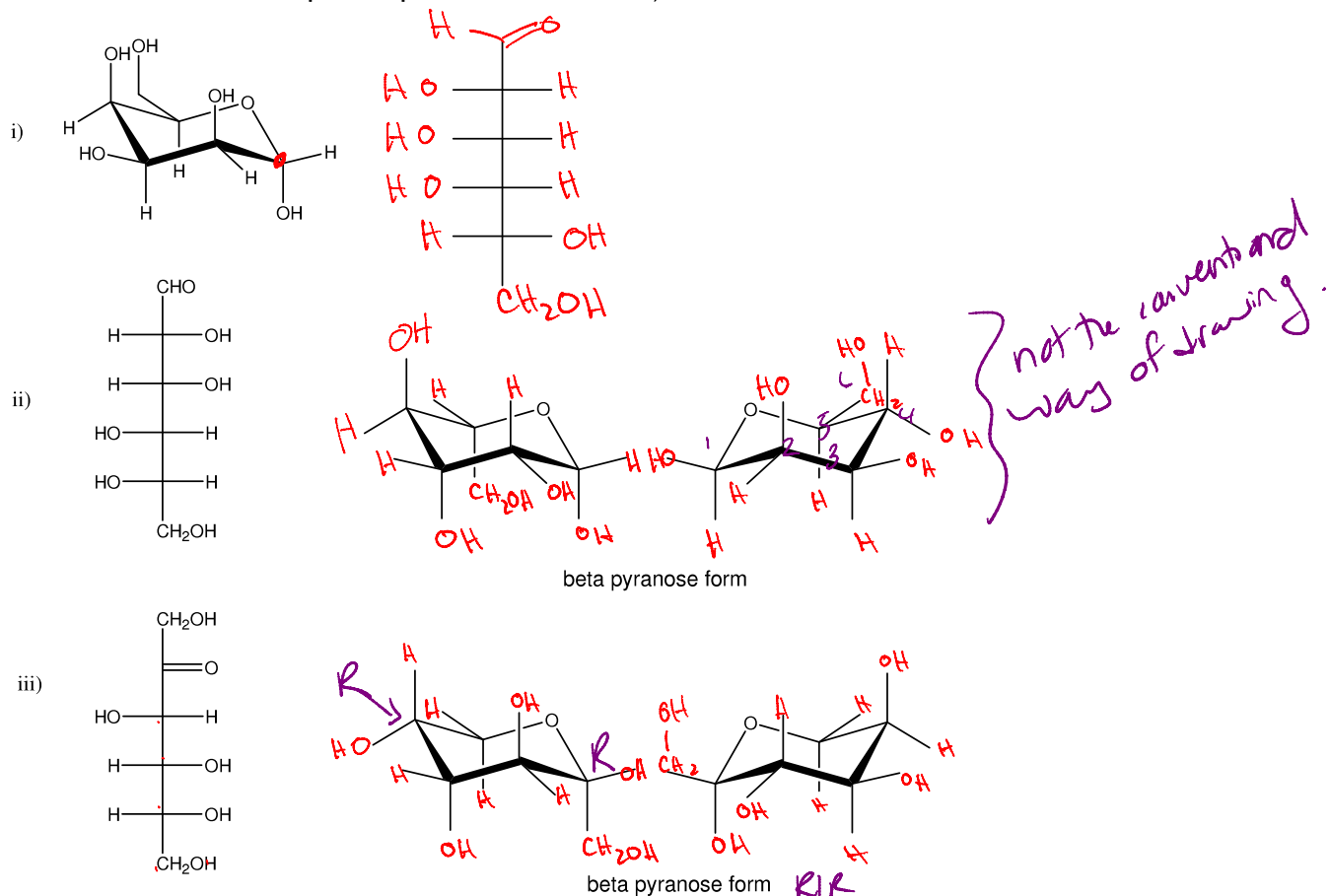


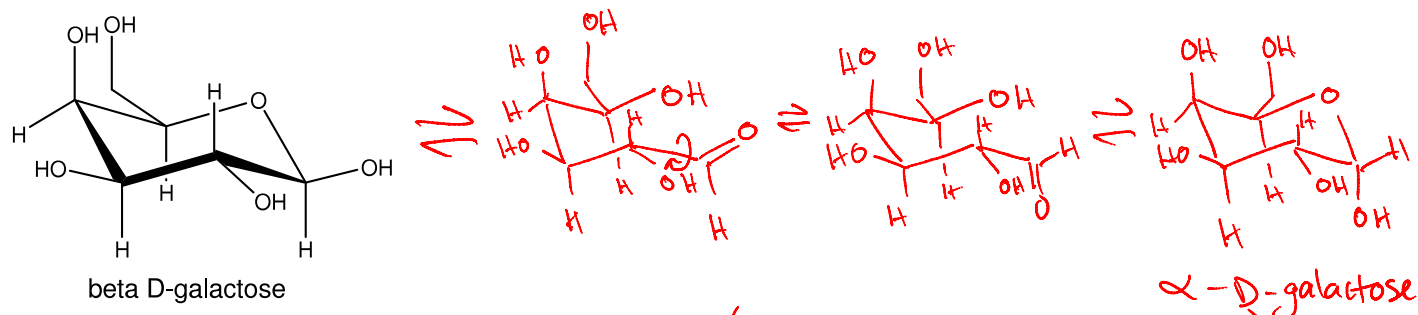
Practice Final Exam Questions "C" Carbohydrates

These questions have been taken from previous CHEM 233 examinations. The question style and level of difficulty are typical of what you can expect on the upcoming final examination. Solutions will be posted on Dec 7th but you must try them before looking at the solutions in order to determine for yourself if you know the material well enough to correctly answer similar questions on an exam.

1. Complete the Fischer projection and/or chair conformation templates of the three sugar compounds below. Use the more appropriate template in ii and iii (you just need to use one of the templates provided, not both).

