Unit 3: Biochemical Processes

Name: _____ Date: _____

Explore: How do Plants Gain Mass?

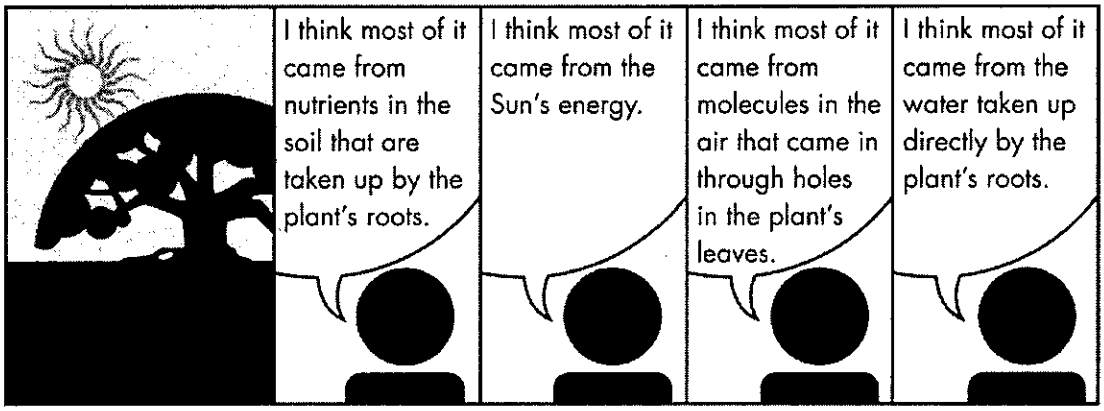
1. Complete the graphic organizer while using the picture of seed to sequoia tree.

See: What did you observe?	**Think**: Based on what you see, what do you think is happening?	**Wonder**: What questions do you have about it? What ideas does it raise in your head?

2. Wheatgrass Time Lapse: https://www.youtube.com/watch?v=9nvAzt9sWIg

See: What did you observe?	**Think**: Based on what you see, what do you think is happening?	**Wonder**: What questions do you have about it? What ideas does it raise in your head?

Question: This large tree started as a little seed. What provided most of the mass that made the tree grow so large?



3. Which of these opinions do you agree with? Provide evidence and reasons to support your opinion.

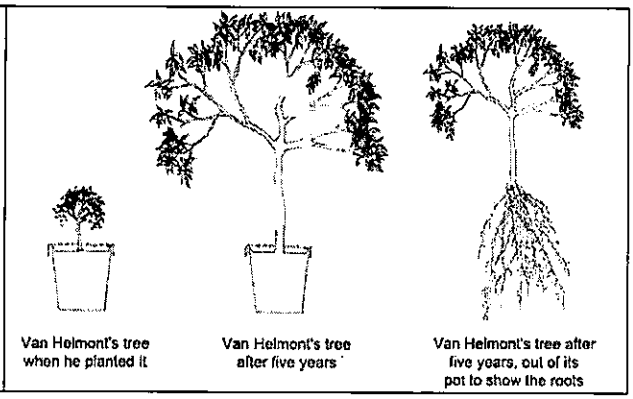
Claim Answer to the question	
Evidence Your observations/data collected	
Reasoning Explanation connecting the claim and evidence	

Explain: How do Plants Gain Mass?

Directions: Read and annotate the passage below. Complete the data table.

Jean Baptista Van Helmont (1577-1644) performed a classic experiment to answer the question of **where do trees get their mass.**

Underline his claim and **CIRCLE** evidence that supports his claim.



Jean Baptista Van Helmont

I took an earthen pot and in it placed 200 pounds of earth [soil] which had been dried out in an oven. This I moistened with rain water, and in it planted a shoot of willow which weighed 5 pounds. When five years had passed the tree which grew from it weighed 169 pounds and 3 ounces. The earthen pot was wetted whenever it was necessary with rain or distilled water only. It was very large, and was sunk in the ground, and had a tin-plated iron lid with many holes punched in it, which covered the edge of the pot to keep air-borne dust from mixing with the earth. I did not keep track of the weight of the leaves which fell in each of the four autumns. Finally, I dried out the earth in the pot once more, and found the same 200 pounds, less about 2 ounces (199 pounds and 14 ounces). Thus, 164 pounds of wood, bark, and roots had arisen from water alone." (Howe 1965)

1. Fill in the table below that summarizes Van Helmont's data. Include units.

	Willow Tree	Soil
Initial Mass		
Final Mass		
Change in Mass		

Watch You Tube video clip: Where Do Trees Get Their Mass From?
https://www.youtube.com/watch?v=2KZb2_vcNTg

2. What did Van Helmont conclude about willow growth? _____

_____

_____

3. Trees are made out of cellulose and other macromolecules. **Cellulose** is a large sugar made from many **glucose** building blocks. The chemical formula is for glucose is **$C_6H_{12}O_6$** while the chemical formula for water is H_2O. Explain whether the mass of the trees could come from water. Hint: If not from the water, then, where are the carbon atoms (mass) coming from?

