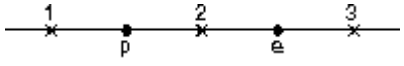
1. Two spheres, one with radius R and the other with radius $2R$, surround an isolated point charge. The ratio of the number of field lines through the larger sphere to the number through the smaller is:
   A) 1
   B) 2
   C) 4
   D) 1/2
   E) 1/4

2. The diagram shows the electric field lines due to two charged parallel metal plates. We conclude that:

   A) the upper plate is positive and the lower plate is negative
   B) a positive charge at X would experience the same force if it were placed at Y
   C) a positive charge at X experiences a greater force than if it were placed at Z
   D) a positive charge at X experiences less force than if it were placed at Z
   E) a negative charge at X could have its weight balanced by the electrical force

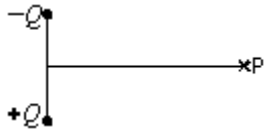
3. An isolated point charge produces an electric field with magnitude E at a point 2 m away. At a point 1 m from the charge the magnitude of the field is:
   A) E
   B) $2E$
   C) $4E$
   D) $E/2$
   E) $E/4$

4. A proton p and an electron e are on the x axis. The directions of the electric field at points 1, 2, and 3 respectively, are:



   A) $\rightarrow, \leftarrow, \rightarrow$
   B) $\leftarrow, \rightarrow, \leftarrow$
   C) $\leftarrow, \rightarrow, \rightarrow$
   D) $\leftarrow, \leftarrow, \leftarrow$
   E) none of these

5. The diagram shows a positive charge Q and a negative charge $-Q$ with the same magnitude. The electric field at point P on the perpendicular bisector of the line joining them is:



A) ↑
B) ↓
C) →
D) ←
E) zero

6. Two point charges, $+8 \times 10^{-9}$ C and -2×10^{-9} C are separated by 4 m. The electric field in N/C midway between them is:
   A) 9×10^{9}
   B) 13,500
   C) 135,000
   D) 36×10^{-9}
   E) 22.5

Answer Key :

1. A
2. B
3. C
4. B
5. A
6. E