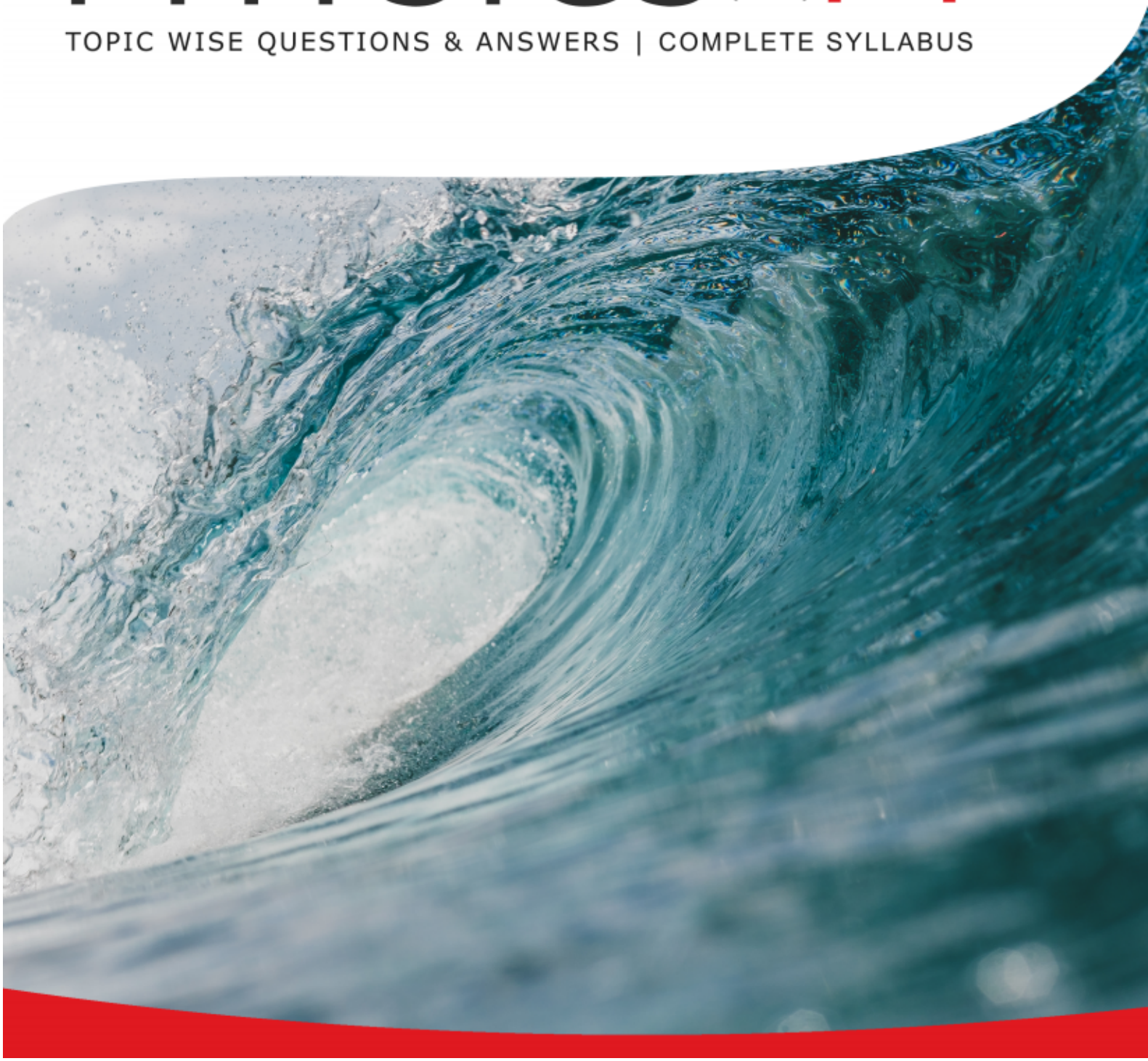
Cambridge International AS & A Level

PHYSICS (9702) P1

TOPIC WISE QUESTIONS & ANSWERS | COMPLETE SYLLABUS



PapaCambridge

Chapter 10

Electric fields

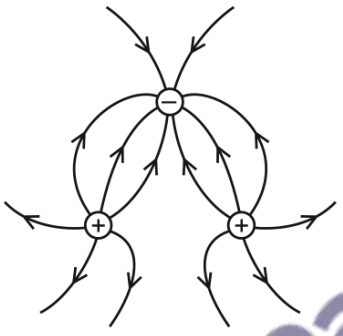
10.1 Concept of an electric field

1008. 9702_m20_qp_12 Q: 30

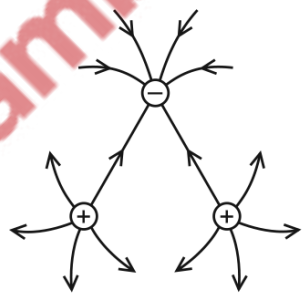
Two positive charges and one negative charge, all of equal magnitude, are set at the corners of an equilateral triangle.

Which diagram represents the electric field surrounding the charges?

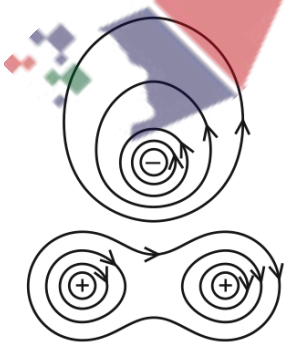
A



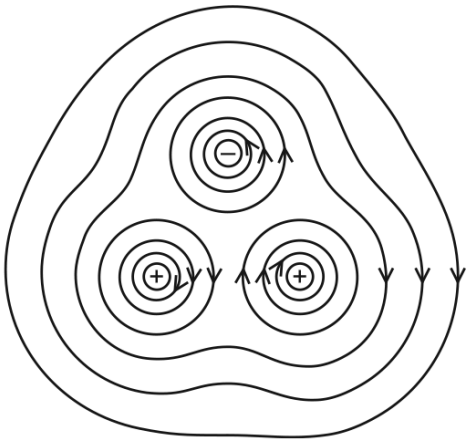
B



C



D



1009. 9702_s20_qp_11 Q: 31

A small charge q is placed in the electric field of a large charge Q.

Both charges experience a force F.

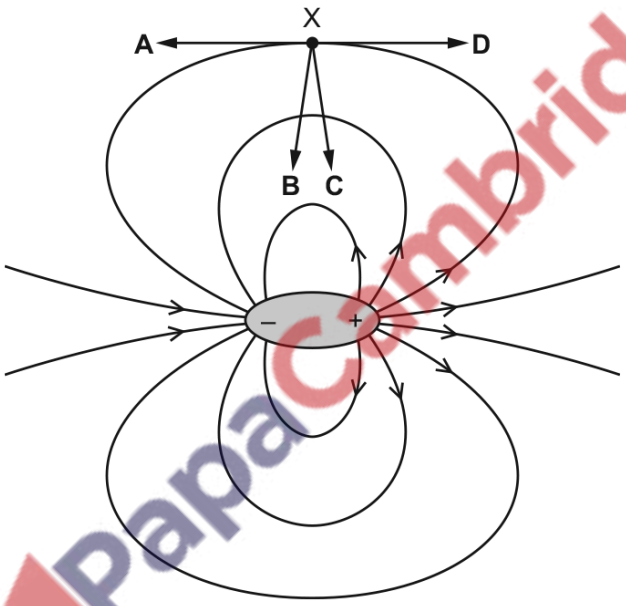
What is the electric field strength of the charge Q at the position of the charge q?

A $\frac{F}{Qq}$ **B** $\frac{F}{Q}$ **C** FqQ **D** $\frac{F}{q}$

1010. 9702_s20_qp_12 Q: 31

A dipole is a pair of charges of equal magnitude, one negative and one positive. The electric field of a dipole is shown below.

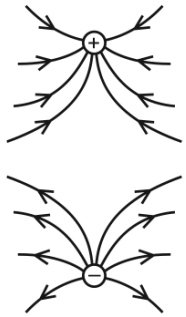
In which direction does the force act on an electron when at point X?



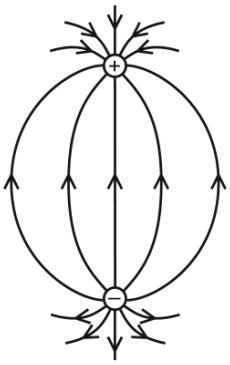
1011. 9702_s20_qp_13 Q: 31

Which diagram best represents the electric field between two point charges of equal magnitude and opposite sign?

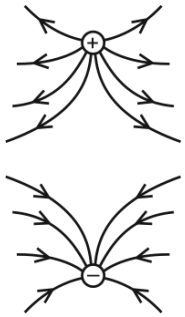
A



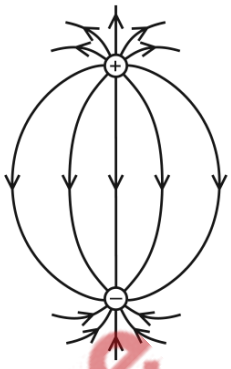
B



C

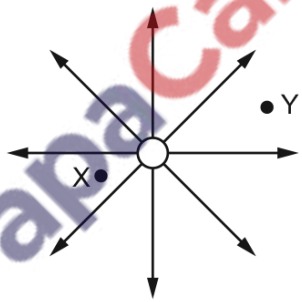


D



1012. 9702_m19_qp_12 Q: 31

The diagram shows the electric field near a point charge and two electrons X and Y.

