HOMEWORK # 8

CHEM 121, section 1
Background and Chps. 18. Carbohydrates
Homework

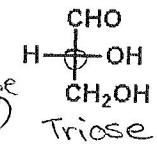
Printed Name: Key

Group Name: F

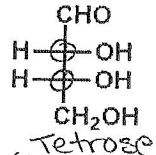
1) (2 pts) Give names of the following carbohydrates. Identify the chiral carbon atoms

Handedness = chirality. Achiral = non-handedness. Chiral- carbon atom attached to four other (structures) groups.

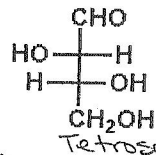
(Aldose CHO)



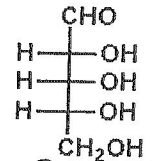
Triose



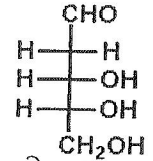
Tetrose (Aldose CHO)



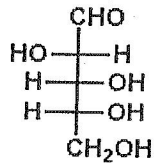
Tetrose



Pentose

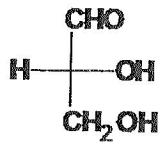
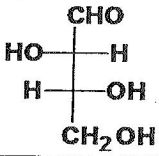
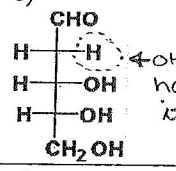
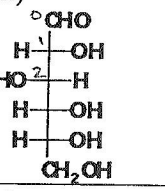
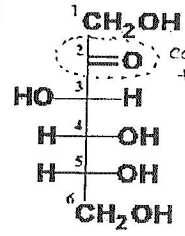


Pentose



a) D-Glucea aldehyde b) D-erythrose c) D-therose d) D-ribose e) D-deoxy-ribose f) D-arabinose

2) (4 pts.) Circle the correct classifications that apply to the following carbohydrates.

Carbohydrate	Formula	Type	Carbons	Named	Configuration
a) 	$C_nH_{2n}O_n$= $C_3H_6O_3$	(Aldose)/ketose	(Triose)/ Tetrose/ Pentose/ Hexose	Name: D-Glyceraldehyde	(D)/L
b) 	$C_nH_{2n}O_n$= $C_4H_8O_4$	(Aldose)/ketose	Triose/ (Tetrose)/ Pentose/ Hexose	Name: D-therose	(D)/L
c)  4 OH here would have made it ribose.	$C_nH_{2n}O_n$= $C_5H_{10}O_4$	(Aldose)/ketose	Triose/ Tetrose/ (Pentose)/ Hexose	Name: D-deoxy-ribose	(D)/L
d) 	$C_nH_{2n}O_n$= $C_6H_{12}O_6$	(Aldose)/ketose	Triose/ Tetrose/ Pentose/ (Hexose)	Name: D-glucose	(D)/L
e) 	$C_nH_{2n}O_n$= $C_6H_{12}O_6$	Aldose/(ketose)	Triose/ Tetrose/ Pentose/ (Hexose)	Name: D-Fructose	(D)/L

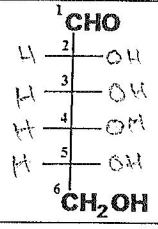
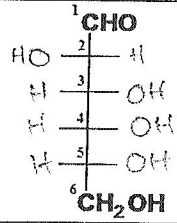
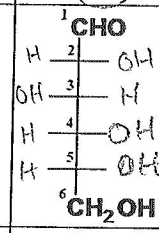
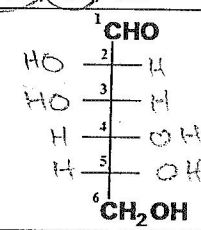
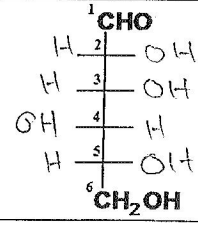
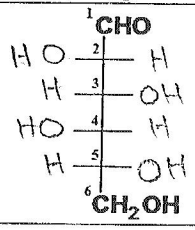
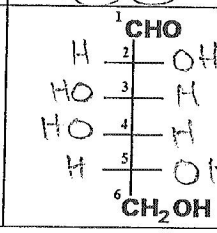
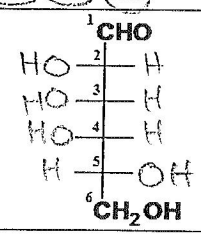
a molecule by one unit than it. * deoxy - w/o oxygen (#1e.)

