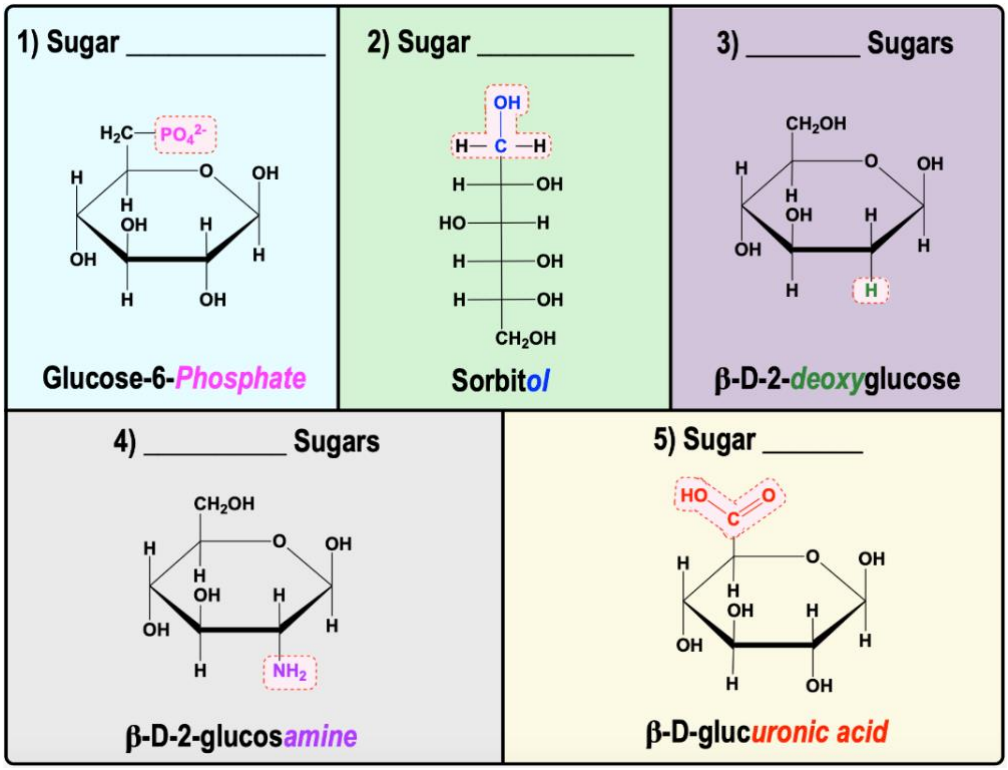
CONCEPT: DERIVATIVES OF MONOSACCHARIDES

●Recall: In addition to *simple sugars* with formula $C_n(H_2O)_n$, there are also many _____ *sugars* in nature.

●*Monosaccharide Derivatives* (or *complex monosaccharides*): chemically _____ monosaccharides.

□ Hydroxyl groups (-OH) _____ with other chemical groups.

●_____ major groups of *monosaccharide derivatives*:

