

Grade 8
Living Environments Regents- Remote Learning Assignments
Week 2: March 30th - April 3rd

Day	Assignments
Monday 3/30/2020	Part A: Review Past Content and Check Answers- Guided Practice Part B: Read article independently and complete Stop-and-Jots Part C: Complete the Exit Ticket using this Illuminate link
Tuesday 3/31/2020	Part A: Watch Video & Guided Practice Part B: Independently review the article from Day 1- Complete Chart Part C: Complete the Exit Ticket using this Illuminate link
Wednesday 4/1/2020	Part A: Watch Video & Guided Practice Part B: Read article independently and complete Stop-and-Jots Part C: Complete the Exit Ticket using this Illuminate link
Thursday 4/2/2020	N/A
Friday 4/3/2020	N/A

**You must know your ID number in order to submit your answers in Illuminate. If you do not know your ID number, please let your teacher know and they can help you.*

Name: _____

Objective: SWBAT

Understand enzymes are catalysts made from protein.

- a. Catalysts affect the rates (speed) of chemical reactions
- b. Lock and key model - one type of enzyme fits one and only one type of molecule.
 - i. Change its shape and the enzyme will no longer work
- c. Very high temperatures cause proteins and enzymes to lose their shape so that they no longer work properly. This is why high fevers are dangerous.

Lesson At-A-Glance for Today

- A. Review Past Content and Check Answers- Guided Practice
- B. Read article independently and complete Stop-and-Jots
- C. Complete the Exit Ticket using this [illuminate link](#)

PART A: Guided Practice - Complete the following as a review.

1. Water is classified as an inorganic compound because it...
 - a. Does not contain carbon
 - b. Does not contain nitrogen
 - c. Contains hydrogen
 - d. Contains oxygen
2. The chart below indicates the elements contained in four different molecules and the number of atoms of each element in those molecules

Element	Number of Atoms			
	Molecule A	Molecule B	Molecule C	Molecule D
Hydrogen	12	0	3	0
Carbon	6	1	0	1
Nitrogen	0	0	1	0
Oxygen	6	2	0	3
Calcium	0	0	0	1

Using the chart above, which molecule can be classified as organic?

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

*****Check answers. Reach out to teachers if you have questions. 1. A 2. A*****

PART B: Independent Practice - Read article independently and complete stop and jots.

Enzymes

Function and structure

Enzymes are very efficient catalysts for biochemical reactions. They speed up reactions by providing an alternative reaction pathway of lower activation energy.

I. Role of Enzymes



1. Organic catalysts - regulate the rate of chemical reactions.
2. All biochemical reactions require an enzyme.
3. Enzymes are specific for each chemical reaction.

Stop and Jot- How do catalysts impact chemical reactions? What does "regulate rate" mean?

4 What determines the shape of proteins? (Look back to Protein Lesson)

1

- ☐ the order of carbohydrates
- ☐ the order of lipids
- ☐ the order of amino acids
- ☐ the order of nucleic acids

1. Large proteins (made up of Carbon, Hydrogen, Oxygen and Nitrogen).

2. Made of 1 or more polypeptide chains.

3. Names end in ase

Ex:

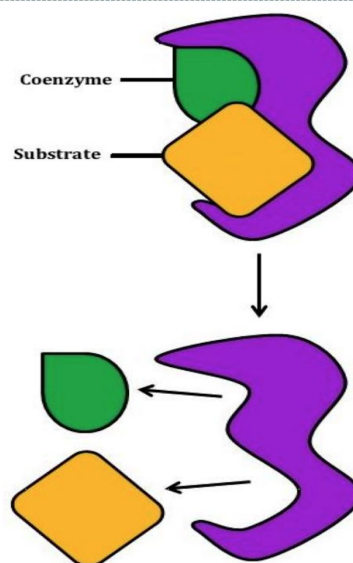
- **Maltase**
- **Lipase**
- **Protease**
- **Amylase**

**Stop and Jot- What are the building blocks of polypeptide chains?
Think about what comes together to form proteins...**

II. Structure of Enzymes

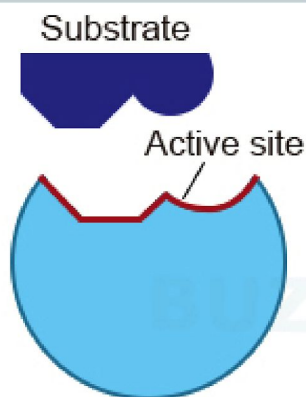
4. Some enzymes have a non-protein part known as a coenzyme. (Vitamins are coenzymes)

Ex: Thiamine (vitamin B1) is a coenzyme for cellular respiration.



