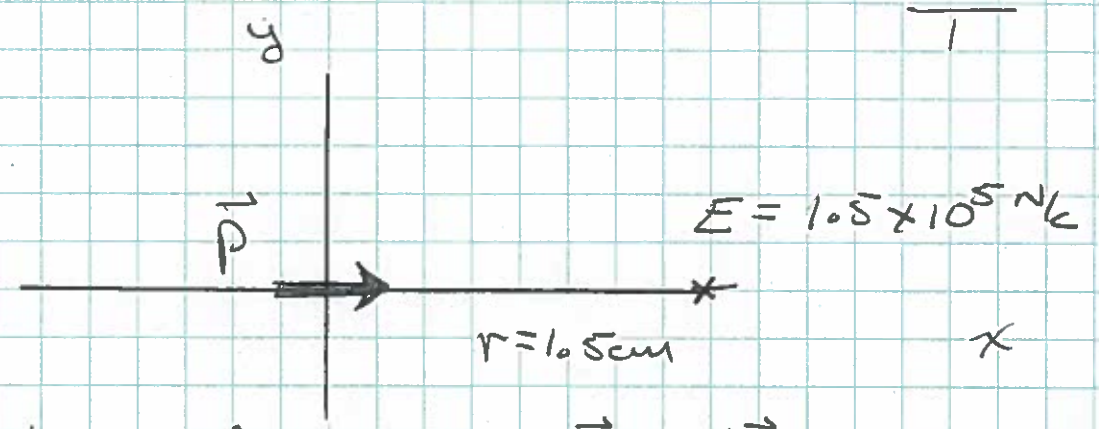

a.) On the dipole axis: $\vec{E} = \frac{2K\vec{p}}{r^3}$

magnitudes:

$$E = \frac{2Kp}{r^3}$$

So $$p = \frac{Er^3}{2K} = 2.816 \times 10^{-11} \text{ Cm}$$

$$2.816 \times 10^{-11} \text{ Cm} \left(\frac{10^9 \text{ nC}}{1 \text{ C}}\right)\left(\frac{1000 \text{ mm}}{\text{m}}\right)$$

$$= \underline{28.16 \text{ nC mm}}$$

b.) $s = 1$ mm $\quad p = qs \Rightarrow q = \frac{p}{s} = \underline{28.16 \text{ nC}}$

c.) for point charge Q:

$$E = 1.5 \times 10^5 \frac{N}{C} = \frac{KQ}{r^2}$$

So: $$Q = \frac{Er^2}{K} = 3.754 \times 10^{-9} \text{ C}$$

$$= \underline{3.754 \text{ nC}}$$