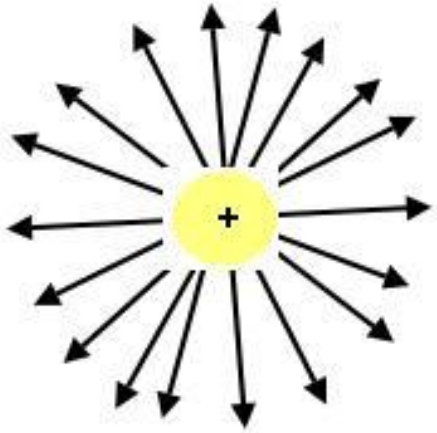
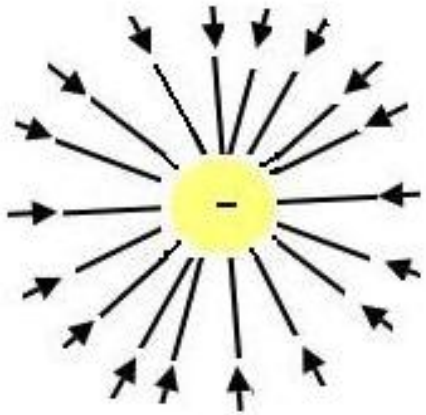
Electric Fields

Electric Fields

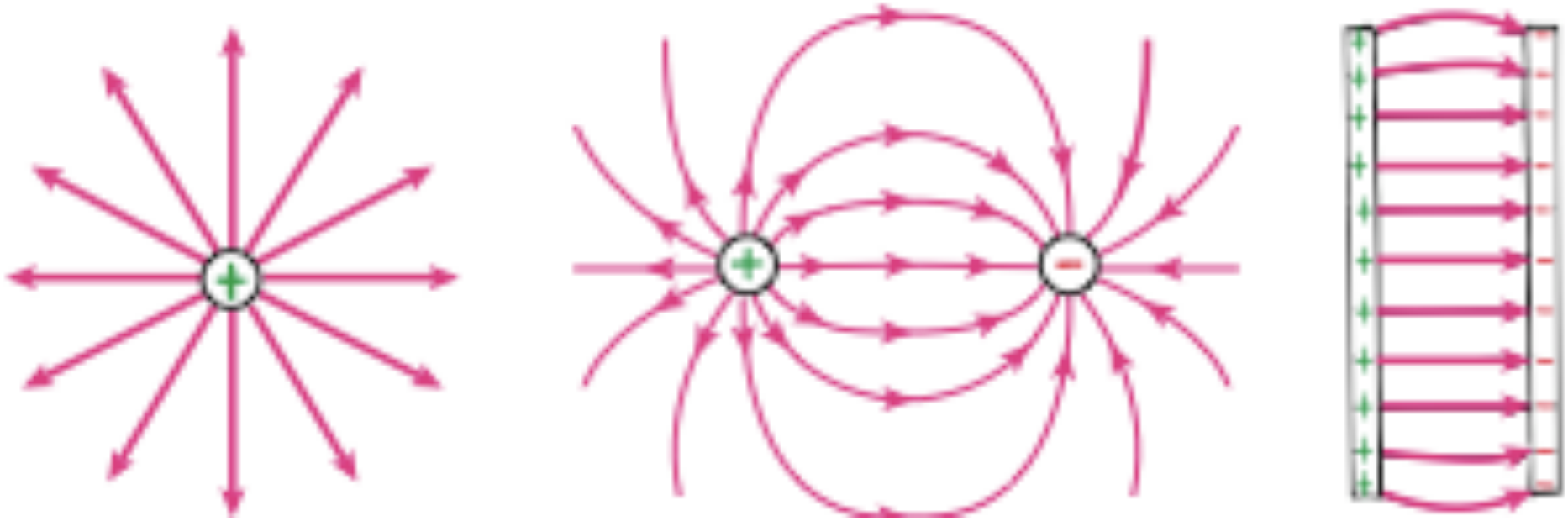
- An **<u>electric field</u>**
  - is a force field that surrounds an electric charge or group of charges
  - has both **magnitude** and **direction**
  - lines show the way a positive charge would move if paced in the electric field
- Electric field lines go:
  - AWAY FROM (+) charges
  - INTO (-) charges
- (+) charges = mountains
- (-) charges = valleys



Electric field lines of a positive point charge



Electric field lines of a negative point charge



If a charge is placed in an electric field, it moves!

(+) Charges move towards (-) charges and away from other (+) charges
(-) Charges move towards (+) charges and away from other (-) charges

We can calculate the **Electric Field** created by a charge at a certain distance away from that charge. The farther we are from the charge, the weaker the electric field is.

$$E = \frac{kQ}{r^2}$$

E = Electric Field [N/C]
Q = charge [C]
r = distance [m]
k = 9 x 10^9 Nm^2/C^2

If you put a charge in an electric field, it feels a FORCE (and moves!)

$$F = qE$$

F = Electric Force [N]
E = Electric Field [N/C]
q = charge [C]

What happens when you substitute the equation for Electric Field into the Electric Force equation?

Ex: 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?

If charge of 5.0×10^{-15} C was placed at this location, what force would it feel?