3055 BA SANGAM COLLEGE

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WORKSHEET 14

SCHOOL:BA SANGAM COLLEGE YEAR 12

SUBJECT: PHYSICS NAME OF STUDENT: _____

STRAND	*ELECTRICITY*
SUB-STRAND	*ELECTROSTATICS*
Content Learning Outcome	Explore electric forces by using Coulomb's law **and** effects on charged objects

ELECTRIC FIELD

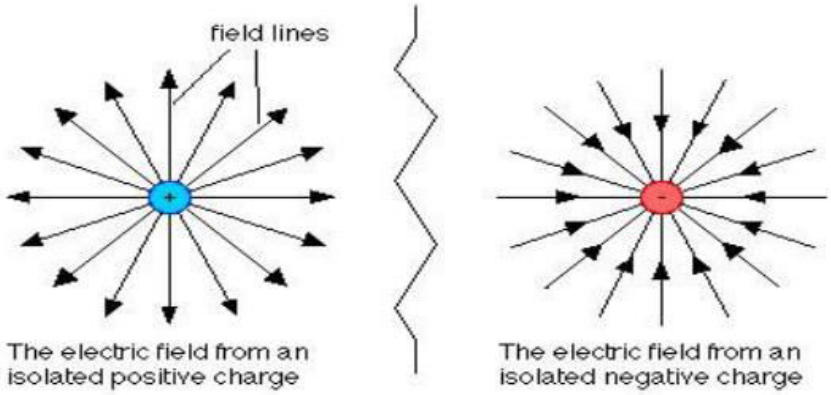
Electric Field is an area of influence around a charged object. The magnitude of the field is proportional to the amount of electrical force exerted on a positive test charge placed at a given point in the field.

$$E = \frac{F}{q}$$

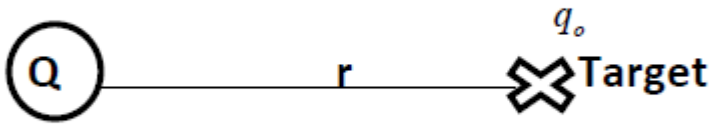
E = Electric Field (N/C)
F = Electrostatic Force (N)
q = Test Charge (C)

FIELD NEAR A POINT CHARGE

A point charge has around it a radial electric field. If the charge is positive the field is directed away from the charge. If the charge is negative the field is directed towards the charge.



$$E = \frac{F}{q_0} = \frac{kq_o q}{q_0 r^2} = \frac{kq}{r^2}$$



That is $$E = \frac{kq}{r^2}$$

EXAMPLE

Shirley pulls her wool sweater over her head, which charges her body as the sweater rubs against her cotton shirt.

(a) What is the electric field at a location where a 1.60×10^{-19} C - piece of lint experiences a force of 3.2×10^{-9} N as it floats near Shirley?

(b) What will happen if Shirley now touches a conductor such as a door knob?

Soln:

a). $E = \frac{F}{Q} = \frac{3.2 \times 10^{-9} N}{1.6 \times 10^{-19} C}$ = **2×10^{10} N/C**

b) She will reduce her charge in a process called **grounding,** in which excess electrons flow from her body into the ground and spread evenly over the surface of Earth.

EXERCISE:

1. A fly accumulates 3.0×10^{-10}C of positive charge as it flies through the air. What is the magnitude and direction of the electric field at a location 2.0 cm away from the fly?

2. Two charges of Q1 = +3 nC(3×10^{9}C) and Q2 = -4 nC(-4×10^{9}C) are separated by a distance of 40 cm. What is the electric field strength at a point that is 10 cm from Q1 and 30 cm from Q2? The point lies between Q1 and Q2.