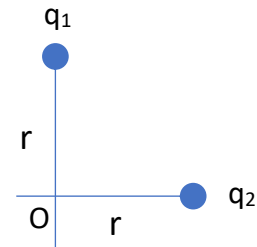


1. Determine the magnitude of the electric force between two charges of $1.00 \times 10^{-4}\text{C}$ and $1.00 \times 10^{-5}\text{C}$ that are separated by a distance of 2m. (2 marks)

2. Two point charges are arranged as shown to the right. (4 marks)

$$q_1 = 4.0 \times 10^{-6} \text{ C}, q_2 = -2.0 \times 10^{-6} \text{ C}, \text{ and } r = 3.0\text{cm}.$$

Calculate the magnitude of the electric field at the origin.



3. A charged particle moves from rest in a **uniform** electric field. (6 marks)
- (a) For a proton ($q=1.602 \times 10^{-19}\text{C}$, $m=1.67 \times 10^{-27} \text{ kg}$), calculate the change in electric potential energy when the magnitude of the electric field is 250 N/C, the starting position is 0.4 m from the positive plate and the final position is 0.9m from the positive plate.
- (b) Using the law of conservation of energy, calculate the speed of the proton for the given displacement

Draw a diagram of the following situation, include the field lines (positive and negative sides), the particle at position 1 and position 2, think about what is being asked versus immediately going to find a formula.