Suggested problems
Chapter 22

The quiz questions will be same or very similar to the following text-book problems.
Refer to the course website for the latest version of this document.
You are encouraged to seek the help of your instructor during his office hours.

2.In Fig. 22-29 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 40 N/C, what is the magnitude of the force on a proton at A? (b) What is the magnitude of the field at B?

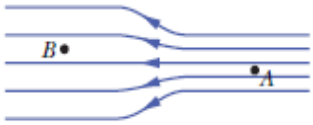
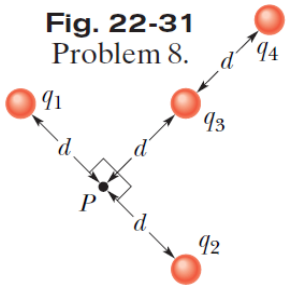


Fig. 22-29 Problem 2.

Answer: (a) 6.4×10^{-18} N ; (b) 20 N/C

8.In Fig. 22-31, the four particles are fixed in place and have charges $q_1 = q_2 = +5e, q_3 = +3e,$ and $q_4 = -12e$. Distance d = 5.0 μm. What is the magnitude of the net electric field at point P due to the particles?



Answer: zero

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23. Figure 22-42 shows two parallel nonconducting rings with their central axes along a common line.Ring 1 has uniform charge q_1 and radius R; ring 2 has uniform charge $q_2$and the same radius R.The rings are separated by distance d = 3.00R. The net electric field at point P on the common line, at distance R fromring 1, is zero.What is the ratio q_1/q_2?

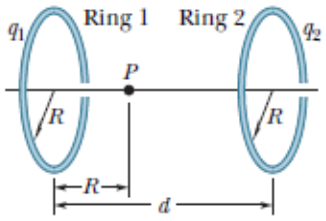

Fig. 22-42 Problem 23.

Answer: 0.506

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52. An electron enters a region of uniform electric field with aninitial velocity of 40 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: 5.0×10^{-5} m = 50 μm

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56. An electric dipole consists of charges + 2e and − 2e separatedby 0.78 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) 8.5×10^{-22} N ; (c) zero

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73. The electric field in an *xy*plane produced by a positivelycharged particle is $\vec{E} = 7.2(4.0\,\hat{i} + 3.0\,\hat{j})$ N/C at the point (3.0, 3.0)cm and $\vec{E} = 100\,\hat{i}$ N/C at the point (2.0, 0) cm.What are the (a) *x* and (b)*y* coordinates of the particle? (c) What is the charge of the particle?

Answer: (a) –1.0 cm ; (b) zero ; c) 1.0×10^{-11} C.