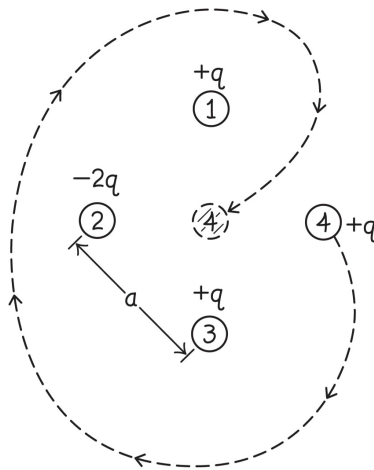


Practical 5 Questions

1. Consider a group of charged toner particles and how one of them can be moved around in the group. Four charged particles form a square with side length $a = 6.9 \mu\text{m}$. Particles 1, 3, and 4 carry charge $+q = 3.9 \times 10^{-15} \text{ C}$, and particle 2 carries charge $-2q$. Particles 2 and 4 are diagonally opposite each other. How much work must be done by an external agent on particle 4 to pull it out of its corner, slide it around outside the perimeter of the square past particles 3, 2, and 1, and then place it stationary at the center of the square?



2. A spherical water drop $50.0 \mu\text{m}$ in diameter has a uniformly distributed charge of $+20.0 \text{ pC}$. Find (a) the potential at its surface and (b) the potential at its center.
3. Three parallel-plate capacitors are separately connected to identical batteries. Capacitor 1 has a plate area A and a plate separation d . Capacitor 2 has a plate area $2A$ and a plate separation d . Capacitor 3 has a plate area A and a plate separation $2d$. Rank the three capacitors, largest first, based on (a) capacitance, (b) charge stored, (c) electric field magnitude between the plates, (d) energy stored, and (e) energy density.