

Chapter 23 Electric Fields (Lecture Examples)

- Ex: 1 In a positronium atom the electron and positron are on average a distance, a , apart. Find the ratio of the electrical force to the gravitational force acting on the electron.
- Ex: 2 Each atom in a one mole piece of copper has lost one electron. If the removed electrons are placed at the South Pole and the piece of copper is at the North Pole, what is the magnitude of the electrical force acting on the copper?
- Ex: 3 A charge, q , is located a distance, a , to the left of a charge, $-Q$. Find the point in space where a charge, C , could be placed and there would be no net force acting on it.
- Ex: 4 There are three identical charges located at the corners of a right triangle whose sides are $3a$, $4a$ and $5a$ in length. What is the force acting on the charge located at the smallest angle?
- Ex: 5 A charge, q , is located a distance, a , to the left of a charge, $-Q$. Calculate the E field strength at the midpoint between the two charges.
- Ex: 6 A charge, q , is located a distance, a , to the left of a charge, $-Q$. Find all of the locations where the electric field strength is zero. (Assume the charge " q " is located at the origin.)
- Ex: 7 Calculate E of a dipole a distance, x , from the midpoint between the charges along the axis of the dipole and along the perpendicular bisector. (Assume $x > a$)
- Ex: 8 A charge, q , is suspended by a string in a horizontal electric field. Find E if the charge has a mass, m , and the support string makes an angle, θ , with the vertical.
- Ex: 9 Calculate the magnitude and direction of the electric field a distance, a , from an infinitely long non-conducting straight line of charge whose charge density is λ .
- Ex: 10 Calculate the magnitude and direction of the electric field on the axis of a thin ring a distance, x , from the center of the ring. The ring's charge density is λ . (The ring has radius, a .)
- Ex: 11 Calculate the magnitude and direction of the electric field on the perpendicular bisector of a line segment of length, L , a distance, a , from the segment. The segment has charge density is λ .
- Ex: 12 A disk has charge on only one side and the charge density is σ . Calculate the magnitude and direction of the electric field on the axis of the disk a distance, x , from the center of the charge. (The disk has radius, a .)
- Ex: 13 Calculate the magnitude and direction of the electric field a distance, R , from the center of a solid conducting sphere of radius, a , and surface charge density, σ . ($R > a$)
- Ex: 14 Calculate the magnitude and direction of the electric field a distance, R , from the center of a solid non-conducting sphere of radius, a , and volume charge density, ρ . ($R > a$)
- Ex: 15 Calculate the time an electron takes to move a distance, x , in an electric field, E . (Assume the electron starts from rest)

Ex: 16 Calculate the maximum distance that an electron will penetrate into a confined electric field, E . (Assume the electron enters the field with a speed of v_0 at an angle of θ to the field)