Worksheet 6.02 Electric Field

1) What is the electric field strength 0.750 m from an 8.00 uC charged object? $(1.28 \times 10^5 \text{ N/C})$

2) Calculate the gravitational field strength on the surface of Mars. Mars has a radius of 3.43×10^6 m and a mass of 6.37×10^{23} kg. (3.61 N/kg)

3) At a point a short distance from a 4.60×10^{-6} C charged object, there is an electric field strength of 2.75×10^5 N/C. What is the distance to the charged object producing this field? (0.388 m)

4) If an alpha particle experiences an electric force of 0.250 N at a point in space, what electric force would a proton experience at the same point? (0.125 N)

5) What is the electric field strength at a point in space where a 5.20×10^{-6} C charged object experiences an electric force of 7.11×10^{-3} N? (1370 N/C)

6) What is the initial acceleration of an alpha particle when it is placed at a point in space where the electric field strength is 7.60×10^4 N/C? $(3.66 \times 10^{12} \text{ m/s}^2)$

7) Calculate the electric field strength midway between a 4.50 uC charged object and a - 4.50 uC charged object if the two charges are 50 cm apart. $(1.30 \times 10^6 \text{ N/C})$

8) Calculate the electric field strength midway between a 3.0 uC charged object and a 6.0 uC object if they are 0.80 m apart. $(1.7 \times 10^5 \text{ N/C})$

9) Calculate the electric field strength midway between two 3.0 uC objects if they are 90 cm apart.
 (0 N/C)

10) What is the electric field strength at a point in space where an electron experiences an initial acceleration of 7.50×10^{12} m/s^2?   (42.7 N/C)

11) The electric field strength at a distance of 3.00×10^{-1} m from a charged object is 3.60×10^5 N/C. What is the electric field strength at a distance of 45 cm from the same object?   (1.60×10^5 N/C)

12) An electric field of 260 000 N/C points due west at a certain spot. What are the magnitude and direction of the force that acts on a charge of $- 7.0$ µC at this spot?   (1.8 N due east)

13) Two charges, -16 µC and + 4.0 µC, are fixed in place and separated by 3.0 m. a) At what spot along a line through the charges is net electric field zero? Locate this spot relative to the positive charge. *(Hint: the spot does not necessarily lie between the two charges.)* b) What would by the force on a charge of + 14 µC placed at this spot?   (3.0 m from the positive charge (not between the charges), 0N)

14) Two point charges are lying on the y axis where $q_1 = - 4.00$ µC and $q_2 = +$ 4.00 µC. They are equidistant from the point P, which lies on the x axis. a) What is the net electric field at P? b) A small object of charge $q_o = +8.00$ µC and mass m = 1.20 g is placed at P. When it is released, what is its acceleration? (7.56×10^4 N/C, directed along the +y axis, 5.04×10^2 m/s^2, along the +y axis)
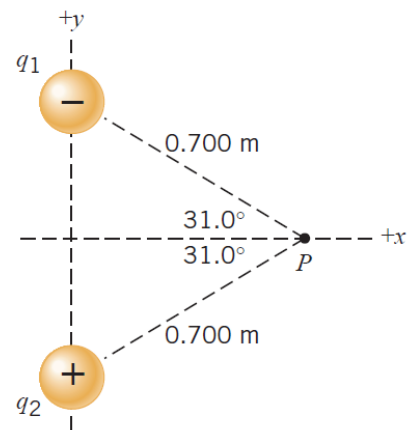
*15) At three corners of a rectangle (length = 2d, height = d), the following charges are located: $+q_1$ (upper left corner), $+q_2$ (lower right corner), and -q (lower left corner). The net electric field at the (empty) upper right corner is zero. Find the magnitudes of q_1 and q_2. Express your answers in terms of q.

($|q_1| = 0.716$ q, $|q_2| = 0.0895q$)