Name: _____ Key _____ Id#: _____ Sect#: _____

1. Two point charges $q_1 = +5.0$ nC and $q_2 = -3.0$ nC are separated by a distance of 35 cm.

   (a) What is the work required to remove the charge q_2 to infinity?

   (b) Does the electric field or an external agent do this work? Why?

a) Work done to bring q_2 from infinity to a distance 35 cm from q_1, is

$$W = \frac{K q_1 q_2}{r} = \frac{(9 \times 10^9)(5 \times 10^{-9})(-3 \times 10^{-9})}{0.35} = -3.9 \times 10^{-7}$$

The work required to remove the charge q_2 to infinity is $-W$ $\Rightarrow$ Work $= 3.9 \times 10^{-7}$ J

Since this work is positive, it is done by an external agent.

2. What is the net electric potential at point P in the figure?

$$V_p = \frac{K q_1}{r_1} + \frac{K q_2}{r_2}$$

$$= (9 \times 10^9)\left[\frac{-6 \times 10^{-6}}{5} + \frac{2 \times 10^{-6}}{4}\right]$$

$$V_p = -6.3 \times 10^3 \text{ V}$$

$q_1 = -6 \,\mu C$

3 m

$r_1 = 5 m$

$q_2 = 2 \,\mu C$ $r_2 = 4$ m   P