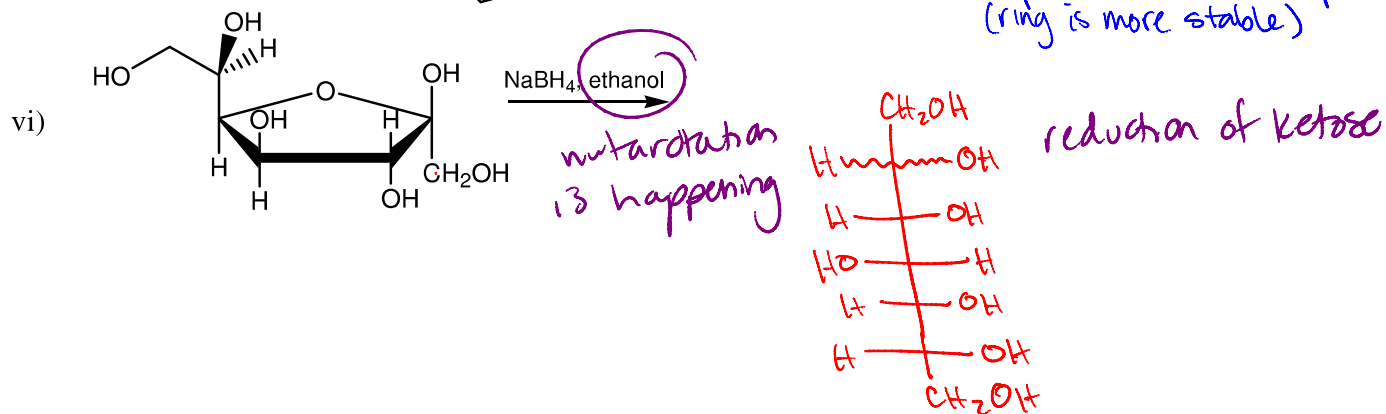
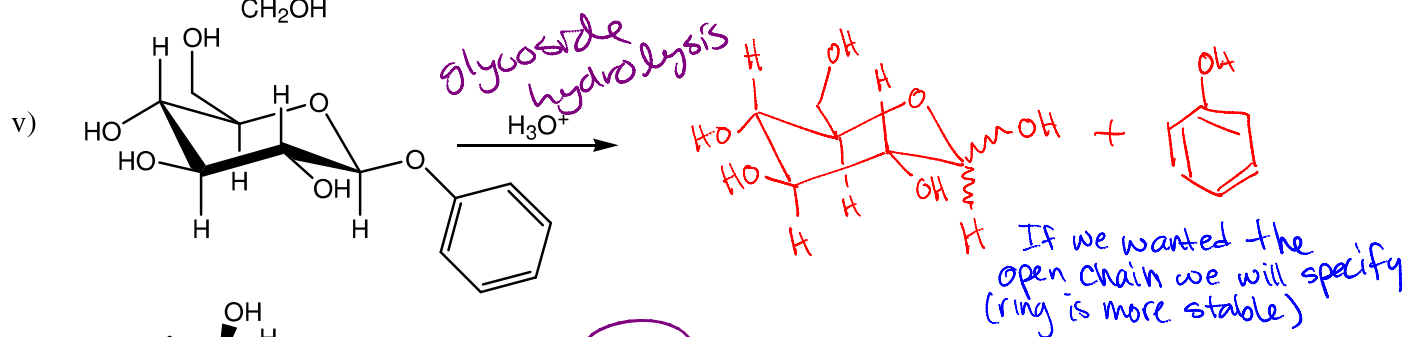
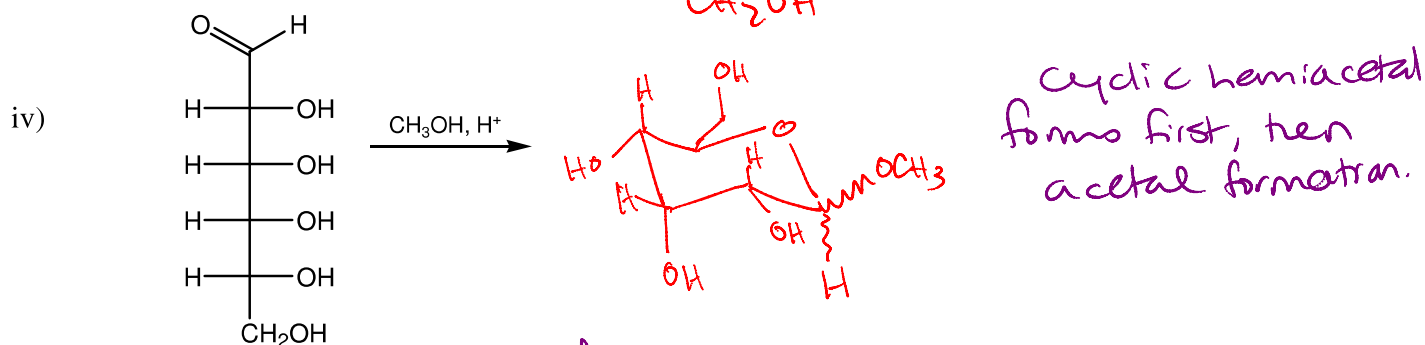
