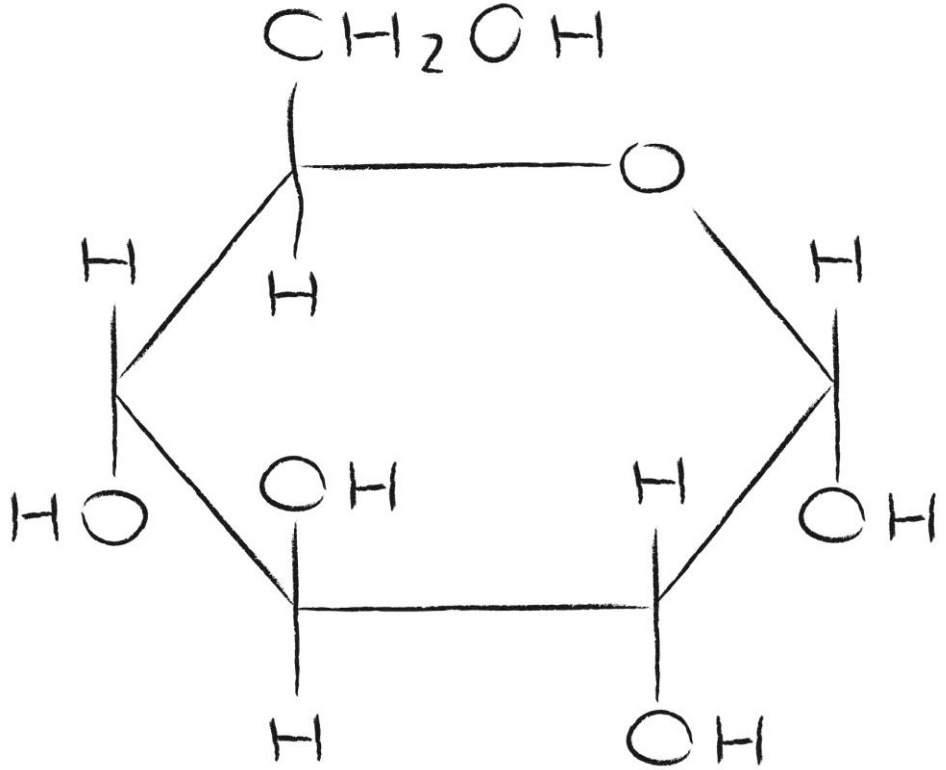
Carbohydrates

Biology 12

What macromolecule is this?

HOW DO YOU KNOW?



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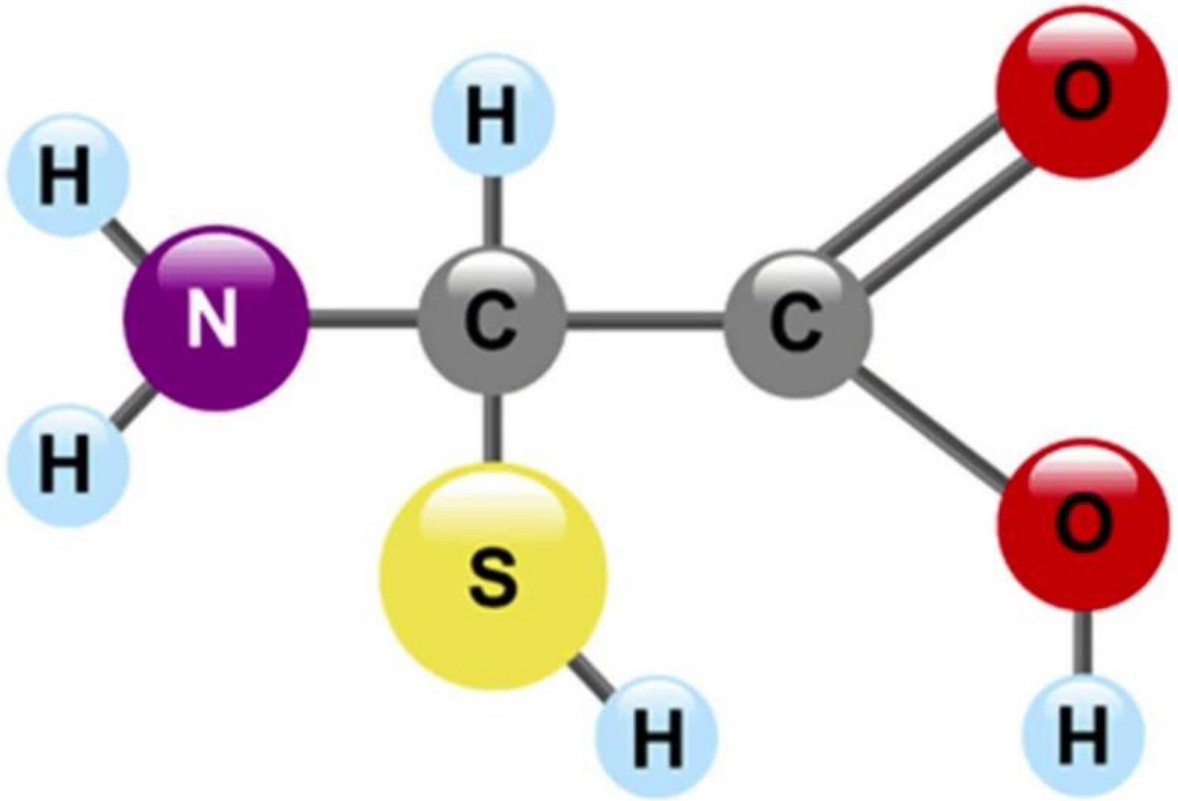