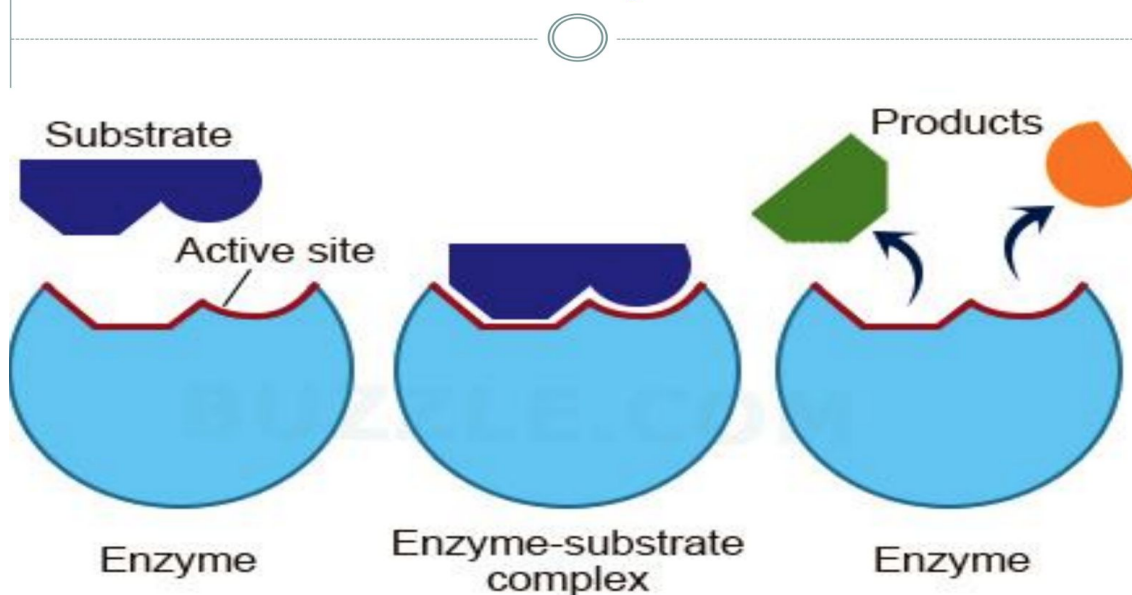
II. Structure of Enzymes

5. Enzymes have Active sites (a location where the substrate attaches).



Biochemistry. In biochemistry, the **substrate** is a molecule upon which an **enzyme** acts. **Enzymes** catalyze chemical reactions involving the **substrate(s)**. In the case of a single **substrate**, the **substrate** bonds with the **enzyme** active site, and an **enzyme-substrate** complex is formed.

Lock and Key Model



Lock and Key Model

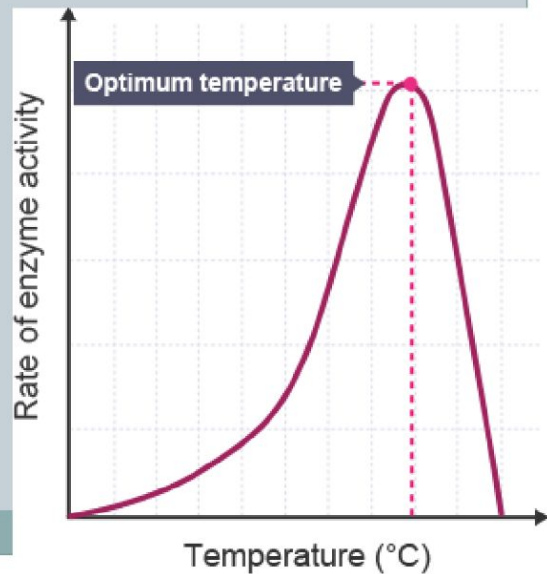
- A. Enzyme and substrate must come together. Substrate must fit active site of enzyme perfectly.**
 - ✦ Each kind of substrate fits only one kind of enzyme (Lock & Key)
- B. While the enzyme substrate complex is formed the enzyme does "its job"**
- C. After completion the enzyme and substrate separate. The enzyme is now available to be used again!**

Stop and Jot- Why do you think this is called a Lock and Key Model for Enzyme and substrates? How is this similar to the lock and key used for a front door to a home?

III. Factors Influencing the Action of Enzymes

1. **Temperature** - as temperature increases, the rate of enzyme action increases.

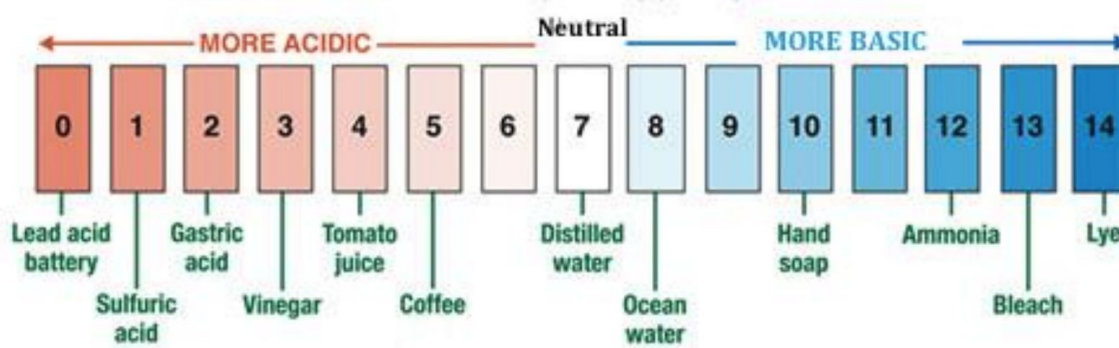
- However as temperature gets too high the shape of the enzyme is altered (this is called denaturation).
- For many human enzymes denaturation begins around 40° C (104° F).



III. Factors Influencing the Action of Enzymes

2. pH of the environment – enzyme action is limited to a specific pH range.

pH - Measures the H^+ ion concentration.

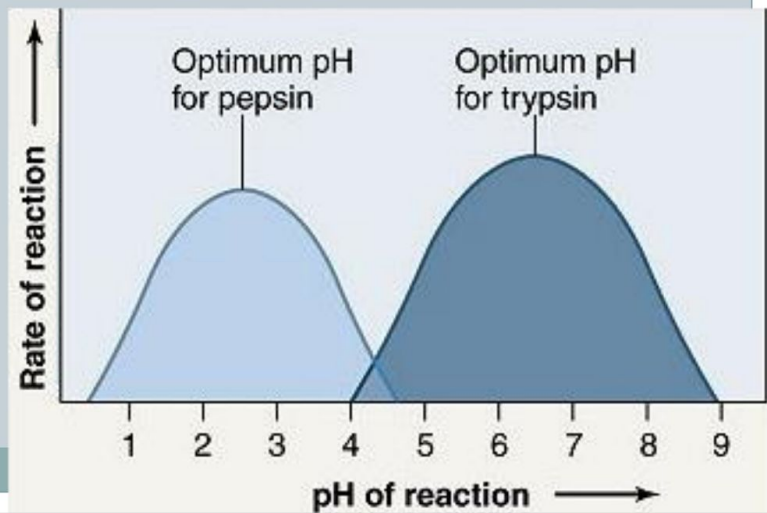


III. Factors Influencing the Action of Enzymes

- The optimal pH for most human enzymes is a pH of 7 (neutral).
- Some enzymes work best at different pH ranges.

