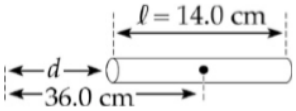
WS # 3 Chapter 23 pr: 37,39,42,43,45,63

Problems



37. A rod 14.0 cm long is uniformly charged and has a total charge of −22.0 μC. Determine (a) the magnitude and (b) the direction of the electric field along the axis of the rod at a point 36.0 cm from its center.

39. A uniformly charged ring of radius 10.0 cm has a total charge of 75.0 μC. Find the electric field on the axis of the ring at (a) 1.00 cm, (b) 5.00 cm, (c) 30.0 cm, and (d) 100 cm from the center of the ring.

42. A uniformly charged rod of length L and total charge Q lies along the x axis as shown in Figure P23.42. (a) Find the components of the electric field at the point P on the y axis a distance d from the origin. (b) What are the approximate values of the field components when $d >> L$? Explain why you would expect these results.

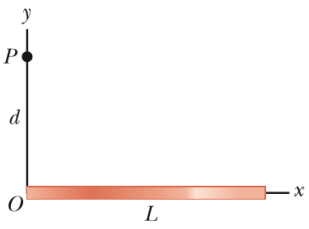
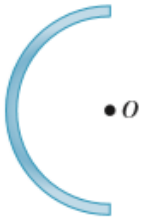


Figure P23.42

43. A continuous line of charge lies along the x axis, extending from $x = +x_0$ to positive infinity. The line carries positive charge with a uniform linear charge density λ_0. What are (a) the magnitude and (b) the direction of the electric field at the origin?

45. A uniformly charged insulating rod of length 14.0 cm is bent into the shape of a semicircle as shown in Figure P23.45. The rod has a total charge of −7.50 μC. Find (a) the magnitude and (b) the direction of the electric field at O, the center of the semicircle.



63. A line of charge starts at $x = +x_0$ and extends to positive infinity. The linear charge density is $\lambda = \lambda_0 x_0 / x$, where λ_0 is a constant. Determine the electric field at the origin.

37) 1.59E6 N/C right, 39) 6.64E6 I N/C etc, 42) $-\frac{kQ}{LD}\left(1-\frac{D}{\sqrt{L^2-D^2}}\right)i, \frac{kQ}{D\sqrt{L^2-D^2}}j$ 43) $E=\frac{k\lambda}{x_o}$ 45) $E=-\frac{2kQ}{\pi R^2}$ i

63) $E=-\frac{k\lambda_o}{2x_o}i$