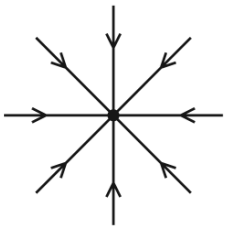


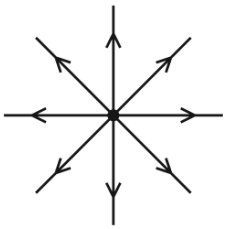
Which row describes the forces acting on X and on Y?

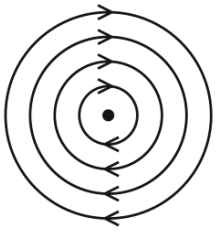
	direction of force	magnitude of force on X
A	radially inwards	less than force on Y
B	radially inwards	greater than force on Y
C	radially outwards	less than force on Y
D	radially outwards	greater than force on Y

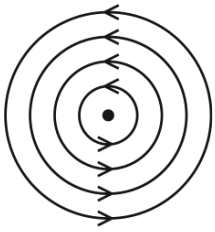
1013. 9702_s19_qp_11 Q: 31

Which diagram shows the pattern of the electric field lines due to a negative point charge?

A 

B 

C 

D 

1014. 9702_s19_qp_11 Q: 32

In an electrolyte, the electric current is carried by charged particles (ions) in solution.

What is **not** a possible value for the charge on an ion in solution?

A -4.8×10^{-19} C

B $+1.6 \times 10^{-19}$ C

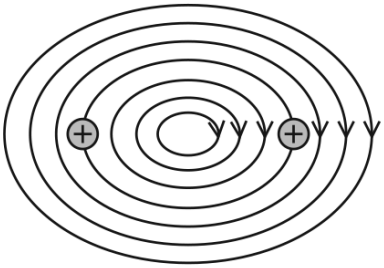
C $+3.2 \times 10^{-19}$ C

D $+4.0 \times 10^{-19}$ C

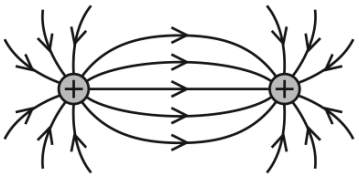
1015. 9702_s19_qp_13 Q: 31

Which diagram represents the electric field line pattern due to a combination of two positive charges?

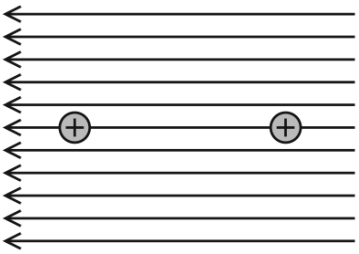
A



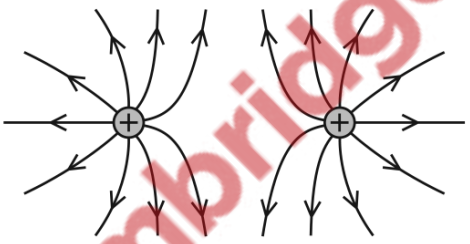
B



C



D



1016. 9702_w19_qp_12 Q: 29

P is a point near to charge X as shown.

When a negatively charged test charge is placed at point P, it is found to experience a force of repulsion from X that is radially away from X.

Which arrow correctly shows the direction of the electric field at point P due to the charge X?

A

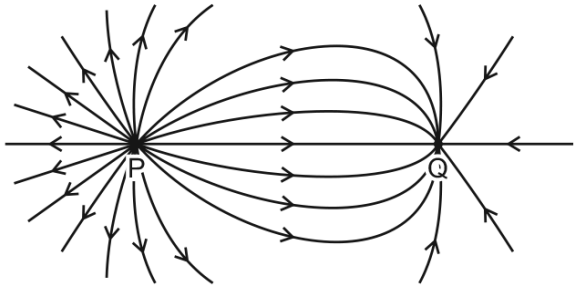
B

C

D

1017. 9702_w19_qp_13 Q: 31

The diagram shows the electric field pattern between two opposite and unequal point charges P and Q.



Which statement about the charges is correct?

A P is negatively charged and has a smaller charge than Q.

B P is negatively charged and has a greater charge than Q.

C P is positively charged and has a smaller charge than Q.

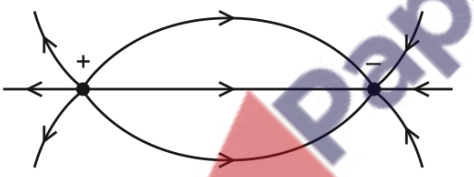
D P is positively charged and has a greater charge than Q.

1018. 9702_s18_qp_12 Q: 31

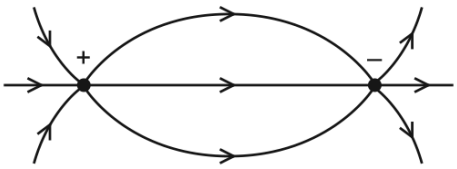
Four diagrams representing the electric field between two oppositely-charged point charges are shown.

Which diagram correctly shows the electric field lines?

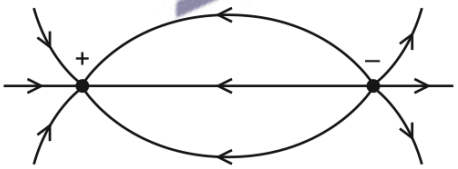
A



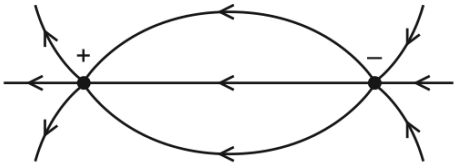
B



C

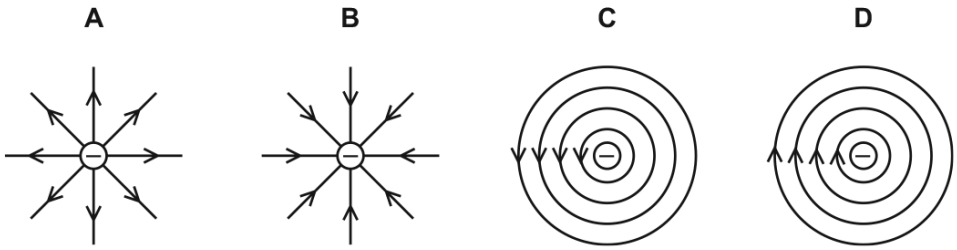


D



1019. 9702_w18_qp_11 Q: 30

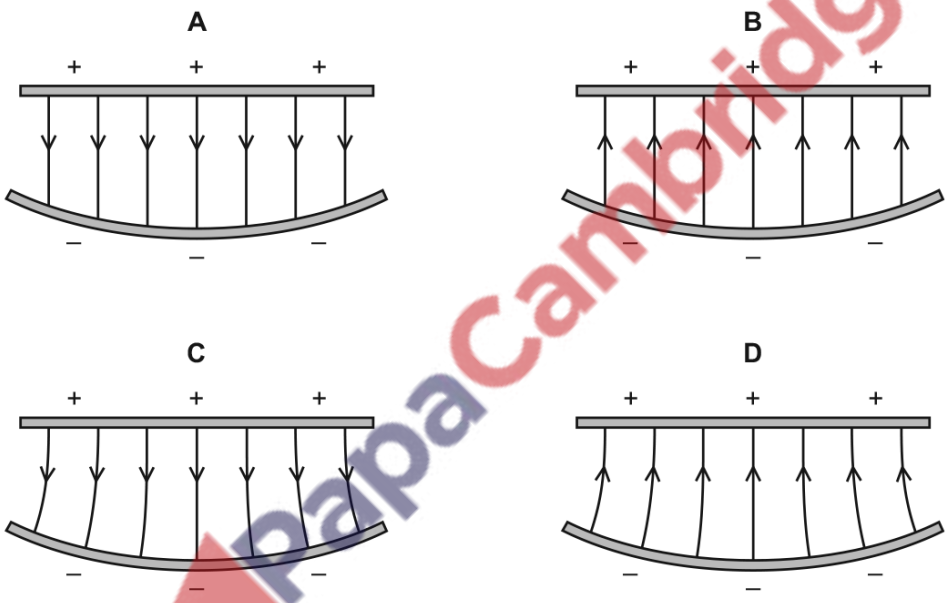
Which diagram shows the electric field lines surrounding an isolated negative point charge?



1020. 9702_w18_qp_12 Q: 31

A flat plate is positively charged and a curved plate is negatively charged.

Which diagram shows the electric field lines between the two plates?

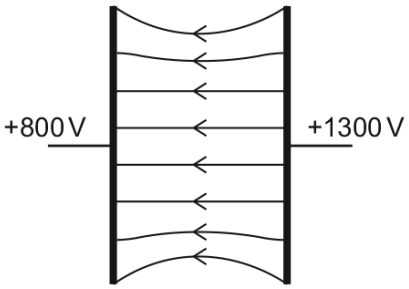


1021. 9702_w18_qp_13 Q: 30

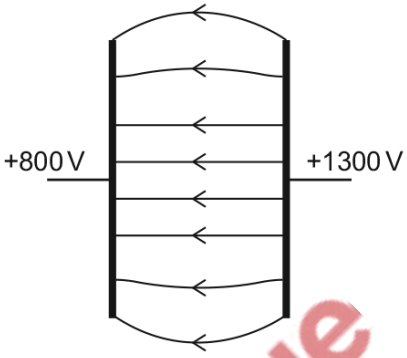
Two parallel metal plates are at electric potentials of +800 V and +1300 V.