Pepsin – an enzyme found in the stomach

Trypsin – an enzyme found in the small intestine

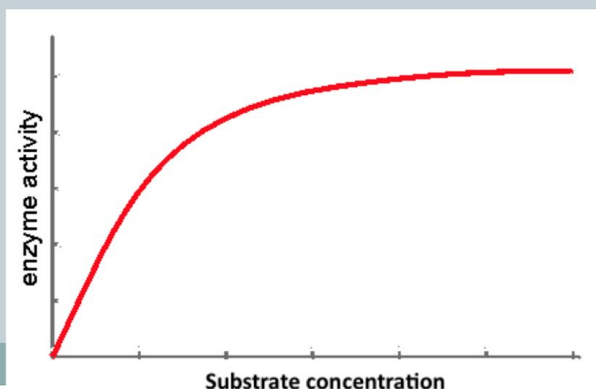


Stop and Jot- What is meant by the word “optimal” in the slide above?

III. Factors Influencing the Action of Enzymes

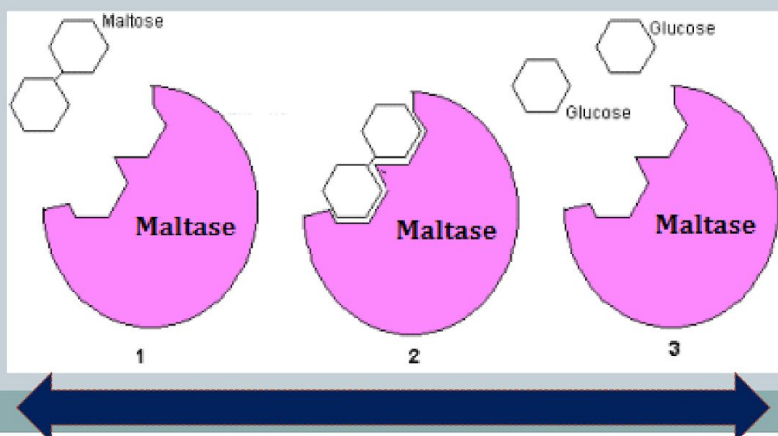
3. Amount of Enzyme and Substrate

When more substrate is added to a system with a constant concentration of enzymes, the rate of enzyme action will increase to a point; and then remain the same.



III. Factors Influencing the Action of Enzymes

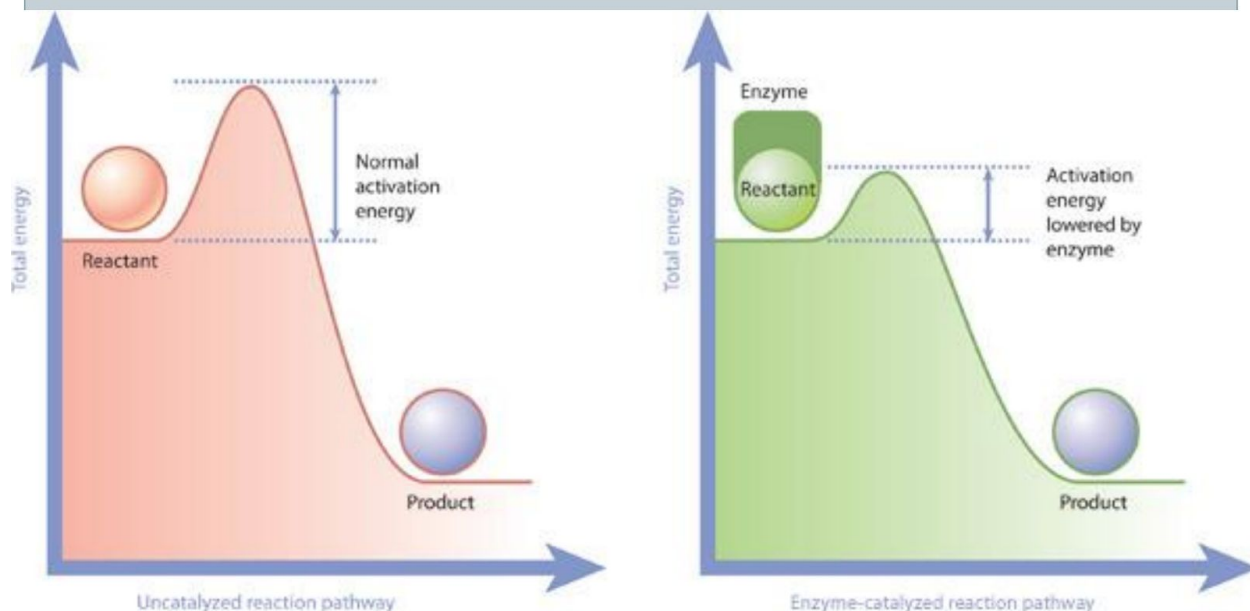
- Enzyme action is reversible
- Ex: Maltase splits maltose into 2 glucose molecules, Maltase also forms maltose from 2 glucose molecules.



