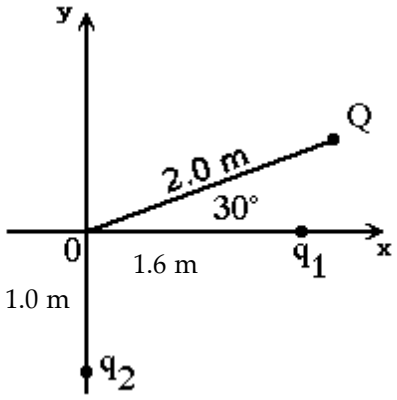
Physics 2B, Electricity and Magnetim -- Spring 2009 Instructor: B. Grinstein
Quiz # 1

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"

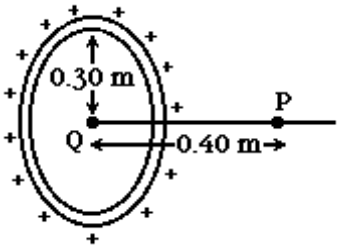
Useful numbers: $K = 9.0 \times 10^9\ Nm^2/C^2$, $\varepsilon_o = 8.85 \times 10^{-12}\ C^2/Nm^2$, $e = 1.60 \times 10^{-19}$ C, $m_e = 9.11 \times 10^{-31}$ kg
$\mu_o = 4\pi \times 10^{-7}$ T m/A

1) Two equally charged spheres of mass 1.0 g are placed 2.0 cm apart. When released, they begin to accelerate at 525 m/s^2. What is the magnitude of the charge on each sphere?
A) 85 nC B) 110 nC C) 130 nC D) 150 nC

2)



A point charge Q = –500 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) 320 B) 280 C) –160 D) –280 E) 160



3) 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) +200 E) –130

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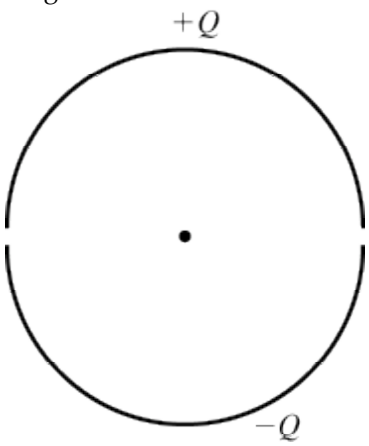
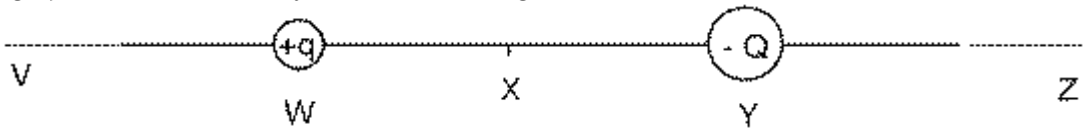
4) A circular conducting ring is split into two semi–circles. The top half has a positive charge (Q) evenly distributed, and the bottom half has a negative charge ($-Q$), also evenly distributed. In which direction is the electric field exactly in the center of the ring?



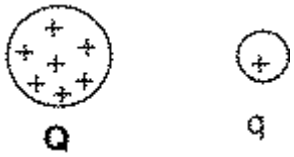
A) to the left
B) downward
C) upward
D) to the right
E) The electric field is zero in the center of the ring.

5) 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) WX
B) YZ
C) XY
D) VW
E) The lectric field does not vanish in any line segment above

6) 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 velocity
B) constant acceleration.
C) decreasing acceleration.
D) increasing acceleration.
E) constant velocity.

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.

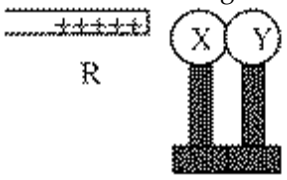


figure 1.

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

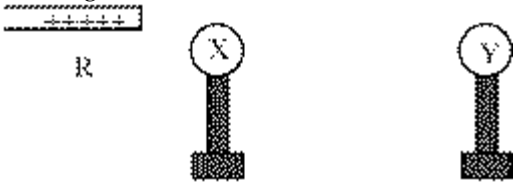
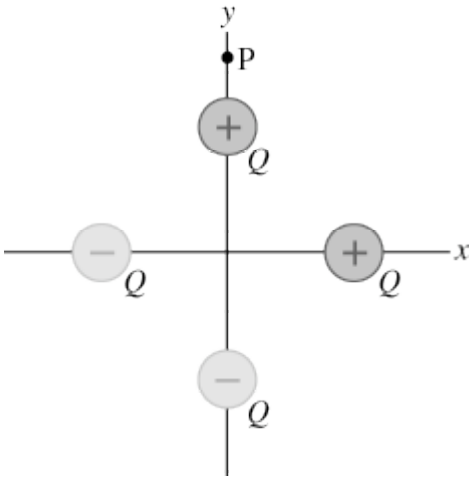


figure 2.

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

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

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

Answer Key
Testname: QZ1

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

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