

# **Test bank - carbohydrates**

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**Q1-What is the role of glycosaminoglycans in the body?**

- a. Energy storage
- b. Structural support
- c. Building blocks for larger molecules
- d. Hormone regulation

**Q2- Glycoproteins are primarily involved in:**

- a. Energy storage
- b. Catalysis of biochemical reactions
- c. Cellular recognition
- d. Transmission of genetic information

**Q3- You are examining various saccharides in a laboratory setting.**

**Based on your analysis, answer the following question , Which of the following statements is true about monosaccharides, disaccharides, oligosaccharides, and polysaccharides?**

- a. Monosaccharides are simple sugars that cannot be hydrolyzed into smaller carbohydrate units.
- b. Disaccharides are composed of three to ten monosaccharide units.
- c. Oligosaccharides are long chains of hundreds to thousands of monosaccharides.
- d. Polysaccharides are composed of two monosaccharide units linked together.

**Q4 - The number of chiral carbon atoms present in open chain forms of glucose and fructose are:**

- a. 3 in each
- b. 4 in each
- c. 3 in glucose 4 in fructose
- d. 4 in glucose and 3 in fructose

**Q5. The number of chiral carbons in Pyranose form of glucose is?**

- a. 3
- b. 4
- c. 6
- d. 5

Q6. Why are glucose, fructose and galactose known as isomers?

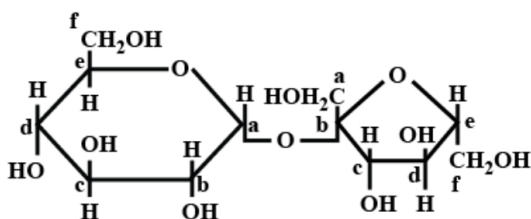
- They all have the same optical property
- They have same structural and chemical formula
- The arrangement of asymmetric carbon
- They have the same chemical formula, but Vary in the arrangement of atoms in the molecule

Q7. Choose the correct combinations of the monosaccharides forming disaccharides.

- Glucose + Glucose = Maltose
- Glucose + Fructose = Lactosesugar
- Glucose + Fructose = Sucrose
- Glucose + Galactose = Lactose

- i , ii , iii only
- ii only
- i , iii , iv only
- All of the above

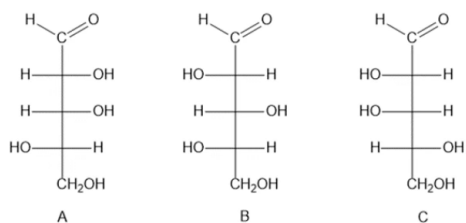
Q8. Structure of a disaccharide formed by glucose and fructose is given below Identify anomeric carbon atoms in monosaccharides units.



- 'a' carbon of glucose and 'a' carbon of fructose
- 'a' carbon of glucose and 'e' carbon of fructose
- 'a' carbon of glucose and 'b' carbon of fructose
- 'f' carbon of glucose and 'f' carbon of fructose

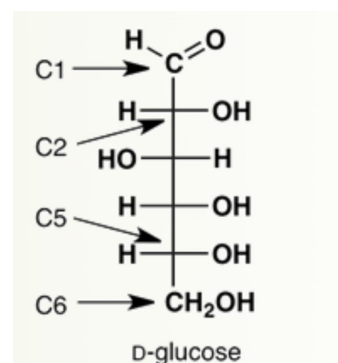
Q9. How are compounds A and B related?

- enantiomers
- Diastereomers
- Structural isomers
- Identical



Q10. Which carbon becomes the anomeric carbon of glucose in its pyranose form?

- a. C1
- b. C2
- c. C5
- d. C6

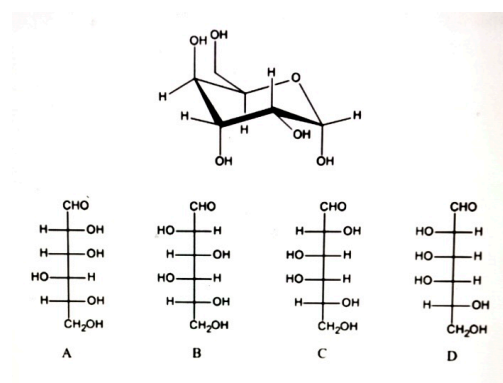


Q11. Which of the following is not a reducing sugar?