Which diagram best represents the electric field between the metal plates?

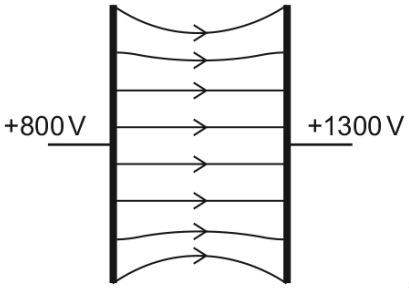
A



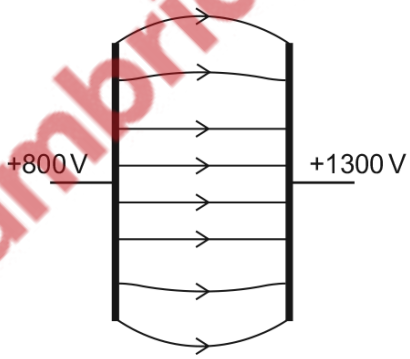
B



C



D

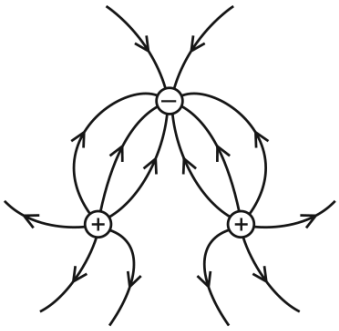


1022. 9702_m17_qp_12 Q: 30

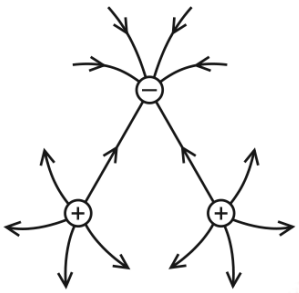
Two positive charges and one negative charge, all of equal magnitude, are set at the corners of an equilateral triangle.

Which diagram best represents the electric field surrounding the charges?

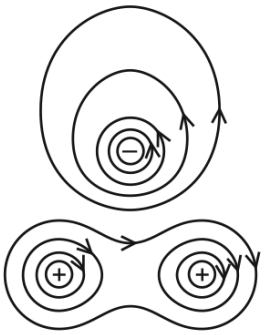
A



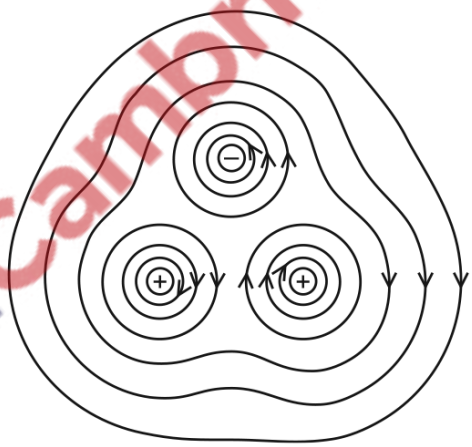
B



C



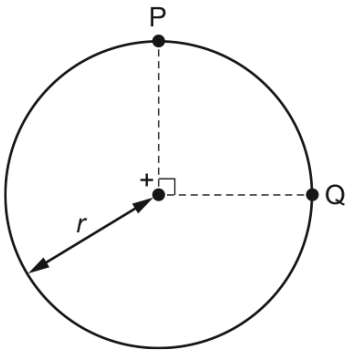
D



1023. 9702_s17_qp_11 Q: 30

The diagram shows two points P and Q which lie 90° apart on a circle of radius *r*.

A positive point charge at the centre of the circle creates an electric field of magnitude *E* at both P and Q.



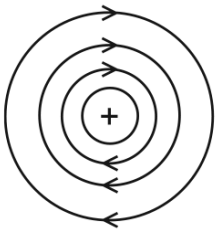
Which expression gives the work done in moving a unit positive charge from P to Q?

A 0 **B** $E \times r$ **C** $E \times \left(\frac{\pi r}{2}\right)$ **D** $E \times (\pi r)$

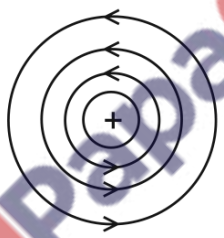
1024. 9702_s17_qp_12 Q: 30

Which diagram best illustrates the electric field around a positive point charge?

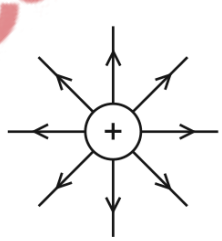
A



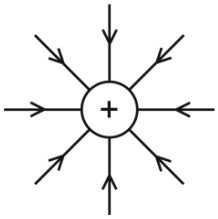
B



C



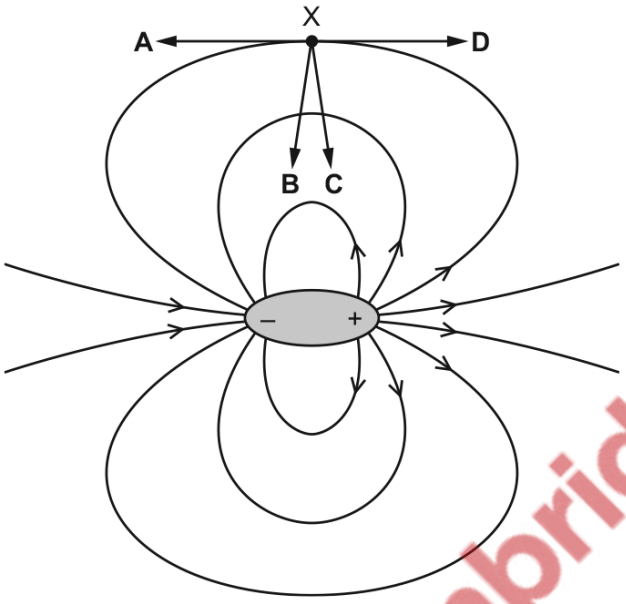
D



1025. 9702_s17_qp_13 Q: 29

A dipole is a pair of charges of equal magnitude, one negative and one positive. The electric field of a dipole is shown below.

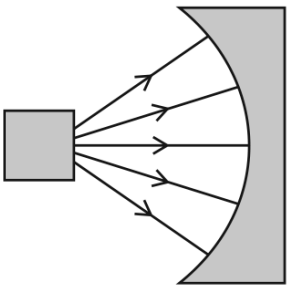
In which direction does the force act on an electron when at point X?



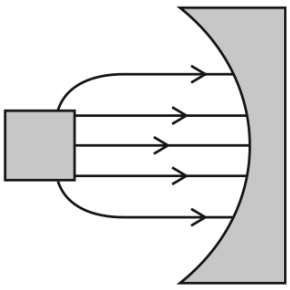
1026. 9702_s16_qp_11 Q: 29

Which diagram could represent the electric field lines between two oppositely charged conducting surfaces?

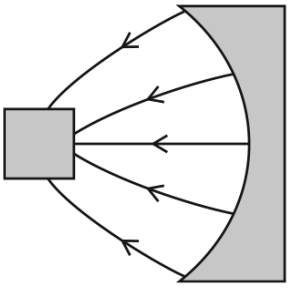
A



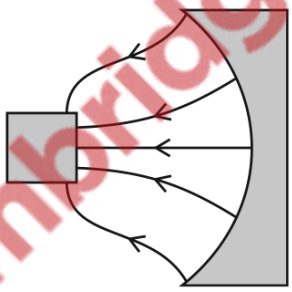
B



C



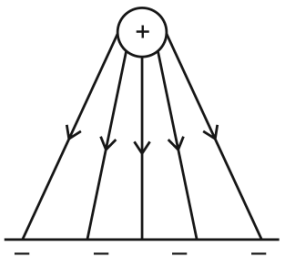
D



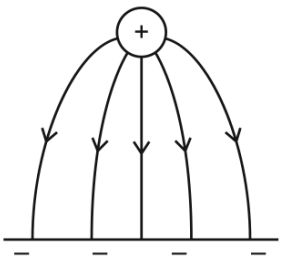
1027. 9702_s16_qp_12 Q: 29

Which diagram shows the pattern of the electric field between a positively charged metal sphere and a negatively charged metal plate?

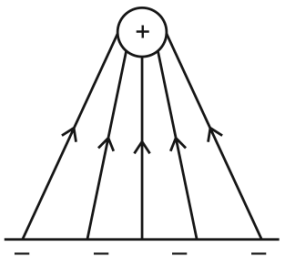
A



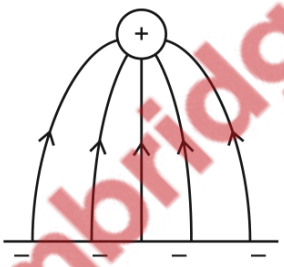
B



C



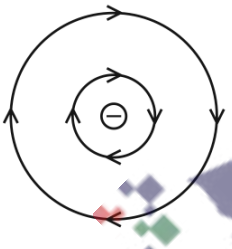
D



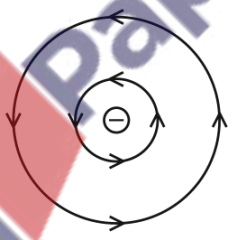
1028. 9702_s16_qp_13 Q: 29

Which diagram shows the electric field pattern of an isolated negative point charge?