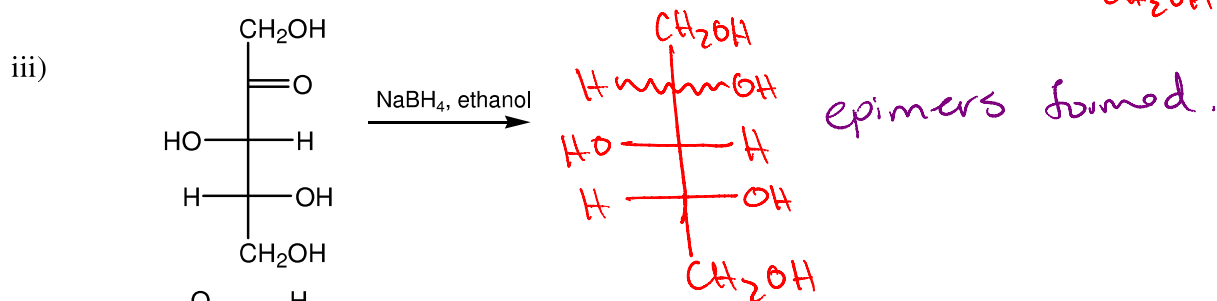
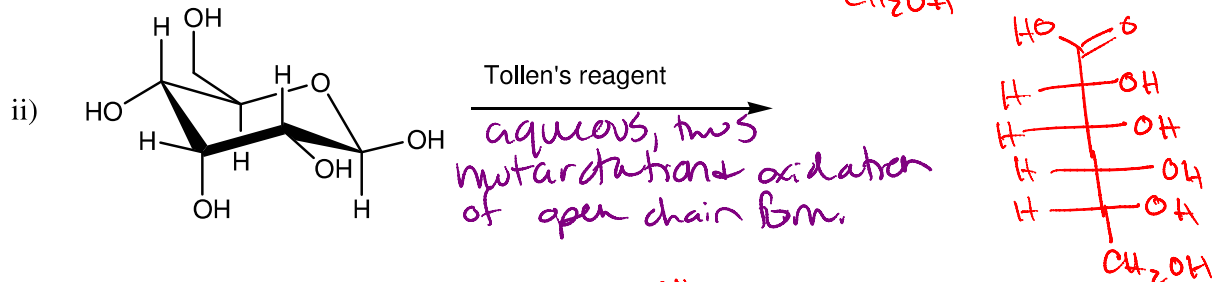
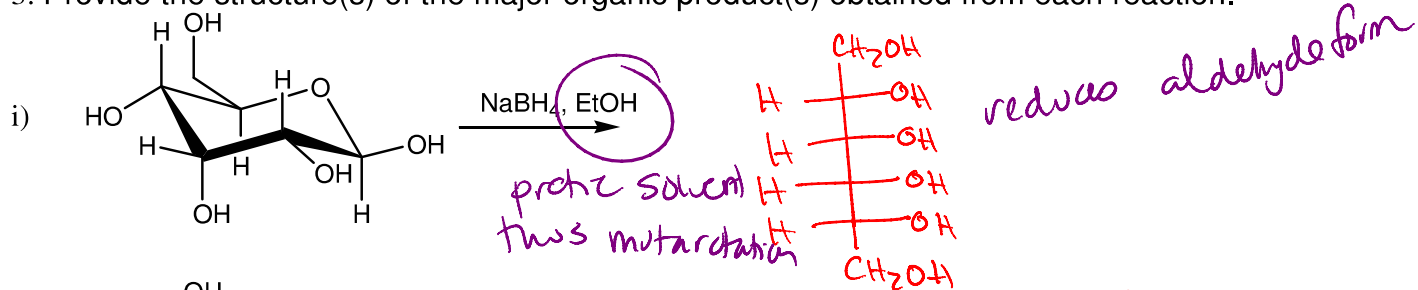


