PHYSICS 3204

UNIT 2- SECTION 1:ELECTROSTATIC

Worksheet 6 -Calculating Electric Field

PART A: Multiple Choice

1. What is the force between a 1.50×10^{-5} C charge and a 1.03×10^{-5} C charge that are separated by a distance of 12.0 m?

   (A) 9.66×10^{-3} N
   (B) 1.16×10^{-1} N
   (C) 9.66×10^{9} N
   (D) 1.16×10^{11} N

2. What force is experienced by a 2.50×10^{-6} C test charge placed in a 2.92×10^{4} N/C electric field?

   (A) 8.56×10^{-11} N
   (B) 7.30×10^{-2} N
   (C) 6.57×10^{8} N
   (D) 1.17×10^{10} N

3. What is the electric field strength at 6.7 m from a 6.0×10^{-6} C charged object?

   (A) 1.3×10^{-7} N/C
   (B) 9.0×10^{-7} N/C
   (C) 1.2×10^{3} N/C
   (D) 8.1×10^{3} N/C

4. What is the electric field strength 0.50 m away from an object having a charge of 2.5×10^{-6} C?

   (A) 5.0×10^{-6} N/C
   (B) 1.0×10^{-5} N/C
   (C) 4.5×10^{4} N/C
   (D) 9.0×10^{4} N/C

5. What is the electric field strength 0.25 m away from an object having a charge of 1.5×10^{-6} C?

   (A) 6.0×10^{-6} N/C
   (B) 2.4×10^{-5} N/C
   (C) 5.4×10^{4} N/C
   (D) 2.2×10^{5} N/C

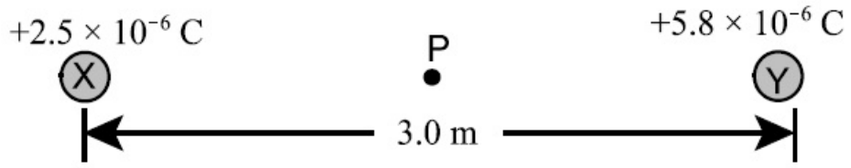
6. What is the magnitude of the electric field at a point 0.012 m from a charge of 0.28 C?

   (A) 1.9×10^{3} N/C
   (B) 2.1×10^{11} N/C
   (C) 4.9×10^{12} N/C
   (D) 1.8×10^{13} N/C

7. What is the magnitude of the electric field strength at a distance of 0.010 m from an object having a charge of 0.25 C?

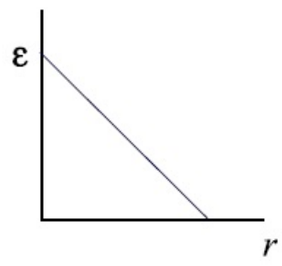
   (A) $5.6 \text{ x } 10^{10}$ N/C
   (B) $2.3 \text{ x } 10^{11}$ N/C
   (C) $5.6 \text{ x } 10^{12}$ N/C
   (D) $2.3 \text{ x } 10^{13}$ N/C

8. If two positive point charges are placed 3.0 m apart as shown below, what is the magnitude of the electric field at point P midway between the two charges?



(A) 0 N/C
(B) 8 300 N/C
(C) 13 000 N/C
(D) 33 000 N/C

9. Which shows how the electric field strength varies with distance from a charged object?

(A)


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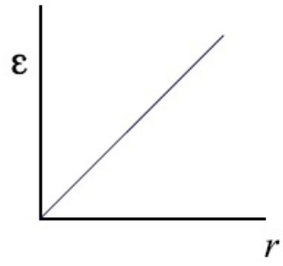

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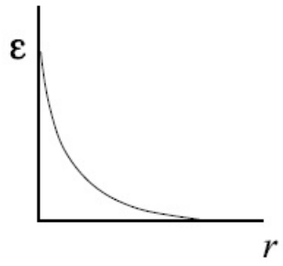

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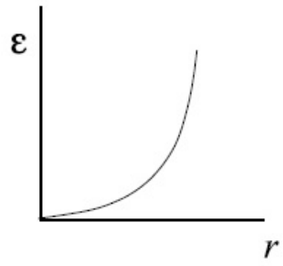


10. Which best describes how electric field strength varies with distance in the region around a point charge?

(A) $\varepsilon \propto r$

(B) $\varepsilon = \frac{1}{r}$

(C) $\varepsilon = r^2$

(D) $\varepsilon = \frac{1}{r^2}$

11. What is the charge on an object that experiences a 5.0 N force in a 50.0 N/C electric field?

(A) 0.10 C
(B) 0.20 C
(C) 2.0 C
(D) 10.0 C

12. What is the electric field strength 2.4 m from an object with a charge of 7.5×10^{-7} C?

(A) 1.8×10^{-6} N/C
(B) 8.5×10^{-4} N/C
(C) 1.2×10^{3}N/C
(D) 2.8×10^{3} N/C

13. A Van de Graaf generator creates an electric field about a metal sphere. A 3.0 μC charge, near the sphere, experiences a force of 5.4×10^{-4} N. What is the strength of the electric field at the location of the charge?