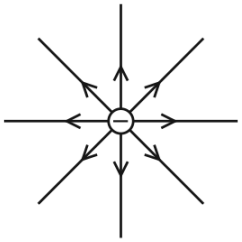
A



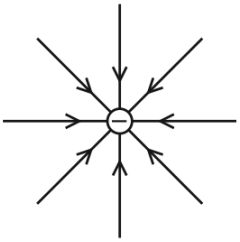
B



C



D

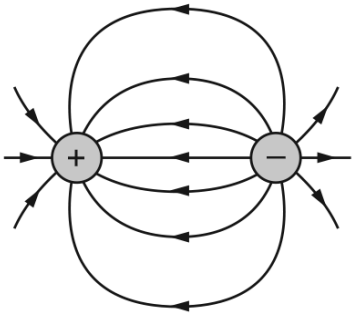


1029. 9702_s15_qp_12 Q: 29

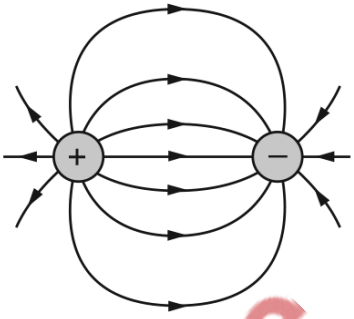
A positive charge and a negative charge of equal magnitude are placed a short distance apart.

Which diagram best represents the associated electric field?

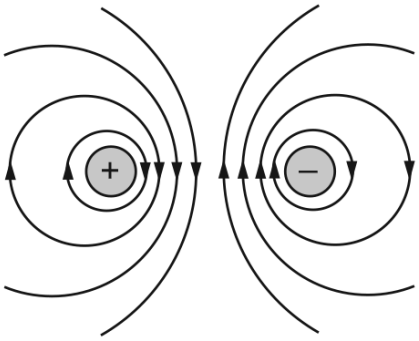
A



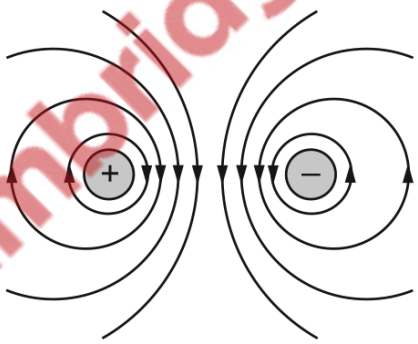
B



C



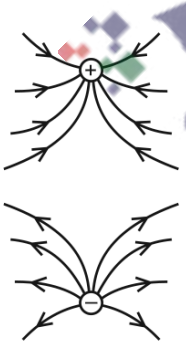
D



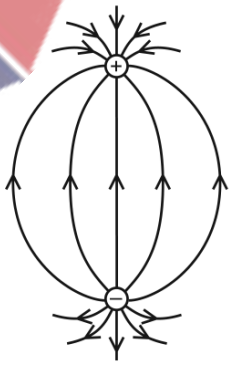
1030. 9702_s15_qp_13 Q: 31

Which diagram best represents the electric field between two point charges of equal magnitude and opposite sign?

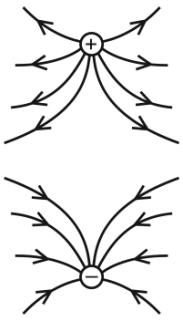
A



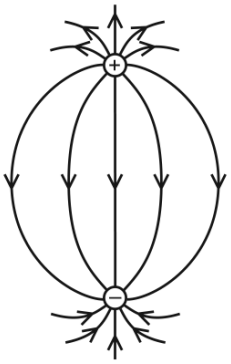
B



C



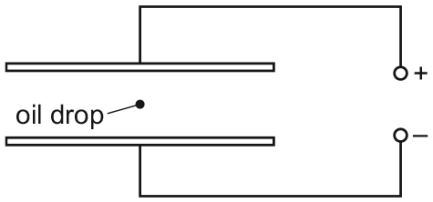
D



10.2 Uniform electric fields

1031. 9702_m20_qp_12 Q: 31

A negatively charged oil drop is held stationary, equidistant between two plates connected to a high voltage supply, as shown.



Which change would **not** increase the upward electrical force on the drop?

A decreasing the distance between the plates whilst keeping the drop equidistant from them

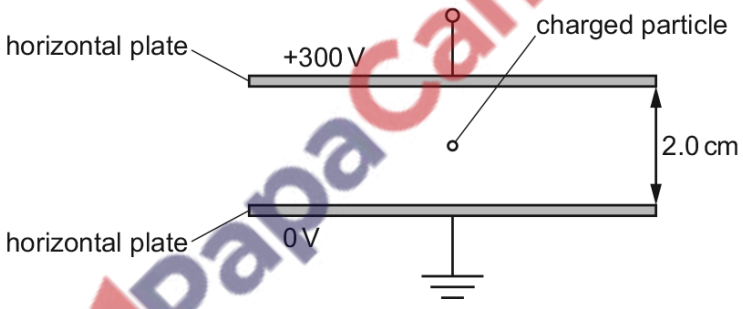
B increasing the amount of negative charge on the drop

C increasing the supply voltage

D moving the drop closer to the positive plate

1032. 9702_s20_qp_11 Q: 32

A charged particle is in a vacuum between two horizontal metal plates as shown.



The acceleration of the particle is $7.15 \times 10^{11}\,\text{m s}^{-2}$ downwards. The particle has a mass of $3.34 \times 10^{-27}\,\text{kg}$.

What is the charge on the particle?

A $+1.6 \times 10^{-19}\,\text{C}$

B $-1.6 \times 10^{-19}\,\text{C}$

C $+1.6 \times 10^{-17}\,\text{C}$

D $-1.6 \times 10^{-17}\,\text{C}$

1033. 9702_s20_qp_12 Q: 32

A charged oil droplet of mass m is falling, initially freely, in a vacuum between two horizontal metal plates that are separated by a distance x.

A potential difference (p.d.) V is then applied across the plates. This results in the oil droplet continuing to accelerate downwards but with a reduced acceleration a.

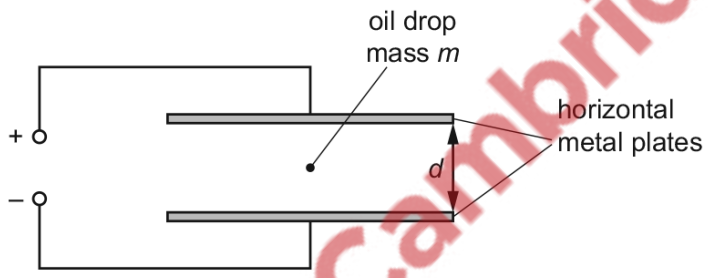
The polarity of the applied p.d. is then reversed so that the direction of the electric force on the droplet is reversed. This results in the downwards acceleration of the oil droplet increasing to $3a$.

What is the magnitude of the charge on the oil droplet?

A $\frac{max}{V}$ **B** $2\frac{max}{V}$ **C** $3\frac{max}{V}$ **D** $4\frac{max}{V}$

1034. 9702_s20_qp_13 Q: 32

A negatively charged oil drop of mass m is between two horizontal parallel metal plates a distance d apart.



When the potential difference (p.d.) between the plates is V_1 the oil drop rises at a constant speed. When the p.d. is decreased to a value V_2 the oil drop falls at the same constant speed.

Air resistance acts on the drop when it is moving. The upthrust on the drop is negligible.

The acceleration of free fall is g.

What is the charge on the oil drop?

A $\frac{mdg}{V_1 - V_2}$ **B** $\frac{mdg}{V_1 + V_2}$ **C** $\frac{2mdg}{V_1 - V_2}$ **D** $\frac{2mdg}{V_1 + V_2}$

1035. 9702_m19_qp_12 Q: 30

Two horizontal parallel plate conductors are separated by a distance of 5.0 mm in air. The lower plate is earthed and the potential of the upper plate is +50 V.

What is the electric field strength E at a point midway between the plates?

A $1.0 \times 10^4\,\text{V m}^{-1}$ downwards

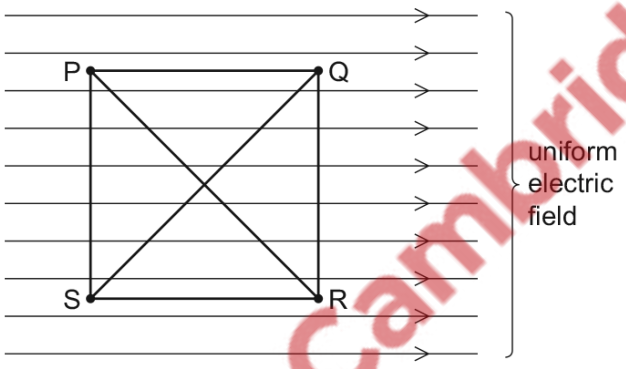
B $1.0 \times 10^4\,\text{V m}^{-1}$ upwards

C $2.0 \times 10^4\,\text{V m}^{-1}$ downwards

D $2.0 \times 10^4\,\text{V m}^{-1}$ upwards

1036. 9702_s19_qp_12 Q: 13

A small positive charge can move inside a uniform electric field.



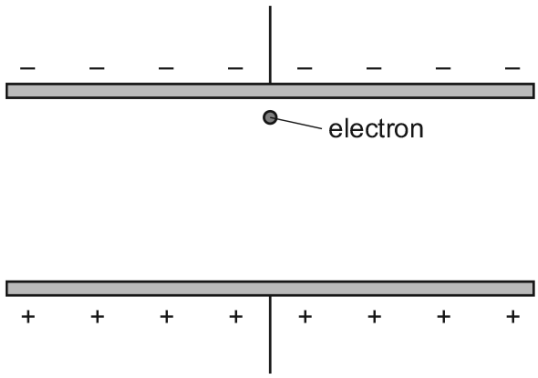
The charge moves along different straight paths between points P, Q, R and S.