2. When β -D-galactose is dissolved in water it has an initial optical rotation of $+52.8^\circ$ which slowly increases to $+80.2^\circ$. Using all significant structures and a few brief sentences, explain what is occurring.

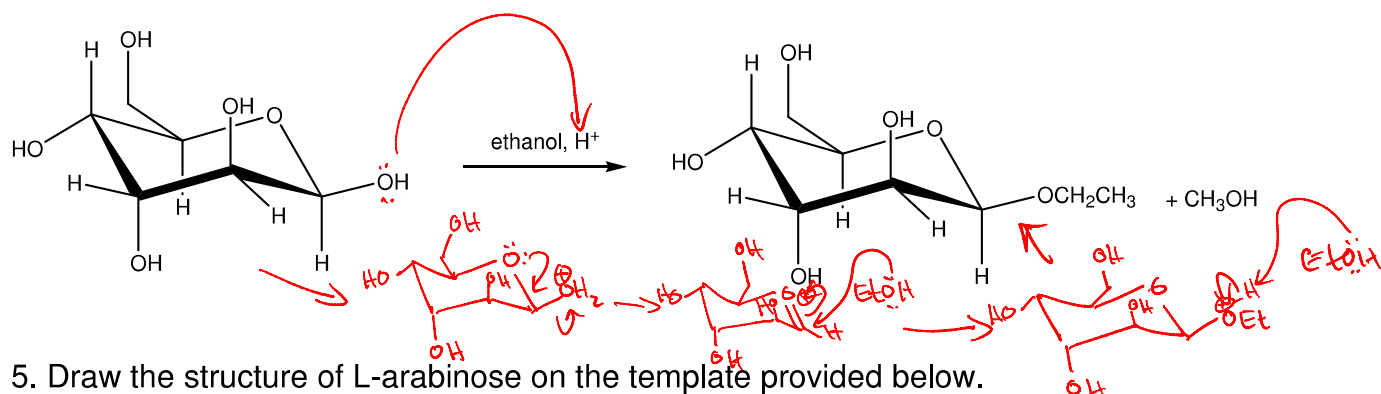


Handwritten explanation: In water, β -D-galactose undergoes mutarotation (opens up chain and re-closes) and a mixture of β -D-galactose and α -D-galactose results. α and β galactose have different optical rotations, thus the optical rotation of the mixture changes.

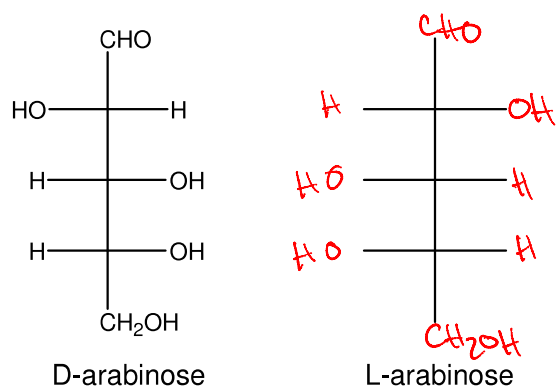
3. Provide the structure(s) of the major organic product(s) obtained from each reaction.



4. Including the correct use of electron movement arrows, lone pairs of electrons, and the position of any formal charges, show the detailed step-by-step mechanism involved in the following transformation.



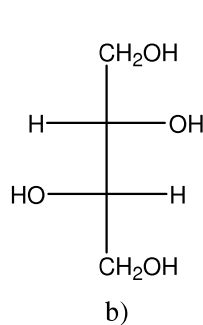
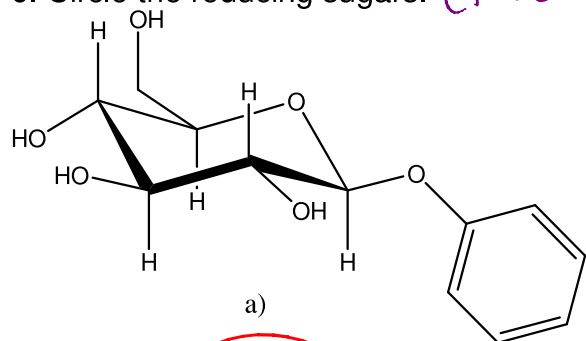
5. Draw the structure of L-arabinose on the template provided below.



