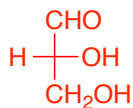
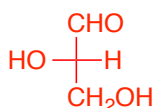


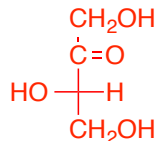
1. Draw one example of each of the following types of monosaccharides (there may be several correct answers) and indicate the number of possible stereoisomers while keeping the same D/L configuration.

(a) D-Aldotriose

1 possible

(b) L-Aldotriose

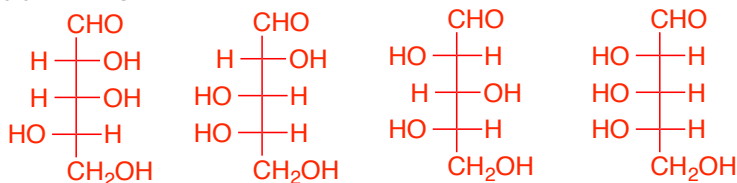
1 possible

(c) L-Ketotetrose

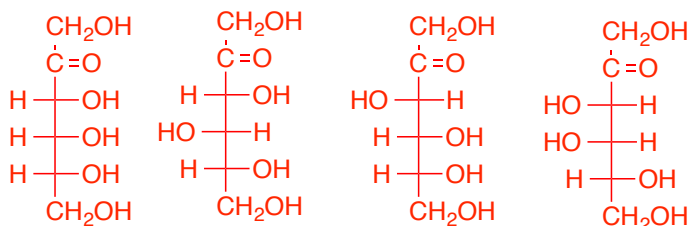
1 possible

(d) L-Aldopentose

4 possible

**(e) D-Ketohexose**

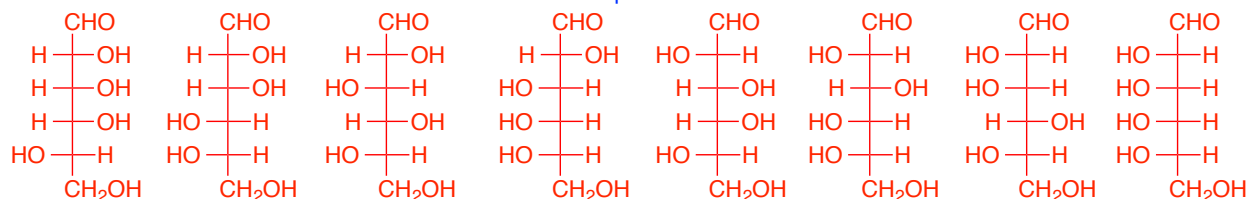
4 possible



ANY ONE EXAMPLE IS CORRECT FOR (d), (e), & (f). I WOULDN'T EXPECT YOU TO DRAW ALL STEREOISOMERS ON AN EXAM!

(f) L-Aldohexose

8 possible

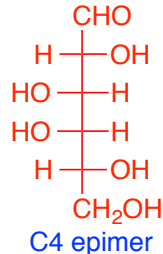
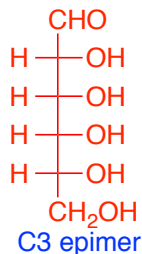
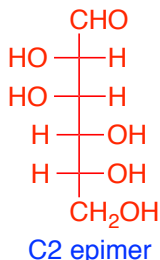
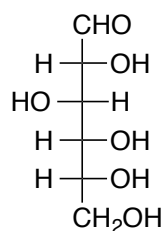


2. What is the relationship between the following monosaccharides (enantiomers, diastereomers, or epimers)? You'll find the structures of D-monosaccharides in chapter 25. You should be able to figure out the structures of the corresponding L-monosaccharides if you're paying attention to the reading! The only monosaccharide you're expected to memorize for exams is D-glucose.

- D-glucose and L-glucose **ARE ENANTIOMERS**
- D-glucose and D-allose **ARE C3 EPIMERS** (more specific than diastereomers)
- D-allose and D-altrose **ARE C2 EPIMERS** (more specific than diastereomers)
- D-altrose and D-glucose **ARE DIASTEREOMERS** (more than one chiral center is different)
- D-glucose and D-mannose **ARE C2 EPIMERS** (more specific than diastereomers)
- L-glucose and D-idose **ARE C5 EPIMERS** (more specific than diastereomers)

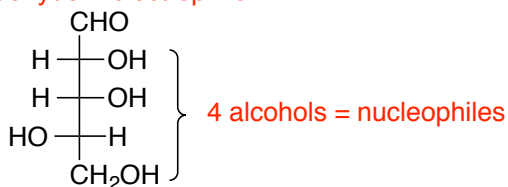
3. Fischer projections of D-glucose's epimers

D-Glucose

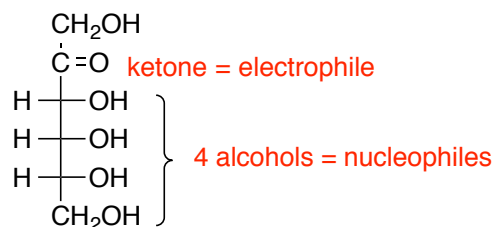


4. Monosaccharides can act as nucleophiles and/or electrophiles. Redraw any sugar from #1d and #1e and indicate the functional groups that could act as nucleophiles and those that can serve as electrophiles.