Explanation: _____

_____

_____

Complete the table below:

Major type of molecule in plant	**How does the plant get or make these molecules?**
H2O	
Organic molecules (ex. cellulose - a large sugar molecule made of glucose)	

5. Based on Van Helmont's experiment, revise your claim for the question, How do plants gain mass?

Claim Answer to the question	
Evidence Your observations/data collected	
Reasoning Explanation connecting the claim and evidence	

6. Where did the tree get the energy needed to create the mass? _____

_____

_____

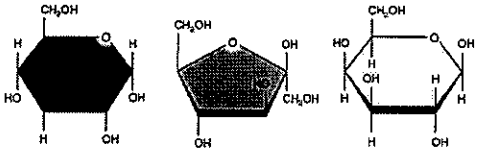
_____

Aim: Energy for Life – Where does it come from?

Carbohydrates

- Made of the Carbon, Hydrogen and Oxygen
- **Most** names end in _____
  - Glucose, Fructose, Lactose, Maltose, Cellulose

Monosaccharides



Glucose Fructose Galactose

- Main Source of _____ for organisms
- Building Blocks of Carbohydrates
  - _____
  - _____
- Prefix Mono = _____
- Monosaccharide + Monosaccharide = Disaccharide
  - Glucose + Glucose = Maltose
  - Glucose + Fructose = Sucrose (table sugar)
  - Glucose + Glactose = Lactose (milk)
- Prefix Di means _____
- _____ – forms when <u>many</u> sugars combine
- Prefix poly means Many
- Polysaccharides are examples of Polymers
  - Long chain of repeating monosaccharides

_____ – Stored Sugar in plants

_____ – Stored sugar in animals (liver)

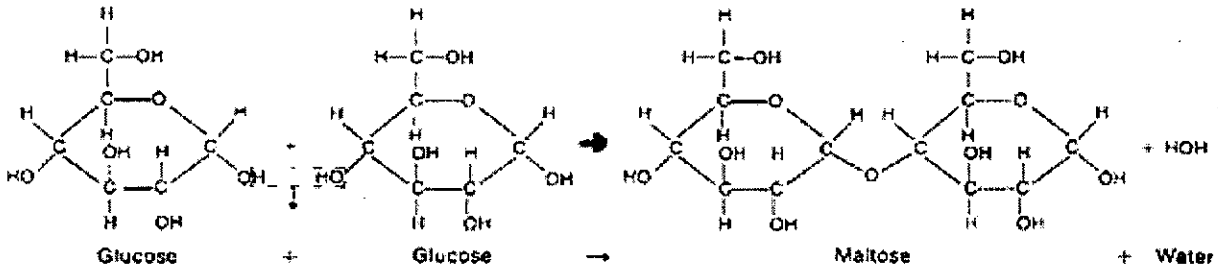
Cellulose – Gives structure to plant cell walls

Chitin – Exoskeleton of insects

Dehydration Synthesis

- _____

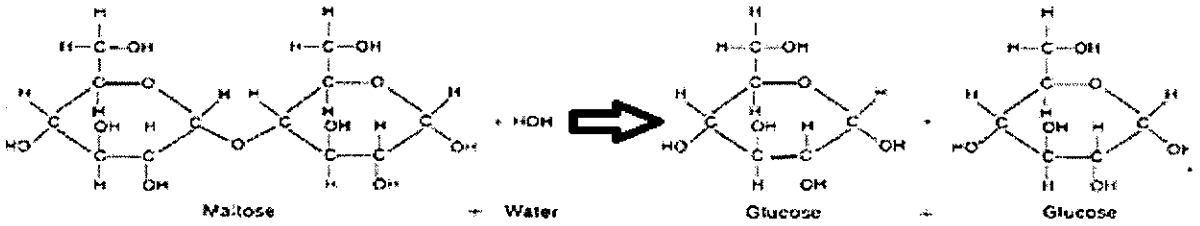
  - simple + simple → complex + water
  - Mono + mono → _____ + _____
  - Di + Di → _____ + _____



Hydrolysis

- _____

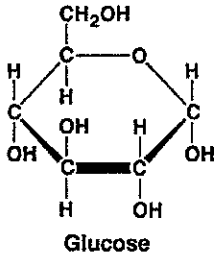
  - Complex + water → _____ + _____



Name:_____ Period:_____

Unit 3 Biochemical Processes

CARBOHYDRATES



Glucose

A **carbohydrate,** is an organic compound composed the following elements: carbon, hydrogen, and oxygen with a ratio of about two hydrogen molecules to every one oxygen molecule (2 Hydrogen : 1 Oxygen).

The simplest type of carbohydrate is a simple sugar called a **monosaccharide**. Simple sugars, such as monosaccharides, are the building blocks of carbohydrates. They are also responsible for providing organisms with energy. Common examples include *glucose* and *fructose*. (Note the both end in -ose). Two monosaccharides form a disaccharide, a two-sugar carbohydrate.

The largest carbohydrate molecules are known as **polysaccharides**, polymers (large molecules) composed of many monosaccharide subunits. *Starch*, *glycogen*, and *cellulose* are examples of polysaccharides. *Starch* is used as food storage by plants. Mammals (including humans) use *glycogen* as their storage carbohydrate. *Cellulose* is found in the cell walls of plants and cannot be digested by humans.

1. What is one important function of carbohydrates? _____

_____

2. Explain the difference between a polysaccharide and a monosaccharide. _____

_____

_____

3. What are the building blocks of carbohydrates, such as starch? _____

4. In humans, excess glucose is stored as a polysaccharide known as

1. glycogen 2. glycerol 3. maltose 4. Cellulose

5. What do plants do with all of the extra glucose they produce from photosynthesis?

_____

_____