374. Two point charges of −13.0 μC and −16.0 μC exert repulsive forces on each other of 12.5 N. What is the distance between the two charges?

375. Three equal point charges of 4.00 nC lie 4.00 m apart on a line. Calculate the magnitude and direction of the net force on the middle charge.

376. A proton is at each corner of a square with sides 1.52×10^{-9} m long. Calculate the resultant force vector on the proton at the upper right corner.

377. Three 2.0 nC charges are located at coordinates (0 m, 0 m), (1.0 m, 0 m), and (1.0 m, 2.0 m). Find the resultant force on the first charge.

378. Charges of 7.2 nC and 6.7 nC are 32 cm apart. Find the equilibrium position for a −3.0 nC charge.

379. A −12.0 μC charge is between two 6.0 μC charges, 5.0 cm away from each. What electric force keeps the central charge in equilibrium?

380. A 9.0 N/C electric field is directed along the *x*-axis. Find the electric force vector on a −6.0 C charge.

381. What charge experiences an electric force of 6.43×10^{-9} N in an electric field of 4.0×10^{3} N/C?

382. A 5.00 μC charge is 0.500 m above a 15.0 μC charge. Calculate the electric field at a point 1.00 m above the 15.0 mC charge.

383. Two static point charges of 99.9 μC and 33.3 μC exert repulsive forces on each other of 87.3 N. What is the distance between the two charges?

384. Two particles are separated by 9.30×10^{-11} m. If the magnitude of the electric force between the charges is 2.66×10^{-8} N, what is the value of q?

385. A −23.4 nC charge is 0.500 m below a 4.65 nC charge and 1.00 m below a 0.299 nC charge. Find the resultant force vector on the −23.4 nC charge.

386. Three point charges are on the corners of a triangle: $q_1 = -9.00$ nC is at the origin; $q_2 = -8.00$ nC is at $x = 2.00$ m; and $q_3 = 7.00$ nC is at $y = 3.00$ m. Find the magnitude and direction of the resultant force on q_1.

387. Charges of −2.50 nC and −7.50 nC are 20.0 cm apart. Find a 5.0 nC charge's equilibrium position.

388. A −4.6 C charge is in equilibrium with a −2.3 C charge 2.0 m to the right, and an unknown charge 4.0 m to the right. What is the unknown charge?

389. Find the electric force vector on a 5.0 nC charge in a 1500 N/C electric field directed along the *y*-axis.

390. What electric charge experiences an 8.42×10^{-9} N electric force in an electric field of 1663 N/C?

391. Two 3.00 μC charges lie 2.00 m apart on the *x*-axis. Find the resultant electric field vector at a point 0.250 m on the *y*-axis, above the charge on the left.

392. Two electrons are 2.00×10^{-10} m and 3.00×10^{-10} m, respectively, from a point. Where with respect to that point must a proton be placed so that the resultant electric field strength is zero?

393. A −7.0 C charge is in equilibrium with a 49 C charge 18 m to the right and an unknown charge 25 m to the right. What is the unknown charge?

394. Suppose two pions are separated by 8.3×10^{-10} m. If the magnitude of the electric force between the charges is 3.34×10^{-10} N, what is the value of q?

395. Suppose two muons having equal but opposite charge are separated by 6.4×10^{-8} m. If the magnitude of the electric force between the charges is 5.62×10^{-14} N, what is the value of q?

396. Consider four electrons at the corners of a square. Each side of the square is 3.02×10^{-5} m. Find the magnitude and direction of the resultant force on q_3 if it is at the origin.

397. A charge of 5.5 nC and a charge of 11 nC are separated by 88 cm. Find the equilibrium position for a −22 nC charge.

398. Three charges are on the *y*-axis. At the origin is a charge, $q_1 = 72$ C; an unknown charge, q_2, is at $y = 15$ mm. A third charge, $q_3 = -8.0$ C, is placed at $y = -9.0$ mm so that it is in electrostatic equilibrium with q_1 and q_2. What is the charge on q_2?

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399. A helium-filled balloon with a 14.5 nC charge rises 290 m above Earth's surface. By how much does the electrical potential energy change if Earth's electric field is −105 N/C?

400. A charged airplane rises 7.3 km in a 3.4×10^{5} N/C electric field. The electrical potential energy changes by -1.39×10^{11} J. What is the charge on the plane?