- a) D-fructose
- b) D-ribose
- c) lactose
- d) sucrose

Q12. Which is the correct open-chain form for the sugar below

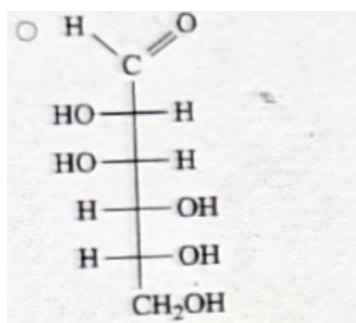
- a. A
- b. B
- c. C
- d. D



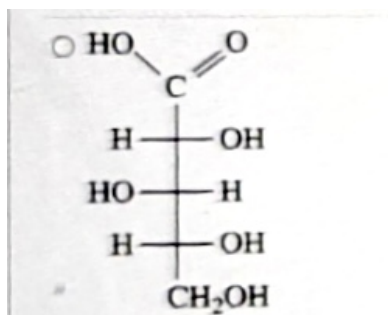
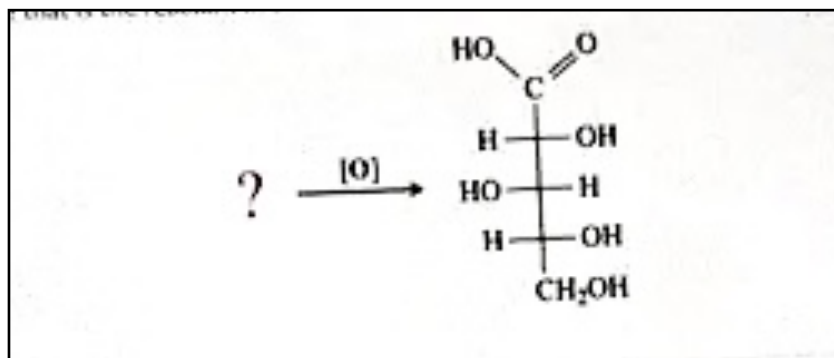
Q13. identify the incorrect statement

- a. The ring forms of sugars occur in equilibrium with the open-chain aldehyde or ketone forms in solution.
- b. open chain aldehyde or ketone forms of sugars are able to act as reducing sugars.
- c. A glycosidic bond is always a bond between two carbon atoms, one of which must always be the anomeric carbon of a sugar.
- d. Cyclization of glucose involves the reaction of the OH group at C-5 with the carbonyl carbon of the aldehyde group to form a stable six-membered pyranose ring.

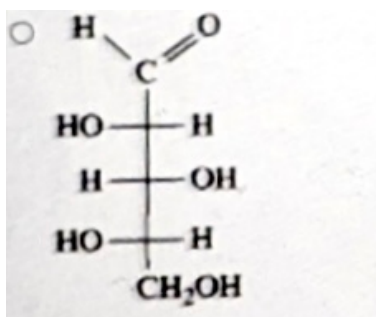
Q14. When a monosaccharide is oxidized by an oxidizing agent such as Benedict's reagent, a sugar acid is produced. For example the oxidation of glucose produces gluconic acid. Following is a representation of the oxidation reaction for a monosaccharide. Identify the monosaccharide that is the reactant in this reaction.



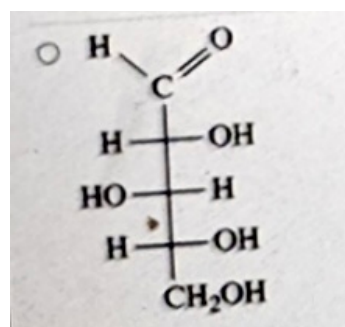
.A



B.