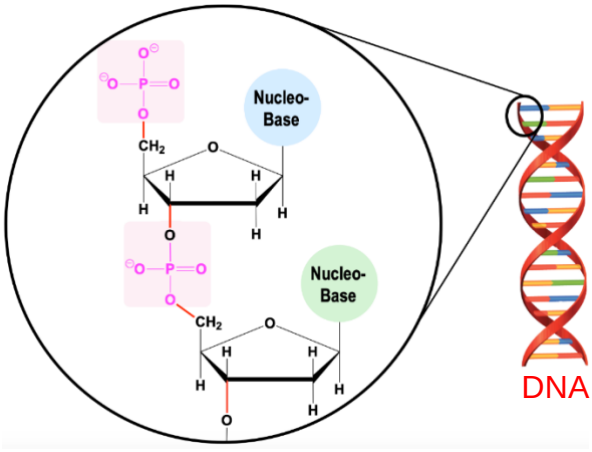


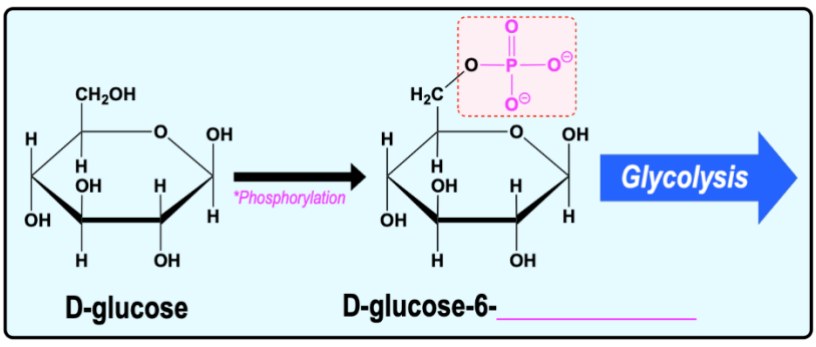
1) Sugar Phosphates

●*Sugar Phosphates*: carbohydrates that are *covalently* attached to _____ groups.

□ Part of the structure of _____ that make up *nucleic acids* (ex. DNA).

□ Important *intermediates* in the pathways of *carbohydrate* _____ & *catabolism*.





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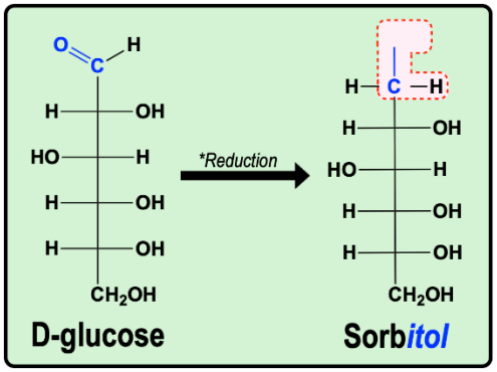
2) Sugar Alcohols (Alditols)

●*Sugar Alcohols*: sugars whose *carbonyl group* is *reduced* to an _____ *(-OH) group* so that *every carbon* has a -OH.

□ *Usually* has the suffix "-_____."

EXAMPLE: Sugar Alcohols.



PRACTICE: What is the name of the sugar alcohol produced when D-ribose is reduced?

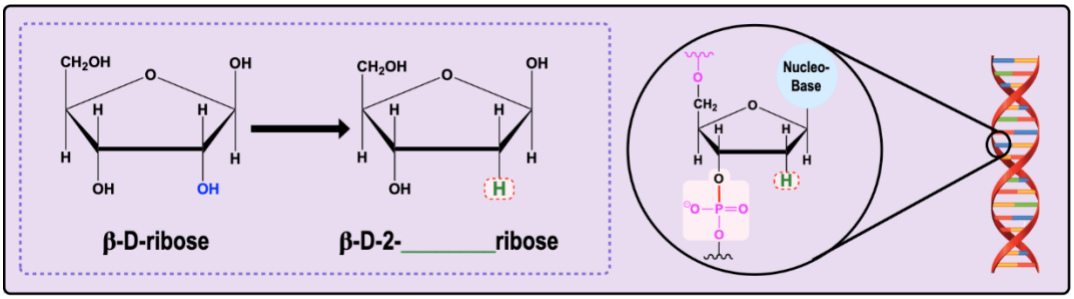
a) L-ribose. b) D-ribitol. c) D-ribulose. d) L-ribitol. e) L-ribulose.

3) Deoxy Sugars

●*Deoxy Sugars*: sugars _____ at least one _____ *group*, usually due to *replacement* with *hydrogen atoms*.

□ 2-_____-D-ribose is a primary building block of *DNA* in all organisms.

EXAMPLE: Deoxy Sugars in DNA.

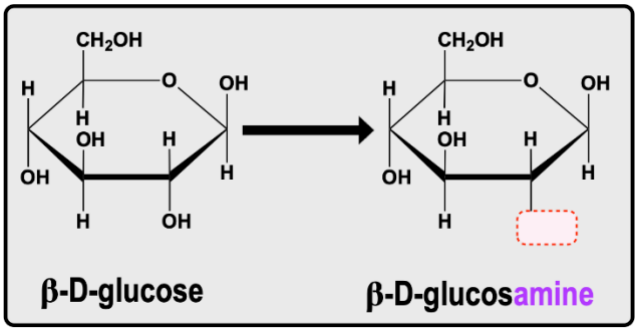


4) Amino Sugars

●*Amino Sugars*: sugars containing an _____ group instead of a hydroxyl group.

□ Commonly found in many oligo & polysaccharides (ex. chitin) and *usually* have the suffix "-_____."

EXAMPLE: Amino Sugars.



