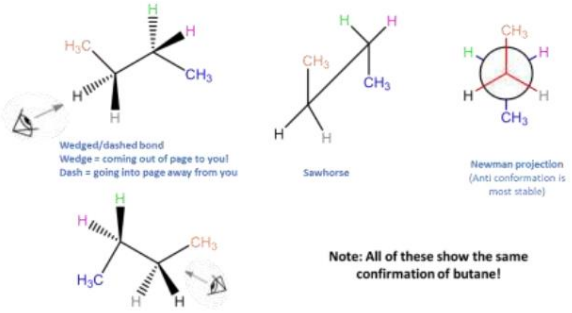
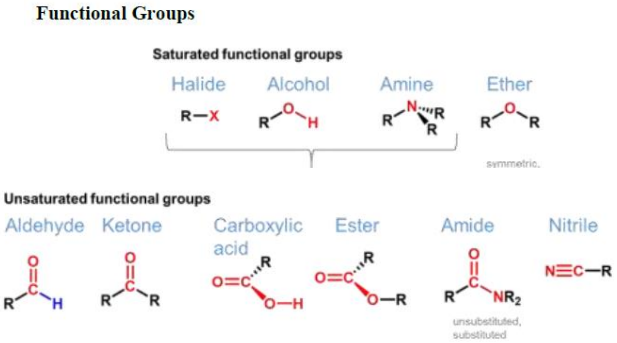
In class review (November 14 and 15)

Major Concepts Covered

Conformation, sawhorse, Newman projects



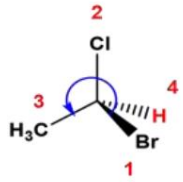


Chirality and *R*, *S* (absolute) configuration

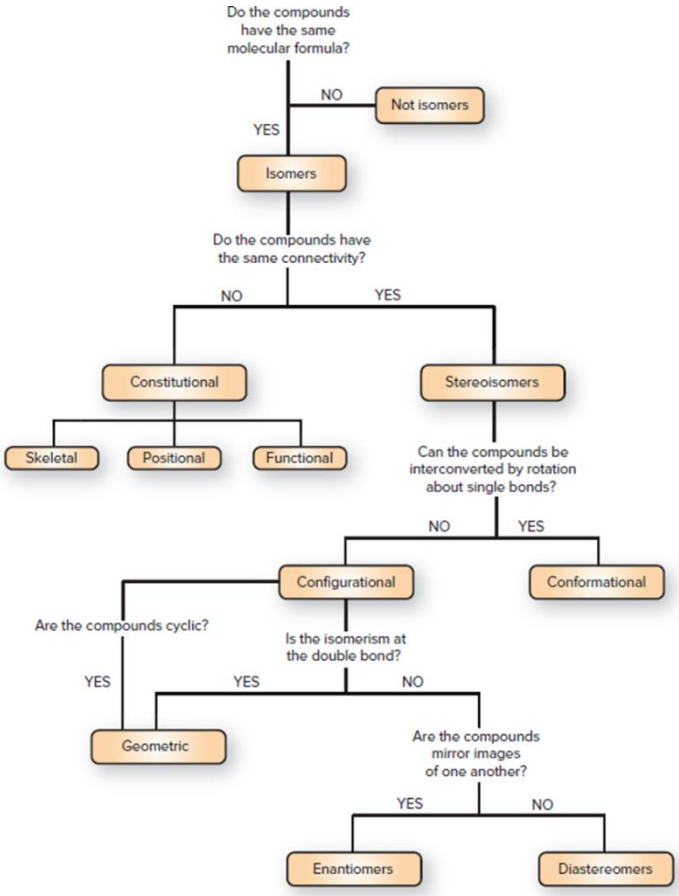
Chiral carbons (chiral centres): have 4 different substituents!