(A) 1.6×10^{-9} N/C
(B) 1.8×10^{-4} N/C
(C) 5.4×10^{-4} N/C
(D) 1.8×10^{2} N/C

14. What is the magnitude of the electric field strength 2.40 m away from a 3.4 μ C point charge?

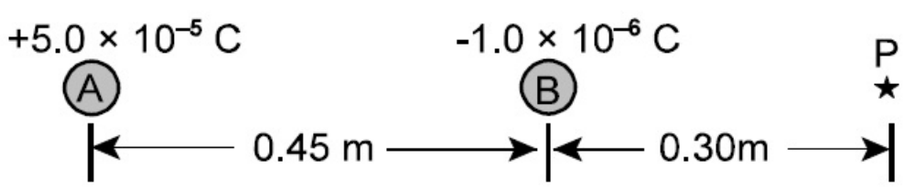
(A) 0.53 N/C
(B) 130 N/C
(C) 5.3×10^{3} N/C
(D) 1.3×10^{4} N/C

15. What is the electric field strength 45 cm from a 5.0×10^{-6} C charged object?

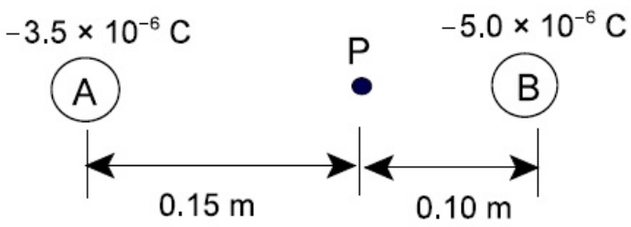
(A) 1.0×10^{3} N/C
(B) 1.0×10^{5} N/C
(C) 2.2×10^{3} N/C
(D) 2.2×10^{5} N/C

PART B : Written Response

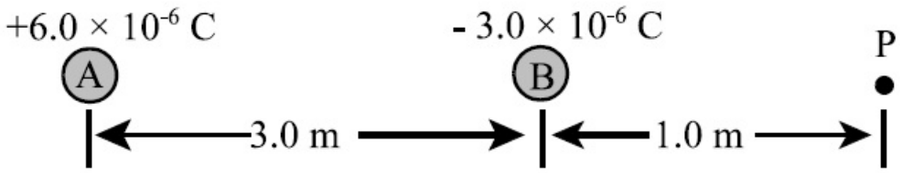
1. A Calculate the net electric field at point P in the diagram shown. AUGUST 2009



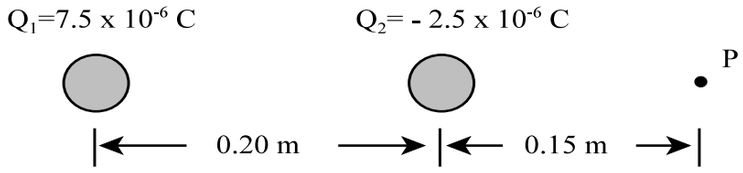
2. Two charged spheres, A and B, are arranged as shown. Calculate the magnitude and direction of the electric field strength at point P. **AUGUST 2008**



3. What is the magnitude and direction of the electric field below at point P? Show workings. **JUNE 2006**

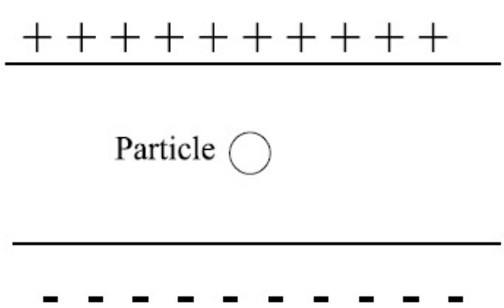


4. Given Q_1 and Q_2 arranged as shown in the diagram below, what is the electric field strength at point P? **JUNE 2005**

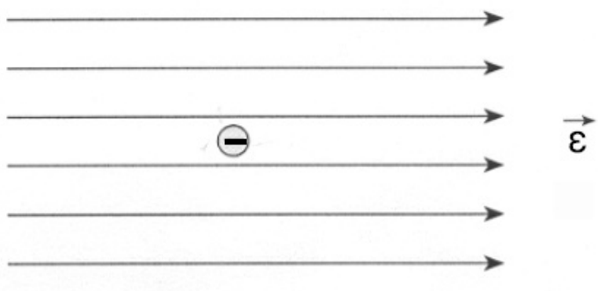


5. In the diagram below, what is the magnitude and direction of the net electric field resulting from the interaction of two fields ($\mathcal{E}_1$ a $\mathcal{E}_2$), at point X? **JUNE 2004**

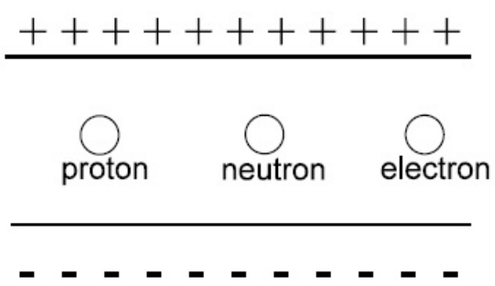
6. A negatively charged particle with a mass of 5.90 × 10^{-15} kg is at rest between two horizontal parallel charged plates as shown. If there is an excess of 5.0 x 10^2 electrons on the particle, calculate the electric field strength between the parallel plates. **JUNE 2007**



7. A 2.5×10^{-5} kg particle with a charge of -1.5×10^{-6} C is placed in an electric field of strength 2.2×10^{3} N/C [right] as shown. Determine the magnitude and direction of the acceleration of the particle. **AUGUST 2007**



8. In the diagram below a proton, neutron and electron are located between two horizontal charged parallel plates. **AUGUST 2008**



i) Describe what will happen to each particle in the field.

II) Explain which particle will have the greatest acceleration.