Suggested problems: Chapter 22- HRW-Principles of Physics- ISV 10th Edition.

1.Two charged particles are fixed to an x-axis: Particle 1 of charge q_1= 2.1 x 10^{-8} C is at position x=20 cm and particle 2 of charge q_2=–4.00 q_1 is at position x = 70 cm. (a) At what coordinate on the x-axis (other than at infinity) is the net electric field produced by the two particles equal to zero? (b) What are the zero-field coordinate if the particles are interchanged?

Answer: (a) –30 cm ; (b) + 1.20 m

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22. In Fig. 22-34 the electric field lines on the left have twice the separation of those on the right. (a) If the magnitude of the field at A is 60 N/C, what is the magnitude of the force on a proton at A? (b) What is the magnitude of the field at B?

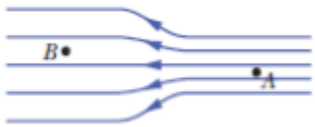

Fig. 22-34 Problem 22

Answer: (a) 9.6 ×10^{-18} N ; (b) 30 N/C

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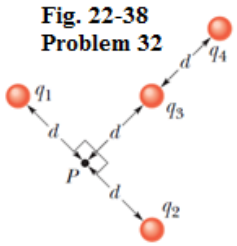
32. In Fig. 22-38, the four particles are fixed in place and have charges $q_1 = q_2 = +5e, q_3 = +3e,$ and$q_4 = -12e$. Distance d = 8.0 μm. What is the magnitude of the net electric field at point P due to the particles?



Answer: zero

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35. An electric dipole consisting of charges of magnitudes 1.50 nC seperated by 6.20 μm is in an electric field of strength 300 N/C. What are (a) the magnitude of the electric dipole moment and (b) the difference between the potential energies for dipole orientation paralell and perpandicular to ***E***?

Answer:(a) 9.30 x 10^{-15} C.m (b) 2.79 x 10^{-12} J

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38. An electron enters a region of uniform electric field with aninitial velocity of 30 km/s in the same direction as the electric field,which has magnitude E = 50 N/C. (a) What is the speed of theelectron 1.5 ns after entering this region? (b) How far does theelectron travel during the 1.5 ns interval?

Answer:(a) 1.7 x 10^{4} m/s (b) 3.5 x 10^{-5} m

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40. An electric dipole consists of charges + 2e and − 2e separatedby 0.85 nm. It is in an electric field of strength 3.4 × 10^{6} N/C.Calculate the magnitude of the torque on the dipole when the dipolemoment is (a) parallel to, (b) perpendicular to, and (c) antiparallelto the electric field.

Answer: (a) zero ; (b) 9.2×10^{-22} N ; (c) zero