R, *S*, absolute configuration: only for chiral centres:

1. Assign priority (1:highest to 4:lowest) to all substituents to the chiral center based on atomic number
2. Point the lowest priority substituent to the back
3. Draw a curved arrow to show decreasing order of priority (from 1 to 3)- ignore the lowest priority substituent
   "R": If the curved arrow is drawn clockwise
   "S": If the curved arrow is drawn counter-clockwise



counterclockwise so it is *S*



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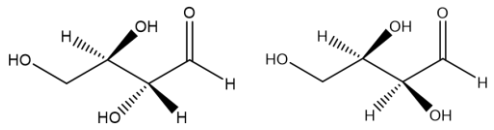
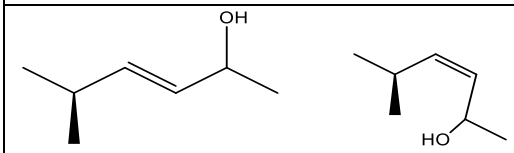
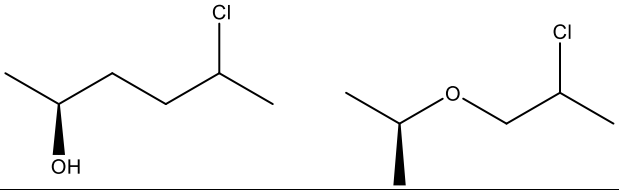
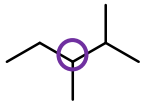
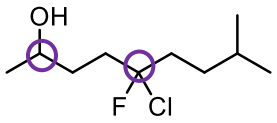
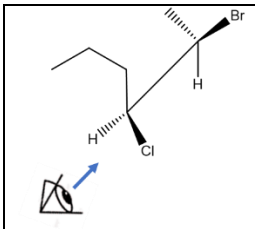
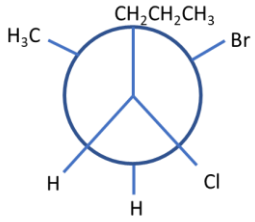
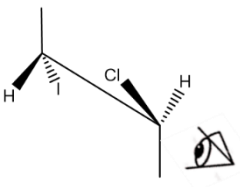
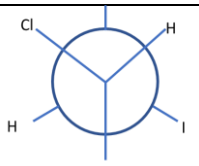
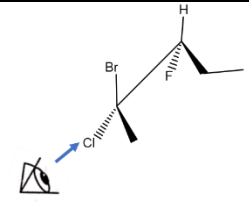
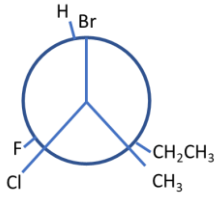
Question 1. Indicate which type of isomers are represented by the pairs. Note: only the precise type must be indicated, the general category (e.g., stereoisomers, constructional isomers, will not suffice here.

	Diastereomers. Note: 2 chiral centers, one pair of same *R*/*S*, other pair different.
	Geometric isomer (i.e. trans and cis)
	Functional isomer. Note: Same molecular formulas yet different functional group. Left is alcohol and right is ether.

Question 2. Circle all the chiral centres in the structures below.

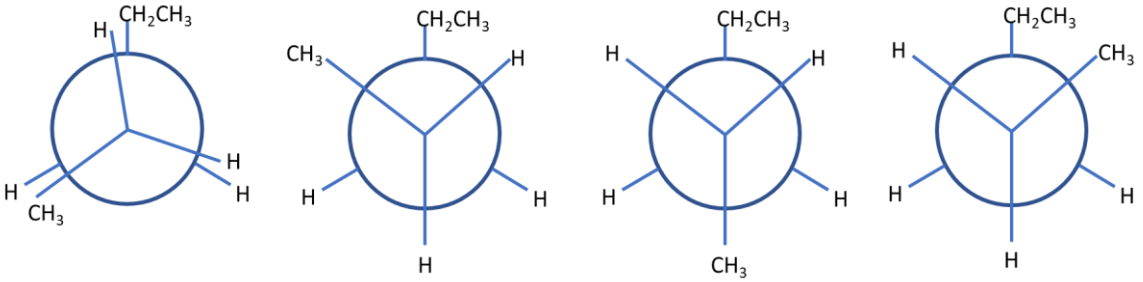
 This is a tricky one! When decided IF something is chiral, you look at the entirety of the 4 groups attached. Then, once you are sure, you assign R/S by determining priority only one atom at a time.		

Question 3. Draw the Newman projection of the molecules below, from the perspective indicated.

