Halliday/Resnick/Walker
Fundamentals of Physics 8th edition

Classroom Response System Questions

Chapter 21 Electric Change

Interactive Lecture Questions

21.3.1. Complete the following statement: When a glass rod is rubbed with silk cloth, the rod becomes positively charged as

a) negative charges are transferred from the rod to the silk.

b) negative charges are transferred from the silk to the rod.

c) positive charges are created on the surface of the rod.

d) positive charges are transferred from the silk to the rod.

e) positive charges are transferred from the rod to the silk.

21.3.2. An initially electrically neutral conducting sphere is placed on an insulating stand. A negatively-charged glass rod is brought near, but does not touch the sphere. Without moving the rod, a wire is then attached to the sphere that connects it to earth ground. The rod and wire are then removed simultaneously. What is the final charge on the sphere?

a) negative

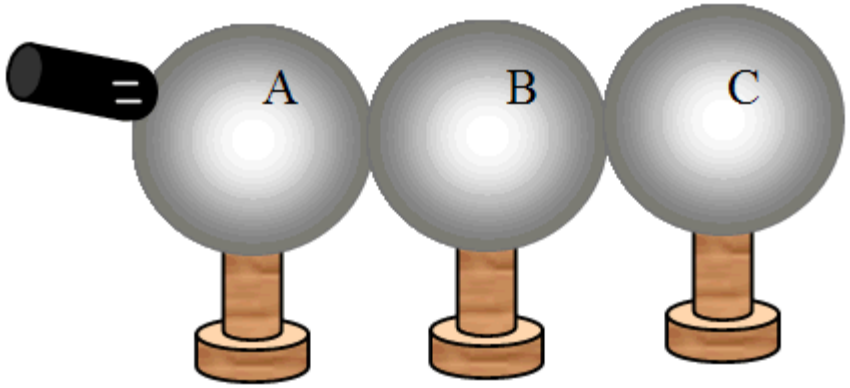
b) positive

c) neutral

d) It has a fifty percent chance of having a positive charge and a fifty percent chance of having a negative charge.

21.3.4. Three identical conducting spheres on individual insulating stands are initially electrically neutral. The three spheres are arranged so that they are in a line and touching as shown. A negatively-charged conducting rod is brought into contact with sphere A. Subsequently, someone takes sphere C away. Then, someone takes sphere B away. Finally, the rod is taken away. What is the sign of the final charge, if any, of the three spheres?

	A	B	C
a)	+	+	–
b)	+	–	+
c)	+	0	–
d)	–	+	0
e)	–	–	–



21.3.6. Consider the conducting spheres labeled A, B, and C shown in the drawing. The spheres are initially charged as shown on the left, then wires are connected and disconnected in a sequence shown moving toward the right. What is the final charge on sphere A at the end of the sequence?

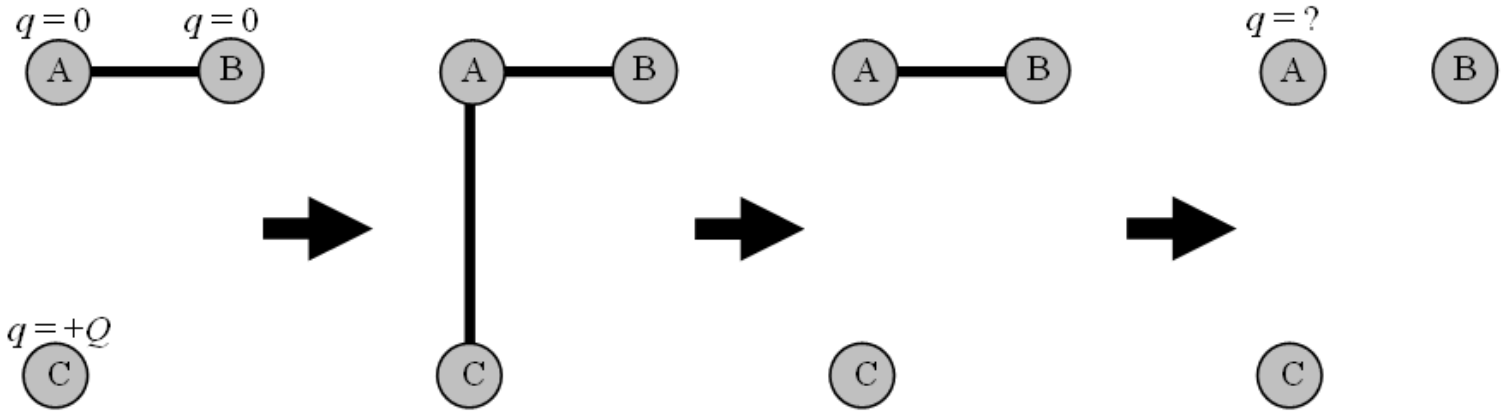
a) $+Q$

b) $+Q/2$

c) $+Q/3$

d) $+Q/4$

e) $+Q/8$



21.3.7. Consider the conducting spheres labeled A, B, and C shown in the drawing. The spheres are initially charged as shown on the left, then wires are connected and disconnected in a sequence shown moving toward the right. What is the final charge on sphere C at the end of the sequence?

