Name: __________ KEY _______________________

1. Draw D-Glc in Fischer (open ring), Haworth (as β-pyranosyl), and stereochemical (as β-pyranosyl as C1 chair) representations (15 points):

   Fisher          Haworth          Stereochemical

   [Diagram showing Fischer, Haworth, and Stereochemical representations of D-Glc]

2. The epimer of D-Glc at position 2 is known as (5 points): ____D-Man____

3. The N-acetylated form of D-Glucosamine epimerized at the 4 position is known as (5 points):
   __________ D-GalNAc __________

4. Give the fully descriptive structural name (ie: Xylb1-4Man) and the common name for the glycan below (10 points):

   [Diagram showing the glycan structure]

   structural name: __________ GlcNAcβ1-4GlcNAc _______________________

   common name: __________ chitobiose _________________________________
5. Draw α-Neu5Ac. Place an arrow pointing to the single carbon that is substituted differently in Neu5Gc and circle the moiety that distinguishes Neu5Ac from KDN. (15 points)

6. Retaining glycosyltransferases use a two-step mechanism that involves a covalent intermediate. (2 points)

(True or False) _____ True ______________________________________________________________________

7. Name two characteristics of the oxocarbenium ion that are recapitulated in effective glycosylhydrolase inhibitors. (4 points)

1) __Introduction of a distributed positive charge________________________________________

2) __planarity induced by double bond between C1 and ring oxygen____________________________

For questions 8-30, indicate ALL of the structures on page 5 that satisfy each of the descriptions. Structures can be used more than once (1 point per correct structure)

8. Core 1 O-glycan: ______________________________________________________________________

9. Linked to protein but not through an N- or O-glycosidic bond: ____F________

10. Attached directly to Ser/Thr: ______B,D,J,M,N___________________________________________

11. Carries sialic acid in α2-3 or α2-6 linkage: ____E,H,J,K,N___________________________
12. GlcNAcT-I (GnT1, MGAT1) activity required to produce the indicated structure: 
   ______________ A,E,H 

13. Bisected glycan: __________ H 

14. Contains sialic acid in α2-8 linkage: ____ K 

15. Core 2 O-glycan: ______ B,N 

16. Linked to ceramide: ___ K 

17. Requires POMT1/2 activity for synthesis: ___ J 

18. Complex N-linked glycan: ___ E,H 

19. Can be flipped from the cytoplasmic to the lumenal face of the ER: 
   ____________ C 

20. Contains a monosaccharide residue that is also found linked directly to Ser/Thr at sites of GAG attachment: 
   __________________ D 

21. Disaccharide repeat found on O-linked GAGs that are initiated by the linker tetrasaccharide: 
   __________________ O 

22. Immediate product of ER Mannosidase I activity: ___ I 

23. Contains a modified chitobiose core: ___ A,H 


25. A polypeptide GalNAcT is required for synthesis: ___ B,M,N 

26. Attached to Dolichol: ___ G,C
27. A component of heparan sulfate: \( \text{O} \)

28. Hybrid glycan: \( \text{A} \)

29. Ligand for calnexin/calreticulin: \( \text{G} \)

30. Sensitive to degradation by nitrous acid: \( \text{F} \)