Which row gives two paths that result in the same total work done on the charge?

	path 1	path 2
A	P to R	Q to S
B	P to R	P to S
C	S to Q	S to R
D	S to Q	R to P

1037. 9702_s19_qp_12 Q: 32

An electron is situated in a vacuum between two charged plates, as shown.



Which statement describes the motion of the electron due to the uniform electric field?

A It moves downwards with a constant acceleration.

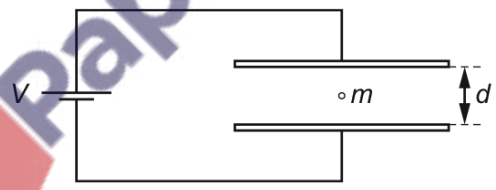
B It moves downwards with zero acceleration.

C It moves upwards with a constant acceleration.

D It moves upwards with a decreasing acceleration.

1038. 9702_w19_qp_12 Q: 30

A charged oil drop of mass m, with n excess electrons, is held stationary in the uniform electric field between two horizontal plates separated by a distance d.



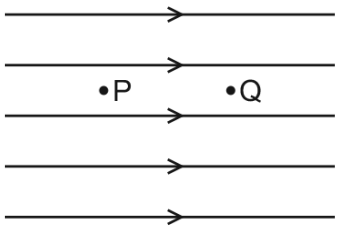
The voltage between the plates is V, the elementary charge is e and the acceleration of free fall is g.

What is the value of n?

A $\frac{eV}{mgd}$ **B** $\frac{mgd}{eV}$ **C** $\frac{meV}{gd}$ **D** $\frac{gd}{meV}$

1039. 9702_w19_qp_13 Q: 32

A uniform electric field is represented by five horizontal field lines.



P and Q are two points in the field. The field causes a positively charged particle in a vacuum to move from P to Q.

Which statement must be correct?

A The acceleration of the particle between P and Q is increasing.

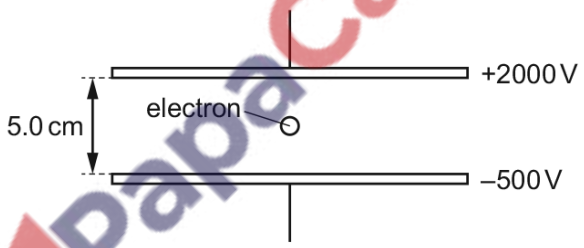
B The kinetic energy of the particle at P is the same as the kinetic energy of the particle at Q.

C The force on the particle at Q is greater than the force on the particle at P.

D Work is done on the particle as it moves from P to Q.

1040. 9702_m18_qp_12 Q: 30

An electron passes into the space between two parallel plates that are 5.0 cm apart and which are maintained at electric potentials of +2000 V and –500 V, respectively.



What is the electric force on the electron?

A 1.6×10^{-15} N

B 4.8×10^{-15} N

C 6.4×10^{-15} N

D 8.0×10^{-15} N

1041. 9702_m18_qp_12 Q: 31

Which statement about electric charges in a uniform electric field is **not** correct?

A Electric charges of the same magnitude, whether positive or negative, experience the same magnitude of force when placed in the same uniform electric field.

B The direction of the force on a positive charge placed in a uniform electric field is independent of the magnitude of the charge.

C The magnitude of the force on a positive charge placed in a uniform electric field is proportional to the magnitude of the electric field strength.

D The work done to move a positive charge a certain distance in a uniform electric field is independent of the direction of the movement.

1042. 9702_s18_qp_11 Q: 28

A particle has a charge of +2.0 mC and is in a vertical uniform electric field. An electric force of 1.0×10^{-2} N acts upwards on the particle.

What is the electric field strength?

A $0.20\,\text{V m}^{-1}$ downwards

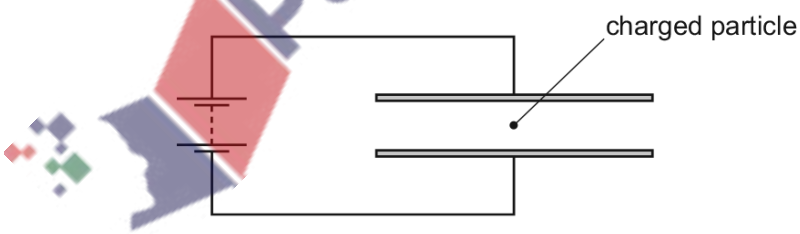
B $0.20\,\text{V m}^{-1}$ upwards

C $5.0\,\text{V m}^{-1}$ downwards

D $5.0\,\text{V m}^{-1}$ upwards

1043. 9702_s18_qp_11 Q: 29

A charged particle is in the electric field between two horizontal metal plates connected to a battery, as shown. There is a force F on the particle due to the electric field.



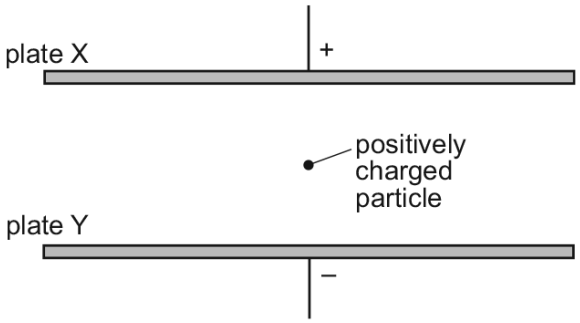
The separation of the plates is doubled.

What is the new force on the particle?

A $\frac{F}{4}$ **B** $\frac{F}{2}$ **C** F **D** $2F$

1044. 9702_s18_qp_12 Q: 30

Two large parallel metal plates X and Y are situated in a vacuum as shown.



Plates X and Y carry equal and opposite charges.

What happens to the force on a positively charged particle as it moves from plate X to plate Y?

A It decreases because the positively charged particle is moving away from the positively charged plate.

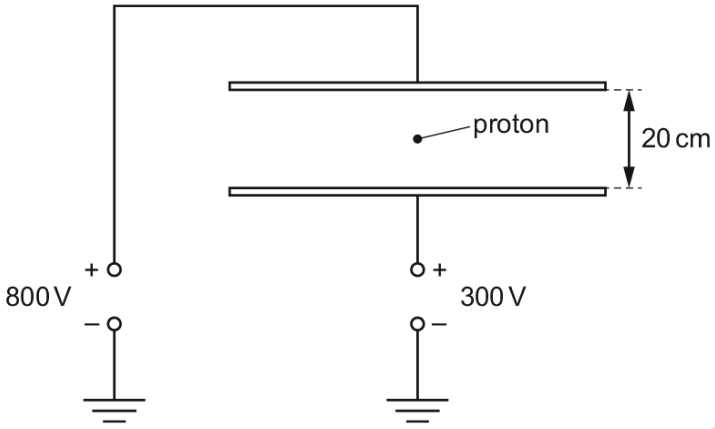
B It decreases because the positively charged particle is moving in the direction of the electric field between the plates.

C It increases because the positively charged particle is moving closer to a negatively charged plate.

D It remains constant because the positively charged particle is in the uniform electric field between the plates.

1045. 9702_s18_qp_13 Q: 27

Two parallel metal plates are situated 20 cm apart in a vacuum. They are connected to two sources of potential difference as shown.



A proton is released in the space between the plates.

What is the magnitude and direction of the acceleration of the proton?

A $2.4 \times 10^{11}\,\text{m s}^{-2}$ downwards

B $2.4 \times 10^{11}\,\text{m s}^{-2}$ upwards

C $5.3 \times 10^{11}\,\text{m s}^{-2}$ downwards

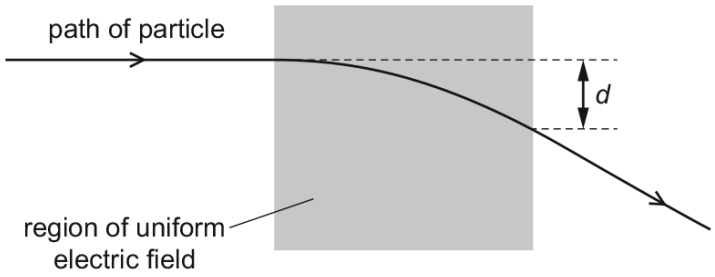
D $5.3 \times 10^{11}\,\text{m s}^{-2}$ upwards

1046. 9702_s18_qp_13 Q: 28

A particle having mass m and charge $+q$ enters a uniform electric field with speed v.

Initially, the particle is travelling at right-angles to the electric field.

During its movement through the field, the particle is deflected through distance d, as shown.



A second particle of mass $2m$, charge $+q$ and speed v enters the electric field along the same path.

What is the distance through which this particle is deflected in the electric field?

A $\frac{d}{4}$ **B** $\frac{d}{2}$ **C** $2d$ **D** $4d$

1047. 9702_w18_qp_11 Q: 31

A beam of electrons is directed into an electric field and is deflected by it.

Diagram 1 represents an electric field in the plane of the paper.
Diagram 2 represents an electric field directed perpendicular to the plane of the paper.

The lines **A**, **B**, **C** and **D** represent possible paths of the electron beam. All paths are in the plane of the paper.