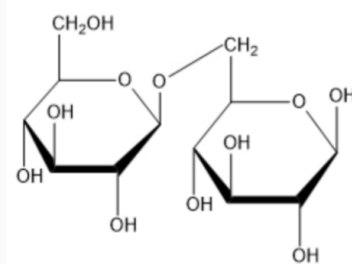
C.



D.

Q15. Select the answers that describes this sugar accurately .

- a. galactose; glucose; reducing
- b. glucose; glucose; non-reducing
- c. glucose; glucose; reducing
- d. galactose; glucose; non reducing



Q16. Phosphoester linkages are formed between a phosphate group and which functional group of a sugar molecule? Two answers

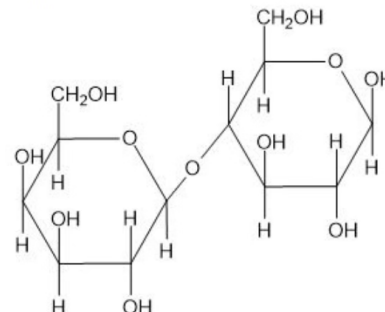
- a. Hydroxyl group
- b. Carbonyl group
- c. Amino group
- d. Carboxyl group

Q17. Which explains why glycosides do not undergo mutarotation?

- a. There is no longer an anomeric carbon.
- b. There are no longer any stereocenters.
- c. The ring structure does not open to become the open-chain structure.
- d. None of the above is correct.

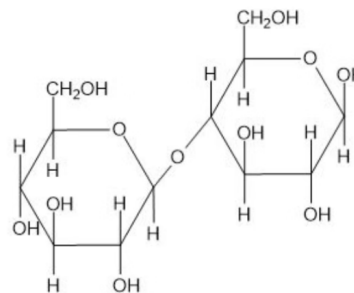
Q18. Identify the type of bond

- a. *a* (1,4)
- b. *b* (1,2)
- c. *a* (1,2)
- d. *b* (1,4)



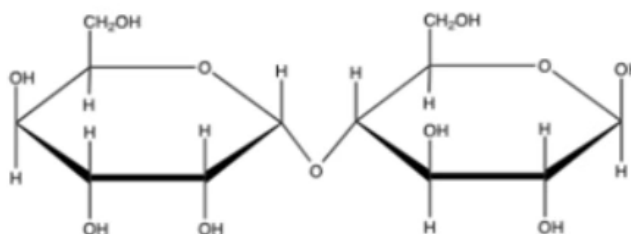
Q19. Choose the monosaccharide units produced by hydrolysis for the disaccharides :

- a. One glucose and one galactose
- b. One glucose and one fructose
- c. Two galactose
- d. Two glucose



Q20. The following is a disaccharide with \_\_\_\_\_ glycosidic bond .

- a. *a* (1,4)
- b. *b* (1,2)
- c. *a* (1,2)
- d. *b* (1,4)



Q21. Which of the following conditions is associated with the formation of cataracts due to metabolic issues?

- a. Lactose intolerance
- b. Galactosemia
- c. Diabetes mellitus
- d. Hypoglycemia

Q22. Which of the following drugs is not correctly matched with its therapeutic use?

- a. Streptomycin - Antibiotic
- b. Digoxin - Cardiovascular disease
- c. Doxorubicin - Antiviral
- d. Erythromycin - Antibiotic

Q23. Which enzyme is responsible for breaking down raffinose in those organisms that can digest it?

- a. Amylase
- b. Lactase
- c. Alpha-galactosidase
- d. Beta-galactosidase

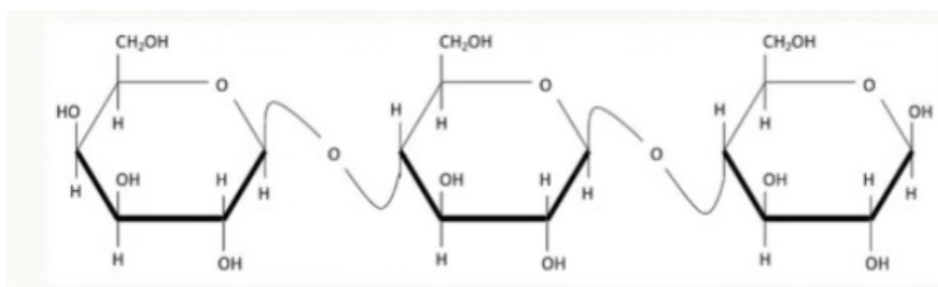
Q24. Which of the following best describes the structure and digestion process of raffinose in the human digestive system?