IV. Enzyme Actions

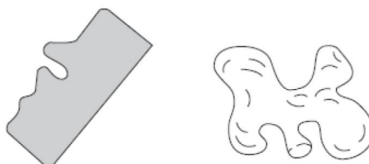
- Enzymes lower activation energy of a reaction
- Activation energy is the amount of energy needed to cause a reaction to go through to completion

IV. Enzyme Actions



PART C: Exit Ticket - Complete the following questions. Annotate your questions! Submit your answers online using this [illuminate link](#).

1. Enzymes belong to which group of chemicals?
 - a. Lipids
 - b. Polysaccharides
 - c. Saccharides
 - d. Proteins
2. Enzymes speed up biochemical reactions by
 - a. Increasing the temperature of the reaction
 - b. Lowering the activation energy of the reaction
 - c. Increasing the activation energy of the reaction
 - d. Lowering the temperature of the reaction
3. The diagrams below represent two molecules that are involved in metabolic activities in some living cells.



The shape of each of the molecules is important because

Name: _____

Objective: SWBAT

Understand enzymes are catalysts made from protein.

- d. Catalysts affect the rates (speed) of chemical reactions
- e. Lock and key model - one type of enzyme fits one and only one type of molecule.
 - i. Change its shape and the enzyme will no longer work
- f. Very high temperatures cause proteins and enzymes to lose their shape so that they no longer work properly. This is why high fevers are dangerous.

Lesson At-A-Glance for Today

- A: Watch Video & Guided Practice
- B: Independently review the article from Day 1- Complete Chart
- C: Complete the Exit Ticket using this [Illuminate link](#)

PART A: Guided Practice

Go here to watch this video on enzymes. Complete the following questions.

<https://www.youtube.com/watch?v=qgVFkRn8f10>

1. Please illustrate an enzyme and substrate. Label the following key words in your illustration: enzyme, substrate, and active site. You can use <https://awwapp.com/#> to draw on your computer.
2. Enzymes are typically which type of biomolecule?
3. Describe the effects that enzymes can have on substrates.

PART B: Independent Practice - Review the article from yesterday independently. Complete this chart.

Real Life Enzyme Scenarios

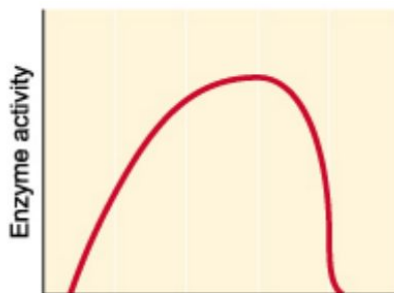
Please fill in the chart for every real life scenario listed below. Some boxes have been filled in for you!

Scenario	Identify Enzyme:	Identify Substrate	Illustrate the Scenario (label enzyme and substrate in illustration):	Describe the relationship between the substrate and enzyme in the scenario.
Lactase is an enzyme that breaks down a sugar found in dairy products known as lactose. Some people are lactose intolerant, and this can be due to not having enough lactase production. People who are lactose intolerant may not feel well after eating foods containing lactose.	1.	2.lactose	3.	4.
An enzyme called glucocerebrosidase breaks down a glycolipid in the body known as glucocerebroside. However, in a genetic disease known as Gaucher's disease, the body does not produce enough glucocerebrosidase. Therefore glucocerebroside can build up in the body and this can cause serious side effects such as anemia and swelling of the liver and spleen.	5.	6.	7.	8.
Pancreatitis is an inflammation of the pancreas which can damage pancreatic tissue. The pancreas produces digestive enzymes such as amylase and lipase. These	9.	10.	11.	12. Since the pancreatic tissue can be damaged in this disorder, the production of the

enzymes assist in breaking down certain food biomolecules. In this disorder, enzyme production from pancreatic tissue may be stopped.				enzymes in this tissue (amylase and lipase) may be disrupted as well. This would affect the ability to break down certain types of food biomolecules (substrate).
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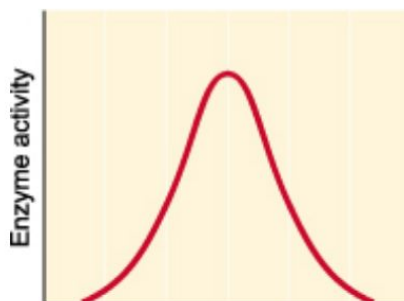
PART C: Exit Ticket - Complete the following questions. Annotate your questions! Submit your answers online using this [illuminate link](#).

4. The diagram below shows a typical relationship between enzyme activity and _____.



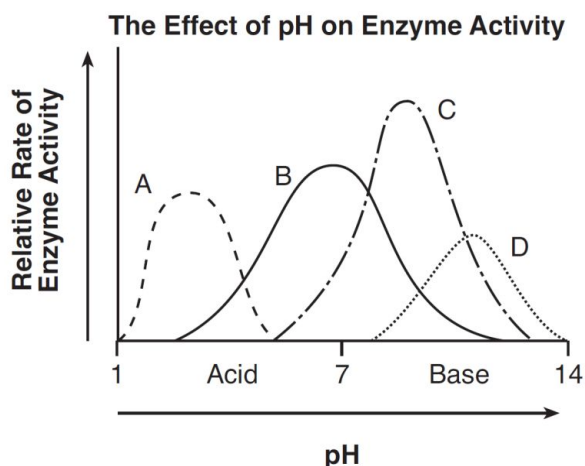
- a. Temperature
- b. Substrate concentration
- c. Enzyme concentration
- d. pH

5. The diagram below shows a typical relationship between enzyme activity and _____.



- a. Substrate concentration
 - b. Temperature
 - c. pH
 - d. Enzyme concentration
6. Base your answer to the following question on the information and graph below and on your knowledge of biology.

