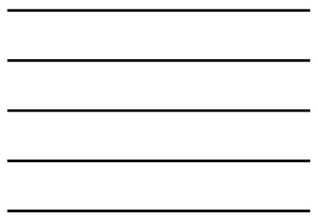
Do not write outside the box

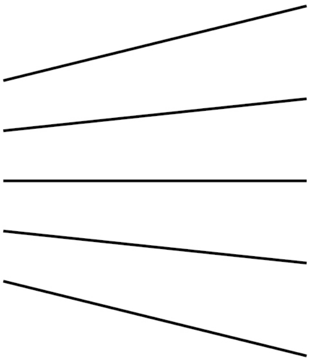
1 6 Which diagram shows lines of equipotential in steps of equal potential difference near an isolated point charge?

[1 mark]

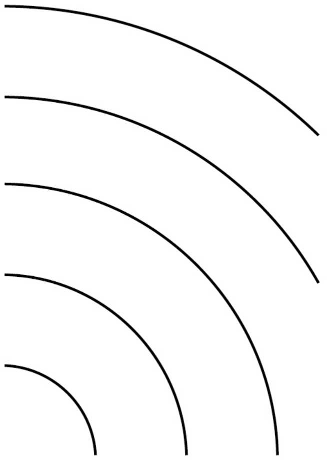
A



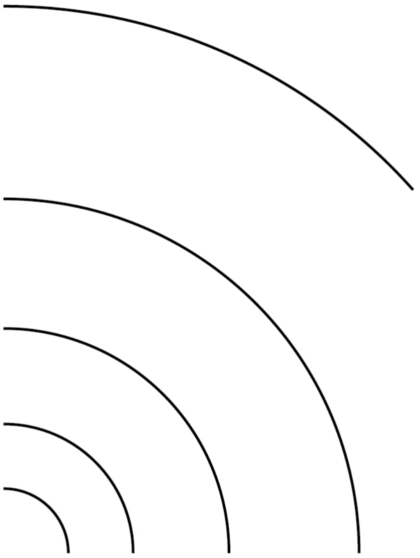
B



C



D



A ⬭

B ⬭

C ⬭

D ⬭

Turn over ►

Do not write outside the box

1 7 A positive charge of 2.0×10^{-4} C is placed in an electric field at a point where the potential is +500 V.

What is the potential energy of the system?

[1 mark]

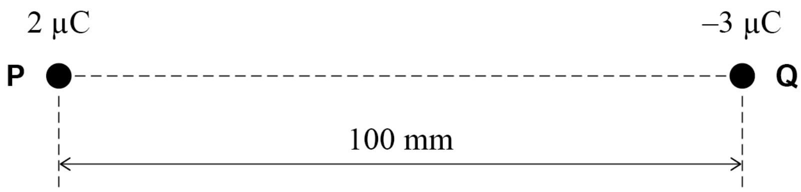
A 1.0×10^{-1} J

B 1.0×10^{-1} J C^{-1}

C 4.0×10^{-7} J

D 4.0×10^{-7} J C^{-1}

1 8 Two charges **P** and **Q** are 100 mm apart.
X is a point on the line between **P** and **Q** where the electric potential is 0 V.



What is the distance from **P** to **X**?

[1 mark]

A 33 mm

B 40 mm

C 60 mm

D 67 mm

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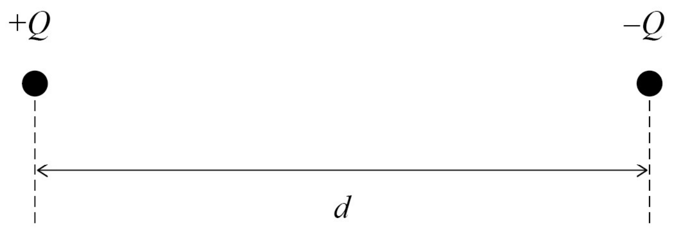
1 4 The diagram shows a particle with charge $+Q$ and a particle with charge $-Q$ separated by a distance d.
The particles exert a force F on each other.



An additional charge of $+2Q$ is then given to each particle and their separation is increased to $2d$.

What is the force that now acts between the particles?

[1 mark]

A an attractive force of $\frac{9}{2}F$ ○

B an attractive force of $\frac{9}{4}F$ ○

C a repulsive force of $\frac{3}{2}F$ ○

D a repulsive force of $\frac{3}{4}F$ ○

1 5 Two protons are separated by distance r.
The electrostatic force between the two protons is **X** times the gravitational force between them.

What is the best estimate for **X**?