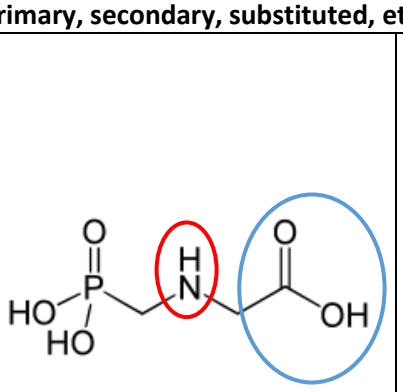
In class review (November 14 and 15)

Question 4. Which of these conformations is most stable and why.



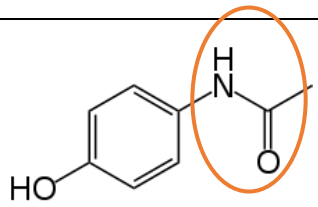
The 3rd one because the bulkiest groups are furthest from each other.

Question 5. Circle and name the type of functional groups in each compound below. Specify if each is primary, secondary, substituted, etc.



Carboxylic acid
Secondary amine

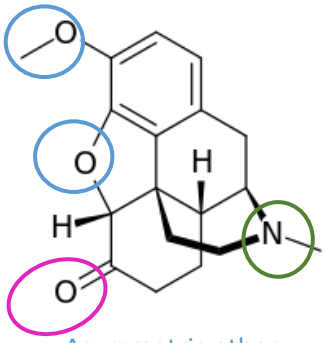
glyphosate (an herbicide)



Substituted amide

*note the OH is part of benzene, this is a special kind of alcohol that we call a phenol, if you circle it, I won't take points off (we haven't learned about it in class, but technically a phenol is different than just a normal alcohol

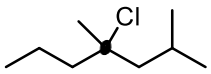
acetaminophen (Tylenol)



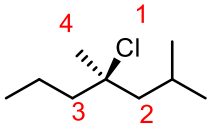
Asymmetric ether
Tertiary amine
Ketone

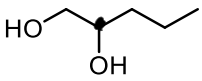
hydrocodone

Question 6. Use the wedge and dashed lines to re-draw the following molecules as either *R* vs *S* as indicated. Be sure to include the priority numbers 1-4.

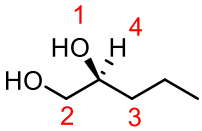


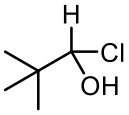
R



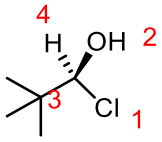


S





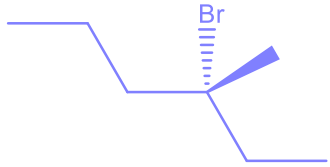
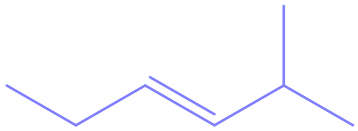
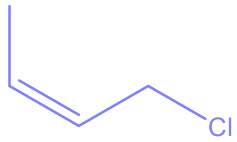
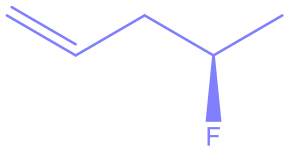
S



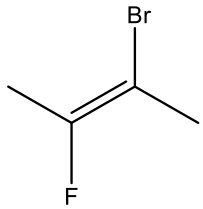
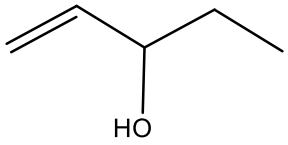
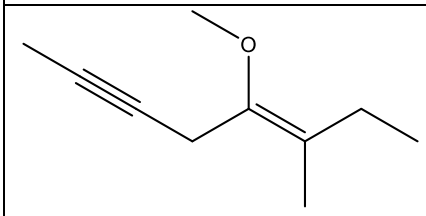
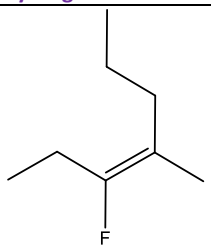
First locate the chiral center. Number priority. Put the lowest priority at the back.
If R, then clockwise. S, counterclockwise. If you are asked to "Draw" these, you can DRAW them however you like. So if you end up drawing R and it asked for S, just swap TWO groups. Note that if I draw you the exact molecule (with wedge/dashed bonds) and ask you if it's R/S then you have to ensure you keep the "same" molecule. So if the lowest priority isn't in the back, use your model to figure out how you could redraw it.

