

### CONCEPT: INTRO TO DIPOLE MOMENTS

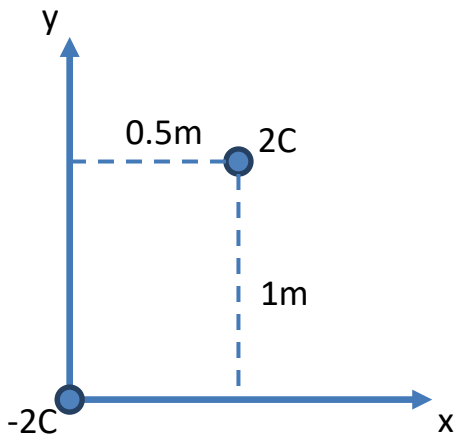
- Two equal charges  $q$  with opposite signs (+ and -) form an electric dipole.

- Dipole moment is a vector →

$$\vec{p} = q \vec{d}$$

-  $\vec{d}$  is a vector that points [ FROM | TO ] positive charge [ FROM | TO ] negative charge.

EXAMPLE: What is the vector dipole moment of the following dipole?



### CONCEPT: ENERGY AND TORQUE OF DIPOLE MOMENTS

• A dipole in an electric field has potential energy →  $U = -\vec{p} \cdot \vec{E} = -pE\cos\theta$

• A dipole experiences a torque due to an electric field →  $\vec{\tau} = \vec{p} \times \vec{E} = pE\sin\theta$

EXAMPLE: The dipole depicted in the figure below is in a uniform electric field of 200 N/C. What is the potential energy of the dipole? What is the magnitude of the torque the dipole experiences?

