreases
C.	decreases	increases
D.	increases	increases

A long straight wire carries an electric current perpendicularly out of the paper. Which of the following represents the magnetic field pattern due to the current?



Three identical filament lamps, X, Y and Z, are connected as shown to a battery of negligible internal resistance.

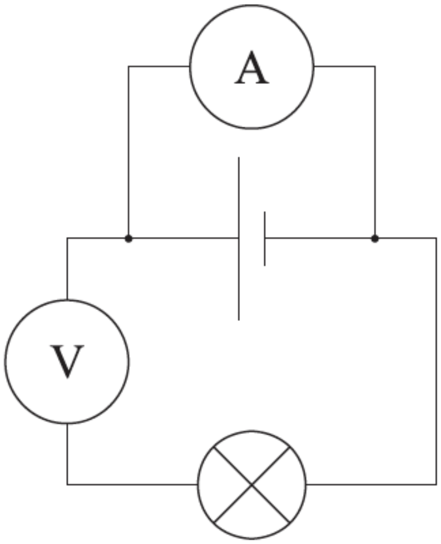


The filament of lamp X breaks. Which of the following correctly describes the change in brightness of lamp Y and of lamp Z?

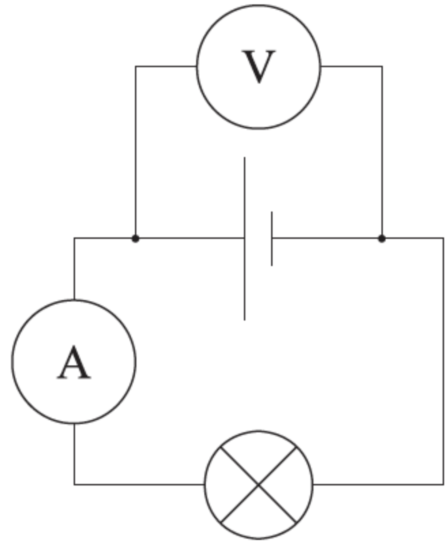
	Lamp Y	Lamp Z
A.	increase	increase
B.	decrease	increase
C.	increase	decrease
D.	decrease	decrease

A lamp is connected to an electric cell and it lights at its working voltage. The lamp is then connected to the same cell in a circuit with an ideal ammeter and an ideal voltmeter. Which circuit allows the lamp to light at the original brightness?

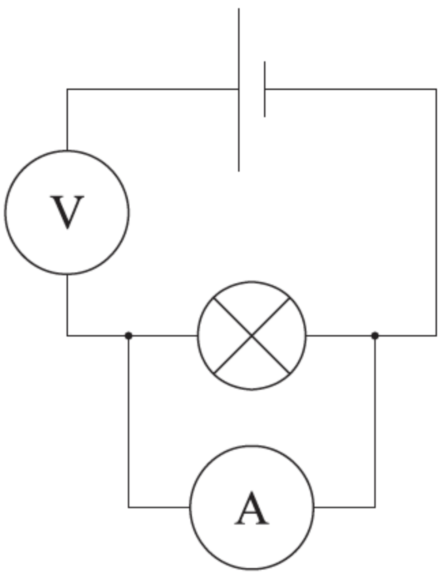
A.



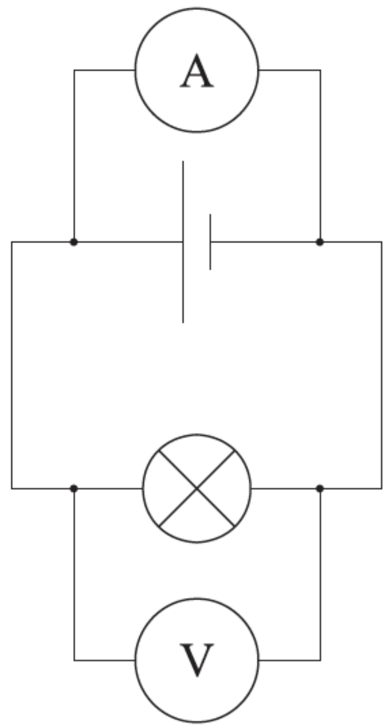
B.



C.



D.



Which of the following is the correct way of connecting an ammeter and of connecting a voltmeter in a circuit designed to measure the characteristics of a thermistor?

	Ammeter	Voltmeter
A.	in series with thermistor	in series with thermistor
B.	in parallel with thermistor	in series with thermistor
C.	in series with thermistor	in parallel with thermistor
D.	in parallel with thermistor	in parallel with thermistor