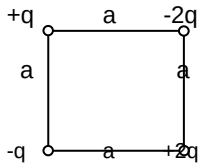
Physics 2 problem
Chapter 23: Electric field
Fundamentals of Physics (6th edition): Halliday/Resnick/Walker

Sec. 23-4: Electric field due to a point charge

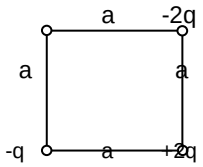
5E: What is the magnitude of a point charge whose electric field 50 cm away has the magnitude 2.0 N/C?

6E: Two particles with equal charge magnitudes 2.0×10^{-7} C but opposite signs are held 15 cm apart. What are the magnitude and direction of ***E*** at the point midway between the charges?

13P: What is the magnitude and direction of the electric filed at the center of the square of Fig. 23-30 if $q = 1.0\times10^{-8}$ C and $a = 5.0$ cm?



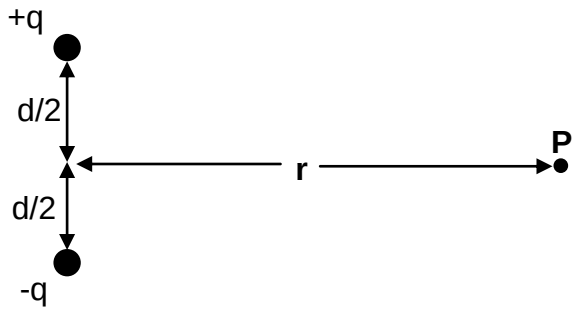
13P-extra: Now the + q charge is removed from the corner of that square. What is the magnitude and direction of the electric filed at that center of the square?



Sec. 23-5: Electric field due to an electric dipole

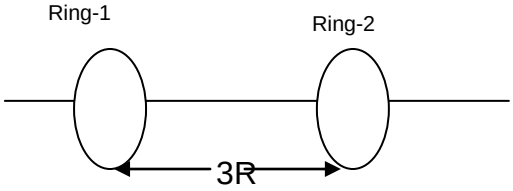
14E: In Fig. 23-8, let both charges be positive. Assuming $z >> d$, show that E at point P in that figure is then given by $E = (1/4\pi\varepsilon_0)\,(2q/z^2)$.

16P: Find the magnitude and direction of the electric field at point P due to the electric dipole in Fig. 23-31. P is located at a distance $r >> d$ along the perpendicular bisector of the line joining the charges. Express your answer in terms of the magnitude and direction of the electric dipole moment ***p***.

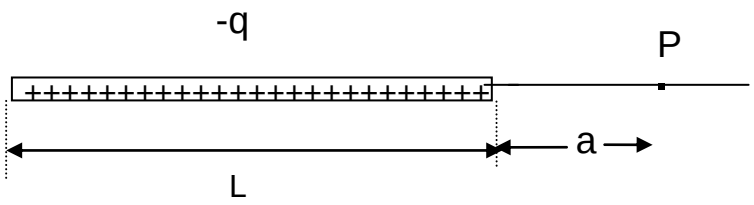


Sec. 23-6: Electric field due to a line of charge

18E: Figure 23-33 shows two parallel nonconducting rings arranged with their central axes along a common line. Ring1 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 a distance $3R$. The net electric field at point P on the common line, at distance R from ring 1, is zero. What is the ratio q_1/q_2?



23P: In the Fig. 23-35, a nonconducting rod of length *L* has charge -*q* uniformly distributed along its length. (a) What is the linear charge density of the rod? (b) What is the electric field at point *P*, a distance *a* from the end of the rod? (c) If *P* were very far from the rod compared to *L*, the rod would look like a point charge. Show that your answer to (b) reduces to the electric field of a point charge for $a>>L$.



Sec. 23-7: Electric field due to a charged disk

26E: A disk of radius 2.5 cm has a surface charge density of 5.3 μC/m^2 on its upper face. What is the magnitude of the electric field produced by the disk at a point on its central axis at distance *z* = 12 cm from the disk?

27P: At what distance along the central axis of a uniformly charged plastic disk of radius *R* is the magnitude of the electric field equal to one-half the magnitude of the field at the center of the surface of the disk?