The pH of the internal environment of lysosomes (organelles that contain digestive enzymes) is approximately 4.5, while the pH of the surrounding cytoplasm is approximately 7. The average pH of the human stomach during digestion is approximately 2.5, while the average pH of the small intestine during digestion is about 8. The graph below shows how pH affects the enzyme activity of four different enzymes, A, B, C, D.



Which enzyme functions best in a pH environment most similar to that of human stomach enzymes? Why?

Objective: SWBAT

Understand:

Photosynthesis takes the radiant energy of the sun and puts it in the bonds of sugar molecules. Photosynthesis occurs mostly in the chloroplast of plant cells.

- a. Plants have stomates (holes) in their leaves that let them exchange the gasses used in photosynthesis. Guard cells open and close the stomates to keep the plant from dehydrating.
- b. Xylem and phloem carry food and water through a plant.
- c. Common mistakes:
 - 1) "Photosynthesis gives us energy." Photosynthesis only stores energy in food (glucose). We need respiration to get the energy out of the food.
 - 2) "Guard cells protect plants from diseases." Guard cells only protect plants from water loss

Lesson At-A-Glance for Today

- A. Watch Video & Guided Practice
- B. Read article independently and complete Stop-and-Jots
- C. Complete the Exit Ticket using this [Illuminate link](#)

PART A: Guided Practice

Go here to watch this video on photosynthesis. Complete the following questions.

<https://www.youtube.com/watch?v=uixA8ZX0KU>

1. In photosynthesis, what are the two major reactions that take place?

2. Where do each of these reactions take place?

*If chloroplasts and mitochondria could only speak! Decide whether each quote could be stated by a chloroplast (label "C"), mitochondria (label "M"), or **both** organelles (label "C, M").*

7. _____ My main goal is to produce a lot of ATP energy.

8. _____ I contain pigments to help capture light energy.

9. _____ Oxygen gas production will happen within me.

10. _____ I can be found in plant cells.

11. _____ I can be found in animal cells.

12. _____ Carbon dioxide gas production will happen within me.

13. _____ Muscle cells would contain a lot of me.

14. _____ Water production will happen within me.

15. _____ Glucose production will happen within me.

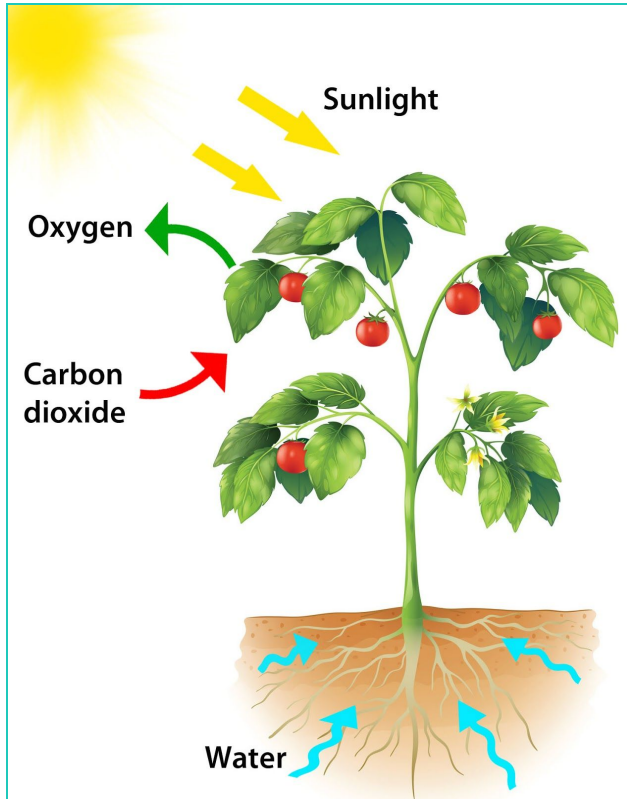
16. _____ I would be found within a photosynthetic protist.

17. _____ I am the site of aerobic cellular respiration.

18. _____ Krebs and the Electron Transport Chain both happen within me.

PART B: Independent Practice - Read the article independently. Complete the stop and jots.

Photosynthesis



What is Photosynthesis?

The word photosynthesis can be separated to make two smaller words:

“photo” which means light

“synthesis” which means putting together

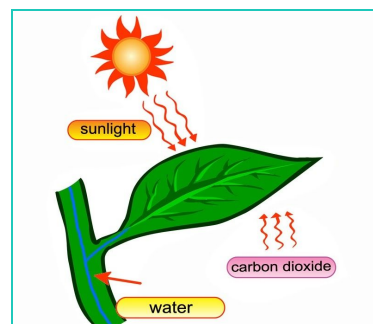
Plants need food but they do not have to wait on people or animals to provide for them. Most plants are able to make their own food whenever they need it. This is done using light and the process is called photosynthesis.

Photosynthesis is the process by which plants make their own food. We will add more details to this definition after making a few things clear as you will see below.

What is needed for Photosynthesis?

To make food, plants need not just one but **all of the following**:

- carbon dioxide
- water
- sunlight



Let's take a look at how these are collected by plants.

- Carbon dioxide from the air passes through small pores (holes) in the leaves. These pores are called stomata.
- Water is absorbed by the roots and passes through vessels in the stem on its way to the leaves.
- Sunlight is absorbed by a green chemical in the leaves.

More about the stomata...