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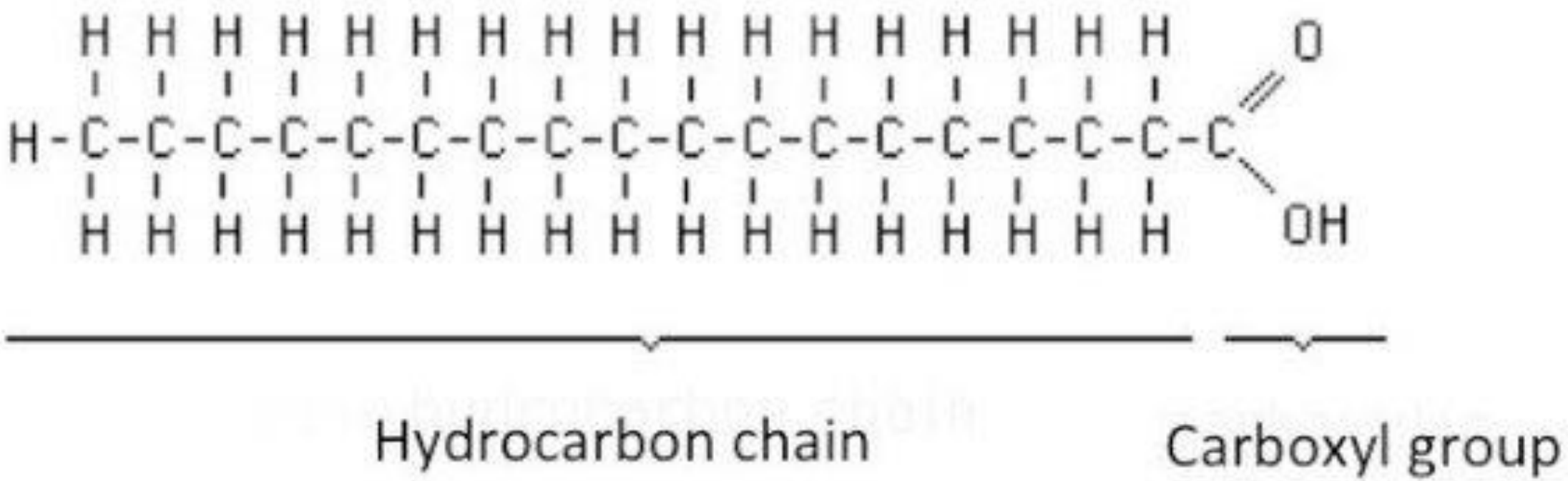