Which line best represents the path of the electrons inside the field?

diagram 1

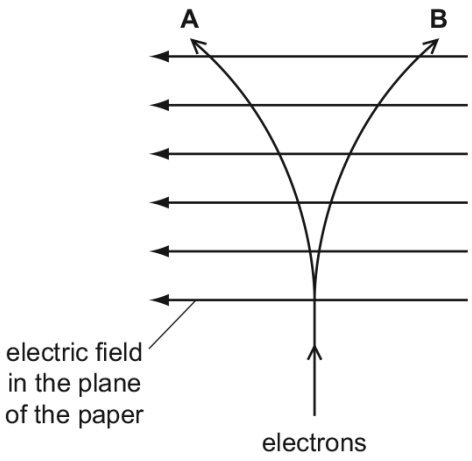
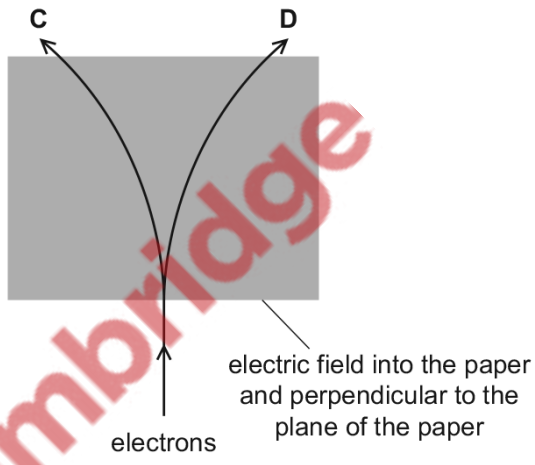


diagram 2



1048. 9702_w18_qp_11 Q: 32

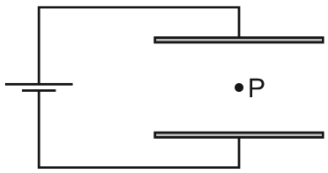
A charged particle of charge q and mass m is initially at rest in a uniform electric field. The field is produced by parallel metal plates separated by a distance d and having a potential difference V between them.

What is an expression for the acceleration of the charged particle?

A $\frac{md}{qV}$ **B** $\frac{mV}{qd}$ **C** $\frac{qd}{mV}$ **D** $\frac{qV}{md}$

1049. 9702_w18_qp_12 Q: 32

Two parallel metal plates are connected to a d.c. supply, as shown.

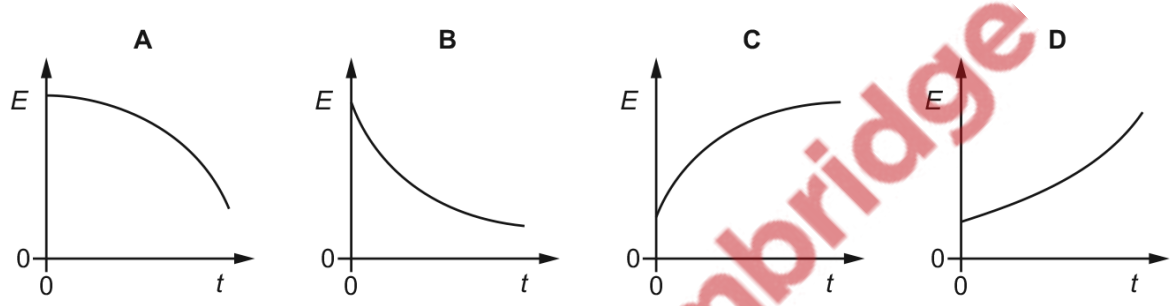


The two plates are moved towards each other at constant speed.

It may be assumed that the electric field between the plates is uniform.

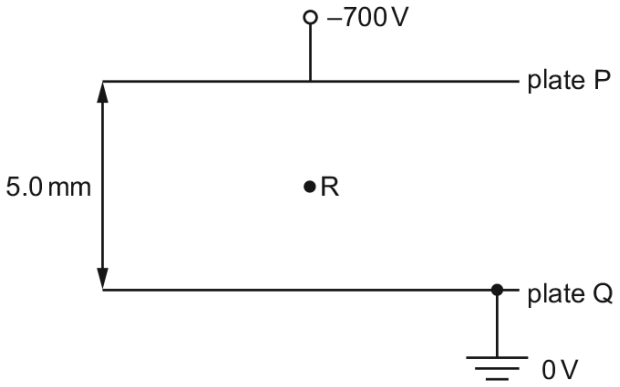
Point P is mid-way between the two plates.

Which graph shows the variation with time *t* of the electric field strength *E* at point P?



1050. 9702_w18_qp_13 Q: 31

The diagram shows two metal plates P and Q. There is a potential difference of 700 V between the plates. Plate Q is earthed.



What is the magnitude and direction of the electric field at point R?

A $1.4 \times 10^2\,\text{N C}^{-1}$ from P towards Q

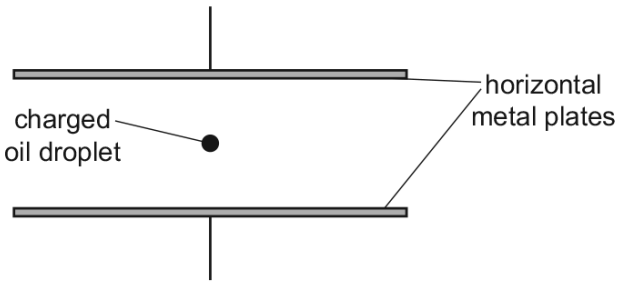
B $1.4 \times 10^2\,\text{N C}^{-1}$ from Q towards P

C $1.4 \times 10^5\,\text{N C}^{-1}$ from P towards Q

D $1.4 \times 10^5\,\text{N C}^{-1}$ from Q towards P

1051. 9702_m17_qp_12 Q: 31

A constant potential difference is applied between two horizontal metal plates. A charged oil droplet is held stationary by the electric field between the plates.



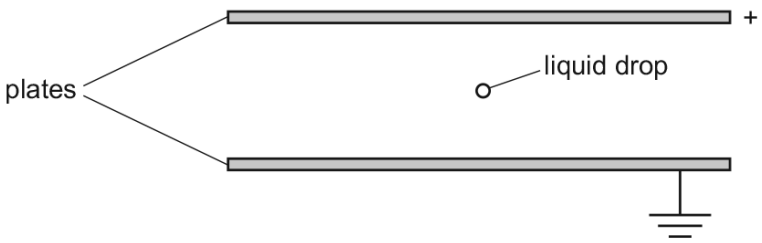
As some of the oil evaporates, the droplet loses mass and starts to accelerate. Its charge remains constant.

In which direction does the droplet accelerate, and which change needs to be made to the separation of the plates in order to stop this acceleration?

	direction of acceleration	separation of the plates
A	downwards	decrease
B	downwards	increase
C	upwards	decrease
D	upwards	increase

1052. 9702_s17_qp_11 Q: 31

The diagram shows two parallel horizontal metal plates. The top plate is positively charged and the bottom plate is earthed.



A small charged liquid drop, midway between the plates, is held in equilibrium by the combination of its weight and the electric force acting on it.

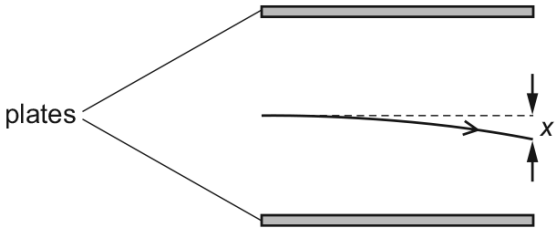
The acceleration of free fall is g and the electric field strength is E.

What is the polarity of the charge on the drop, and the ratio of charge to mass of the drop?

	polarity	$\frac{\text{charge}}{\text{mass}}$
A	negative	$\frac{E}{g}$
B	negative	$\frac{g}{E}$
C	positive	$\frac{E}{g}$
D	positive	$\frac{g}{E}$

1053. 9702_s17_qp_12 Q: 31

The path of an electron with initial speed v in the uniform electric field between two parallel plates is shown.



The vertical deflection x is measured at the right-hand edge of the plates.

The distance between the plates is halved. The potential difference between the plates remains the same.

What will be the new deflection of the electron with the same initial speed v?

A x **B** $\sqrt{2}x$ **C** $2x$ **D** $4x$

1054. 9702_s17_qp_13 Q: 30

In a uniform electric field, which statement is correct?

A All charged particles experience the same force.

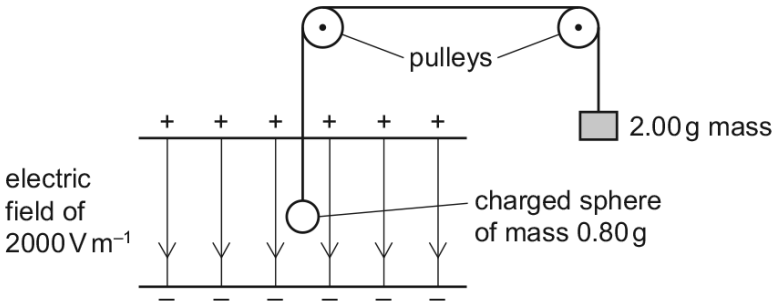
B All charged particles move with the same velocity.

C All electric field lines are directed towards positive charges.

D All electric field lines are parallel.

1055. 9702_w17_qp_11 Q: 31

A small charged sphere of mass 0.80 g hangs from a light thread inside a vertical uniform electric field of strength 2000 V m^{-1}. The thread passes over two frictionless pulleys and a mass of 2.00 g hangs on the other end.



The sphere is in equilibrium.

What is the charge on the sphere?

