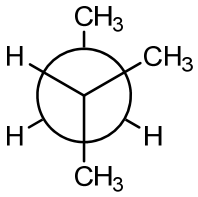
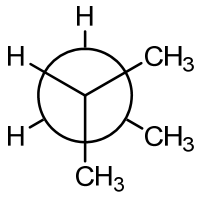
1. Which conformer is higher in energy for each pair? Explain.

A.

More stable conformation because less methyl groups are in gauche relationships. Two gauche and one anti.

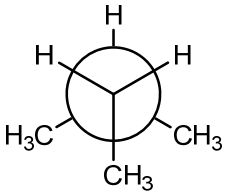


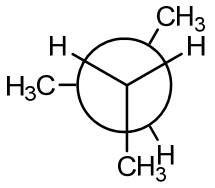


Three gauche interactions

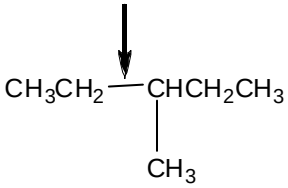
B.

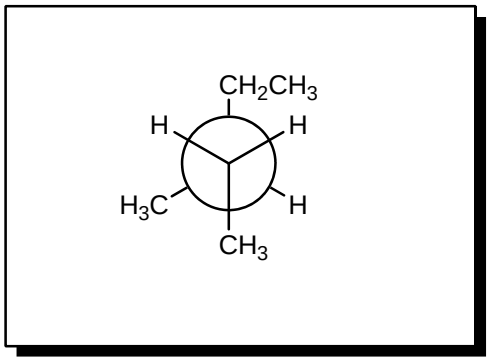
More stable conformation because staggered is more stable than eclipsed.



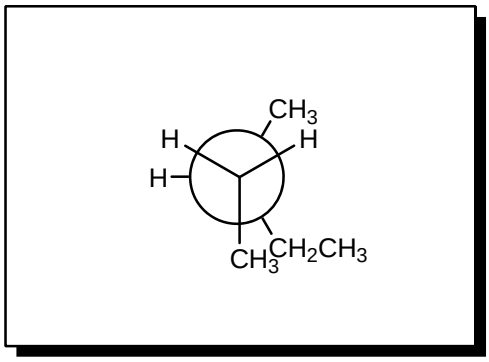


2. Consider the structure below and draw its **most** and **least** stable conformations in Newman projections while looking down the bond indicated. Put your final answers in the box.



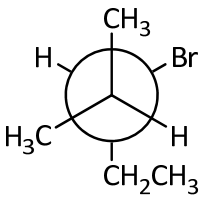


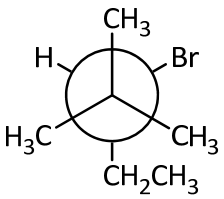
MOST STABLE

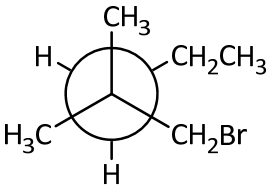


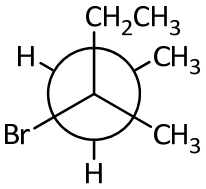
LEAST STABLE

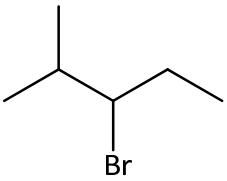
3. Draw line drawings for the following Newman projections. **For practice, I have provided names.**

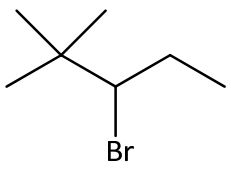




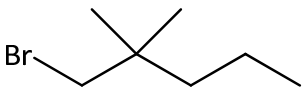




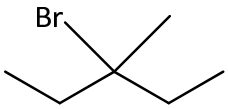




3-bromo-2,2-dimethylpentane

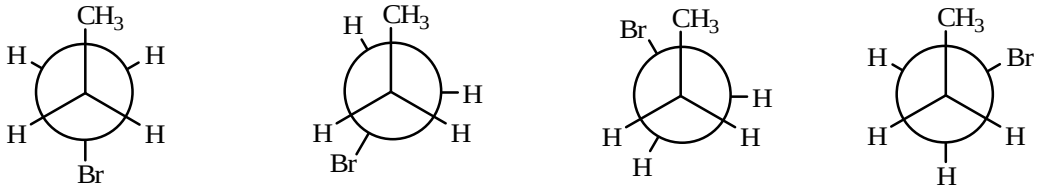


1-bromo-2,2-dimethylpentane



3-bromo-3-methylpentane

4. Regarding the conformations below for 1-bromopropane, provide the order of stability from least to most stable and lowest to highest energy?