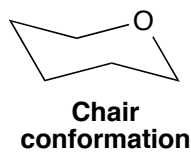
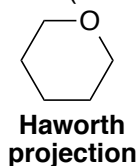
aldehyde = electrophile



alcohol = nucleophile

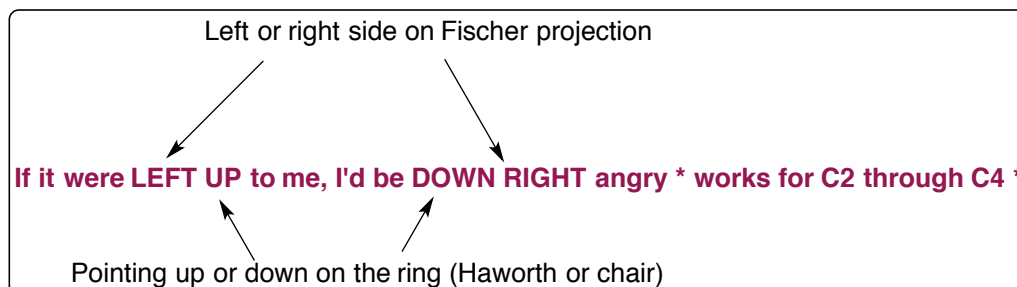


5. Redraw the following structures *exactly*. These are the backbone structures to be used for #6 of this worksheet. Pay special attention to the placement of the oxygen and the particular chair conformation used (no ring flips necessary!).

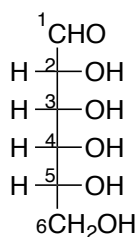


(NO KEY SHOULD BE NECESSARY!)

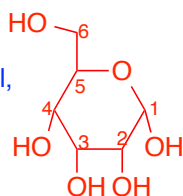
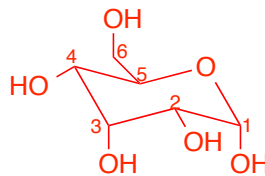
6. Draw Haworth projections and the chair conformation for the following aldohexoses using the backbone structures from #5. Consult Fig 25.3 of McMurry; memorize the structure of D-Glucose for the final exam.



(a)

**D-Allose**

Bonds in Haworth projections are up/down only, no axial or equatorial, no wedge/dash

Haworth**Chair**

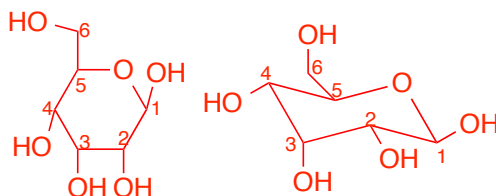
The C5 CH₂OH (penultimate) group always points "up" for D-sugars

C1-C4 are "down" but alternate axial-equatorial. Take special note of the angles of the equatorial groups - parallel to bonds in the ring.

C1 OH (anomeric) points "down" for alpha (α)

 α -D-Allopyranose

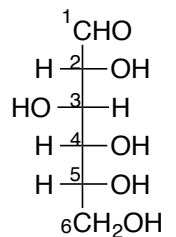
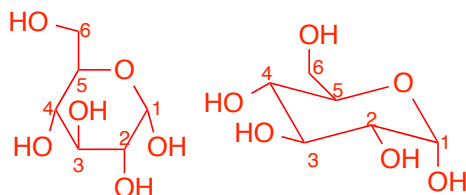
(b)



Everything except C1 is the same as part (a)

 β -D-Allopyranose

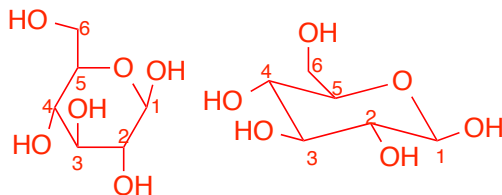
(c)

**D-Glucose**

Everything except C3 is the same as part (a)

 α -D-Glucopyranose

(d)

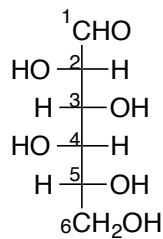
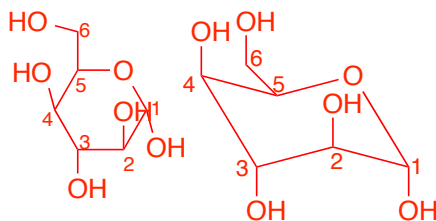


Everything except C1 is the same as part (c)

 β -D-Glucopyranose

Hey, look at that!
They're all equatorial!
Notice that equatorial bond angles still point up or down, not horizontally

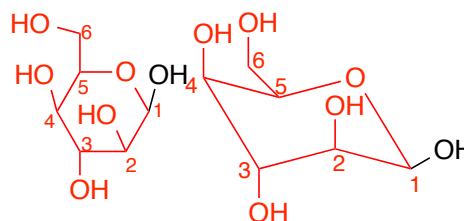
(e)

**D-Idose**

C2 and C4 differ from part (a)

 α -D-Idopyranose

(f)



Everything except C1 is the same as part (e)

 α -D-Idopyranose