A –5.9 μC **B** +0.60 μC **C** +5.9 μC **D** +9.8 μC

1056. 9702_w17_qp_11 Q: 32

An electron enters a region of space where there is a uniform electric field *E* as shown.

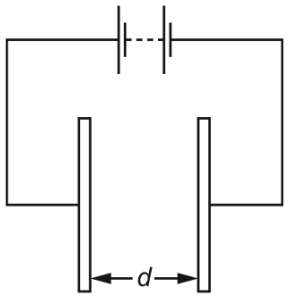
Initially, the electron is moving parallel to, and in the direction of, the electric field.

What is the subsequent path and change of speed of the electron caused by the electric field?

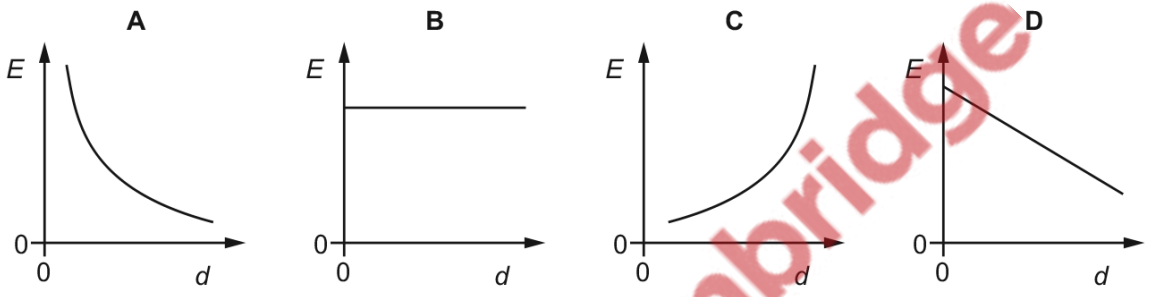
	path of electron	speed of electron
A	curved	decreases
B	curved	increases
C	linear	decreases
D	linear	increases

1057. 9702_w17_qp_12 Q: 31

The diagram shows two metal plates connected to a constant high voltage.



Which graph shows the variation of the electric field strength E midway between the two plates as the distance d between the two plates is increased?



1058. 9702_w17_qp_12 Q: 32

An electron moves between two points X and Y in a uniform electric field, as shown.

The distance between X and Y is 4.0 cm and the line XY is at an angle of 60° to the direction of the field.

The field exerts the only force on the electron.

The field strength is 100 N C^{-1}.

What is the change in the kinetic energy of the electron as it moves from X to Y?

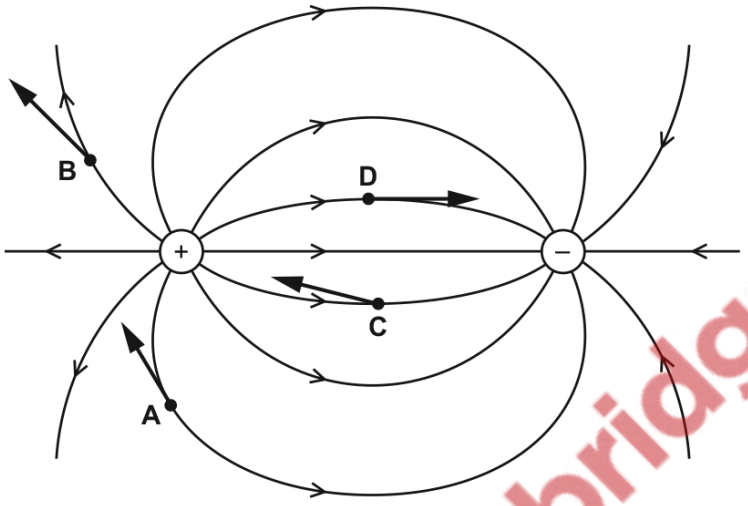
A −4 eV **B** −2 eV **C** +2 eV **D** +4 eV

1059. 9702_w17_qp_13 Q: 31

The diagram shows the electric field near a positively charged sphere and a negatively charged sphere.

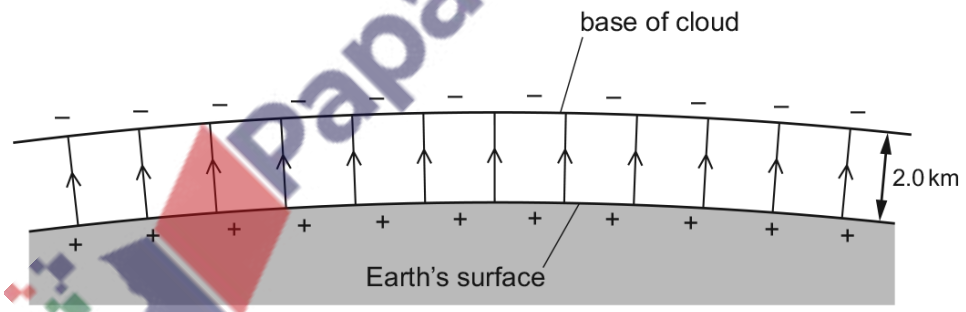
Four electrons **A**, **B**, **C** and **D** are shown at different positions in the field.

On which electron is the direction of the force on the electron shown correctly?



1060. 9702_w17_qp_13 Q: 32

Lightning can occur between a charged cloud and the Earth's surface when the electric field strength in the intervening atmosphere reaches 25 kN C^{-1}. The diagram shows the electric field between the base of a cloud and the Earth's surface.



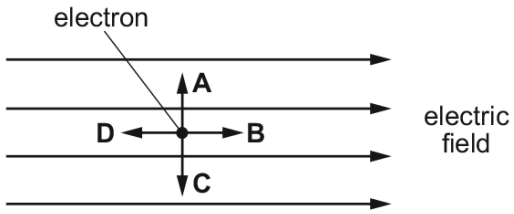
What is the minimum potential difference between the Earth and the base of a cloud, 2.0 km high, for lightning to occur?

A 12.5 MV **B** 25 MV **C** 50 MV **D** 100 MV

1061. 9702_m16_qp_12 Q: 27

The diagram shows an electron in a uniform electric field.

In which direction will the field accelerate the electron?



1062. 9702_m16_qp_12 Q: 28

The electric field strength at a certain distance from an isolated alpha particle is $3.0 \times 10^{7}\,\text{N C}^{-1}$.

What is the force on an electron when at that distance from the alpha particle?

A $4.8 \times 10^{-12}\,\text{N}$

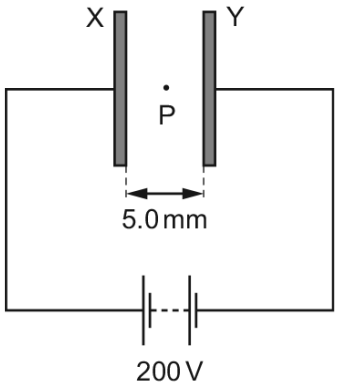
B $9.6 \times 10^{-12}\,\text{N}$

C $3.0 \times 10^{7}\,\text{N}$

D $6.0 \times 10^{7}\,\text{N}$

1063. 9702_m16_qp_12 Q: 29

Two large parallel plates X and Y are placed a distance of 5.0 mm apart and connected to the terminals of a 200 V d.c. supply, as shown.



A small oil drop at P carries one excess electron.

What is the magnitude of the electrostatic force acting on the oil drop due to the electric field between the plates?

A 6.4×10^{-15} N

B 6.4×10^{-18} N

C 1.6×10^{-19} N

D 4.0×10^{-24} N

1064. 9702_s16_qp_11 Q: 28

A charged particle is moving in a uniform electric field.

For the motion of the particle due to the field, which quantity has a constant non-zero value?

A acceleration

B displacement

C rate of change of acceleration

D velocity

1065. 9702_s16_qp_12 Q: 30

Before a thunderstorm, the hairs on your head sometimes stand on end.

A hair with mass 0.50 mg and charge 1.0 pC is supported by a force due to an electric field. Ignore any forces other than the weight of the hair and the electric force.

What is the electric field strength?

A $4.9 \times 10^{3}\,\text{N C}^{-1}$

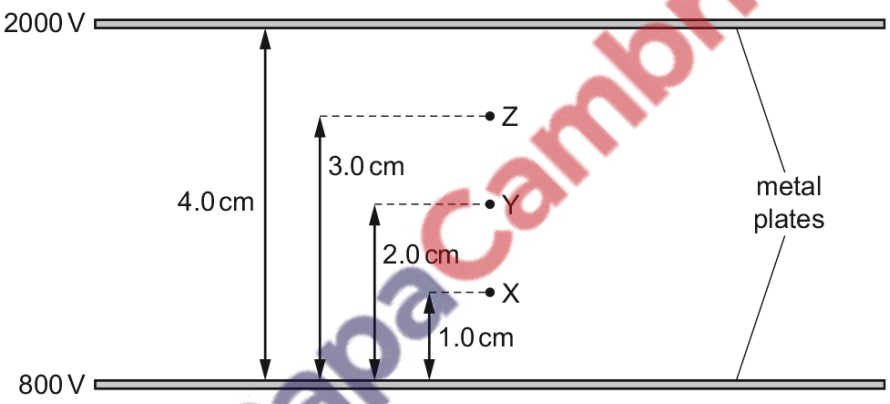
B $4.9 \times 10^{5}\,\text{N C}^{-1}$

C $4.9 \times 10^{6}\,\text{N C}^{-1}$

D $4.9 \times 10^{9}\,\text{N C}^{-1}$

1066. 9702_s16_qp_12 Q: 31

Two parallel metal plates, 4.0 cm apart, are at electric potentials of 800 V and 2000 V. Points X, Y and Z are situated in the space between the plates at distances of 1.0 cm, 2.0 cm and 3.0 cm from the lower plate.