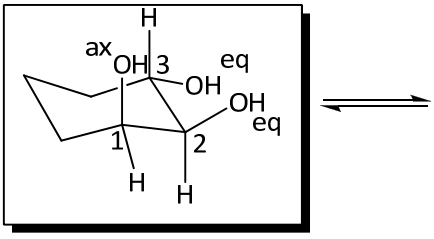


A **B** **C** **D**

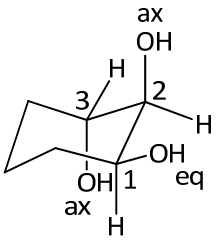
LEAST STABLE C < B < D < A **MOST STABLE**

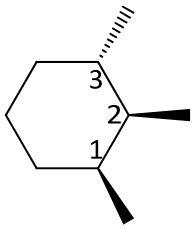
LOWEST ENERGY A < D < B < C **HIGHEST ENERGY**

5. For the compound below, label each substituent as axial or equatorial. Draw a flat structure with wedges and dashes. Draw the second possible chair structure for the compound. Circle the more stable conformer.



More stable because two substituents are equatorial and one is axial. Equatorial is more stable a position over axial.

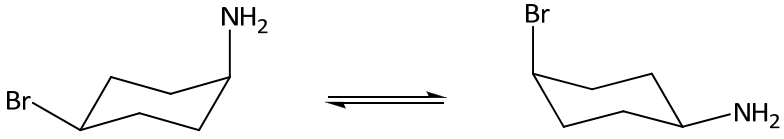




Looking from the top, the two-dimensional structure will look the same for both chair conformations. Do not confuse an axial position with being a wedged or a dashed position.

6. Circle the most stable conformation for each pair of chair configurations. If the configurations are equal, then state this. Consult a table ΔG values to answer these questions. Calculate the energy that is released or absorbed as the following rings flip from right to left.

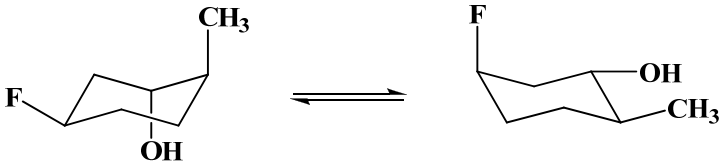
A. a.



-3.5 kJ/mol

most stable

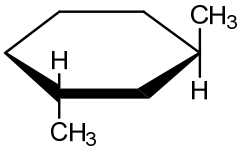
B.

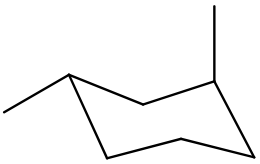


-10.18 kJ/mol

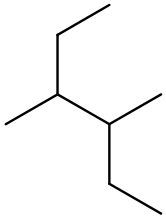
most stable

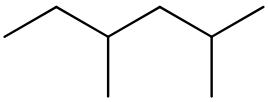
7. Label each pair of compounds as isomers (I), constitutional isomers (CI), identical molecules (ID), or no relationship (NR) of each other.



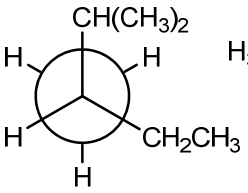


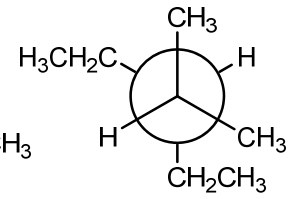
Identical



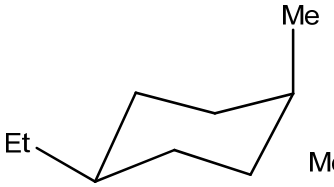


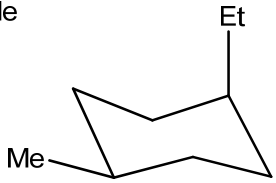
CI



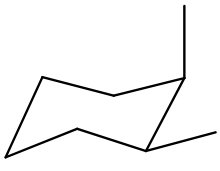


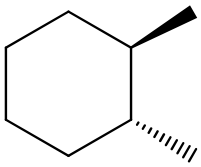
NR



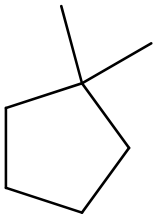


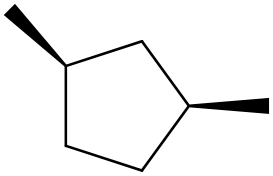
Identical





Isomers - cis versus trans





Const. Isomers

8. Draw both chair conformations for each substituted cyclohexane below, and determine which conformation is more stable. If necessary, use the ΔG table (below) to help you arrive at an answer. (Yes, you will have to do this on a separate piece of paper.)