

Section Review

20.1 Electric Charge pages 541–545

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- 1. Charged Objects** After a comb is rubbed on a wool sweater, it is able to pick up small pieces of paper. Why does the comb lose that ability after a few minutes?

The comb loses its charge to its surroundings and becomes neutral once again.
- 2. Types of Charge** In the experiments described earlier in this section, how could you find out which strip of tape, B or T, is positively charged?

Bring a positively charged glass rod near the two strips of tape. The one that is repelled by the rod is positive.
- 3. Types of Charge** A pith ball is a small sphere made of a light material, such as plastic foam, often coated with a layer of graphite or aluminum paint. How could you determine whether a pith ball that is suspended from an insulating thread is neutral, is charged positively, or is charged negatively?

Bring an object of known charge, such as a negatively charged hard rubber rod, near the pith ball. If the pith ball is repelled, it has the same charge as the rod. If it is attracted, it may have the opposite charge or be neutral. To find out which, bring a positively charged glass rod near the pith ball. If they repel, the pith ball is positive; if they attract, the pith ball must be neutral.
- 4. Charge Separation** A rubber rod can be charged negatively when it is rubbed with wool. What happens to the charge of the wool? Why?

The wool becomes positively charged because it gives up electrons to the rubber rod.

- 5. Conservation of Charge** An apple contains trillions of charged particles. Why don't two apples repel each other when they are brought together?

Each apple contains equal numbers of positive and negative charges, so they appear neutral to each other.
- 6. Charging a Conductor** Suppose you hang a long metal rod from silk threads so that the rod is isolated. You then touch a charged glass rod to one end of the metal rod. Describe the charges on the metal rod.

The glass rod attracts electrons off the metal rod, so the metal becomes positively charged. The charge is distributed uniformly along the rod.
- 7. Charging by Friction** You can charge a rubber rod negatively by rubbing it with wool. What happens when you rub a copper rod with wool?

Because the copper is a conductor, it remains neutral as long as it is in contact with your hand.
- 8. Critical Thinking** It once was proposed that electric charge is a type of fluid that flows from objects with an excess of the fluid to objects with a deficit. Why is the current two-charge model better than the single-fluid model?

The two-charge model can better explain the phenomena of attraction and repulsion. It also explains how objects can become charged when they are rubbed together. The single-fluid model indicated that the charge should be equalized on objects that are in contact with each other.