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PRACTICE: What is the difference between deoxyribose and ribose?

a) Deoxyribose is a D form, whereas ribose is an L form.

b) Deoxyribose has one less oxygen atom than ribose.

c) Ribose is found in the straight chain structure, whereas deoxyribose is not.

d) Ribose is a monosaccharide, but deoxyribose is a polysaccharide.

e) All statements are incorrect.

5) Sugar Acids

● *Sugar Acids*: carbohydrates with _____ *acids*.

□ _____ main types of sugar acids: 1) _____ *Acids*. 2) _____ *Acids*. 3) _____ *Acids*.

1) *A*ldonic *Acids*: aldoses whose C1 _____ group is oxidized to a *carboxylic acid* (usually has suffix "-_____").

2) *U*ronic *Acids*: sugars whose _____-numbered carbon is oxidized to a carboxylic acid.

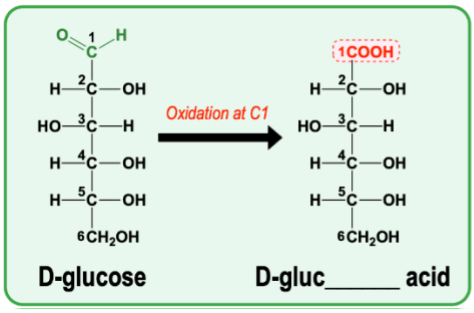
□ Usually has suffix "-_____."

3) *A*ldaric *Acids*: sugars whose _____ & _____-numbered carbons are oxidized to carboxylic acids.

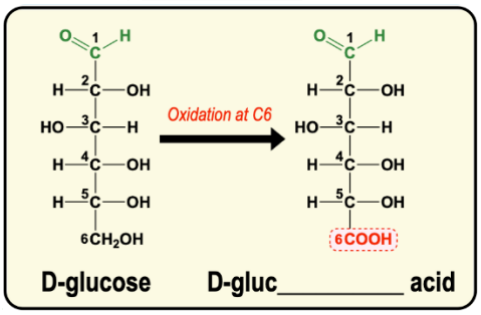
□ Usually has suffix "-_____."

EXAMPLE: Label the following sugar acids:

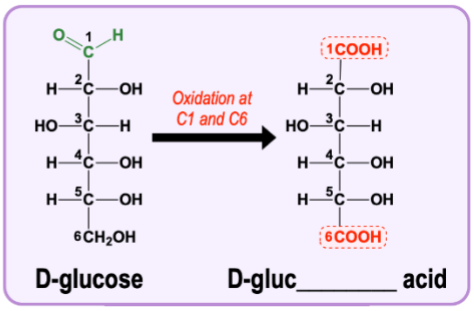
1) _____ Acid



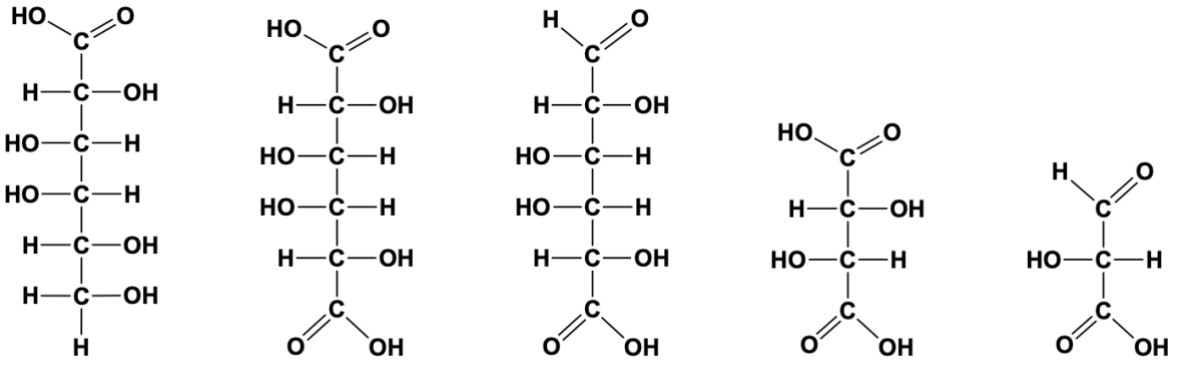
2) _____ Acid



3) _____ Acid



PRACTICE: Classify the following sugar acids as *aldonic*, *uronic* or *aldaric* acids:



_____ _____ _____ _____ _____