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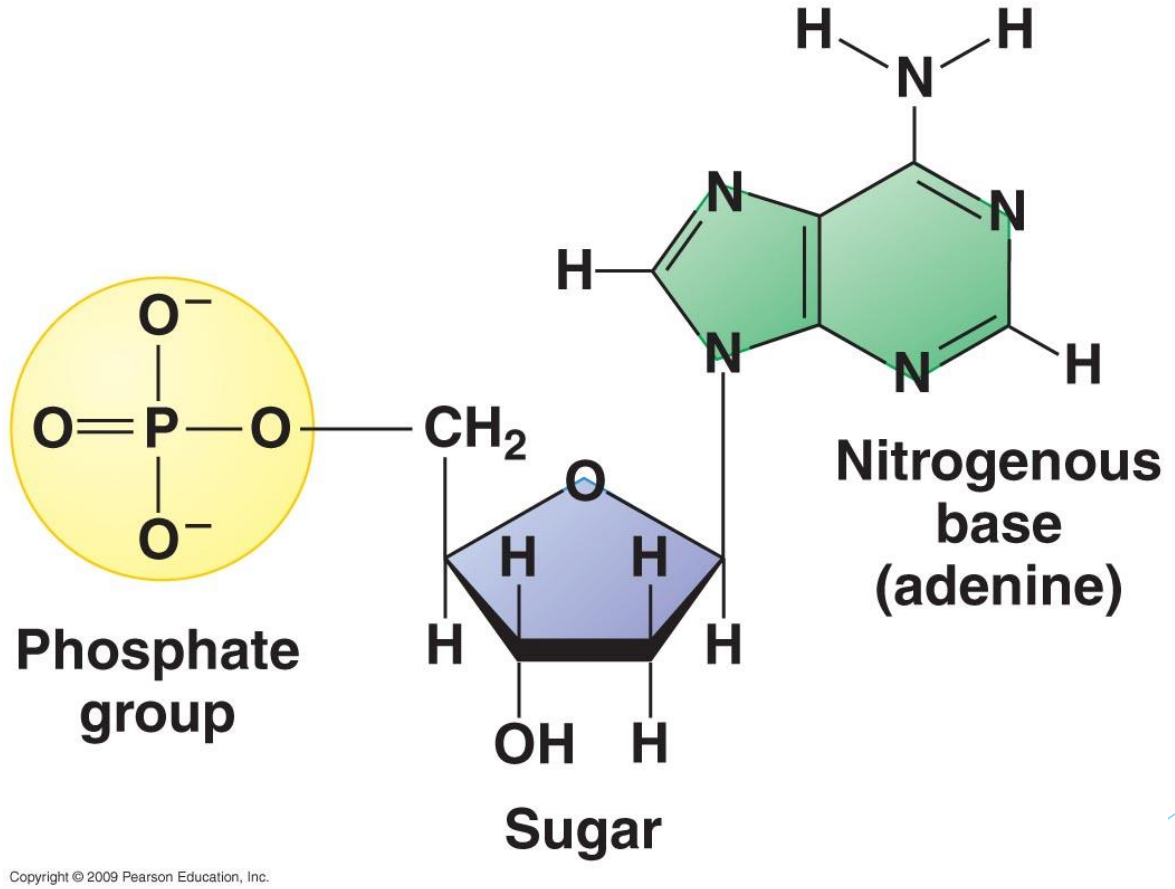


What is a Carbohydrate?

