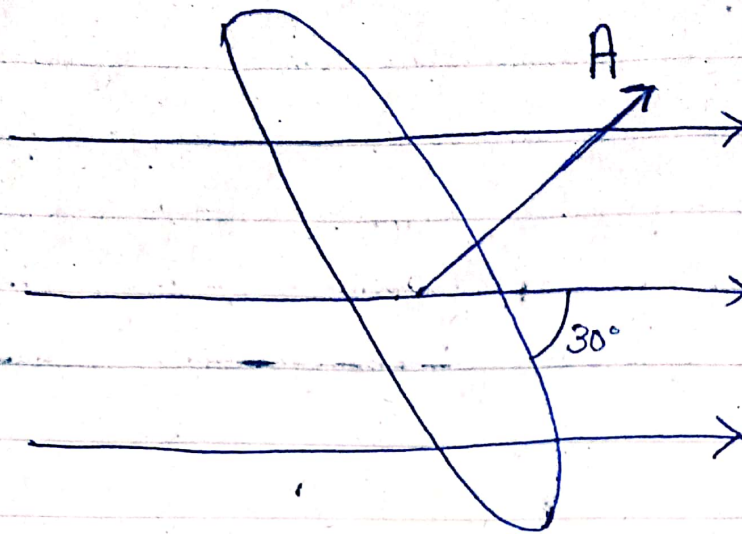


1.



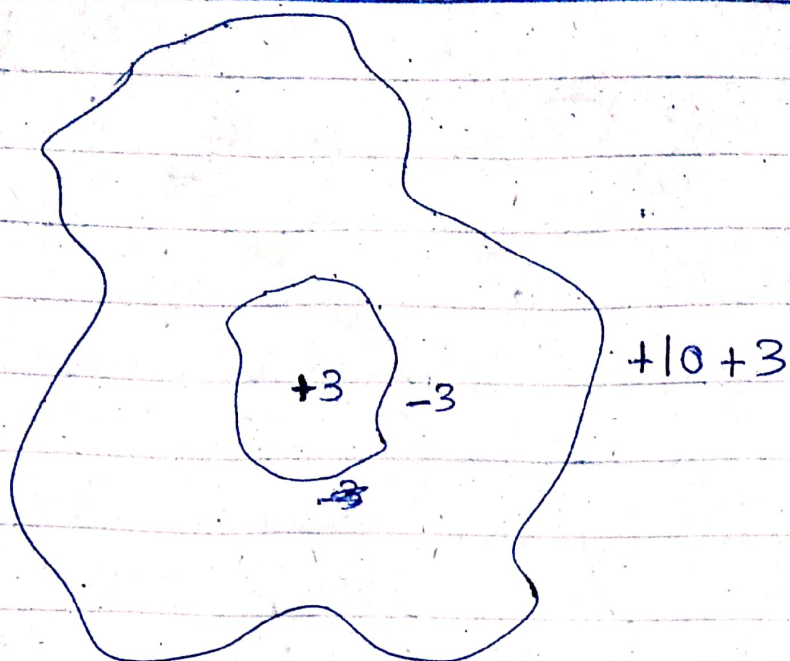
$$\begin{aligned}\Phi &= E.A \cos \theta \\ &= (450)(\pi \times 0.12^2) \cos(60) \\ \Phi &= 10.2 \text{ N}\cdot\text{m}^2/\text{C}\end{aligned}$$

2. $\Delta q = 2 \mu\text{C}$

$$\begin{aligned}\Phi &= \frac{q}{\epsilon_0} \\ &= \frac{2 \times 10^{-6}}{8.85 \times 10^{-12}}\end{aligned}$$

$$\Phi = 2.3 \times 10^5 \text{ (inwards)}$$

3



a. $-3\mu\text{C}$

b. $13\mu\text{C}$

4. $\Phi = \frac{q}{\epsilon_0}$

$$= \frac{1.8 \times 10^{-6}}{8.85 \times 10^{-12}}$$

$$\Phi = 2.0 \times 10^5$$

$$5a. \sigma = \frac{q}{A}$$

$$q = \sigma A \\ = (8.1 \times 10^{-6}) [4\pi \times (1.2/2)^2]$$

$$q = 3.66 \times 10^{-5} \text{ C}$$

$$b. \Phi = \frac{q}{\epsilon_0}$$

$$= \frac{3.66 \times 10^{-5}}{8.85 \times 10^{-12}}$$

$$\Phi = 4.1 \times 10^6$$

$$6. E = \frac{\lambda}{2\pi\epsilon_0 r}$$

$$\lambda = 2\pi\epsilon_0 E r$$

$$= 2\pi(8.85 \times 10^{-12})(4.52 \times 10^4)(1.96)$$

$$\lambda = 4.9 \times 10^{-6} \text{ C/m}$$

$$7a. \Phi = \frac{q}{\epsilon_0}$$

$$= \frac{60 \times 10^{-6}}{8.85 \times 10^{-12}}$$

$$\Phi = 6.8 \times 10^6$$

$$b. \Phi = \frac{6.8 \times 10^6}{6}$$

$$\Phi = 1.1 \times 10^6$$

c. For (a), it would not change
For (b), it would change

$$8. \sigma = \frac{q}{A}$$

$$q = \sigma A$$

$$= (0.1 \times 10^{-9})(4\pi \times (0.08)^2)$$

$$q = 8.04 \times 10^{-12} \text{ C}$$

$$a. E = \frac{kQ}{r^2} = \frac{(8.99 \times 10^9)(8.04 \times 10^{-12})}{(0.08)^2}$$

$$E = 11.4$$

$$b. E = \frac{kQ}{r^2} = \frac{(8.99 \times 10^9)(8.04 \times 10^{-12})}{(0.1)^2} = 7.3$$