e troses. rose- rythrose

* Carbohydrates are water-soluble b/c they have an OH group. The more

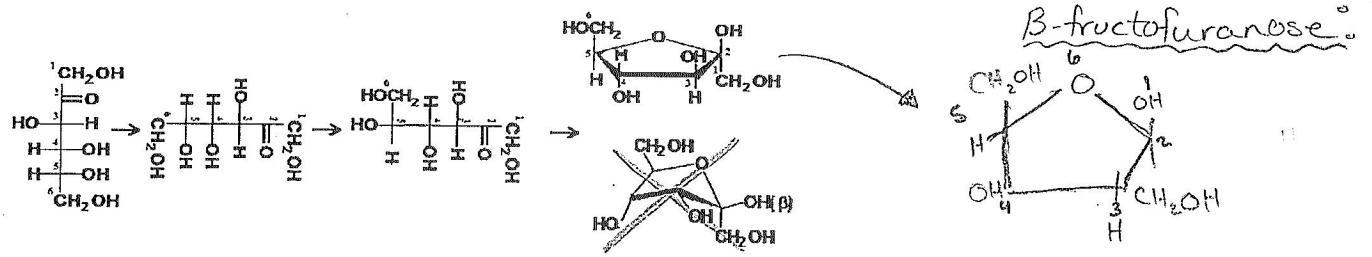
D-glucose Right
L-glucose Left

3) (3 pts.) Complete the names, circle carbon atom numbers of the OH group which is on the left and the structure for following aldohexoses.

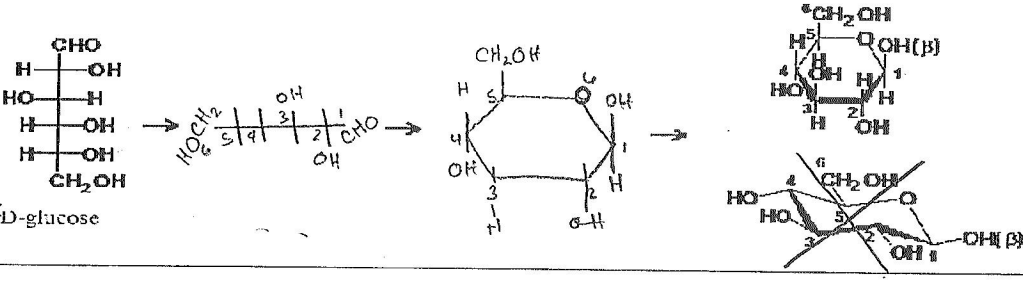
All	**Altruists**	**Gladly**	**Make**
Name: D-Allose	Name: D-Altrose	Name: D-Glucose	Name: D-Mannose
C2/C3/C4	(C2)/C3/C4	C2/(C3)/C4	(C2)/(C3)/C4
			
Gum	**in**	**Gallon**	**Tanks**
Name: D-Gulose	Name: D-Idose	Name: D-Galactose	Name: D-Talose
C2/C3/(C4)	(C2)/C3/(C4)	C2/(C3)/(C4)	(C2)/(C3)/(C4)
			

4) (3 pts.) Complete the hemiacetal structures for following carbohydrates. Circle the **anomeric carbon atom.**