[1 mark]

A 10^{20} ○

B 10^{28} ○

C 10^{36} ○

D 10^{42} ○

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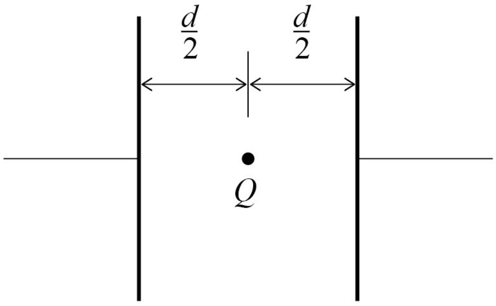
1 6 Two parallel metal plates separated by a distance d have a potential difference V across them. A particle with charge Q is placed midway between the plates.



What is the magnitude of the electrostatic force acting on the particle?

[1 mark]

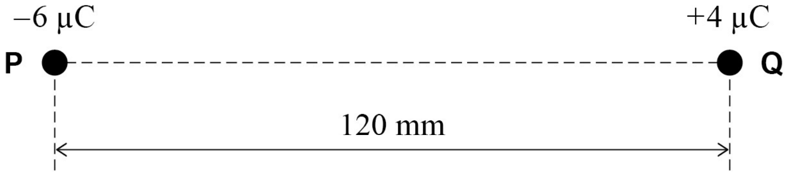
A zero ⬭

B $\frac{QV}{2d}$ ⬭

C $\frac{QV}{d}$ ⬭

D $\frac{2QV}{d}$ ⬭

1 7 Two charged particles **P** and **Q** are separated by a distance of 120 mm.
X is a point on the line between **P** and **Q** where the electric potential is zero.



What is the distance from **P** to **X**?

[1 mark]

A 40 mm ⬭

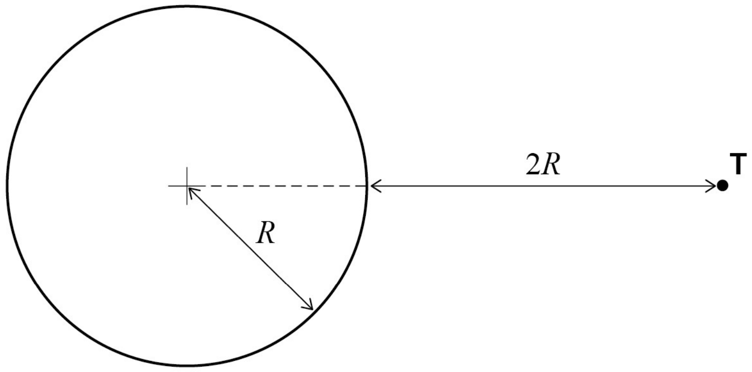
B 48 mm ⬭

C 60 mm ⬭

D 72 mm ⬭

Do not write outside the box

1 8 An isolated spherical conductor is charged.
The conductor has a radius R and an electric potential V. The electric field strength at its surface is E.



Point **T** is a distance $2R$ from the surface.

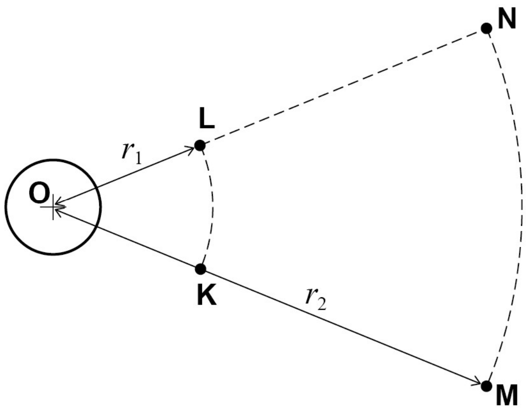
What are the electric field strength and electric potential at **T**?

[1 mark]

	Electric field strength	Electric potential	
A	$\frac{E}{2}$	$\frac{V}{4}$	⬭
B	$\frac{E}{3}$	$\frac{V}{9}$	⬭
C	$\frac{E}{4}$	$\frac{V}{2}$	⬭
D	$\frac{E}{9}$	$\frac{V}{3}$	⬭

Do not write outside the box

1 9 **O** is the centre of a negatively charged sphere.



K and **L** are two points at a distance r_1 from **O**.
M and **N** are two points at a distance r_2 from **O**.

Which statement is true?

[1 mark]

A The work done moving an electron from **M** to **K** is the same as that done moving an electron from **K** to **L**. ⬭

B The work done moving a positron from **K** to **M** is the same as that done moving an electron from **K** to **M**. ⬭

C No work is done moving an electron from **M** to **N**. ⬭

D No work is done moving a positron from **L** to **N**. ⬭

Turn over for the next question