1. 9702/11/M/J/18/No.28
A particle has a charge of +2.0 mC and is in a vertical uniform electric field. An electric force of \(1.0 \times 10^{-2} \text{ N}\) acts upwards on the particle.

What is the electric field strength?
A. 0.20 V m\(^{-1}\) downwards
B. 0.20 V m\(^{-1}\) upwards
C. 5.0 V m\(^{-1}\) downwards
D. 5.0 V m\(^{-1}\) upwards

\[
E = \frac{F}{q} = \frac{1.0 \times 10^{-2}}{2 \times 10^{-3}} = 5 \text{ V m}^{-1} \text{ upwards}
\]

2. 9702/11/M/J/18/No.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. \(F/4\)
B. \(F/2\)
C. \(F\)
D. \(2F\)

\[
f = \frac{V}{d}
\]

Substitute \(f = F\) in \(f_2\).

\[
f_2 = \frac{F}{2}
\]

\[
f = \frac{V_2}{d}
\]

\[
f_2 = \frac{V_2}{2d}
\]
3. 9702/12/M/J/18/No.30
Two large parallel metal plates X and Y are situated in a vacuum as shown.

\[ 	ext{plate X} \quad + \quad \text{positively charged particle} \quad \text{plate Y} \quad - \]

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.

4. 9702/12/M/J/18/No.31
Four diagrams representing the electric field between two oppositely-charged point charges are shown.

Which diagram correctly shows the electric field lines?
5. 9702/13/M/J/18/No.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 $2.4 \times 10^{11} \text{ms}^{-2}$ downwards
B $2.4 \times 10^{11} \text{ms}^{-2}$ upwards
C $5.3 \times 10^{11} \text{ms}^{-2}$ downwards
D $5.3 \times 10^{11} \text{ms}^{-2}$ upwards

6. 9702/13/M/J/18/No.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 $4d$
7. What is a possible charge on a particle?

A $6.40 \times 10^{-20} \text{C}$
B $4.00 \times 10^{-19} \text{C}$
C $1.12 \times 10^{-18} \text{C}$ (Correct answer)
D $9.11 \times 10^{-18} \text{C}$

- Charge should be multiple of $1.6 \times 10^{-19} \text{C}$.

8. A charged oil drop is held stationary between two charged parallel plates.

Which forces act on the oil drop?

A both electric and gravitational
B electric only
C gravitational only
D neither electric nor gravitational

- Oil drop is matter:
  - It is attracted by gravity.
  - Oil drop is charged:
    - It will feel force due to electric field.

9. An electron passes into the space between two parallel plates that are 5.0 cm apart and which are maintained at electric potentials of $+2000 \text{V}$ and $-500 \text{V}$, respectively.

What is the electric force on the electron?

A $1.6 \times 10^{-15} \text{N}$
B $4.8 \times 10^{-15} \text{N}$
C $6.4 \times 10^{-15} \text{N}$
D $8.0 \times 10^{-15} \text{N}$

\[ F = e \cdot \frac{V}{d} \]

\[ = 1.6 \times 10^{-19} \text{C} \times \frac{2500 \text{V}}{0.05 \text{m}} \]

\[ = 8.0 \times 10^{-15} \text{N} \]

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10. 9702/12/F/M/18/No.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.