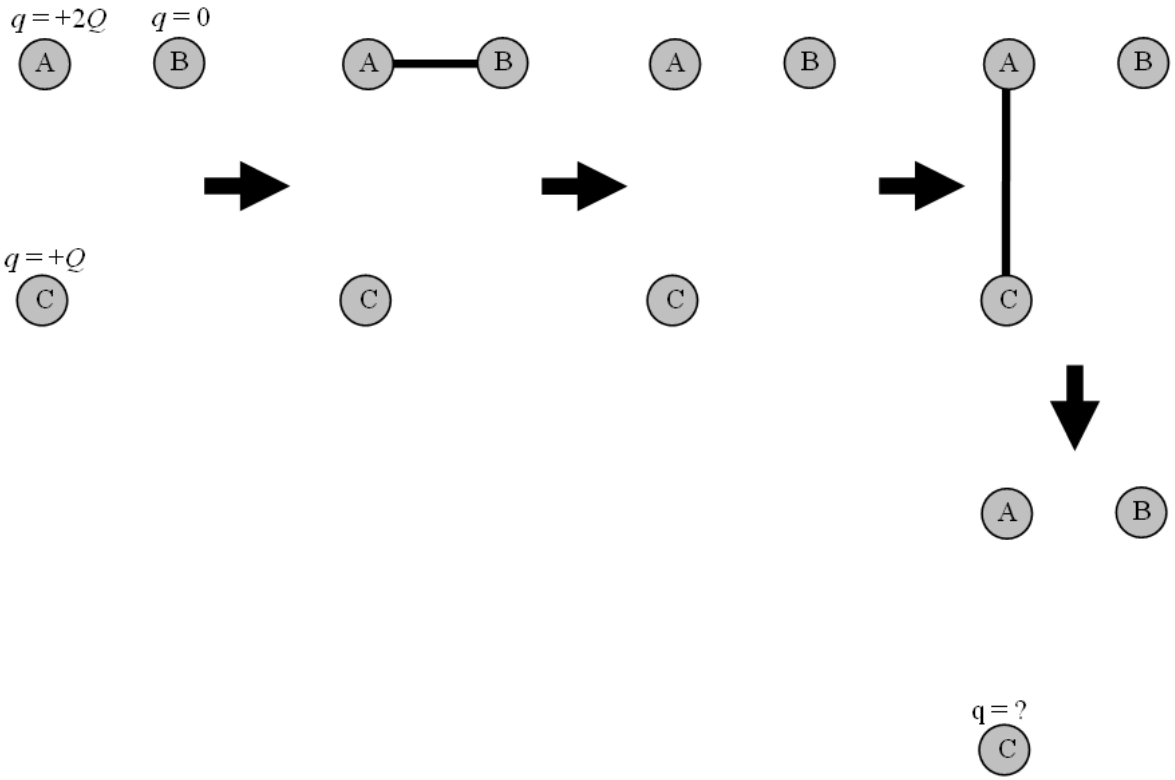
a) $+Q$

b) $+Q/2$

c) $+Q/3$

d) $+2Q$

e) $+3Q$



21.3.8. Glass is a very good electrical insulator. How is then possible that a glass rod can be charged by rubbing it with cloth?

a) When the rod is rubbed, it becomes an electrical conductor.

b) Although the rod is an insulator, any excess charge will slowly be conducted away.

c) When the rod is rubbed, the part of the rod that is in contact with the cloth becomes electrically conductive.

d) Because the rod is an insulator, the charge that is transferred to the surface of the rod has difficulty moving.

e) None of the above answers are correct.

21.4.2. Two objects, **A** with charge +Q and **B** with charge +4Q, are separated by a distance r. The magnitude of the force exerted on the second object by the first is F. If the first object is moved to a distance 2r from the second object, what is the magnitude of the electric force on the second object?

a) zero newtons

b) 2F

c) F

d) $F/2$

e) $F/4$

21.4.3. Consider the two charges shown in the drawing. Which of the following statements correctly describes the direction of the electric force acting on the two charges?

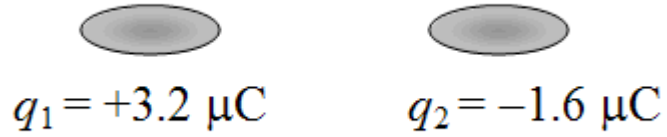
a) The force on q_1 points to the left and the force on q_2 points to the left.

b) The force on q_1 points to the right and the force on q_2 points to the left.

c) The force on q_1 points to the left and the force on q_2 points to the right.

d) The force on q_1 points to the right and the force on q_2 points to the right.

