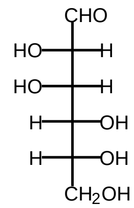
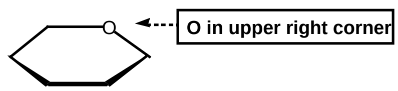
How to draw a Haworth projection from an acyclic aldohexose

Example: Convert D-mannose into a Haworth projection.



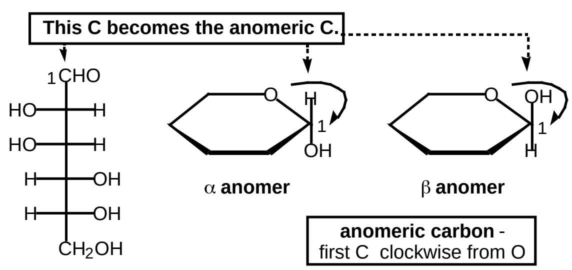
D-mannose

Step [1]: · **Draw a hexagon and place the oxygen atom in the upper right corner.**



Step [2]: · **Place the anomeric carbon on the first carbon clockwise from the oxygen.**

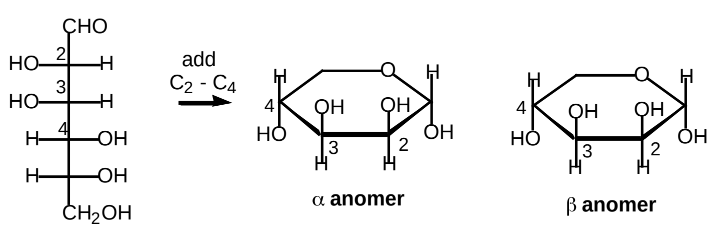
- For an α **anomer**, the **OH** is drawn **down**.
- For a β **anomer**, the **OH** is drawn **up**.



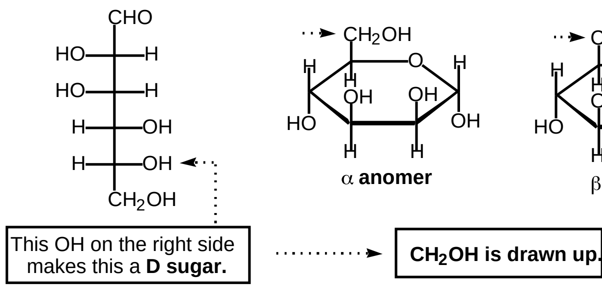
- Always keep in mind that the **anomeric carbon comes from the carbonyl carbon in the acyclic form.**

Step [3]: · **Add the substituents of the three chiral carbons closest to the C=O.**

- The substituents on the **right side** of the Fischer projection are drawn ***down.***
- The substituents on the **left** are drawn ***up.***

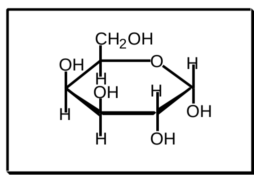


Step [4]: · **For D sugars the *CH_2OH group is drawn up*. For L sugars the *CH_2OH group is drawn down*.**

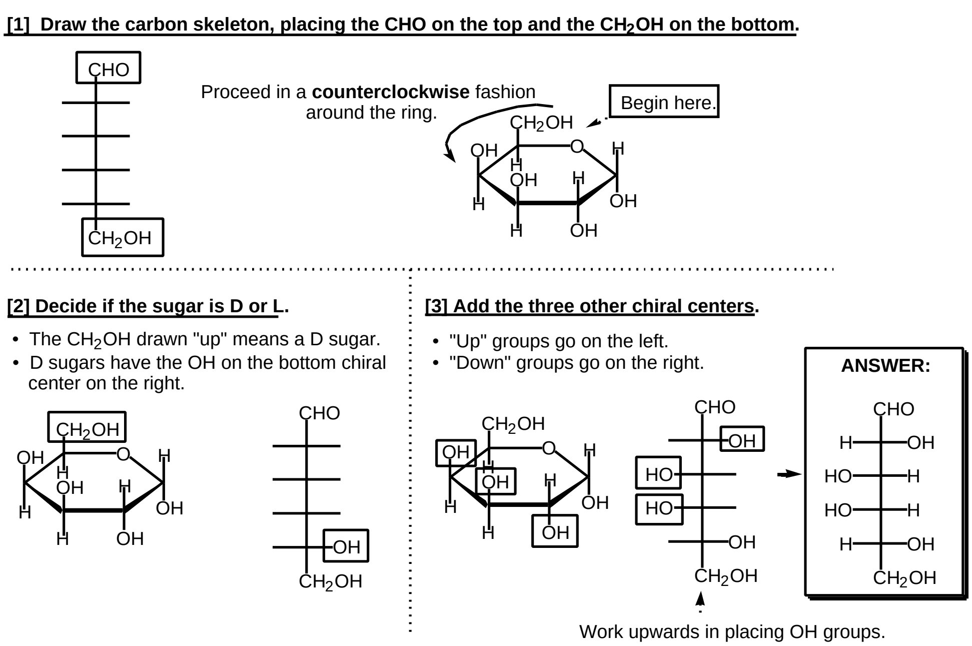


· The structures are now complete. This stepwise procedure can be used for any aldohexose. Notice that we have added substituents in a clockwise fashion around the ring.

Sample problem – Going in the opposite direction. **Convert the following Haworth projection to the acyclic form of the aldohexose.**



Begin by vertically drawing the six carbon atoms of the acyclic aldohexose. To draw the substituents on this skeleton, start at the pyranose O atom, and work in a ***counterclockwise*** fashion around the ring.



Both anomers give the same acyclic hydroxy aldehyde.