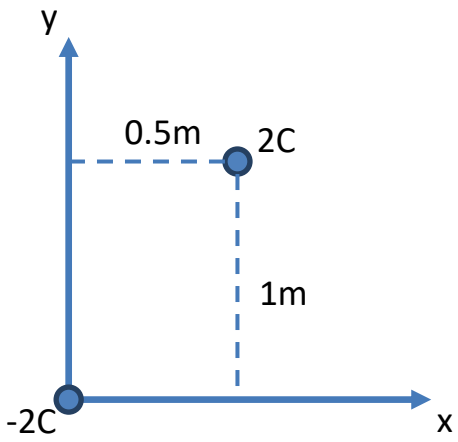
**CONCEPT: INTRO TO DIPOLE MOMENTS**

- 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 → $\mathbf{U = -\vec{p} \cdot \vec{E} = -pE\cos\theta}$

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

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?