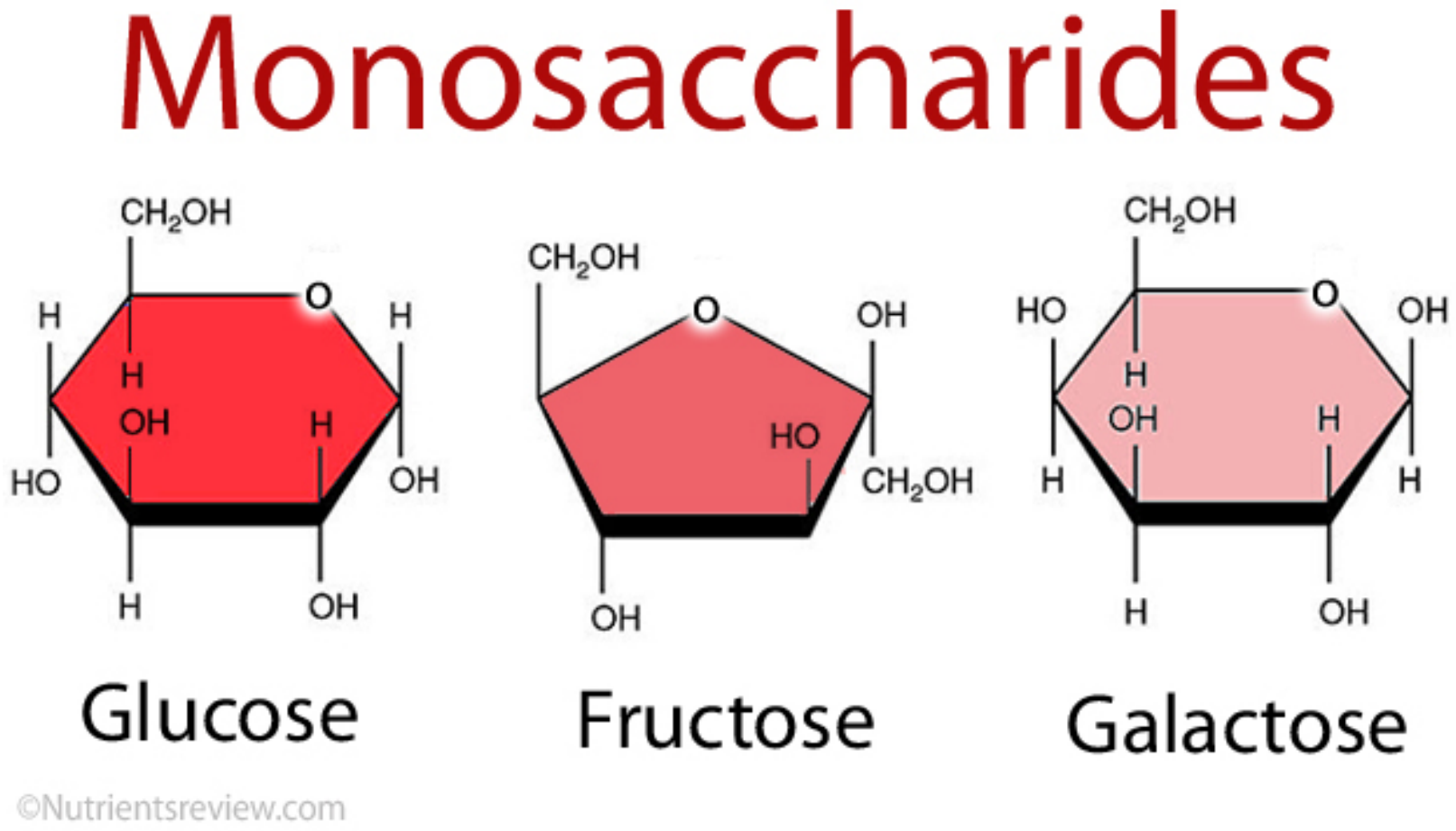
- Used for “energy” production in the body
- Contains C, H, O
- H and O in a 2:1 ratio
- Body uses carbs to help create ATP in cellular respiration
- Monomers – monosaccharides
- Polymers – disaccharide and polysaccharides

