Halliday/Resnick/Walker
Fundamentals of Physics

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.

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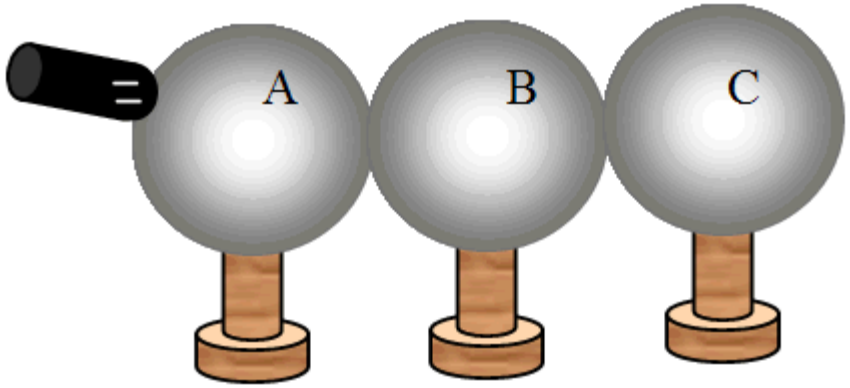
21.3.4. Three identical conducting spheres on individual insulating stands are initially electrically neutral. The three spheres are arranged so that they are in a line and touching as shown. A negatively-charged conducting rod is brought into contact with sphere A. Subsequently, someone takes sphere 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)	–	–	–



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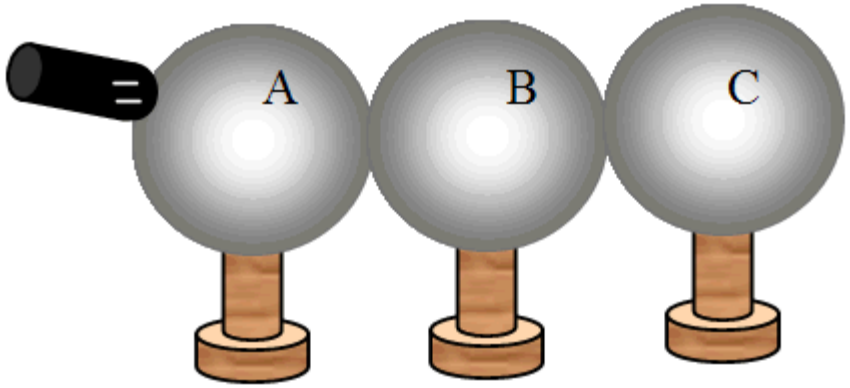
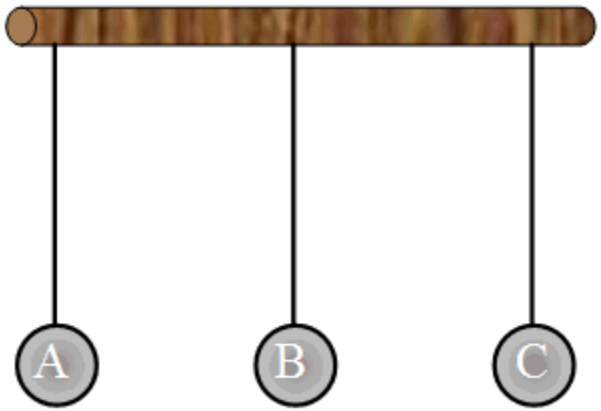


21.3.5. Three insulating balls are hung from a wooden rod using thread. The three balls are then individually charged via induction. Subsequently, balls A and B are observed to attract each other, while ball C is repelled by ball B. Which one of the following statements concerning this situation is correct?



a) A and B are charged with charges of opposite signs; and C is charged with charge that has the same sign as B.

b) A and B are charged with charges of the same sign; and C is electrically neutral.

c) A is electrically neutral; and C is charged with charge that has the same sign as B.

d) B is electrically neutral; and C is charged with charge that has the same sign as A.

e) Choices a and c are both possible configurations.

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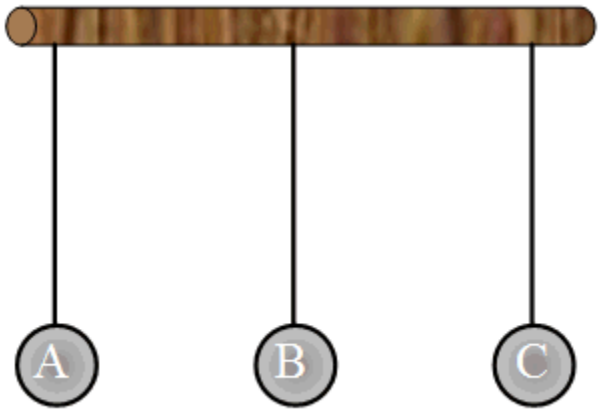

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e) Choices a and c are both possible configurations.

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?

