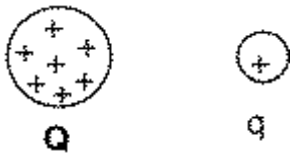
Physics 2B, Electricity and Magnetim -- Spring 2009 Instructor: B. Grinstein
Quiz # 1

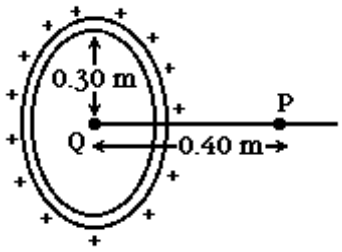
INSTRUCTIONS: Fill, tear and return the bottom strip of the front page with your scantron. Keep the top portion of the front page and the rest of the quiz. Use a pencil #2 to fill your scantron. Write your code number and bubble it in under "EXAM NUMBER". Bubble in the quiz form (see letter A--D at bottom of page) in your scantron under "TEST FORM"

Useful numbers: $K = 9.0 \times 10^9\ Nm^2/C^2$, $\varepsilon_o = 8.85 \times 10^{-12}\ C^2/Nm^2$, $e = 1.60 \times 10^{-19}$ C, $m_e = 9.11 \times 10^{-31}$ kg
$\mu_o = 4\pi \times 10^{-7}$ T m/A

1) A positive test charge $q$ is released near a positive fixed charge $Q$.




As q moves away from $Q$, it will move with
A) decreasing acceleration.
B) constant acceleration.
C) increasing acceleration.
D) constant velocity.
E) decreasing velocity




2) As shown in the figure, a conducting ring 0.30 m in radius carries a charge of +250 nC (1 nC = $10^{-9}$ C). A point charge Q is placed at the center of the ring. The electric field is equal to zero at field point P, which is on the axis of the ring, and 0.40 m from its center. The point charge Q, in nC, is closest to:
A) +170 B) −170 C) −200 D) −130 E) +200

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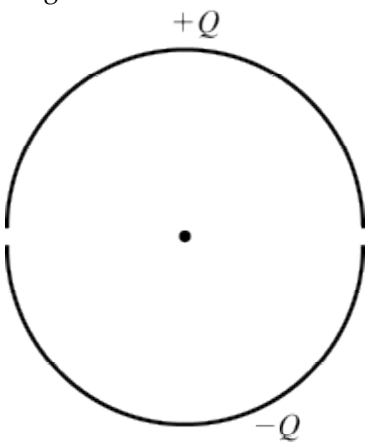
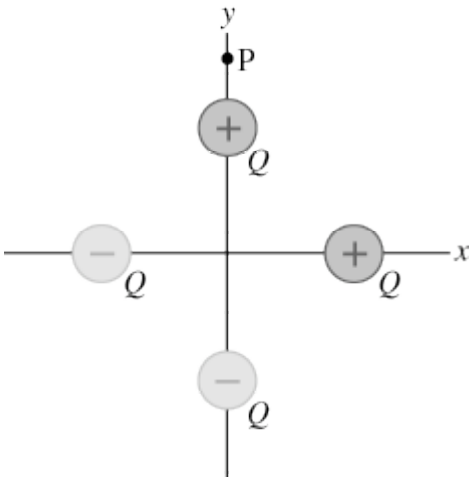
3) A circular conducting ring is split into two semi-circles. The top half has a positive charge ($Q$) evenly distributed, and the bottom half has a negative charge ($-Q$), also evenly distributed. In which direction is the electric field exactly in the center of the ring?




A) upward
B) downward
C) to the left
D) to the right
E) The electric field is zero in the center of the ring.

4) Four charged particles (two having a charge $+Q$ and two having a charge $-Q$) are distributed as shown below. Each charge is equi-distant from the origin. In which direction is the net electric field at the point P, which is on the $y$ axis?

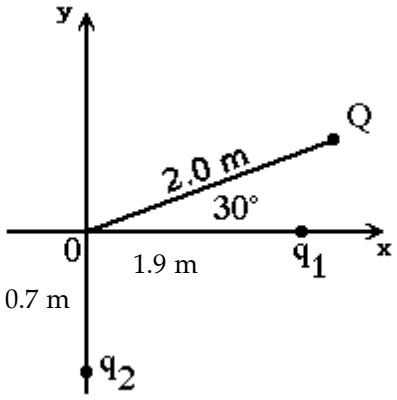



A) the net field is zero, so there is no direction
B) directly up (in the positive $y$ direction)
C) directly left (negative $x$ direction)
D) upwards, towards the left
E) upwards, towards the right

5) Two equally charged spheres of mass 1.0 g are placed 2.0 cm apart. When released, they begin to accelerate at 723 $m/s^2$. What is the magnitude of the charge on each sphere?

A) 150 nC B) 180 nC C) 130 nC D) 99 nC

6)




A point charge Q = –800 nC and two unknown point charges, $q_1$ and $q_2$, are placed as shown. The electric field at the origin O, due to charges Q, $q_1$ and $q_2$, is equal to zero. In Figure 21.1b, the charge $q_1$, in nC, is closest to:

A) 720 B) 360 C) –630 D) 630 E) –360

7) X and Y are two uncharged metal spheres on insulating stands, and are in contact with each other. A positively charged rod R is brought close to X as shown in figure 1.

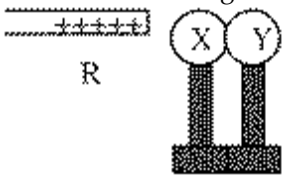



figure 1.

Sphere Y is now moved away from X (figure 2).

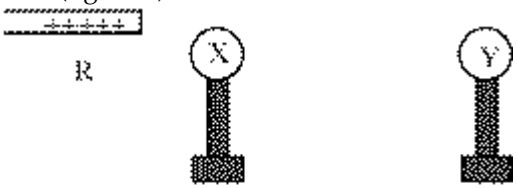
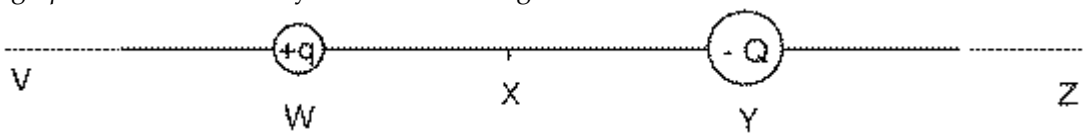



figure 2.

What are the final charge states of X and Y, respectively?

A) positive and negative
B) neutral and positive
C) negative and positive
D) positive and neutral
E) neutral and neutral

8) The diagram shows two unequal charges $+q$ and $-Q$, of opposite sign. Charge $Q$ has greater magnitude than charge $q$. Point X is midway between the charges.




In what section of the line will there be a point where the resultant electric field is zero?

A) YZ

B) XY

C) VW

D) The lectric field does not vanish in any line segment above

E) WX

Answer Key
Testname: QZ1

1) A
2) D
3) B
4) D
5) B
6) D
7) C
8) C

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