What is the electric field strength, in V m^{-1}, at X, Y and Z?

	X	Y	Z
A	300	600	900
B	1100	1400	1700
C	3.0×10^{4}	3.0×10^{4}	3.0×10^{4}
D	5.0×10^{4}	5.0×10^{4}	5.0×10^{4}

1067. 9702_s16_qp_13 Q: 30

An electron is in an electric field of strength $5 \times 10^4\,\text{V m}^{-1}$. The field is the only influence on the electron.

The mass and charge of an electron are known.

Which quantity can be calculated without any more information?

A the force on the electron

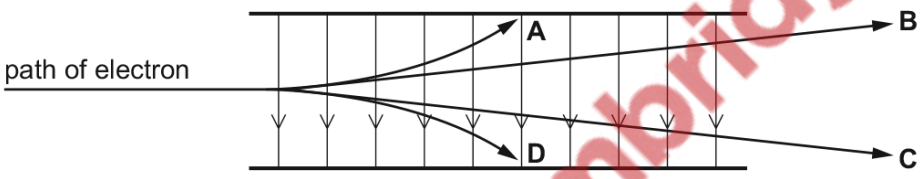
B the momentum of the electron

C the kinetic energy of the electron

D the speed of the electron

1068. 9702_w16_qp_11 Q: 30

Which path shows a possible movement of an electron in the electric field shown?



1069. 9702_w16_qp_11 Q: 32

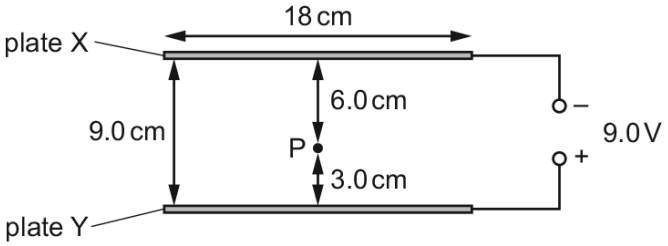
Two large horizontal metal plates are separated by 4 mm. The lower plate is at a potential of –80 V.

Which potential should be applied to the upper plate to create an electric field of strength $60\,000\,\text{V m}^{-1}$ upwards in the space between the plates?

A –320 V **B** –160 V **C** +160 V **D** +320 V

1070. 9702_w16_qp_12 Q: 30

Two parallel circular metal plates X and Y, each of diameter 18 cm, have a separation of 9.0 cm. A potential difference of 9.0 V is applied between them.



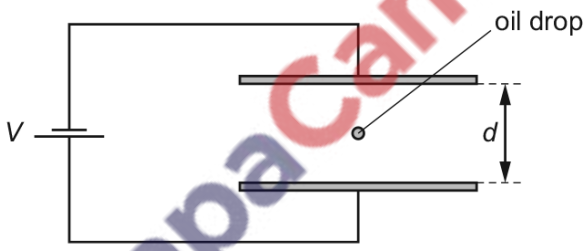
Point P is 6.0 cm from the surface of plate X and 3.0 cm from the surface of plate Y.

What is the electric field strength at P?

A $50\,\text{N C}^{-1}$ **B** $100\,\text{N C}^{-1}$ **C** $150\,\text{N C}^{-1}$ **D** $300\,\text{N C}^{-1}$

1071. 9702_w16_qp_12 Q: 31

An oil drop has mass m and charge q. The drop is held stationary in an electric field between two parallel horizontal plates, distance d apart, as shown.



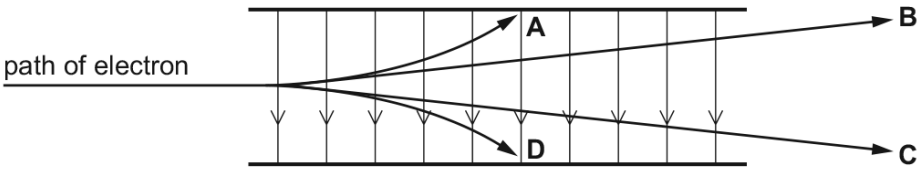
The potential difference between the plates is V and the acceleration of free fall is g.

What is the charge-to-mass ratio $\frac{q}{m}$ of the oil drop?

A $\frac{gd}{V}$ **B** $\frac{V}{dg}$ **C** $\frac{gV}{d}$ **D** $\frac{d}{Vg}$

1072. 9702_w16_qp_13 Q: 30

Which path shows a possible movement of an electron in the electric field shown?



1073. 9702_w16_qp_13 Q: 32

Two large horizontal metal plates are separated by 4 mm. The lower plate is at a potential of –80 V.

Which potential should be applied to the upper plate to create an electric field of strength 60 000 V m^{-1} upwards in the space between the plates?

A –320 V **B** –160 V **C** +160 V **D** +320 V

1074. 9702_s15_qp_11 Q: 31

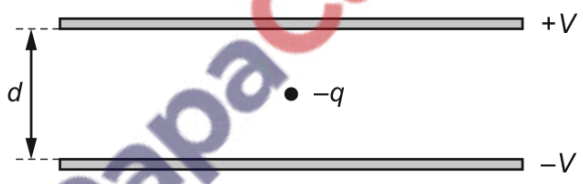
Two parallel metal plates, a distance of 2 mm apart, have a potential difference of 1000 V across them.

What is the electric field strength between the plates?

A 500 V m^{-1} **B** 50 000 V m^{-1} **C** 50 000 N C^{-1} **D** 500 000 N C^{-1}

1075. 9702_s15_qp_11 Q: 32

An oil droplet has charge $-q$ and is situated between two horizontal metal plates as shown in the diagram.



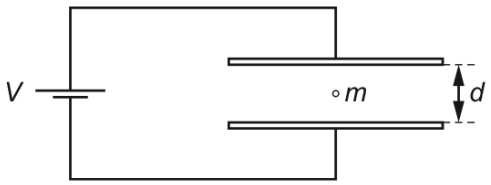
The separation of the plates is d. The droplet is observed to be stationary when the upper plate is at potential $+V$ and the lower plate is at potential $-V$.

For this to occur, what is the weight of the droplet?

A $\frac{Vq}{d}$ **B** $\frac{2Vq}{d}$ **C** $\frac{Vd}{q}$ **D** $\frac{2Vd}{q}$

1076. 9702_s15_qp_12 Q: 30

A charged oil drop of mass m, with n excess electrons, is held stationary in the uniform electric field between two horizontal plates separated by a distance d.



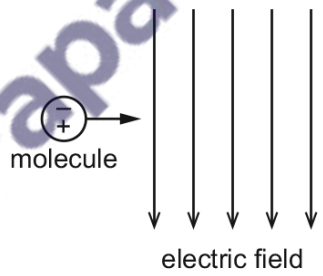
The voltage between the plates is V, the elementary charge is e and the acceleration of free fall is g.

What is the value of n?

A $\frac{eV}{mgd}$ **B** $\frac{mgd}{eV}$ **C** $\frac{meV}{gd}$ **D** $\frac{gd}{meV}$

1077. 9702_s15_qp_13 Q: 30

A molecule behaves as an electric dipole consisting of two equal point charges, of opposite sign, separated by a fixed distance. The molecule moves with constant horizontal velocity as it enters a vertical uniform electric field, as shown.



The positive and negative charges of the molecule enter the field at the same time.

Which row describes the velocity of the molecule in the field?

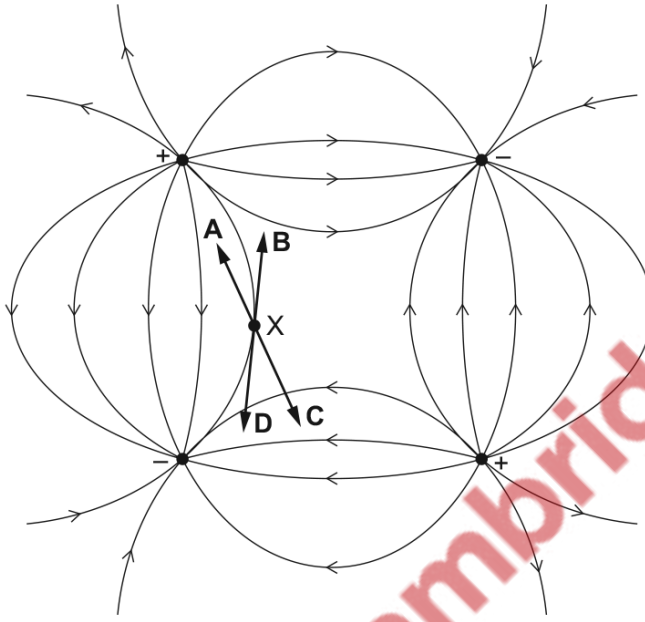
	horizontal component of velocity	vertical component of velocity
A	constant	increases
B	constant	zero
C	increases	increases
D	increases	zero

10.3 Electric forces between point charges

1078. 9702_w16_qp_11 Q: 31

The diagram shows an electric field pattern caused by two positive and two negative point charges of equal magnitude placed at the four corners of a square.

In which direction does the force act on an electron at point X?



1079. 9702_w16_qp_13 Q: 31

The diagram shows an electric field pattern caused by two positive and two negative point charges of equal magnitude placed at the four corners of a square.

In which direction does the force act on an electron at point X?