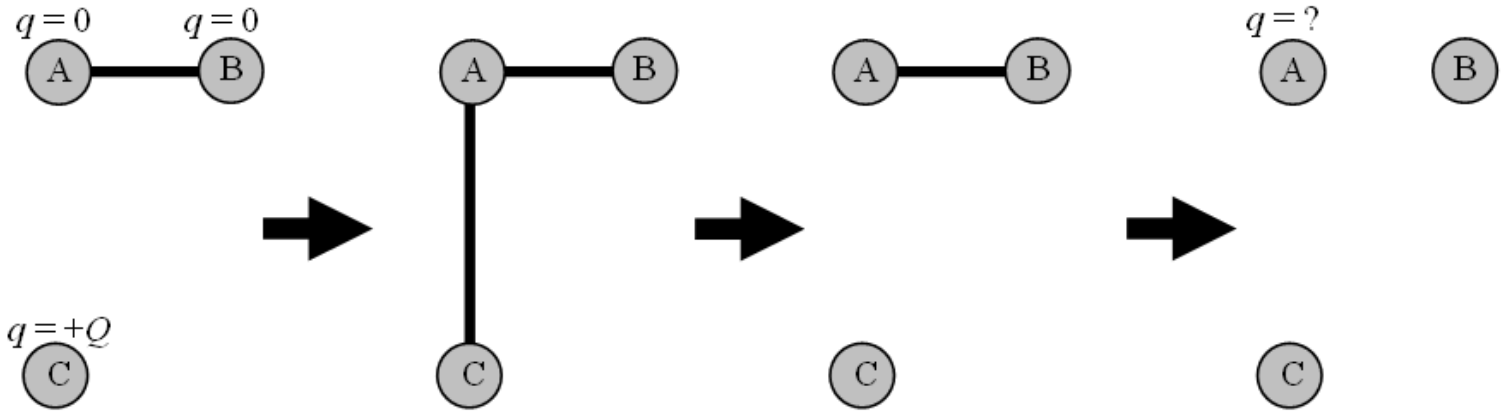
a) $+Q$

b) $+ Q/2$

c) $+ Q/3$

d) $+ Q/4$

e) $+ Q/8$



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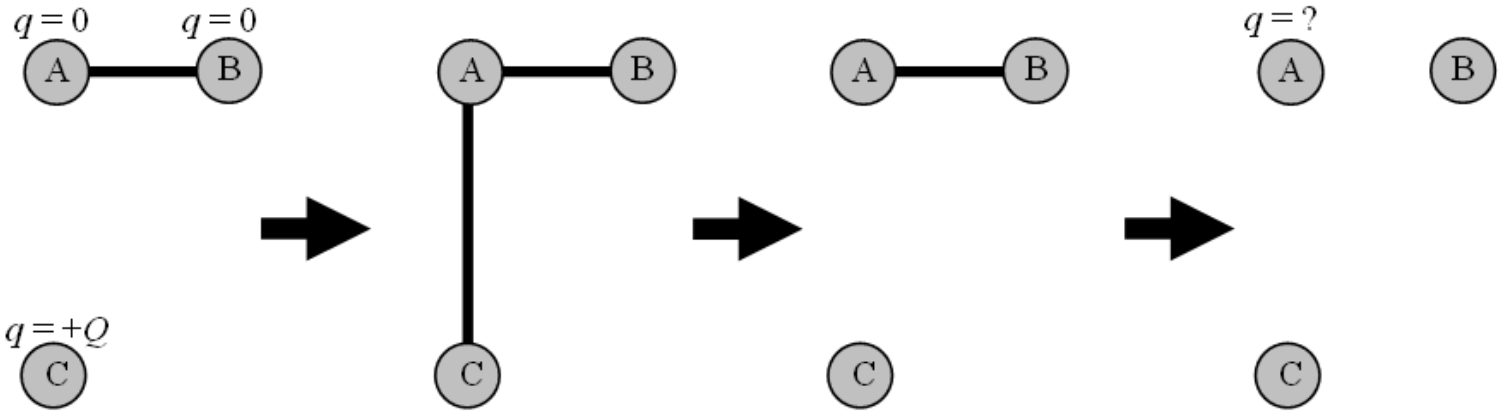

21.4.3. Consider the two charges shown in the drawing. Which of the following statements correctly describes the direction of the electric force acting on the two charges?

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.

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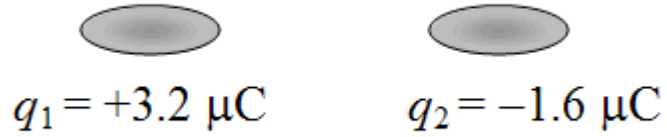
21.4.4. Consider the two charges shown in the drawing. Which of the following statements correctly describes the magnitude of the electric force acting on the two charges?



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.

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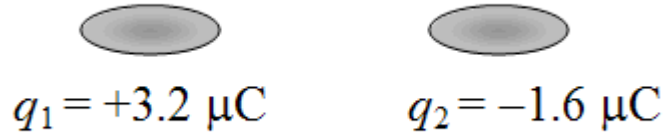

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21.4.6. A charged particle is located at the center of a uniformly charged hollow sphere. What is the net electrostatic force on the charged particle?

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.

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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.

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21.4.13. Imagine two conducting spheres separated by one meter. Each sphere carries an excess charge of one coulomb. What is the magnitude of the electrostatic force that each sphere exerts on the other?

a) 1.0 N

b) 1.8×10^5 N

c) 2.3×10^7 N

d) 9.0×10^9 N

e) 7.8×10^{14} N

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21.5.1. A brass key has a net positive charge of $+1.92 \times 10^{-16}$ C. Approximately, how many electrons must be added to the key to make it electrically neutral?

a) 770

b) 960

c) 1200

d) 1800

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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.

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