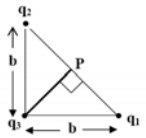
Questions

Chapter 22
Electric Fields

22-2 The Electric Field
M2-062

Three point charges q_1, q_2, and q_3 are fixed at the three corners of a right-angle triangle as shown in the figure. Given that $q_1 = q_2 = +3.2 \times 10^{-19}$ C while $q_3 = -1.6 \times 10^{-19}$ C, and b = 5.0 cm. The magnitude of the net electric field at point P due to all the three point charges is:



A) 0.00 N/C
B) 7.07×10^{-6} N/C
C) 5.00×10^{-6} N/C
D) 1.15×10^{-6} N/C
E) 4.80×10^{-6} N/C

Answer D

22-2 The Electric Field
M2-061

Three electric charges $Q_A = Q_B = q$, and $Q_C = -2q$ are located at the points A (x = + a, y = 0), B (x = -a, y = 0), and C (x = 0, y = +2a), respectively. What is the electric field at the origin?

A) $k\, q/a$ toward Q_c
B) $k\, q/2a^2$ away from Q_c
C) $k\, q/2a^2$ toward Q_c
D) $k\, q/a$ away from Q_c
E) Zero

Answer C

22-2 The Electric Field
M2-042

Three charges +2.00x10^{-8} C, +2.00x10^{-8} C, and -4.00x10^{-8} C are respectively arranged at the corners F, G, and H of a right-angle triangle as shown in figure 2. Find the magnitude and direction of the resultant electric field at point P due to the three charges.

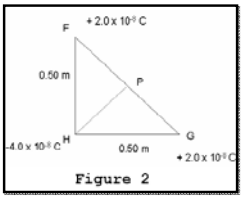


Figure 2

A) 1.09x10^{5} N/C towards F.
B) 5.37x10^{3} N/C towards H.
C) 2.88x10^{3} N/C towards H.
D) 5.37x10^{3} N/C away from H.
E) 2.88x10^{3} N/C away from H.

Answer C

22-2 The Electric Field
M2-041

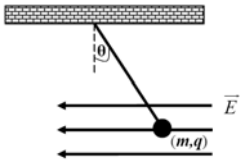
The electric field produced by a +3.0 C charge at a point 1000 m to the left of the charge is:

A)1.7 x 10^{7} N/C toward the left.
B)2.7 x 10^{4} N/C toward the right.
C)3.0 x 10^{4} N/C toward the left.
D)3.0 x 10^{4} N/C toward the right.
E)2.7 x 10^{4} N/C toward the left.

Answer E

22-8 A Point Charge in an Electric Field
M2-062

The figure shows a charged ball of mass m = 1.0 g is suspended by a light string in the presence of a uniform electric field, $\vec{E} = -3.0\times10^{5}\,\hat{i}\ \frac{N}{C}$. In this field, the ball is in equilibrium at θ = 37^{0}. The charge "q" on the ball is:



A) 0.00 C
B) - 2.46 ×10^{-8} C
C) 2.46 ×10^{-8} C
D) - 7.07 ×10^{-8} C
E) 4.80 ×10^{-6} C

Answer B

22-8 A Point Charge in an Electric Field
M2-062

The electric field between two long and parallel charged plates is uniform, and is equal to $\vec{E} = 240\,\hat{j}\ \frac{N}{C}$. An electron with velocity components $v_x = 3.0 \times 10^5$ m/s and $v_y = 2.0 \times 10^3$ m/s enters the region between these plates. The acceleration of the electron when its x-coordinate has changed by 2 cm is:

A) $-4.2 \times 10^{13}\,\hat{j}$ (m/s^2)
B) $-9.8\,\hat{j}$ (m/s^2)
C) $+1.8 \times 10^{11}\,\hat{i}$ (m/s^2)
D) $-3.0 \times 10^{8}\,\hat{i}$ (m/s^2)
E) $+5.4 \times 10^{9}$ (m/s^2)

Answer A

22-8 A Point Charge in an Electric Field
M2-061

A proton with a speed of 3.0×10^5 m/s moves in uniform electric field of 1.9×10^3 N/C. The field is acting to decelerate the proton. How far does the proton travel before it is brought to rest?

A) 0.61 m
B) 0.45 m
C) 0.53 m
D) 0.29 m
E) 0.25 m

Answer E

22-8 A Point Charge in an Electric Field
M2-061

In a uniform electric field, which statement is CORRECT?

A) All electric field lines are parallel.
B) All charged particles experience the same force.
C) All charged particles move with the same velocity.
D) All electric field lines are directed away from the negative charges.
E) All electric field lines are directed towards the positive charges.

Answer A

22-8 A Point Charge in an Electric Field
M2-042

In figure 9, a small ball of mass m=2.0 g is hanging from a fixed point by a non-conducting string of length 1.00 m. The ball carries a charge $q=25.0\times10^{-9}$ C. The mass of the string is negligible. An electric field E with magnitude $E=2.0\times10^{5}$ N/C, in the positive x-direction, causes the ball to be in an equilibrium position with an angle Theta. Find the angle Theta. [Take g = 9.80 m/s^2].

A)0.2 degrees.
B)10.0 degrees.
C)7.1 degrees.
D)14.3 degrees.
E)75.7 degrees.

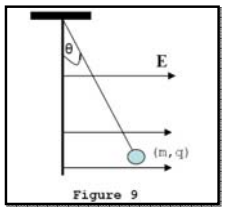


Figure 9

Answer D

22-8 A Point Charge in an Electric Field
M2-042

A uniform electric field is set up between two large charged plates, see Figure 3. An electron is released from the negatively charged plate, and at the same time, a proton is released from the positively charged plate. They cross each other at a distance of 5.00×10^{-6} m from the positively charged plate. If only the field due to the charged plates is considered, find the distance between the two plates. [Take the ratio mass of the electron : mass of the proton = 1 : 1833]

A)7.77 mm.
B)11.3 mm.
C)2.34 mm.
D)9.19 mm.
E)14.6 mm.

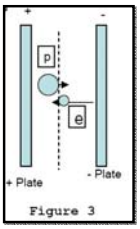


Figure 3

Answer D