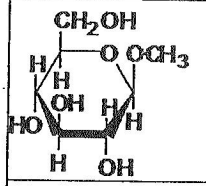
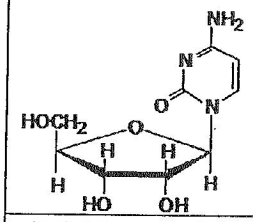
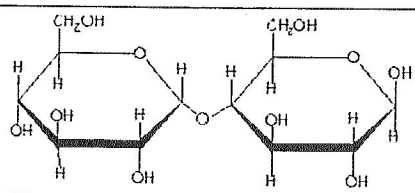
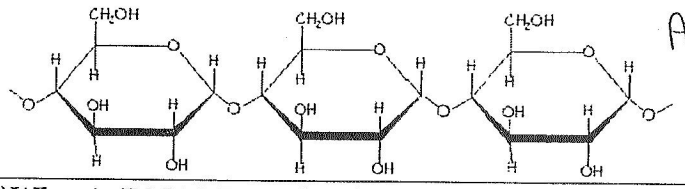
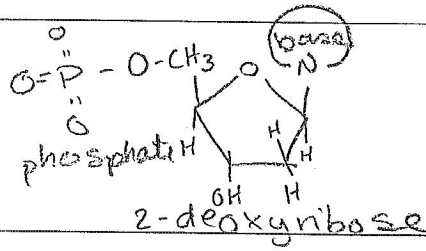
The following diagram shows how to get the cyclic hemiacetal form of the ketohexose sugar D-fructo**furanose** with β-anomeric



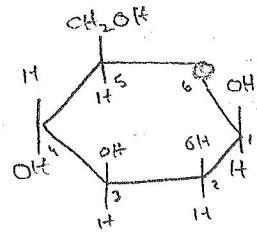
a) Complete following diagram to get the cyclic hemiacetal form of the aldohexose sugar D-gluco**pyranose** with β-anomeric configuration.



7) (3 pts.) Answer following question about glycosidic bond of the di-, oligo- and poly- saccarides.

a) Name of the following glucoside	**Answer**
 Methoglycoside	
b) Name of the following N-Glycoside	**Answer**
 N-cytocyglycoside riboside	
c) a) Name of the following glucoside.	**Answer**
 Maltose (α-1,4 glycoside)	
d) The following is a part of a cellulose polymeric chain. What is the type of glucosidic linkage?	**Answer**
 Amylose (α-1,4 linkage)	
e)What is DNA? Describe the components. Nucliotide made up of 4 different bases. Double stranded. 	
f)What is RNA? Describe the components. Single stranded.	

b) Draw the structure of β-D-mannopyranose



c) What is the difference between pynanose and furanose types of sugars?

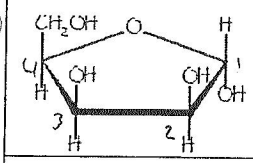
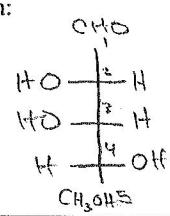
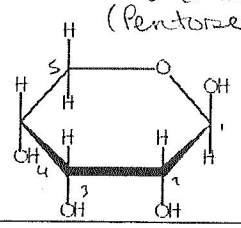
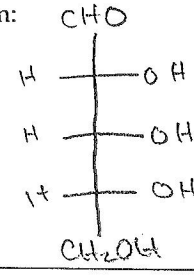
Pynanose sugars have 6 & furanose have 5 carbons. Hexoaldoses make pynanose. Hexaketoses make furanoses. Pentoses are all furanoses.

d) What is the difference between α and β forms of cyclic hemiacetal forms of sugars?

α is 6 carbon atoms & anomeric is opposite to the OH group.

5) (3 pts.) Convert the hemiacetal cyclic structures (Haworth Projections) for following carbohydrates to Fischer Projections.

The following diagram shows how to get the cyclic hemiacetal form of the hexoketose sugar D-fructo**furanose** with b-anomeric

a) Haworth Projections of cyclic hemiacetal. 	Name of the compound: (2,3) α-D-lyxofuranose	Fischer Projection of linear form: 	Name of the compound: D-lyxose
b) Haworth Projections of cyclic hemiacetal. 5-carbons (Pentose) 	Name of the compound: D-ribopyranose	Fischer Projection of linear form: 	Name of the compound: D-Ribose

6) (2 pts) What are the following? What is/are glucosidic linkage found in them? α or β depending on if the anomeric carbon is up or down. (1,4 α & 1,4 β are most common.)

a) **Starch:** (Energy storage of plants.) α-1,4-glycosidic links (chains)

b) **Amylopectin:** α-1,6-glycosidic link

c) **Glycogen:** made up of Amylopectin α-1,6 linkage at cross link chains (energy storage of animals.)

d) **Cellulose** β-1,4 glycosidic linkages