Physics 210 Week 2 Multiple Choice Practice Problems

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. A 40-μC charge is positioned on the x axis at x = 4.0 cm. Where should a –60-μC charge be placed to produce a net electric field of zero at the origin?
   a. –5.3 cm
   b. 5.7 cm
   c. 4.9 cm
   d. –6.0 cm
   e. +6.0 cm

____ 2. A charge of 80 nC is uniformly distributed along the x axis from x = 0 to x = 2.0 m. Determine the magnitude of the electric field at a point on the x axis with x = 8.0 m.
   a. 30 N/C
   b. 15 N/C
   c. 48 N/C
   d. 90 N/C
   e. 60 N/C

____ 3. A charge of 25 nC is uniformly distributed along a circular arc (radius = 2.0 m) that is subtended by a 90-degree angle. What is the magnitude of the electric field at the center of the circle along which the arc lies?
   a. 81 N/C
   b. 61 N/C
   c. 71 N/C
   d. 51 N/C
   e. 25 N/C

____ 4. A 16-nC charge is distributed uniformly along the x axis from x = 0 to x = 4 m. Which of the following integrals is correct for the magnitude (in N/C) of the electric field at x = +10 m on the x axis?
   a. $\int_0^4 \frac{36dx}{(10-x)^2}$
   b. $\int_0^4 \frac{154dx}{(10-x)^2}$
   c. $\int_0^4 \frac{36dx}{x^2}$
   d. $\int_6^{10} \frac{154dx}{x^2}$
   e. none of these

____ 5. A uniform linear charge of 2.0 nC/m is distributed along the x axis from $x = 0$ to $x = 3$ m. Which of the following integrals is correct for the y component of the electric field at $y = 4$ m on the y axis?

a. $\int_0^3 \frac{72dx}{(16+x^2)^{3/2}}$

b. $\int_0^3 \frac{18dx}{(16+x^2)^{3/2}}$

c. $\int_0^3 \frac{72dx}{16+x^2}$

d. $\int_3^0 \frac{18dx}{16+x^2}$

e. none of these

____ 6. A particle ($q = 4.0$ mC, $m = 50$ g) has a velocity of 25 m/s in the positive x direction when it first enters a region where the electric field is uniform (60 N/C in the positive y direction). What is the speed of the particle 5.0 s after it enters this region?

a. 49 m/s
b. 35 m/s
c. 32 m/s
d. 44 m/s
e. 24 m/s

____ 7. Two charged particles, Q_1 and Q_2, are a distance r apart with $Q_2 = 5Q_1$. Compare the forces they exert on one another when $\mathbf{F}_1$ is the force Q_2 exerts on Q_1 and $\mathbf{F}_2$ is the force Q_1 exerts on Q_2.

a. $\mathbf{F}_2 = 5\mathbf{F}_1$.
b. $\mathbf{F}_2 = -5\mathbf{F}_1$.
c. $\mathbf{F}_2 = \mathbf{F}_1$.
d. $\mathbf{F}_2 = -\mathbf{F}_1$.
e. $5\mathbf{F}_2 = \mathbf{F}_1$.

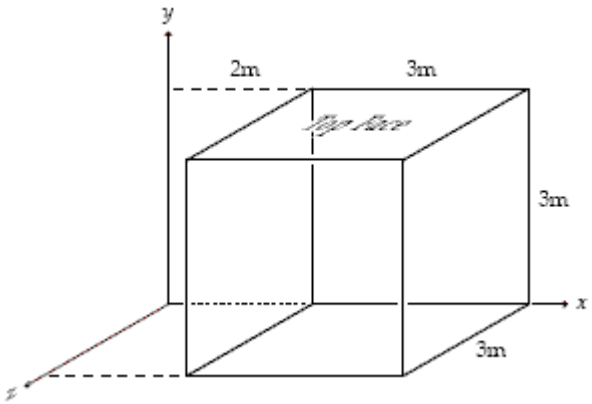
____ 8. Two charges of 15 pC and −40 pC are inside a cube with sides that are of 0.40-m length. Determine the net electric flux through the surface of the cube.

a. $+2.8\ \text{N} \cdot \text{m}^2/\text{C}$
b. $-1.1\ \text{N} \cdot \text{m}^2/\text{C}$
c. $+1.1\ \text{N} \cdot \text{m}^2/\text{C}$
d. $-2.8\ \text{N} \cdot \text{m}^2/\text{C}$
e. $-0.47\ \text{N} \cdot \text{m}^2/\text{C}$

____ 9. A uniform charge density of 500 nC/m^3 is distributed throughout a spherical volume (radius = 16 cm). Consider a cubical (4.0 cm along the edge) surface completely inside the sphere. Determine the electric flux through this surface.

a. $7.1\ \text{N} \cdot \text{m}^2/\text{C}$
b. $3.6\ \text{N} \cdot \text{m}^2/\text{C}$
c. $12\ \text{N} \cdot \text{m}^2/\text{C}$
d. $19\ \text{N} \cdot \text{m}^2/\text{C}$
e. $970\ \text{N} \cdot \text{m}^2/\text{C}$

____ 10. The electric field in the region of space shown is given by $E = (8\mathbf{i} + 2y\mathbf{j})$ N/C where y is in m. What is the magnitude of the electric flux through the top face of the cube shown?



a. 90 N · m^2/C
b. 6.0 N · m^2/C
c. 54 N · m^2/C
d. 12 N · m^2/C
e. 126 N · m^2/C

Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 1
2. ANS: B PTS: 1
3. ANS: D PTS: 1
4. ANS: A PTS: 1
5. ANS: A PTS: 1
6. ANS: B PTS: 1
7. ANS: D PTS: 1
8. ANS: D PTS: 1
9. ANS: B PTS: 1
10. ANS: C PTS: 1