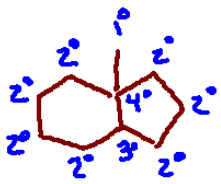
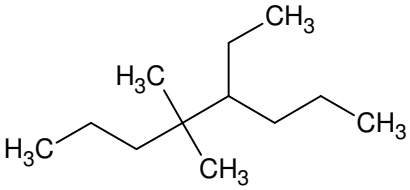
ANSWERS

#1.

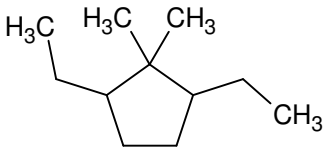
Loudon 2.27A – carbons are labeled primary, secondary, etc., using standard chemical symbols, 1^o, 2^o, etc.



Loudon 2.29AE – these are tricky applications of rule #8. I normally do not try to get this tricky in posing problems, but since this was a homework assignment, I was willing to give you something to argue about with classmates.



5-ethyl-4,4-dimethyloctane



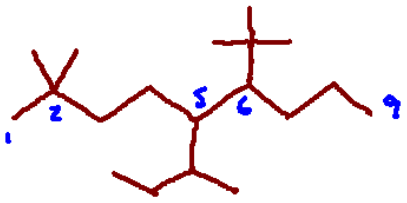
2,5-diethyl-1,1-dimethylcyclopentane

Discussion of alternate answer for 2.29A = 4-ethyl-5,5-dimethyloctane. The "number set" for the right answer is 4,4,5. The set for the alternate is 4,5,5 (notice that I am collecting all of the numbers together even though some are assigned to the ethyl group and others are assigned to the methyl groups). The first point of difference (rule #8) occurs at the second position in these sets.

Discussion of alternate answers for 2.29E = 1,3-diethyl-2,2-dimethylcyclopentane and 1,4-diethyl-5,5-dimethylcyclopentane. Again, the "number set" for the right answer is 1,1,2,5 while those for the alternates are 1,2,2,3 and 1,4,5,5. The first point of difference is at the second position in all three sets.

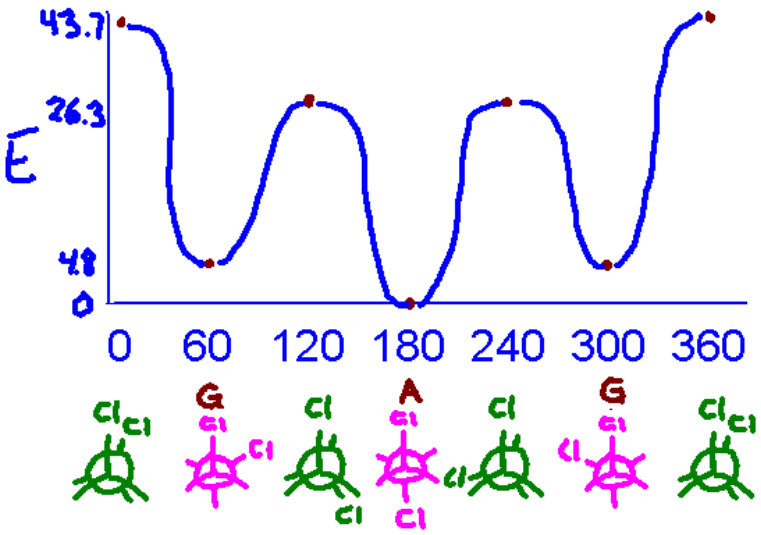
FYI – I named both of these molecules incorrectly when I tried to do it on my own, but I think I have learned something about rule #8 that I didn't understand before. We'll see.

Loudon 2.30C



Loudon 2.37A – Notice that the answer in the solutions manual is at the bottom of pages 24 and 25 (Figure SG2.2). Ignore the diagram at the top of page 25 (Figure SG2.1).

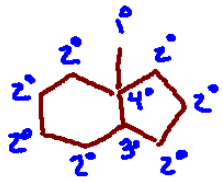
Discussion – Cl is larger than H so the *gauche* conformers (60° & 300°) are less stable than the *anti* conformer by 4.8 kJ/mol. The rotation barriers are stated by Loudon as 21.5 and 38.9 kJ/mol, but it isn't obvious to me whether the lower barrier is *anti* → *gauche* or *gauche* → *anti* (the higher barrier must involve eclipsing Cl atoms, so this is clearly *gauche* → *gauche*). The energy diagram that I show below reproduces the one in the solutions manual. Can you tell from *my* diagram whether 21.5 is the *anti* → *gauche* or *gauche* → *anti* barrier?



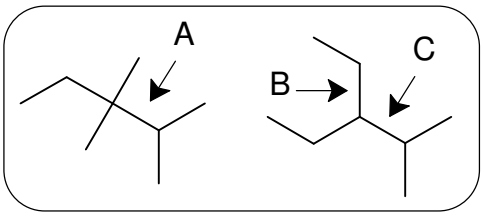
Loudon 2.37B – the *anti* conformer is most stable and present in greatest amount

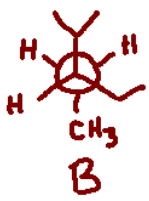
Loudon 2.40 – the barrier is expected to be lower for the Si-Si compound because the Si-Si bond is longer. This might reduce both torsion strain and steric repulsion.

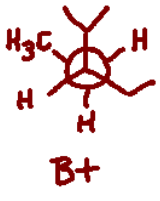
#2. The methylene (CH_2) groups are the secondary (2°) carbons in the formula:

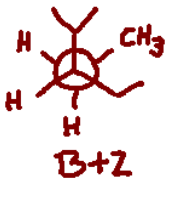


#3.
A. compound A on left, compounds B & C on right
B. bonds used for axes of Newman projections identified by arrows
C. Energy order = B < B+ < B+2 because of changing magnitude of steric repulsion. Group size increases H < CH_3 < CH_2CH_3 < $CH(CH_3)_2$.



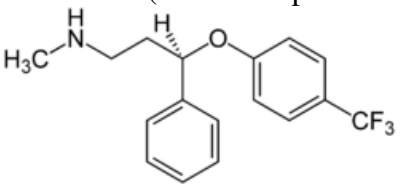






#4.
An atom's van der Waals radius describes the region of space that the atom likes to reserve for itself. If two C atoms can approach each other to 2.9 Å, then each atom must be trying to reserve at least 1.45 Å for itself. This is a lower limit. We should appreciate the fact that I have deliberately chosen "crowded" examples, so each C would probably like a little more space than a sphere of radius 1.45 Å.

#5.
Fluoxetine (from Wikipedia …)



A. The N-containing group is an <u>amine</u>. The O-containing group is an <u>ether</u>.
B. You can be certain that the chemists at Eli Lilly made and tested other compounds with similar formulas in an effort to discover a compound with better therapeutic properties. These efforts probably involved modifying the alkyl group on N and the aryl group on O. We could imagine all of these candidate drugs collectively represented by: