MisConceptual Questions

1. $Q_1 = -0.10\,\mu C$ is located at the origin. $Q_2 = +0.10\,\mu C$ is located on the positive x axis at $x = 1.0$ m. Which of the following is true of the force on Q_1 due to Q_2?
   (*a*) It is attractive and directed in the $+x$ direction.
   (*b*) It is attractive and directed in the $-x$ direction.
   (*c*) It is repulsive and directed in the $+x$ direction.
   (*d*) It is repulsive and directed in the $-x$ direction.

2. Swap the positions of Q_1 and Q_2 of MisConceptual Question 1. Which of the following is true of the force on Q_1 due to Q_2?
   (*a*) It does not change.
   (*b*) It changes from attractive to repulsive.
   (*c*) It changes from repulsive to attractive.
   (*d*) It changes from the $+x$ direction to the $-x$ direction.
   (*e*) It changes from the $-x$ direction to the $+x$ direction.

3. Fred the lightning bug has a mass m and a charge $+q$. Jane, his lightning-bug wife, has a mass of $\frac{3}{4}m$ and a charge $-2q$. Because they have charges of opposite sign, they are attracted to each other. Which is attracted more to the other, and by how much?
   (*a*) Fred, twice as much.
   (*b*) Jane, twice as much.
   (*c*) Fred, four times as much.
   (*d*) Jane, four times as much.
   (*e*) They are attracted to each other by the same amount.

4. Figure 16–50 shows electric field lines due to a point charge. What can you say about the field at point 1 compared with the field at point 2?
   (*a*) The field at point 2 is larger, because point 2 is on a field line.
   (*b*) The field at point 1 is larger, because point 1 is not on a field line.
   (*c*) The field at point 1 is zero, because point 1 is not on a field line.
   (*d*) The field at point 1 is larger, because the field lines are closer together in that region.

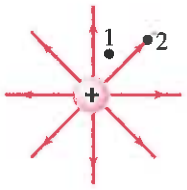

FIGURE 16–50
MisConceptual Question 4.

5. A negative point charge is in an electric field created by a positive point charge. Which of the following is true?
   (*a*) The field points toward the positive charge, and the force on the negative charge is in the same direction as the field.
   (*b*) The field points toward the positive charge, and the force on the negative charge is in the opposite direction to the field.
   (*c*) The field points away from the positive charge, and the force on the negative charge is in the same direction as the field.
   (*d*) The field points away from the positive charge, and the force on the negative charge is in the opposite direction to the field.

6. As an object acquires a positive charge, its mass usually
   (*a*) decreases.
   (*b*) increases.
   (*c*) stays the same.
   (*d*) becomes negative.

7. Refer to Fig. 16–32d. If the two charged plates were moved until they are half the distance shown without changing the charge on the plates, the electric field near the center of the plates would
   (*a*) remain almost exactly the same.
   (*b*) increase by a factor of 2.
   (*c*) increase, but not by a factor of 2.
   (*d*) decrease by a factor of 2.
   (*e*) decrease, but not by a factor of 2.

8. We wish to determine the electric field at a point near a positively charged metal sphere (a good conductor). We do so by bringing a small positive test charge, q_0, to this point and measure the force F_0 on it. F_0/q_0 will be _____ the electric field $\vec{\mathbf{E}}$ as it was at that point before the test charge was present.
   (*a*) greater than
   (*b*) less than
   (*c*) equal to

9. We are usually not aware of the electric force acting between two everyday objects because
   (*a*) the electric force is one of the weakest forces in nature.
   (*b*) the electric force is due to microscopic-sized particles such as electrons and protons.
   (*c*) the electric force is invisible.
   (*d*) most everyday objects have as many plus charges as minus charges.

10. To be safe during a lightning storm, it is best to be
    (*a*) in the middle of a grassy meadow.
    (*b*) inside a metal car.
    (*c*) next to a tall tree in a forest.
    (*d*) inside a wooden building.
    (*e*) on a metal observation tower.

11. Which are the worst places in MisConceptual Question 10?

12. Which vector best represents the direction of the electric field at the fourth corner of the square due to the three charges shown in Fig. 16–51?

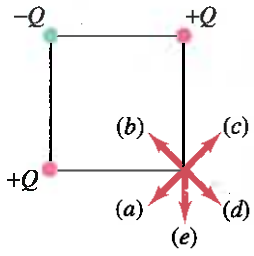

FIGURE 16–51
MisConceptual Question 12.

13. A small metal ball hangs from the ceiling by an insulating thread. The ball is attracted to a positively charged rod held near the ball. The charge of the ball must be
    (*a*) positive.
    (*b*) negative.
    (*c*) neutral.
    (*d*) positive or neutral.
    (*e*) negative or neutral.