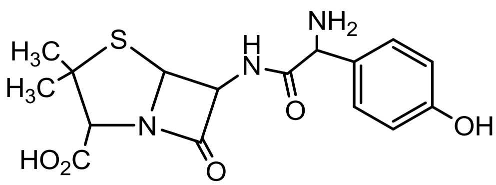
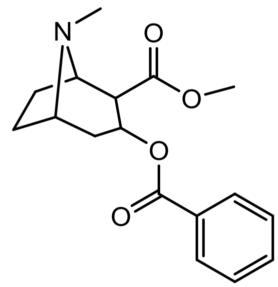
Molecules are three-dimensional. Because of this, the position of each atom in space can affect how one molecule interacts with another. Importantly, the difference in the 3-D structure in a molecule can be the difference between a useful drug and a dangerous toxin. You must therefore learn to recognize chirality and assess the different isomers, in this case through nomenclature and absolute configuration (R vs. S).

1. Place an asterisk "*" next to every chirality center in the molecules below. Based on these answers, can you predict any pattern in structures which help you to quickly identify what is or is not a chirality center?

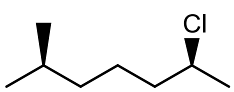


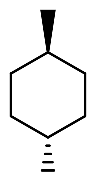
Amoxicillin

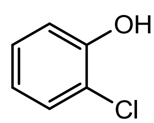


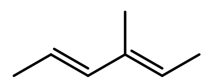
Cocaine

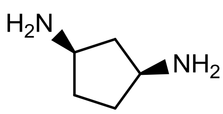
2. Circle those molecules below that are chiral. Based on your answers, what does it take to make a molecule chiral?

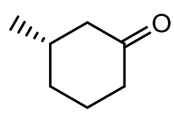


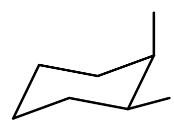




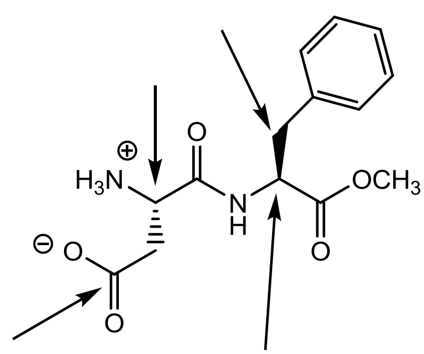






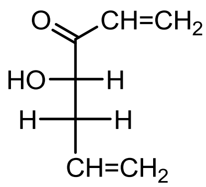
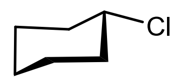
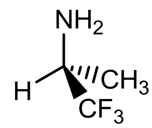
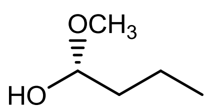
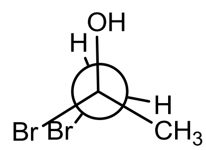
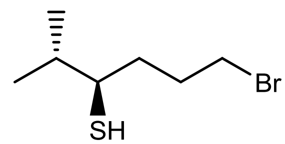
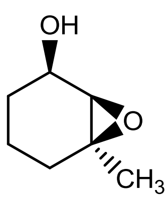
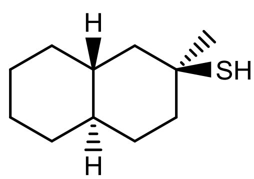
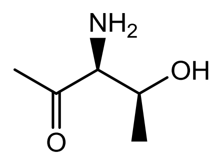


3. Give the absolute configuration (R or S) for the indicated carbons below.



4. Draw the following molecules, being sure to indicate stereochemistry where necessary.
   a. (S) 3-methylhexane
   b. (1R, 3R) 3-isopropylcyclohexanol

5. Much more practice! (Do as many as needed) Find the chirality centers in each molecule below and give the absolute configuration (R or S) for each.

6. Put it all together: Using the tests for chirality we have learned, determine whether the following molecules are chiral. For each chiral molecule, determine the configuration (R or S) of the chiral center(s) in the molecule.