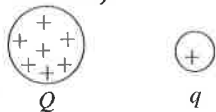


## Ch 19,20 Honors Review

## 19.1 Conceptual Questions

- \_\_\_\_\_ 1) A plastic rod is charged up by rubbing a wool cloth, and brought to an initially neutral metallic sphere that is insulated from ground. It is allowed to touch the sphere for a few seconds, and then is separated from the sphere by a small distance. After the rod is separated, the rod
- A) is repelled by the sphere.
  - B) is attracted to the sphere.
  - C) feels no force due to the sphere.
- \_\_\_\_\_ 2) Two tiny beads are 25 cm apart with no other charges or fields present. Bead A carries  $10\ \mu\text{C}$  of charge and bead B carries  $1\ \mu\text{C}$ . Which one of the following statements is true about the magnitudes of the electric forces on these beads?
- A) The force on A is 10 times the force on B.
  - B) The force on B is 10 times the force on A.
  - C) The force on A is exactly equal to the force on B.
  - D) The force on A is 100 times the force on B.
  - E) The force on B is 100 times the force on A.
- \_\_\_\_\_ 3) Two very small plastic balls of equal mass are released from rest. One of them carries  $+10\ \mu\text{C}$  of excess charge and the other one carries  $+1\ \mu\text{C}$  of charge. No other charges or fields are present. Which of the following statements are true about them as they move away from each other? (There may be more than one correct choice.)
- A) The acceleration of the  $10\text{-}\mu\text{C}$  ball is 10 times that of the  $1\text{-}\mu\text{C}$  ball.
  - B) The acceleration of the  $1\text{-}\mu\text{C}$  ball is 10 times that of the  $10\text{-}\mu\text{C}$  ball.
  - C) The balls always have accelerations of equal magnitude.
  - D) The speed of the balls keeps increasing.
  - E) The acceleration of the balls keeps increasing.
- \_\_\_\_\_ 4) In outer space, a positive charge  $q$  is released near a positive fixed charge  $Q$ , as shown in the figure. As  $q$  moves away from  $Q$ , what is true about the motion of  $q$ ? (There may be more than one correct choice.)



- A) It will move with decreasing speed.
- B) It will move with constant acceleration.
- C) It will move with increasing acceleration.
- D) It will move with decreasing acceleration.
- E) It will move with increasing speed.

- \_\_\_\_\_ 5) Two point charges,  $Q_1$  and  $Q_2$ , are separated by a distance  $R$ . If the magnitudes of both charges are doubled and their separation is also doubled, what happens to the electrical force that each charge exerts on the other one?
- A) It increases by a factor of 2.
  - B) It increases by a factor of  $\sqrt{2}$ .
  - C) It is reduced by a factor of  $\sqrt{2}$ .
  - D) It increases by a factor of 4.
  - E) It remains the same.
- \_\_\_\_\_ 6) An electron and a proton are released simultaneously from rest and start moving toward each other due to their electrostatic attraction, with no other forces present. Which of the following statements are true just before they are about to collide? (There could be more than one correct choice.)
- A) They are closer to the to the initial position of the electron than to the initial position of the proton.
  - B) They are closer to the to the initial position of the proton than to the initial position of the electron.
  - C) They are at the midpoint of their initial separation.
  - D) They both have the same speed.
  - E) The electrostatic force on the proton is greater than the electrostatic force on the electron.

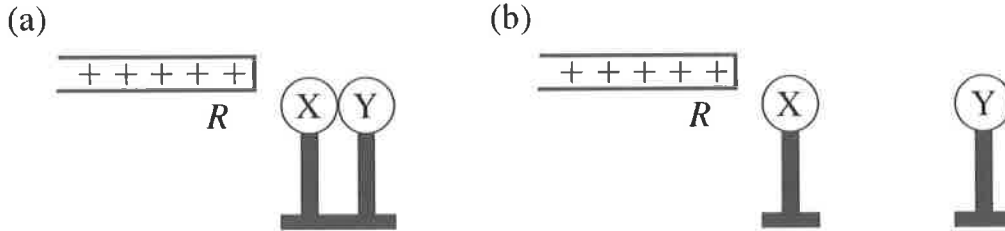
## 19.2 Problems

- \_\_\_\_\_ 7) How many electrons are necessary to produce 1.0 C of negative charge? ( $e = 1.60 \times 10^{-19}$  C)
- A)  $6.3 \times 10^{18}$
  - B)  $6.3 \times 10^9$
  - C)  $1.6 \times 10^{19}$
  - D)  $1.6 \times 10^9$
  - E)  $6.0 \times 10^{23}$
- \_\_\_\_\_ 8) A piece of plastic has a net charge of  $+2.00 \mu\text{C}$ . How many more protons than electrons does this piece of plastic have? ( $e = 1.60 \times 10^{-19}$  C)
- A)  $1.25 \times 10^{13}$
  - B)  $1.25 \times 10^{19}$
  - C)  $2.50 \times 10^{13}$
  - D)  $2.50 \times 10^{19}$
  - E)  $3.01 \times 10^{23}$

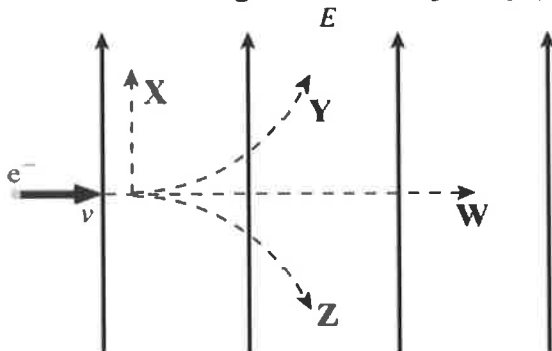
## 20.1 Conceptual Questions

- \_\_\_\_\_ 9) A negatively-charged plastic rod is brought close to (but does not touch) a neutral metal sphere that is connected to ground. After waiting a few seconds, the ground connection is removed (without touching the sphere), and after that the rod is also removed. The sphere is now
- A) negatively charged.
  - B) positively charged.
  - C) neutral.

- 10) X and Y are two initially uncharged metal spheres on insulating stands, and they are in contact with each other. A positively charged rod  $R$  is brought close to X as shown in part (a) of the figure. Sphere Y is now moved away from X, as shown in part (b). What are the final charge states of X and Y?

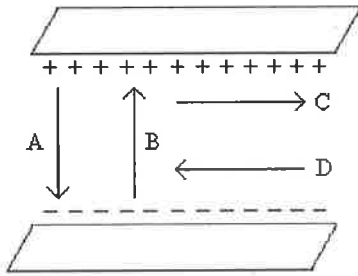


- A) Both X and Y are neutral.  
 B) X is positive and Y is neutral.  
 C) X is neutral and Y is positive.  
 D) X is negative and Y is positive.  
 E) Both X and Y are negative.
- 11) An electron is initially moving to the right when it enters a uniform electric field directed upwards, as shown in the figure. Which trajectory (X, Y, Z, or W) will the electron follow in the field?



- A) trajectory W  
 B) trajectory X  
 C) trajectory Y  
 D) trajectory Z

- 12) Which one of the arrows shown in the figure best represents the direction of the electric field between the two uniformly charged metal plates?



- A) A  
B) B  
C) C  
D) D  
E) None of the above
- 13) A proton is accelerated from rest through a potential difference  $V_0$  and gains a speed  $v_0$ . If it were accelerated instead through a potential difference of  $2V_0$ , what speed would it gain?
- A)  $8v_0$   
B)  $4v_0$   
C)  $2v_0$   
D)  $v_0\sqrt{2}$