- a. Raffinose is a disaccharide composed of glucose and fructose; it is easily digested by human enzymes in the small intestine.
- b. Raffinose is an oligosaccharide composed of galactose, glucose, and fructose; it is not digested by human enzymes but is fermented by intestinal bacteria producing gases.
- c. Raffinose is a monosaccharide composed of galactose; it is digested by the enzyme lactase in the small intestine.
- d. Raffinose is a polysaccharide composed of multiple glucose units; it is partially digested by human enzymes and further broken down by bacteria in the large intestine.

Q25. In which of the following, glucose residues are linked by  $\beta$  1 & 4 glycosidic bonds?

- a) Amylose
- b) Starch
- c) Cellulose
- d) Glycogen

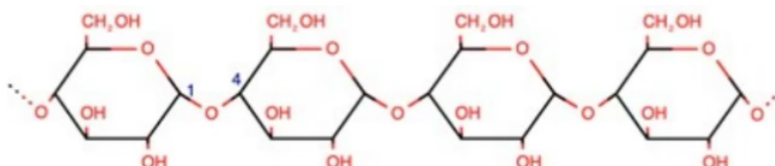
Q26. Consider this structure , it is a \_\_\_\_\_?



- a. hetero-polysaccharide
- b. Homo-polysaccharide
- c. Hetero-disaccharide
- d. Homo-disaccharide

Q27. Which of the following polysaccharides could NOT be represented by this diagram?

- a. Glycogen
- b. Amylopectin
- c. Cellulose
- d. Starch



Q28 .Which of the following statements accurately describes the structure and biological role of dextran?

- a.Dextran is a storage polysaccharide produced by yeast and bacteria, composed of  $\alpha$ -(1-6)-D-glucose units with branched chains at positions 1-2, 1-3, or 1-4.
- b.Dextran is a disaccharide found in plants, composed of  $\alpha$ -(1-6)-D-glucose units without any branches, and primarily functions as an energy source in humans.
- c.Dextran is a storage polysaccharide found in animals, composed of  $\beta$ -(1-4)-D-glucose units, and serves as a structural component in cell walls.
- d.Dextran is a monosaccharide utilized by bacteria for energy production and has no branching in its structure.

Q29. Starch and glycogen, which are both polysaccharides, differ in their functions in that starch is \_\_\_\_\_ whereas glycogen\_\_\_\_\_

- a. the principle energy storage compound of plants; is the main energy storage of animals
- b. a structural material found in plants and animals: forms external skeletons in animals
- c. a temporary compound used to store glucose: is a highly stable compound that stores complex lipids.
- d. the main component for plant structural support; is an energy source for animals

Q30. Which of the following monosaccharides is a primary component of pectin?

- A. Glucose
- B. Galactose
- C. Fructose
- D. Mannose

Q31. Which GAG is characterized by its presence in basement membranes and as a component of cell surfaces, containing higher acetylated glucosamine than heparin?

- A. Dermatan sulfate
- B. Heparan sulfate
- C. Hyaluronate
- D. Heparin

Q32. Which amino acid residue is involved in N-glycosidic linkage of carbohydrates to glycoproteins?

- A. Aspartic acid (Asp)
- B. Glutamic acid (Glu)
- C. Asparagine (Asn)
- D. Glutamine (Gln)

Q33. What carbohydrate structure is present on glycoproteins blood type B individuals?