Molecular structure

Monosaccharides

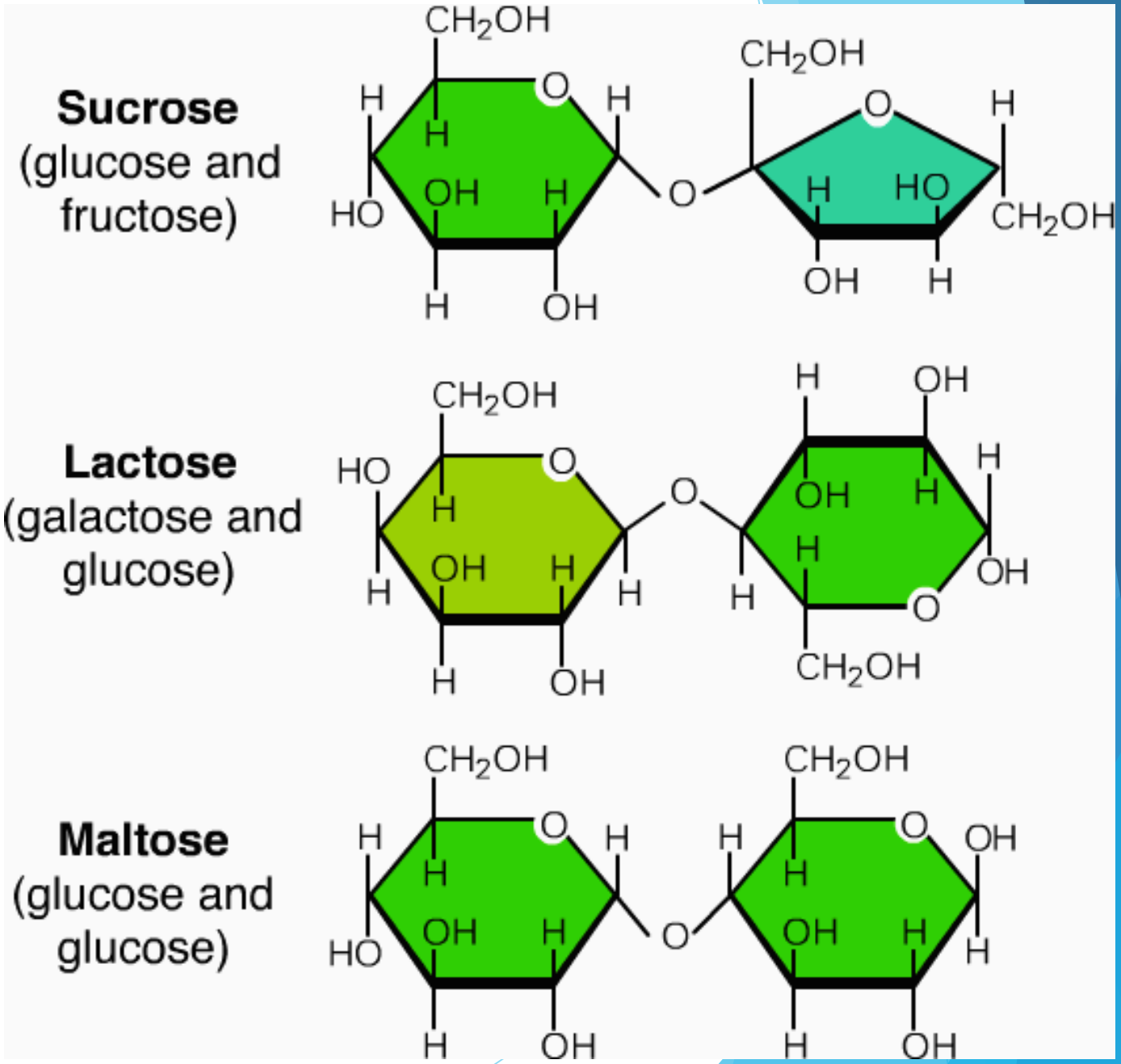
- These are the monomers of carbohydrates
- They can cross from small intestine into circulatory system to go around the body for energy source

- **Galactose vs glucose: 4th OH is UP in galactose in ring structure (or to left in Fisher)**