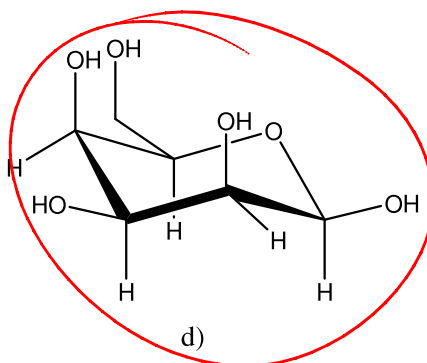
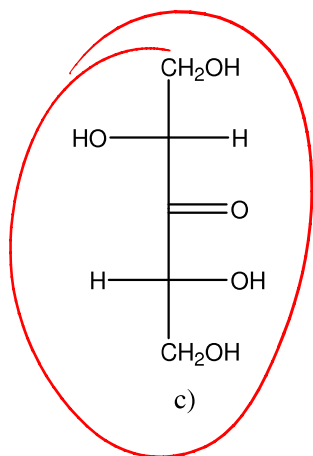
enantiomers

6. Circle the reducing sugars.

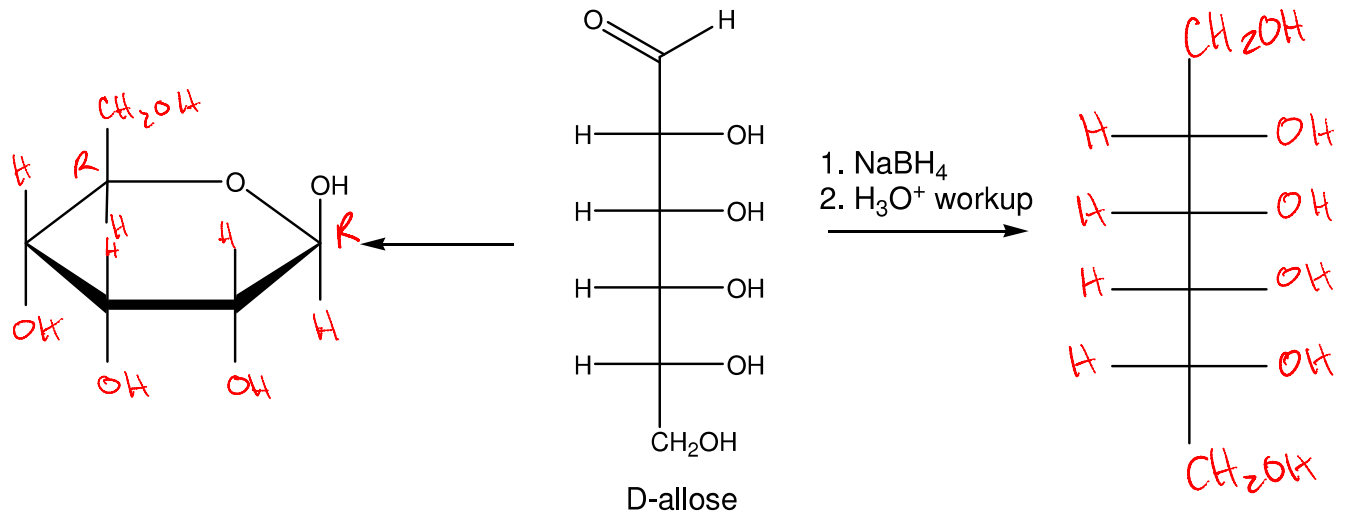
(those that will react with Tollens reagent.)



} no aldehyde or ketone present



7. Complete the given template of the pyranose form of D-allose and use the Fischer projection to draw the product of the reaction of D-allose with NaBH₄.

