

Electric Fields - Questions by Topic

Q1.

Two parallel plates have a potential difference of 12 V across them and are separated by a distance of 5.0×10^{-4} m.

What is the magnitude of the electric field strength halfway between the plates?

- A 6000 Vm^{-1}
- B 12 000 Vm^{-1}
- C 24 000 Vm^{-1}
- D 48 000 Vm^{-1}

(Total for question = 1 mark)

Q2.

A teacher states 'the repulsive force between 1 C of charge on the ground and 1 C of charge on a 1000 kg mass is large enough to support the mass when it is 1 km above the ground'.

Determine whether the teacher is correct.

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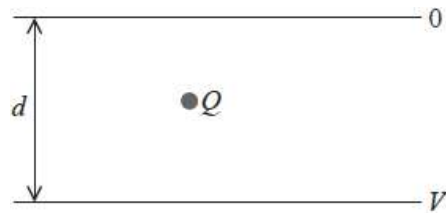
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(Total for question = 4 marks)

Q3.

The diagram shows two horizontal parallel plates separated by a distance d . There is a potential difference V across the plates. An oil drop with charge Q is held stationary between the plates.



Which of the following gives the mass m of the oil drop?

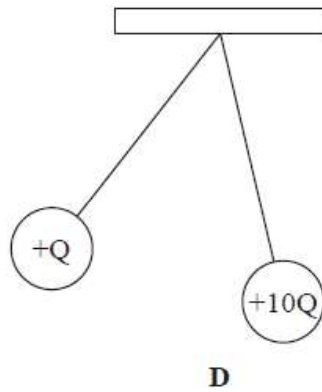
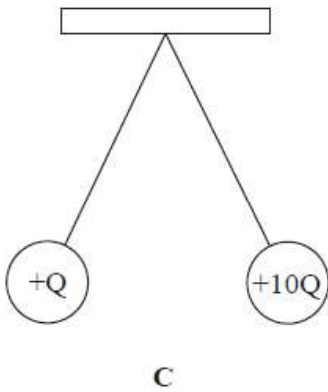
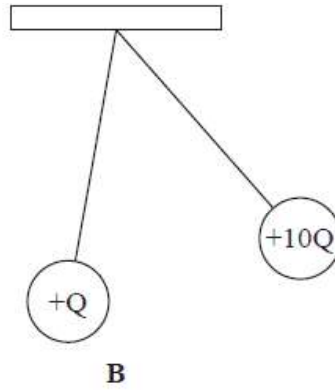
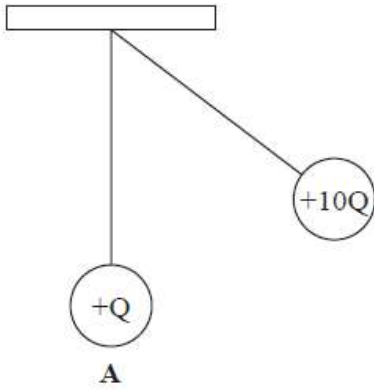
- A $\frac{dg}{VQ}$
- B $\frac{VQ}{dg}$
- C $\frac{V}{Qdg}$
- D $\frac{Qdg}{V}$

(Total for question = 1 mark)

Q4.

Two charged spheres of equal mass are suspended with insulating threads of equal length. One sphere has a charge of $+Q$ and the other has a charge of $+10Q$.

Which of the following shows the arrangement of these spheres when they are in equilibrium?



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

(Total for question = 1 mark)

Q5.

Calculate the electric field strength at a distance of 5.0 cm from the surface of a positively charged sphere.

diameter of sphere = 12 cm

charge on sphere = +34 nC

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Magnitude of electric field strength =

Direction of electric field strength =

(Total for question = 3 marks)

Q6.

When two point charges, each with charge Q , are separated by a distance r the force between them is F .

Two point charges, each with charge $2Q$, are separated by a distance $2r$.

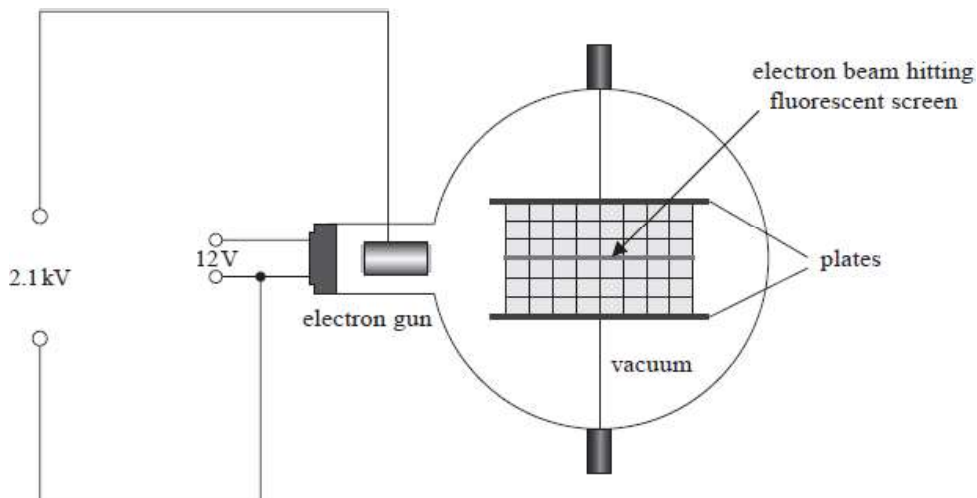
What is the force between these two charges?

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

(Total for question = 1 mark)

Q7.

The diagram shows the parts of an electron deflection tube.



(a) The electron gun consists of a hot metal filament and a positively charged anode.

Explain how this produces a beam of electrons.

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(b) The potential difference between the hot metal filament and the anode is 2.1 kV.

Calculate the velocity of the electrons as they leave the electron gun.

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Velocity =

(c) The electron beam passes between plates across which a potential difference has been applied. The electron beam is deflected, as shown in the photograph.



On the diagram below, sketch the electric field between the plates.

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(d) A potential difference of 550 V is applied across the plates of another deflection tube. The vertical separation of the plates is 5.0 cm.

(i) Show that the electrostatic force on an electron between the plates is about 2×10^{-15} N.

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(ii) The electrons in the beam enter the region between the plates with a horizontal velocity of 2.2×10^7 m s⁻¹.

Determine the vertical deflection of the beam after travelling 10 cm horizontally between the plates.

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Vertical deflection =

(Total for question = 14 marks)

Q8.

(a) Two point charges of $3.1 \times 10^{-9} \text{ C}$ and $-2.4 \times 10^{-8} \text{ C}$ are placed a distance of 0.043 m apart in a vacuum.

Calculate the magnitude of the force between the charges.

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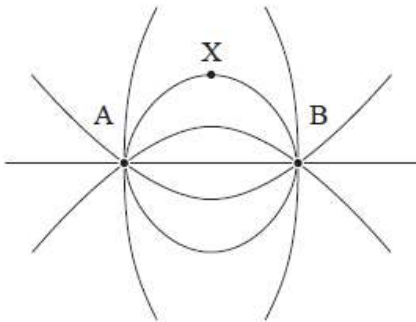
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Force =

(b) The diagram represents the electric field around two point charges of equal magnitude. A is a positive charge and B is a negative charge.



(i) State the meaning of electric field strength.

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(ii) By considering the electric field at X due to A and due to B separately, explain the direction of the electric field at X.

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(Total for question = 7 marks)