Grade 12 physics V2
SPH4U

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December 2, 2025

Contents

Chapter 1

Electricity and Magnetism

1.1 Electric Fields

Definition 1.1.1 (Field)
The region where an appropriate object would feel a force!

- If there's a gravitational field, a <u>mass</u> will feel a force.

- If there's an electric field, a <u>charge</u> will feel a force.

- If there is an magnetic field, a <u>magnet</u> (or a moving charge) will feel a force.

Visualizing Electric Fields - Field lines show how a small <u>positive</u> charge would move.
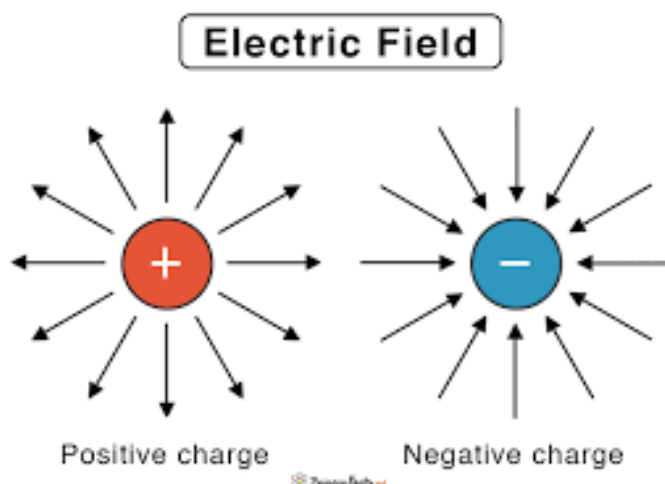

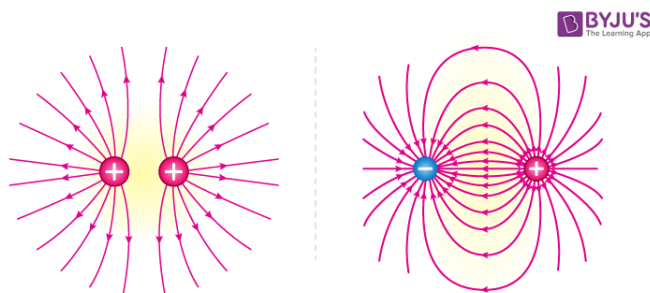Figure 1.1: Electric field of Positive and negative charge

Figure 1.2: Electric field between two charges

Formulas

$$\mathcal{E} = \frac{k\,|q|}{R^2} \tag{1.1}$$

$\mathcal{E}$ is the magnitude of the <u>electric field strength</u> around a point charge (in $\frac{N}{C}$)
$$k = 8.99 \times 10^9 \frac{Nm^2}{C^2}$$
R is the distance away from the point charge (q) where you want to know the field strength (in m)

Remark. Electric fields are <u>vector</u>. The direction of the field will be based on the direction of force that would be exerted on a <u>positively-charged</u> object!

$$F_E = q \times \mathcal{E} \tag{1.2}$$

F_E is the magnitude of the electrical force exerted on q (in N)

q is the that is <u>in the electric field</u>(in C)

$\mathcal{E}$ is the strength of the electrical field that the charge is in (in $\frac{N}{C}$)