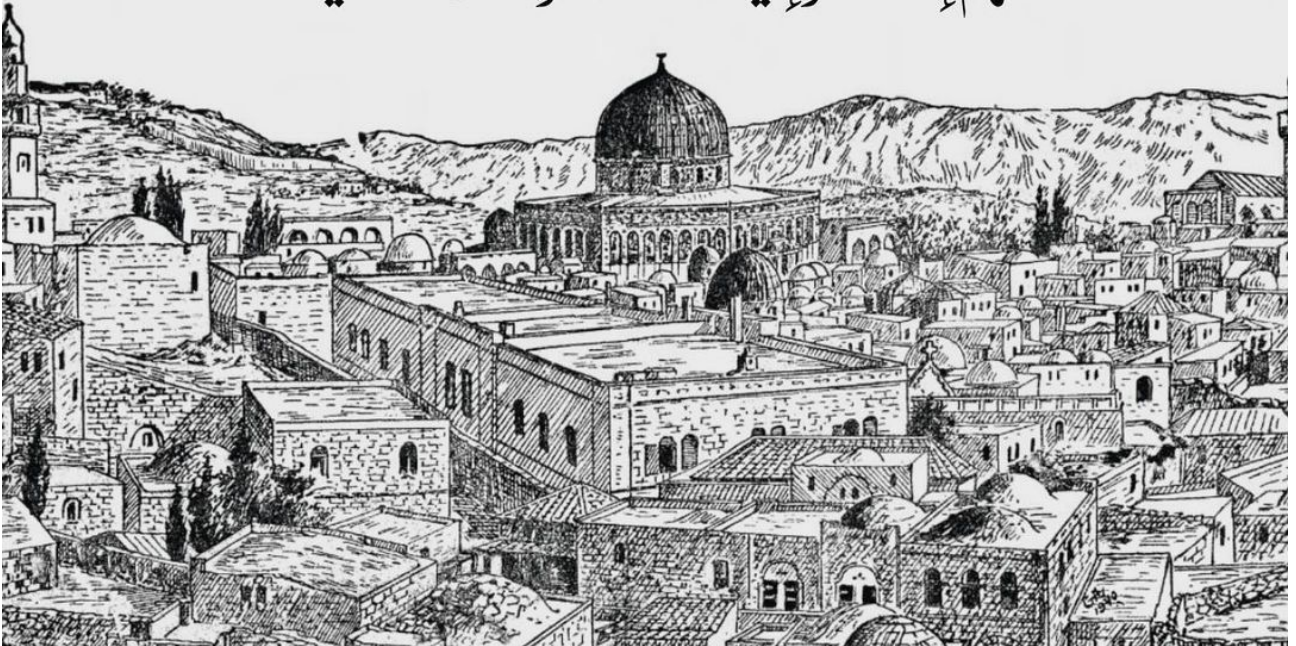
- A. N-acetylgalactosamine
- B. Galactose
- C. N-acetylglucosamine
- D. Mannose



Q34. Where is sialic acid (N-acetylneuraminate) typically located in glycoconjugates such as glycoproteins and glycolipids?

- A. In the core of oligosaccharide chains
- B. In the middle of polysaccharide chains
- C. As a terminal residue at the ends of oligosaccharide chains
- D. Within the lipid bilayer

نَعُوْذُ بِكَ يَا اِلٰهَ مِنَ الْعِزْزِ وَنَحْنُ نَرٰى اِخْوَانَنَا فِي غُرَّةِ  
وَلَا نَسْتَطِيعُ صَرْفًا وَلَا دَفْعًا وَلَا وَصُولًا  
اَللّٰهُمَّ اِنَّا نَشْكُوْا اِلَيْكَ ضَعْفَ قُوَّتِنَا وَقِلَّةَ حِيلَتِنَا



## **Answers key**

- 1. C**
- 2. C**
- 3. A**
- 4. D**
- 5. D**
- 6. D**
- 7. C**
- 8. C**
- 9. B**
- 10. A**
- 11. D**
- 12. A**
- 13. C**
- 14. D**
- 15. C**
- 16. A**
- 17. C**
- 18. D**
- 19. D**
- 20. A**
- 21. B**
- 22. C**
- 23. C**
- 24. B**
- 25. C**
- 26. B**
- 27. C**
- 28. A**
- 29. A**
- 30. B**
- 31. B**
- 32. C**
- 33. B**
- 34. C**