In class review (November 14 and 15)

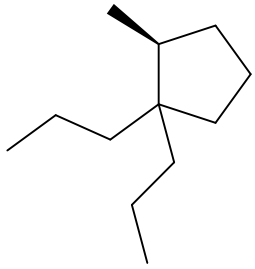
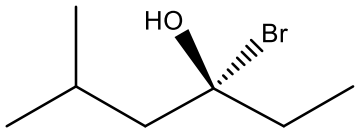
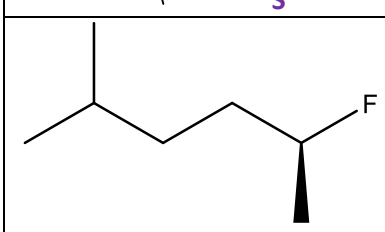
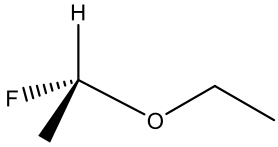
Question 7. Draw these structures using skeletal diagrams.

(*R*)-3-bromo-3-methylhexane 	(*E*)-2-methylhex-3-ene 
(*Z*)-1-chlorobut-2-ene 	(*R*)-4-fluoropent-1-ene 

Question 8. Indicate if these structures are cis/trans AND E/Z

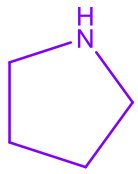
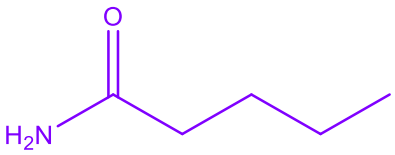
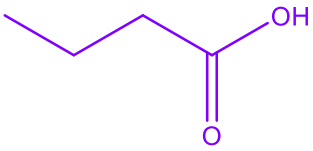
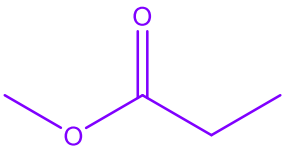
 **E; trans**	 **Both cis/trans and E/Z do not apply here because the two groups at the very end of the d.b. on the left are both hydrogens**
 **Z; trans**	 **E; cis**

Question 9. Determine the configuration (R vs S).

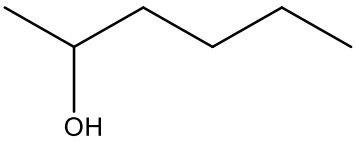
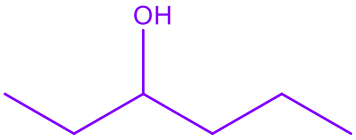
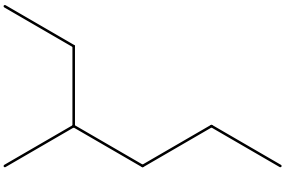
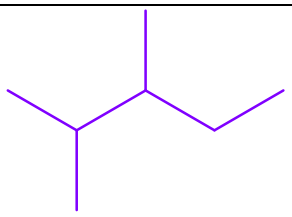
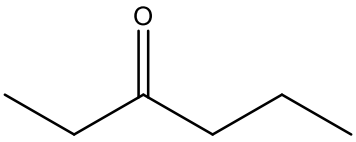
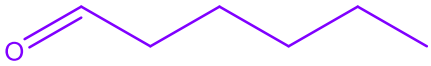
 **S**	 **R**
 **S**	 **S**

In class review (November 14 and 15)

Question 10. Draw one example each of a structure containing the indicated functional groups.
Note these are all just examples!

Secondary amine  Must have only one hydrogen bonded to the nitrogen	**Unsubstituted amide**  Must have 2 hydrogens bonded to the nitrogen
Carboxylic acid  	**Ester** 

Question 11. Draw (using skeletal structures) the indicated isomer of these molecules.
Note these are all just examples!

Positional  	 Must place the OH group on a different carbon.
Skeletal 	 Must connect the 6 carbon skeleton in a different way (but keep same chemical formula!)
Functional  	 Need to keep same molecular formula but change the functional group – so ketone must become an aldehyde (or you could get away with an alcohol with an alkene)

Question 12. What is the difference between conformation and configuration?
Both terms describe the 3D arrangement of atoms in a molecule. However, conformations are "of the same molecule" and are simple arrangements that rapidly interconvert. Configurations describe the arrangement of atoms of different molecules and cannot interconvert.