

A-Level Physics

Name: _____ Score: _____

1. Electric field strength is the force per unit:

- ☐ positive charge
- ☐ mass
- ☐ area
- ☐ volume

2. Two plates 0.050 m apart have 200 V between them. What is the field strength?

_____ V/m

3. Coulomb's law gives the force between two point charges as:

- ☐ $\frac{Q_1 Q_2}{4\pi\epsilon_0 r^2}$
- ☐ $\frac{Q_1 Q_2}{4\pi\epsilon_0 r}$
- ☐ $\frac{Q_1 Q_2}{r}$
- ☐ $4\pi\epsilon_0 Q_1 Q_2 r^2$

4. The field strength at distance r from a point charge Q is:

- ☐ $\frac{Q}{4\pi\epsilon_0 r^2}$
- ☐ $\frac{Q}{4\pi\epsilon_0 r}$
- ☐ $\frac{Qq}{4\pi\epsilon_0 r^2}$
- ☐ $\frac{Q}{r}$

5. Electric potential at a point is the work per unit charge to bring a positive charge from:

- ☐ infinity
- ☐ the nearest charge
- ☐ the ground
- ☐ one metre away

6. A charge of 2.0 C feels a force of 6.0 N. What is the field strength?

_____ N/C

7. A uniform field between two plates points:

- ☐ from the + plate to the – plate
- ☐ from the – plate to the + plate
- ☐ along the plates
- ☐ in circles

8. Two charges of the same sign repel each other.

- ☐ True ☐ False

9. The field is $100 \frac{\text{N}}{\text{C}}$ at distance r from a charge. What is it at $2r$?

_____ N/C

10. The electric potential near a point charge varies as $1/r$.

- ☐ True ☐ False

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1. **positive charge**

$E = \frac{F}{q}$ — the force on each coulomb of a small positive test charge.

2. **4000 V/m**

$$E = \frac{V}{d} = \frac{200}{0.050} = 4000 \frac{\text{V}}{\text{m}}.$$

3. $\frac{Q_1 Q_2}{4\pi\epsilon_0 r^2}$

Proportional to each charge, inversely proportional to the distance squared.

4. $\frac{Q}{4\pi\epsilon_0 r^2}$

From $E = F/q$ with Coulomb's force, the test charge cancels, leaving $E = \frac{Q}{4\pi\epsilon_0 r^2}$.

5. **infinity**

Like gravitational potential, it is measured from infinity, where the potential is taken as zero.

6. **3 N/C**

$$E = \frac{F}{q} = \frac{6.0}{2.0} = 3.0 \frac{\text{N}}{\text{C}}.$$

7. **from the + plate to the – plate**

The field runs from high potential (+) toward low potential (–).

8. **True**

Like charges repel; opposite charges attract — both along the line joining them.

9. **25 N/C**

$$\text{Inverse-square: } \frac{100}{2^2} = 25 \frac{\text{N}}{\text{C}}.$$

10. **True**

Yes — $V = \frac{Q}{4\pi\epsilon_0 r}$ goes as $1/r$, while the field goes as $1/r^2$.