Stomata cells & Homeostasis

■ **Stoma/Stomata**- molecule on the underside of leaf that lets molecules in and out

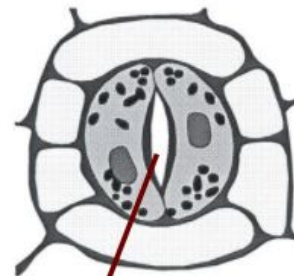
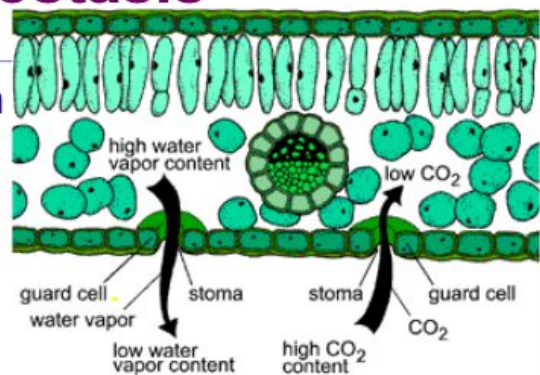
- ◆ internal environment of the plant balanced by.....

■ **Stomata opening**

- ◆ let CO_2 in
- ◆ let H_2O (vapor) out
- ◆ let O_2 out

■ **Stomata closing**

- ◆ if too much H_2O is evaporating



**Stomata (the hole)
underneath of the leaf**

Regents Biology

Stop and Jot- How does the stomata support homeostasis?

What happens during Photosynthesis?

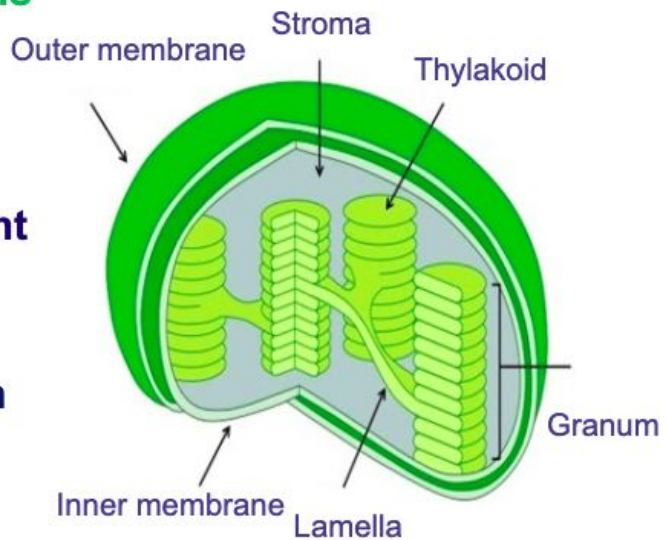
The photosynthesis process takes place in the leaves of plants. The leaves are made up of very small cells. Inside these cells are tiny structures called **chloroplasts**. Each chloroplast contains a green chemical called **chlorophyll** which gives leaves their green color.

- Chlorophyll absorbs the sun's energy.
- It is this energy that is used to **split water molecules into hydrogen and oxygen**.
- Oxygen is released from the leaves into the atmosphere.
- Hydrogen and carbon dioxide are used to form glucose or food for plants.

More about chloroplasts...

The chloroplast

- Site of **photosynthesis**
- Contain **Chlorophyll** pigments that reflect green.
- **Thylakoid**: site of light dependent reactions
- **Stroma**: site of light independent reaction



Some of the glucose is used to provide energy for the growth and development of plants while the rest is stored in leaves, roots or fruits for later use by plants.

Stop and Jot- What role does the sun have in forming glucose?

Here is the process in greater detail:

Photosynthesis occurs in two stages commonly known as Light dependent Reactions and the Calvin Cycle.

Light dependent Reactions

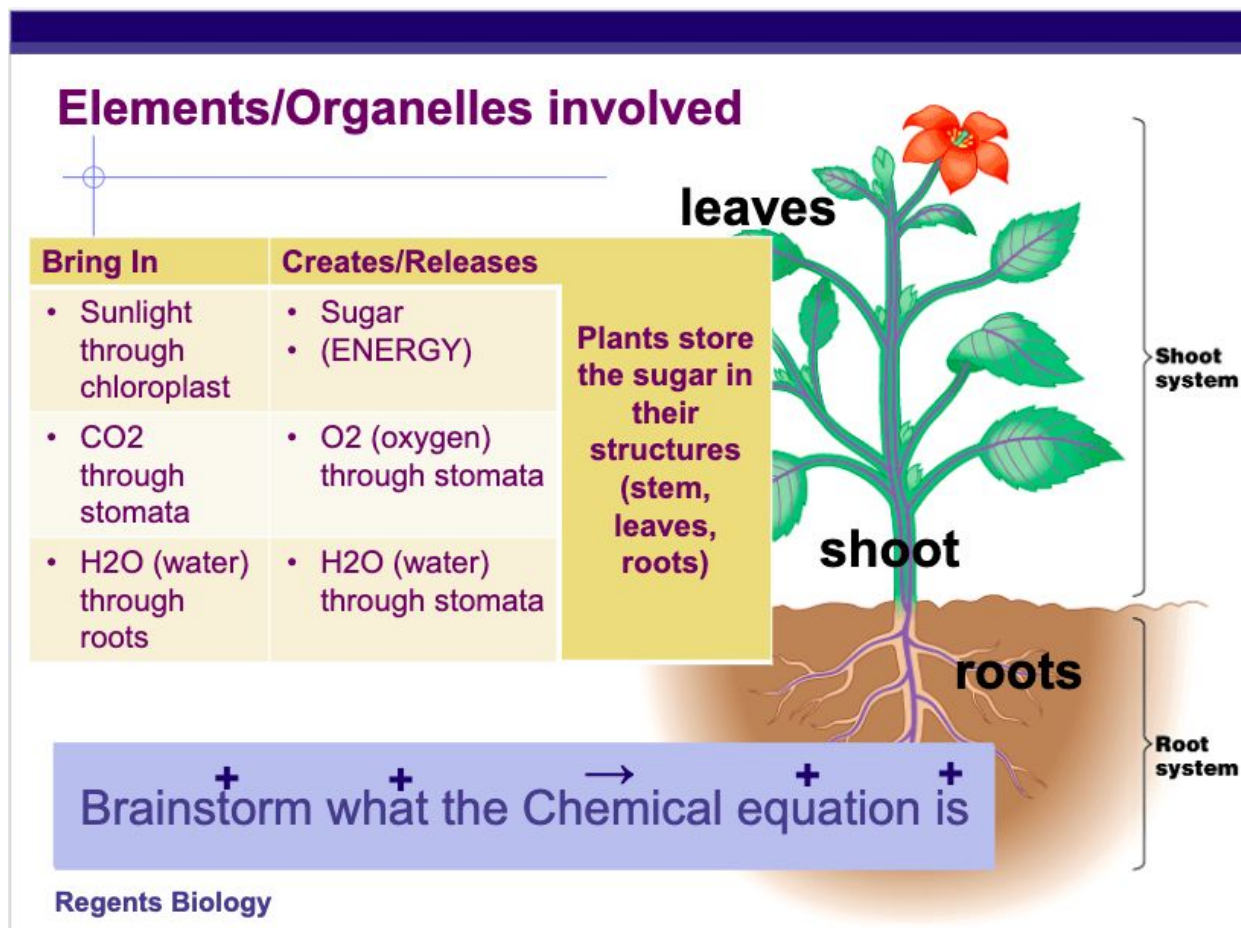
Light dependent reactions occur in the thylakoid membrane of the chloroplasts and take place only when light is available. During these reactions light energy is converted to chemical energy.

