"The Bare Essentials of Polarity"

Directions: Read the comic & answer the following questions:

1. How does the comic book define a "polar molecule"?
   A molecule with a difference in electrical charge between two ends.

2. Interpret the picture at the bottom of page 1. Explain how the iceberg, penguins, and polar bears represent trends in electronegativity.
   The iceberg represents the periodic table. The polar bears represent more electronegative atoms (the larger the polar bear, the more electronegative). The penguins represent less electronegative atoms (the smaller the penguin, the less electronegative).

3. What is the artist trying to show when there are 2 polar bears arm wrestling together or 2 penguins arm wrestling together?
   The two polar bears (or penguins) are equal in electronegativity, therefore they pull electrons equally as hard and neither one will end up with more electrons more of the time.

4. a. What 3 types of bonds are represented on the third page of the comic book?
   Nonpolar covalent, polar covalent and ionic

   b. What happens to the bonding electrons in each type of bond?
      - Nonpolar covalent - the electrons (represented by ice cream cones) are shared equally
      - Polar covalent - the more electronegative atom (polar bear) hogs the electrons (ice cream) and the less electronegative atom (penguin) doesn't get as many electrons (ice cream)
      - Ionic - the more electronegative atom (polar bear) complete steals the electron (ice cream) and the less electronegative atom (penguin) doesn't get any

5. Explain why there are 4 scoops of ice cream in the illustration of O₂ on page 3.
   Each scope of ice cream represents one electron. Since the oxygen atoms share a double bond, they share a total of four electrons (ice cream scopes).

6. What do the 6 scoops of ice cream represent in the illustration of N₂ on page 4?
   Each scope of ice cream represents one electron. Since the nitrogen atoms share a triple bond, they share a total of six electrons (ice cream scopes).

7. Describe what you think is happening to the penguin in the CO₂ molecule in the illustration on page 4.
   The oxygen atoms (polar bears) are more electronegative and hog the electrons (ice cream), but the carbon atom (penguin) is sharing with both, so it gets a fair share of electrons (ice cream).

8. Name 3 things that the picture of CO₂ on page 4 illustrates about the molecule.
   - The atoms in the molecule
   - The relative electronegativity of each atom
   - The number of bonds (electrons) between each atom

9. Describe what you think is happening to the penguins in the H₂O molecule in the illustration on page 4.
   They are not getting an equal share of electrons (ice cream).

10. Explain what you think the crossed arrow represents in the comic book.
    The arrow shows the direction the electrons (ice cream) are being pulled. The cross on the arrow shows that there is a slightly positive charge on that side of the bond.

11. What are the 2 definitions of "dipole" given in the comic book?
    - The polarity of an individual polar bond between atoms.
    - The net polarity of a polar molecule that may have several polar covalent bonds within it.
    - The polar molecule itself.