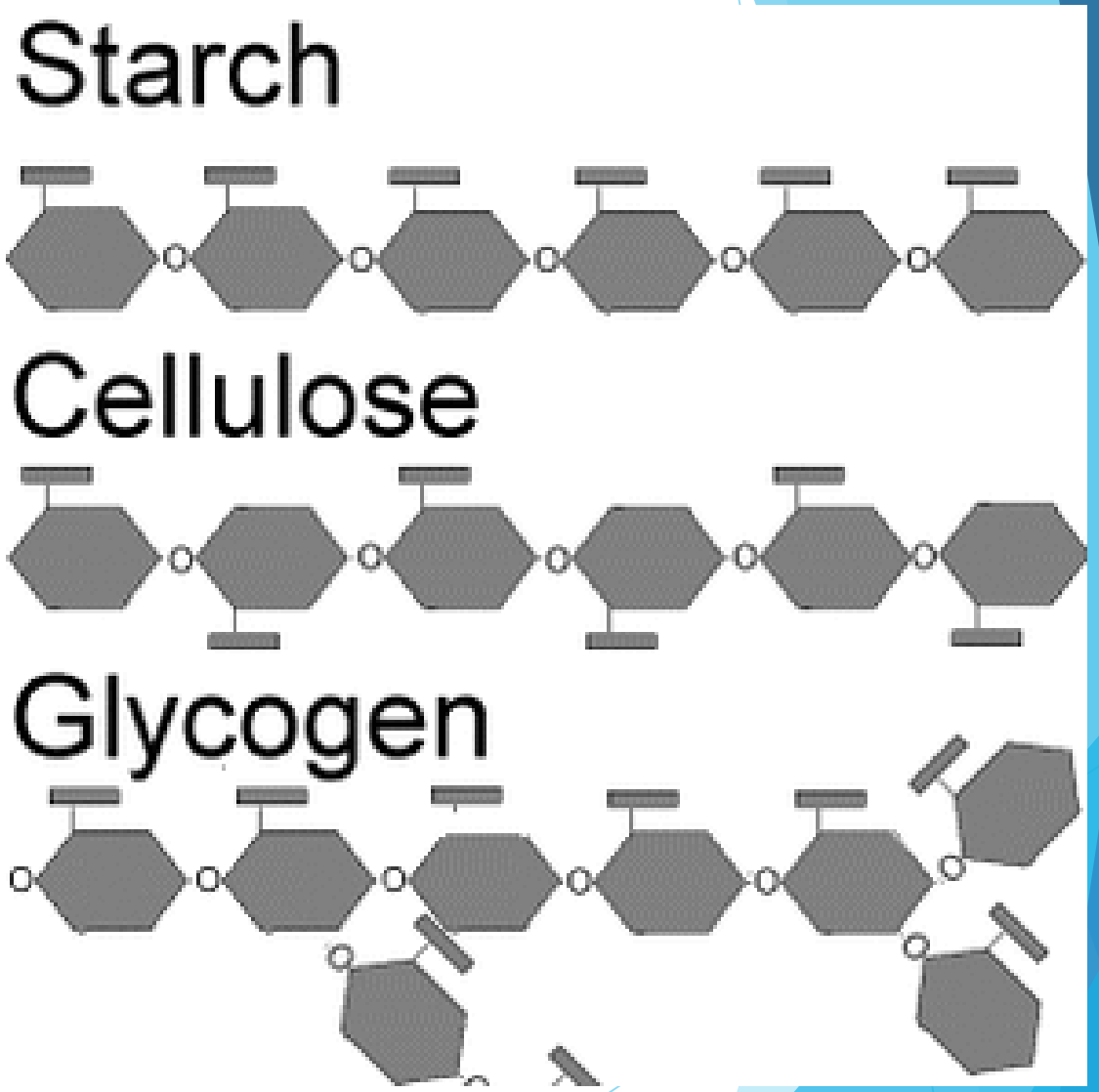
Molecular structure
Disaccharides

- Sucrose, lactose, and maltose are ripped apart in lower duodenum to monomers using enyzmes
- Sucrose = table sugar
- Lactose = sugar in millk products
- Maltose = sugar in sweet potatoes (high starch)



Molecular structure
Polysaccharides

- Starch has alpha bonds (OH from carbon-1 is below glucose ring)
- Cellulose has beta bonds (OH from carbon-1 is above the plane)
- Humans do not have the enzyme to rip apart beta bonds (can not digest cellulose)
- Glycogen is a branched polysaccharide that is stored in the liver (10%) and the muscles (1%) for future use