- Chlorophyll and other pigments absorb energy from sunlight. This energy is transferred to the **photosystems responsible for photosynthesis**.
- Water is used to provide electrons and hydrogen ions but also produces oxygen. Do you remember what happens to the oxygen?
- The electrons and hydrogen ions are used to create ATP and NADPH. ATP is an energy storage molecule. NADPH is an electron carrier/donor molecule. Both ATP and NADPH will be used in the next stage of photosynthesis.

Stop and Jot- What would happen if water was not present?

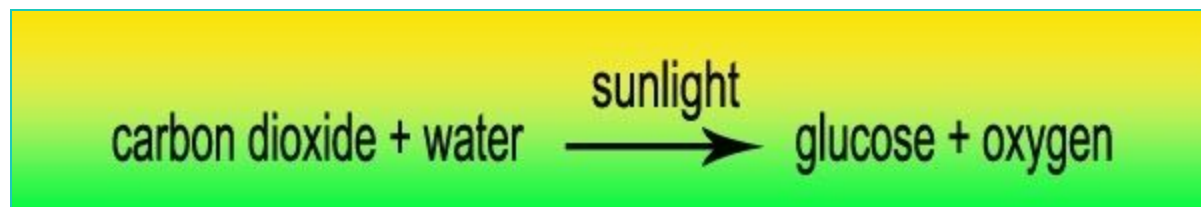
The Calvin Cycle

The Calvin Cycle reactions occur in the stroma of the chloroplasts. Although these reactions can take place without light, the process requires ATP and NADPH which were created using light in the first stage. Carbon dioxide and energy from ATP along with NADPH are used to form glucose.

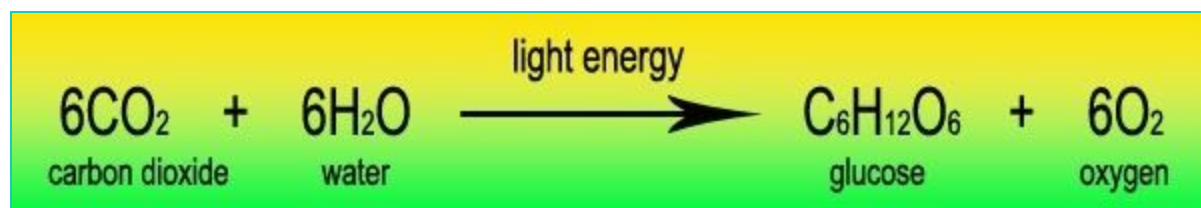


What have you learned so far?

You already know that plants need carbon dioxide, water and sunlight to make their food. You also know that the food they make is called glucose. In addition to glucose, plants also produce oxygen. This information can be written in a word equation as shown below.



The equation below is the same as the one above but it shows the chemical formula for carbon dioxide, water, glucose and oxygen.



Now back to the definition... Earlier you learned that photosynthesis is the process by which plants make their own food. Now that we know what plants need to make food, we can add that information as shown below.

Photosynthesis is the process by which plants make their own food using carbon dioxide, water and sunlight.

Stop and Jot- Can a plant complete photosynthesis without light using the Calvin Cycle?

What does Photosynthesis produce?

Photosynthesis is important because it provides two main things:

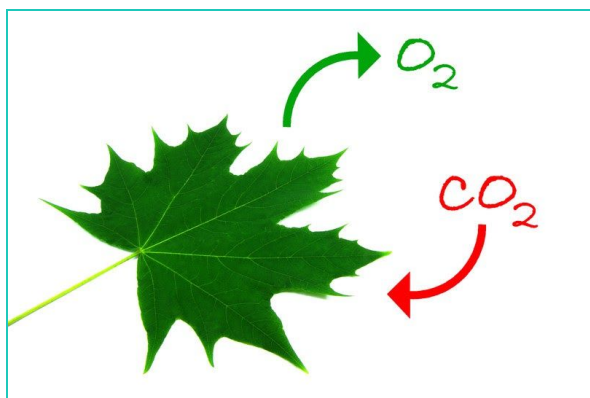
- food
- oxygen

Some of the glucose that plants produce during photosynthesis is stored in fruits and roots. This is why we are able to eat carrots, potatoes, apples, water melons and all the others. These foods provide energy for humans and animals.