21.4.4. Consider the two charges shown in the drawing. Which of the following statements correctly describes the magnitude of the electric force acting on the two charges?



a) The force on q_1 has a magnitude that is twice that of the force on q_2.

b) The force on q_2 has a magnitude that is twice that of the force on q_1.

c) The force on q_1 has the same magnitude as that of the force on q_2.

d) The force on q_2 has a magnitude that is four times that of the force on q_1.

e) The force on q_1 has a magnitude that is four times that of the force on q_2.

21.4.6. A charged particle is located at the center of a uniformly charged hollow sphere. What is the net electrostatic force on the charged particle?

a) The net electrostatic force on the particle will be zero newtons because all of the charges on the sphere are either repelled or attracted to the particle, so they exert no force on it.

b) The net electrostatic force on the particle will be zero newtons because the vector sum of all of the forces on it due to the charges on the sphere is zero, so they exert no force on it.

c) The net electrostatic force on the particle will be the least at the center, but its magnitude will be greater than zero newtons.

d) The net electrostatic force on the particle will be positive if the particle and sphere have opposite signs and negative if they have the same sign.

e) The net electrostatic force on the particle will be negative if the particle and sphere have opposite signs and positive if they have the same sign.

21.4.7. A charged particle is located at a distance $R/2$ from the center of a uniformly charged hollow sphere of radius R. What is the net electrostatic force on the charged particle?

a) The net electrostatic force on the particle will be zero newtons because the vector sum of all of the forces on it due to the charges on the sphere is zero, so they exert no force on it.

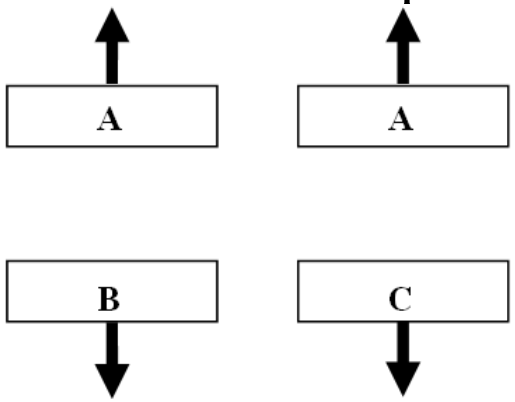
b) The net electrostatic force on the particle will be larger than that which would be exerted if the particle was at the center of the sphere.

c) The net electrostatic force on the particle will be smaller than that which would be exerted if the particle was at the center of the sphere.

d) The net electrostatic force on the particle will be positive if the particle and sphere have opposite signs and negative if they have the same sign.

e) The net electrostatic force on the particle will be negative if the particle and sphere have opposite signs and positive if they have the same sign.

21.4.9. Three plates may be charged positively or negatively or be electrically neutral. In the drawing shown, plate A is repelled by both plates B and C. What occurs if plates B and C are brought close together?



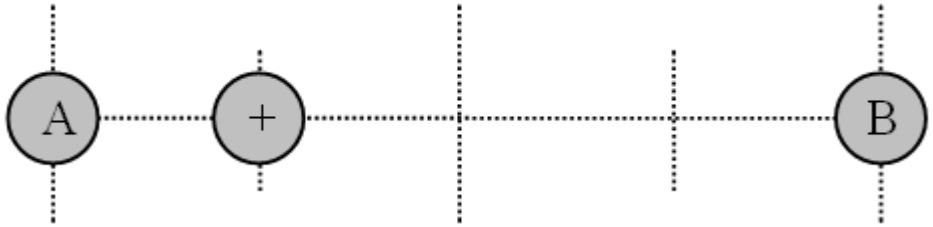
a) B and C would be attracted to one another.

b) B and C would be repelled by one another.

c) B and C would exert no force on each other.

d) There is too little information given to make a conclusion.

21.4.10. As shown in the drawing, a positively charged particle remains stationary between particles A and B. The positively charged particle is one-quarter the distance between the two other particles, as shown. What can be concluded from the situation?



a) The charge on A must be four times as large as the charge on B.

b) The charge on A must be nine times as large as the charge on B.

c) The charge on A must be one-half as large as the charge on B.

d) The charge on A must be one-fourth as large as the charge on B.

e) The charge on A must be one-ninth as large as the charge on B.

21.5.2. Can an object carry a charge of 2.0×10^{-19} C?

a) Yes, if the object is a conductor.

b) Yes, if the object has electrons or protons.

c) Yes, if the object is an insulator.

d) No, because objects do not have charge.

e) No, because charge is quantized.