Section 8.4 Molecular Shape

In your textbook, read about the VSEPR model.

Circle the letter of the choice that best completes the statement.

1. The VSEPR model is used mainly to
   - **a.** determine molecular shape.
   - **b.** write resonance structures.
   - **c.** determine ionic charge.
   - **d.** measure intermolecular distances.
2. The bond angle is the angle between
   - **a.** the sigma and pi bonds in a double bond.
   - **b.** the nucleus and the bonding electrons.
   - **c.** two terminal atoms and the central atom.
   - **d.** the orbitals of a bonding atom.
3. The VSEPR model is based on the idea that
   - **a.** there is always an octet of electrons around an atom in a molecule.
   - **b.** electrons are attracted to the nucleus.
   - **c.** molecules repel one another.
   - **d.** shared and unshared electron pairs repel each other as much as possible.
4. The shape of a molecule whose central atom has four pairs of bonding electrons is
   - **a.** tetrahedral. **b.** trigonal planar. **c.** trigonal pyramidal. **d.** linear.
5. The shape of a molecule that has two covalent single bonds and no lone pairs on the central atom is
   - **a.** tetrahedral. **b.** trigonal planar. **c.** trigonal pyramidal. **d.** linear.
6. The shape of a molecule that has three single covalent bonds and one lone pair on the central atom is
   - **a.** tetrahedral. **b.** trigonal planar. **c.** trigonal pyramidal. **d.** linear.

In your textbook, read about hybridization.

Use each of the terms below just once to complete the passage.

carbon	hybridization	sp^3	identical	methane

The formation of new orbitals from a combination or rearrangement of valence electrons is called **(7)** _____. The orbitals that are produced in this way are **(8)** _____ to one another. An example of an element that commonly undergoes such formation is **(9)** _____. When this atom combines its three p orbitals and its one s orbital, the orbitals that result are called **(10)** _____ orbitals. An example of a molecule that has this type of orbital is **(11)** _____.

Section 8.3 Molecular Structures

In your textbook, read about Lewis structures.

For each statement below, write *true* or *false*.

_____ **1.** A structural formula shows the arrangement of the atoms in a molecule.

_____ **2.** The central atom in a molecule is the one with the highest electron affinity.

_____ **3.** In molecules, hydrogen is always a terminal atom.

_____ **4.** The number of bonding pairs in a molecule is equal to the number of electrons.

_____ **5.** To find the total number of electrons available for bonding in a positive ion, you should add the ion charge to the total number of valence electrons of the atoms present.

_____ **6.** The electrons in a coordinate covalent bond are donated by both the bonded atoms.

_____ **7.** Resonance occurs when more than one valid Lewis structure can be written for a molecule.

_____ **8.** Nitrate is an example of an ion that forms resonance structures.

_____ **9.** The carbon dioxide molecule contains two double bonds.

_____ **10.** All electrons in an atom are available for bonding.

_____ **11.** In the sulfate ion (SO_4^{2-}), 32 electrons are available for bonding.

_____ **12.** When carbon and oxygen bond, the molecule contains ten pairs of bonding electrons.

In your textbook, read about resonance structures and exceptions to the octet rule.

For each item in Column A, write the letter of the matching item in Column B.

Column A	Column B
_____ **13.** Odd number of valence electrons	**a.** O_3
_____ **14.** Fewer than 8 electrons around an atom	**b.** BF_3
_____ **15.** More than 8 electrons around central atom	**c.** NO
_____ **16.** More than one valid Lewis structure	**d.** SF_6