Oxygen that is produced during photosynthesis is released into the atmosphere. This oxygen is what we breathe and we cannot live without it.

While it is important that photosynthesis provides food and oxygen, its impact on our daily lives is far more extensive. Photosynthesis is so essential to life on earth that most living organisms, including humans, cannot survive without it.

All of our energy for growth, development and physical activity comes from eating food from plants and animals. Animals obtain energy from eating plants. Plants obtain energy from glucose made during photosynthesis.



Our major sources of energy such as natural gas, coal and oil were made millions of years ago from the remains of dead plants and animals which we already know got their energy from photosynthesis.

Photosynthesis is also responsible for balancing oxygen and carbon dioxide

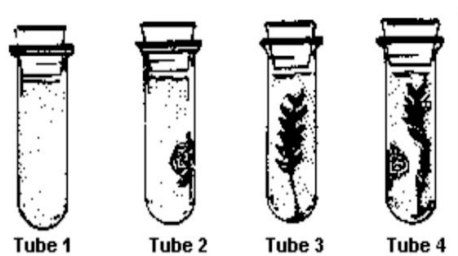
levels in the atmosphere. Plants absorb carbon dioxide from the air and release oxygen during the process of photosynthesis.

Stop and Jot- How is photosynthesis responsible for all living things?

PART C: Exit Ticket - Complete the following questions. Annotate your questions! Submit your answers online using this [illuminate link](#).

Base your answer to the question on the diagram and information provided.

In an investigation of the cycling of environmental gases, a student placed water and bromthymol blue in each of four test tubes as shown in the diagrams below. No additional items were placed in Tube 1, a snail was placed in Tube 2, an aquatic plant (elodea) was placed in Tube 3, and both a snail and an elodea were placed in Tube 4. The tubes were then stoppered and placed in bright light for 24 hours.



1. How would the solution in tube 3 change after 24 hours?

- A. It would contain more oxygen.
- B. It would change from yellow to blue.
- C. It would change from blue to brick red.
- D. It would contain less nitrogen.

Base your answer on the reading passage below and on your knowledge of biology.

Carnivorous Plants

Carnivorous plants make carbohydrates by the process of photosynthesis, as do other green plants. However, few nitrogenous minerals are available in the acid bog environment, and the roots of carnivorous plants are not efficient at absorbing them. In order to survive, these plants have evolved modified leaves that trap insects to supplement their nutrition. The modified leaves contain nectar glands which give off substances that attract and aid in the capture of insects. Once an insect is trapped, the leaves begin to produce digestive enzymes. Nutrients from the digested insects are then absorbed by the leaves.

Carnivorous plants have several types of traps. The Venus flytrap is an example of an active trap. It has colorful red-lined leaves that are hinged in the middle. When an insect lands and touches the sensitive hairs on the inner surface of the leaf, the leaf folds. Spines along the leaf's edges interlock, keeping the insect from escaping. Glands secrete enzymes that digest the insect's soft parts. When digestion is complete, the leaf reopens, allowing the undigested parts to blow away.

The largest of the carnivorous plants are the pitcher plants, which have pitfall traps. The leaves of these plants form a slender tube with a hood that prevents rain from entering. Nectar glands on the lip of the tube attract insects. The insects land on a slick area of the tube and fall into a pool of digestive juices at the bottom. Hairs inside the plant prevent the insect from crawling out.

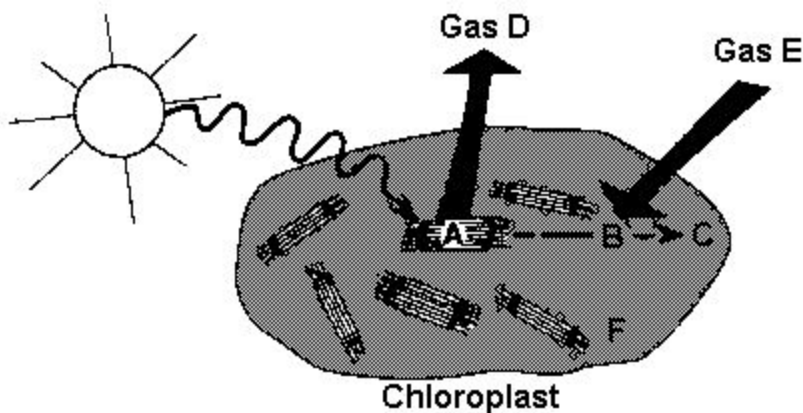
The sundew is a flypaper trap. The attractive leaves of this plant are covered with hairs that secrete sticky droplets. The odor produced by this liquid lures insects to the plant. The insect then becomes entangled in the hairs of the leaf, where enzymes digest the soft parts of the insect.

These and other varieties of carnivorous plants grow in the marshes, swamps, and bogs of the eastern United States. These plants are becoming endangered or threatened species as wetlands are drained for commercial or residential development.

2. Carnivorous plants are similar to other green plants because they have the ability to

- A. secrete enzymes from leaf surfaces
- B. absorb digestive end products through the leaves
- C. produce carbohydrates from inorganic materials
- D. carry on heterotrophic nutrition

Base your answer to the question on the diagram which represents some of the events that take place in a chloroplast and on your knowledge of biology.



3. If C represents PGAL produced by the Calvin Cycle, What would Gas E most likely represent? Explain your answer.