Blood Glucose

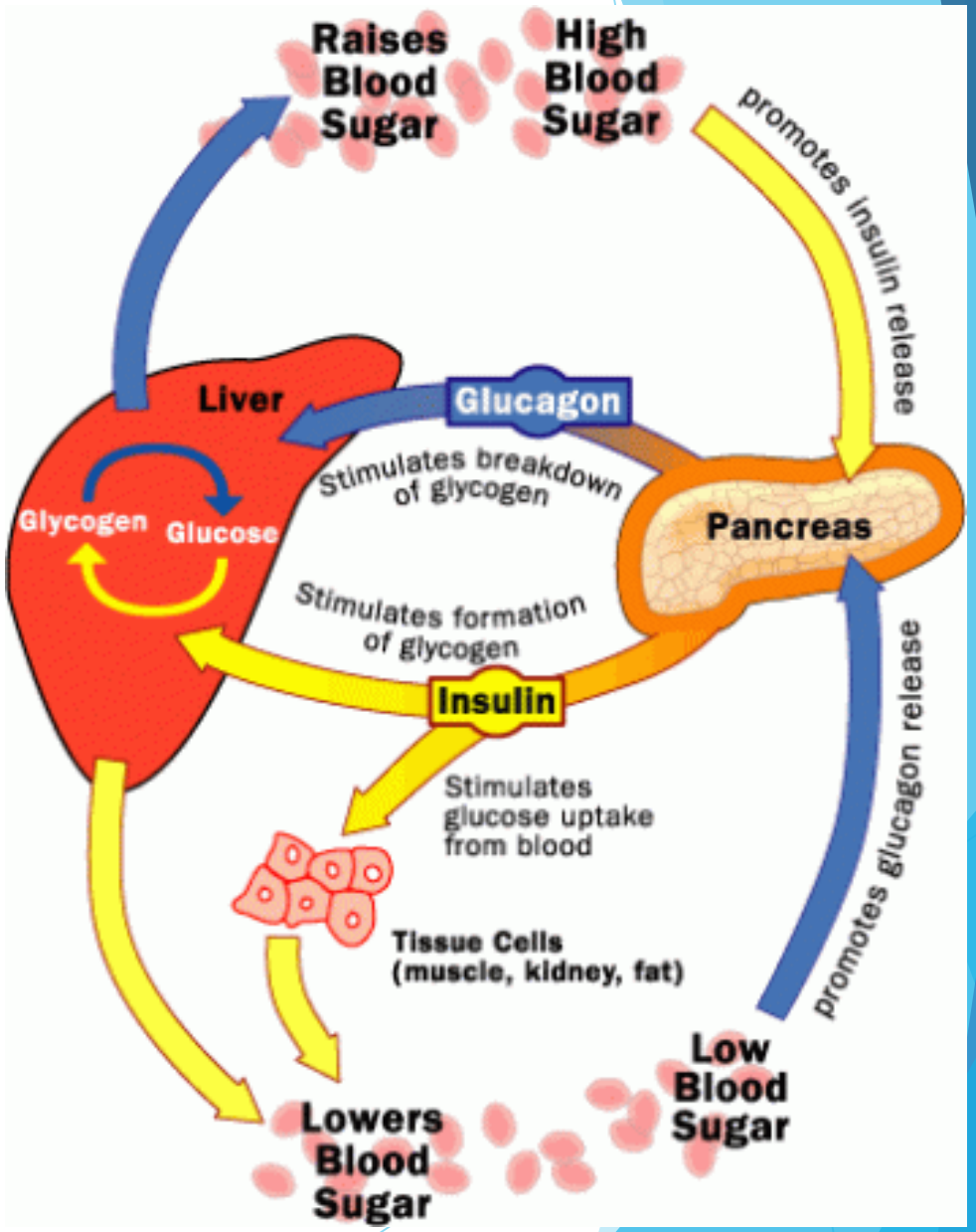
- We want to maintain blood glucose to be consistent
- Homeostasis = the internal body balance
- Glucose goes through our blood to every cell of the body to allow for production of ATP (cellular respiration)

BLOOD GLUCOSE CHART

Mg/DL	Fasting	After Eating	2-3 hours After Eating
Normal	80-100	170-200	120-140
Impaired Glucose	101-125	190-230	140-160
Diabetic	126+	220-300	200 plus

Insulin/Glucagon Cycle

- Pancreas will make insulin when you have HIGH glucose in blood to store it as glycogen
- Pancreas will make glucagon when the blood glucose is low to rip apart glycogen to glucose
- Homeostasis is monitored by beta islet cells of the pancreas



Can We Get Addicted To Sugar??

Sweet Truth: Not All Carbs Are Alike

Read the case study as a table team

Questions to discuss:

1. What are the types of monosaccharides that you might consume and how do we ingest them?
2. What polysaccharides do we ingest and from what foods do we ingest them?
3. If you needed to test the amount of mono, di, and polysaccharides in your food how would you do it?
4. What are some of the sugar replacements out there? What impact do they have on our body systems?

Test for Sugars

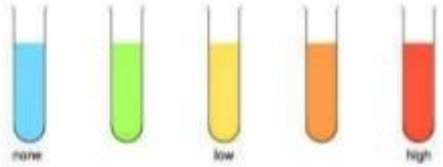
Test for reducing sugars

1. Add 2cm³ of food sample (in liquid form) to a test tube.
2. Then add 2cm³ of Benedict's Reagent.
3. Heat mixture in gentle boiling water bath for 5mins.

Benedict's Test

Results

[Reducing sugar]	*Colour of solution and precipitate*
None	Blue
Very low	Green
Low	Yellow
Medium	Brown
High	Red



Test for Starches