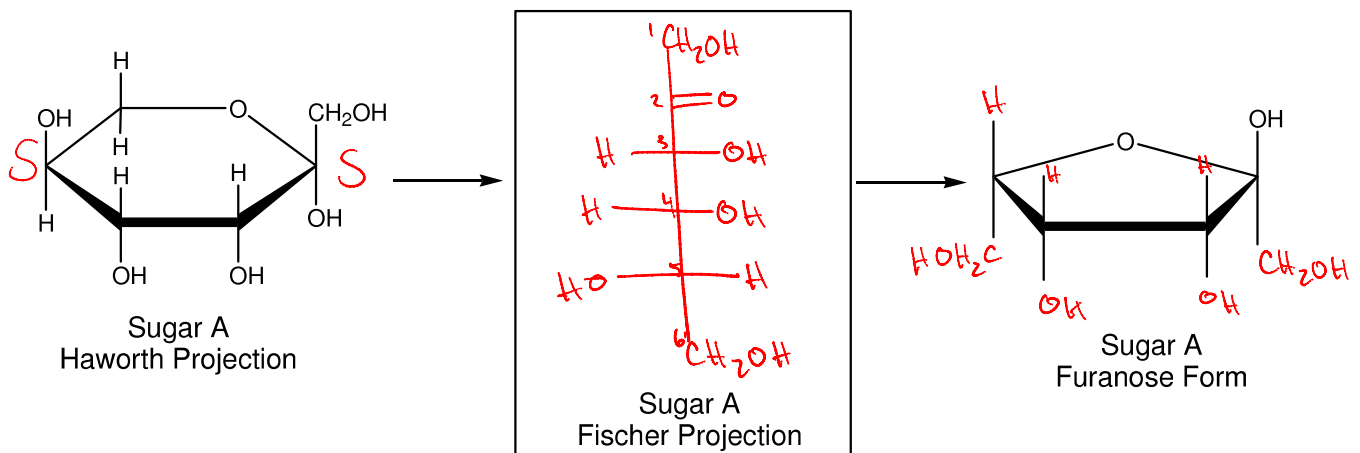


7 b) Circle the correct answer to complete the sentence below:

- i) The pyranose form of D-allose (shown above) is the { alpha | beta } anomer.
- ii) When D-allose is treated with NaBH₄ the product(s) { is | is not } optically active.

internal plane of symmetry

8. Complete the Fischer projection of Sugar A and the furanose form of the same sugar.



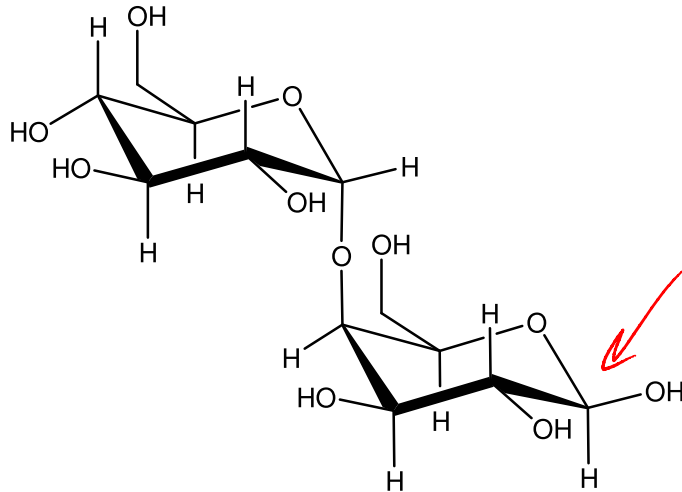
8 b) Circle the correct answer to complete the sentences below:

- i) Sugar A shown above is a { D | L } sugar.
- ii) The pyranose form of sugar A above is the { alpha | beta } anomer. *S/S*
- iii) Carbon 3 of sugar A above is a { R | S } stereocenter.

9. Circle the correct answer to complete the sentences below.

i) This disaccharide has a { 1-1' | 1-2' | 1-3' | 1-4 | 3-1' } { alpha | beta } linkage.

ii) This disaccharide is a { reducing | non-reducing } sugar.



10. An L-aldose sugar rotates plane polarized light:

a) to the right (clockwise)

b) must be determined experimentally

c) to the left (counterclockwise)

d) does not rotate plane polarized light