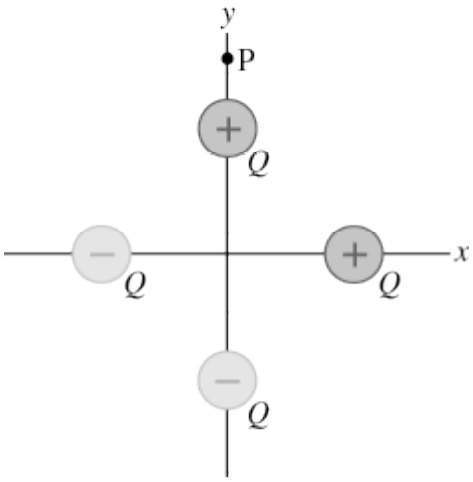
Physics 2B, Electricity and Magnetim -- Spring 2009 Instructor: B. Grinstein
Quiz # 1

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

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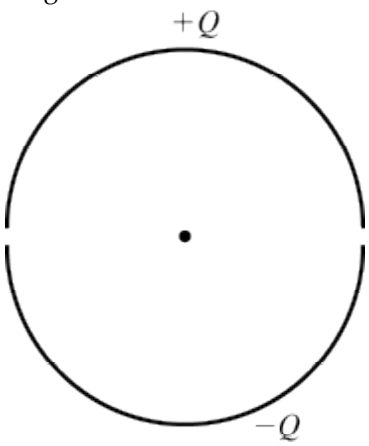
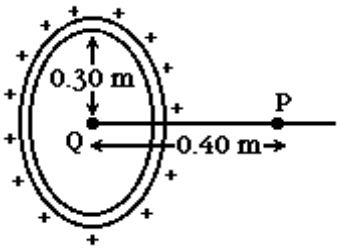
2) A circular conducting ring is split into two semi–circles. The top half has a positive charge (Q) evenly distributed, and the bottom half has a negative charge ($-Q$), also evenly distributed. In which direction is the electric field exactly in the center of the ring?



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

3) Two equally charged spheres of mass 1.0 g are placed 2.0 cm apart. When released, they begin to accelerate at 233 m/s^2. What is the magnitude of the charge on each sphere?

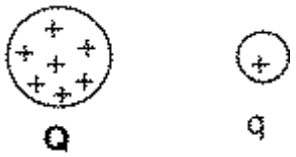
A) 87 nC B) 72 nC C) 100 nC D) 56 nC



4) 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) –200 B) –170 C) +200 D) –130 E) +170

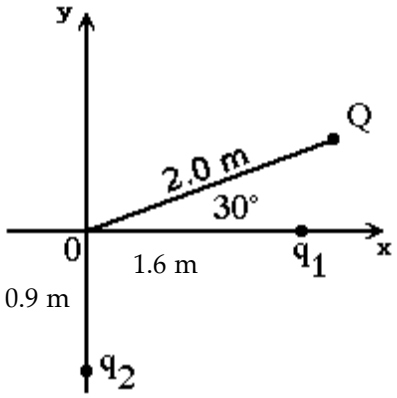
5) A positive test charge q is released near a positive fixed charge Q.



As q moves away from Q, it will move with

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

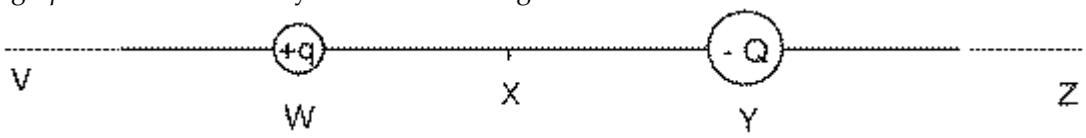
6)



A point charge Q = –900 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) –500 B) 290 C) 580 D) 500 E) –290

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

8) 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.

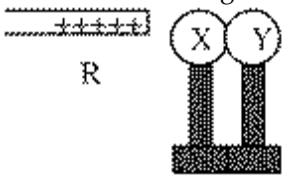


figure 1.

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

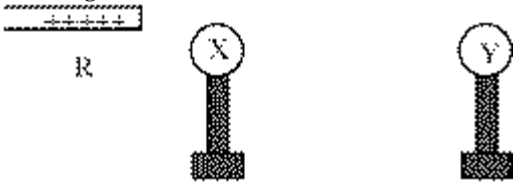


figure 2.

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

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

Answer Key
Testname: QZ1

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

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