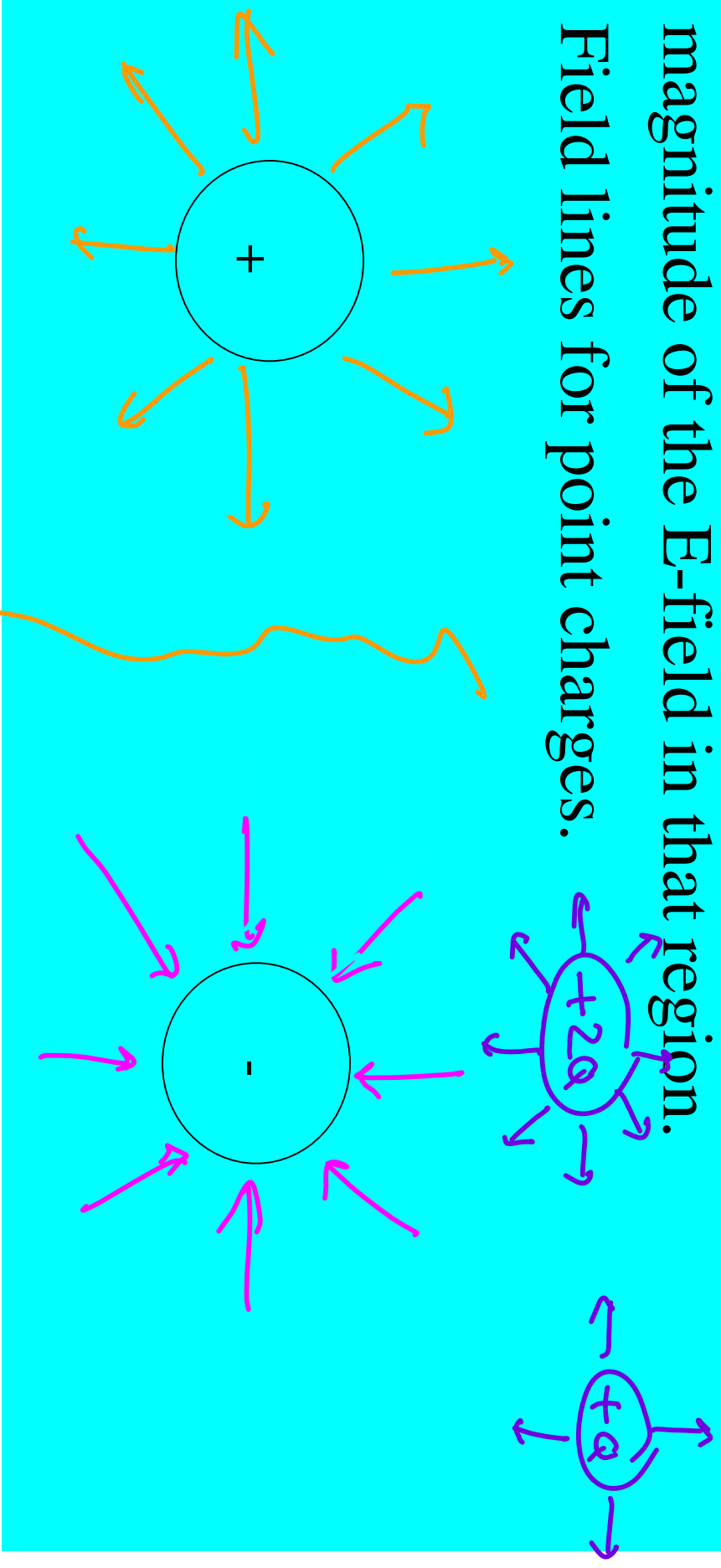


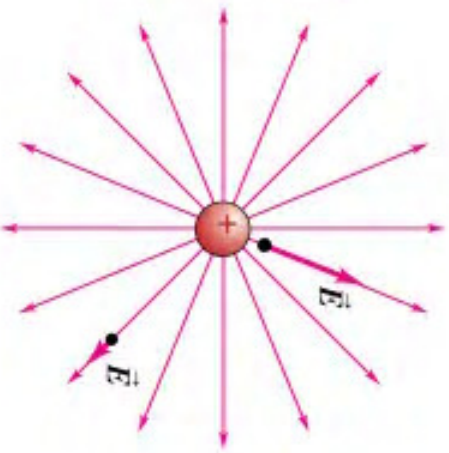
# Field Lines, Particles in E-Fields

*God is a comic playing to an  
audience afraid to laugh.*

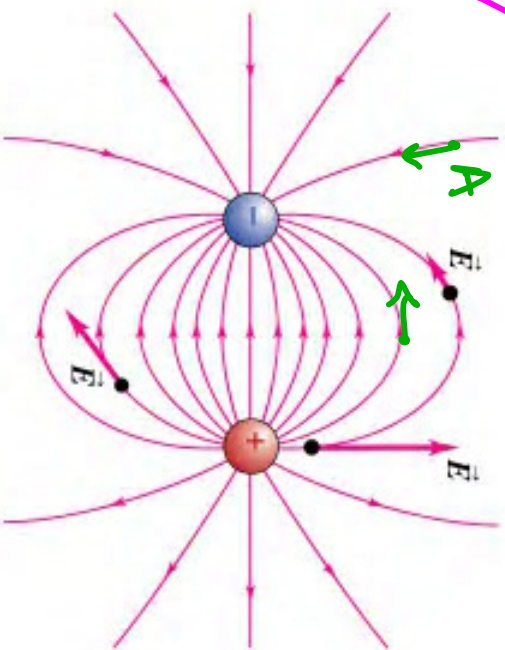
# Electric Field Lines

- E-field vectors are tangent to the electric field lines at each point.
- The number of lines per unit area through a surface perpendicular to the lines is proportional to the magnitude of the E-field in that region.
- Field lines for point charges.

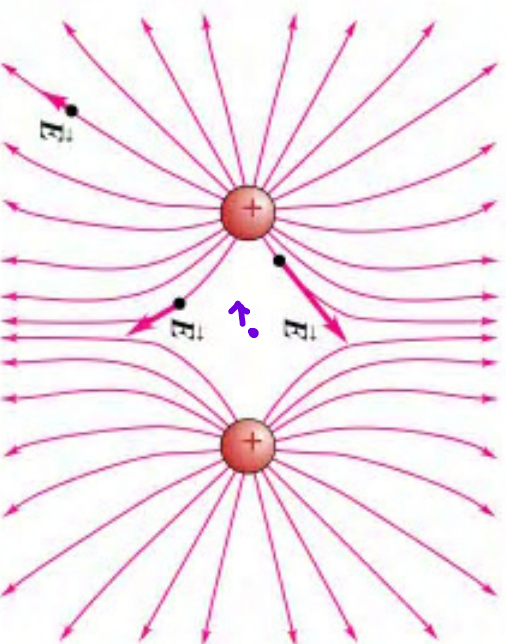




(a) A single positive charge  
(compare Figure 21.16)

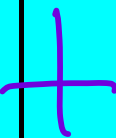



(b) A positive charge and a negative charge  
of equal magnitude (an electric dipole)



(c) Two equal positive charges

# Rules for Drawing Field Lines

- The lines must begin on a  charge and terminate on a  charge.
- The number of lines drawn leaving a positive charge or approaching a negative charge is proportional to the magnitude of the charge.
- No two field lines can cross. *Force can't go 2 directions @ same point.*

# Motion of charge in a Uniform E-Field

- Solve for the acceleration of a proton moving in a uniform E-field.
- Ex #1
  - Draw E-field
  - Charge to move down?
  - Describe motion
- Ex #2
  - Draw E-field
  - Charge to move down?
  - Describe motion

$$\frac{E\cancel{q}}{m} = a$$

$$F = ma$$

$$V_2 = V_1 + at$$

