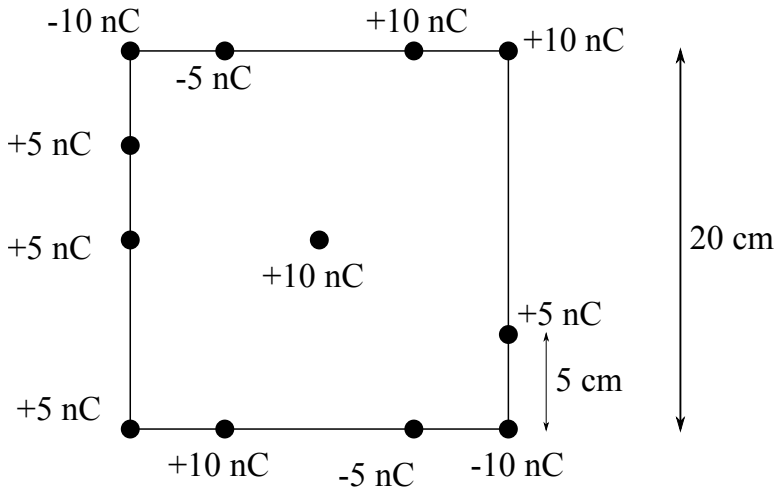
Practical 2 Questions

1. In the figure shown, a central particle of charge +10 nC is surrounded by a square array of charged particles, separated by 5 cm, 10 cm, or 15 cm along the perimeter of the square. One side of the square is 20 cm. What are the magnitude and direction of the net electrostatic force on the central particle due to the other particles? Give your answer both in component form, and as a magnitude and an angle (specify from which axis the angle is measured).



2. Two balloons A and B are filled with He gas. The density of He gas is 0.17 kg/m^3. They have identical radii of 10 cm. The balloons are made with rubber so that they can be charged by rubbing against hair. They are held together with insulating strings of length $L = 90$ cm, whose mass and charge can be ignored for this problem. You can also ignore the mass of the balloons. Each balloon is charged with +40 nC. What is the angle θ at equilibrium? *(Hint: You may assume that the angle is small. To simplify calculation of the Coulomb force between the balloons, treat each balloon as a point charge located at the centre of the balloon. if the string extended to the centre of the balloon.)*