DSJ Pg 54
Friday

Can animals live without plants, and can plants live without animals? How are plants and animals connected?

Energy Flow, Photosynthesis and Respiration

Table of Contents

Gotta Front Load the Vocab!

You can either copy the vocab prompts from 87-88 and 141-143 in your text book

OR

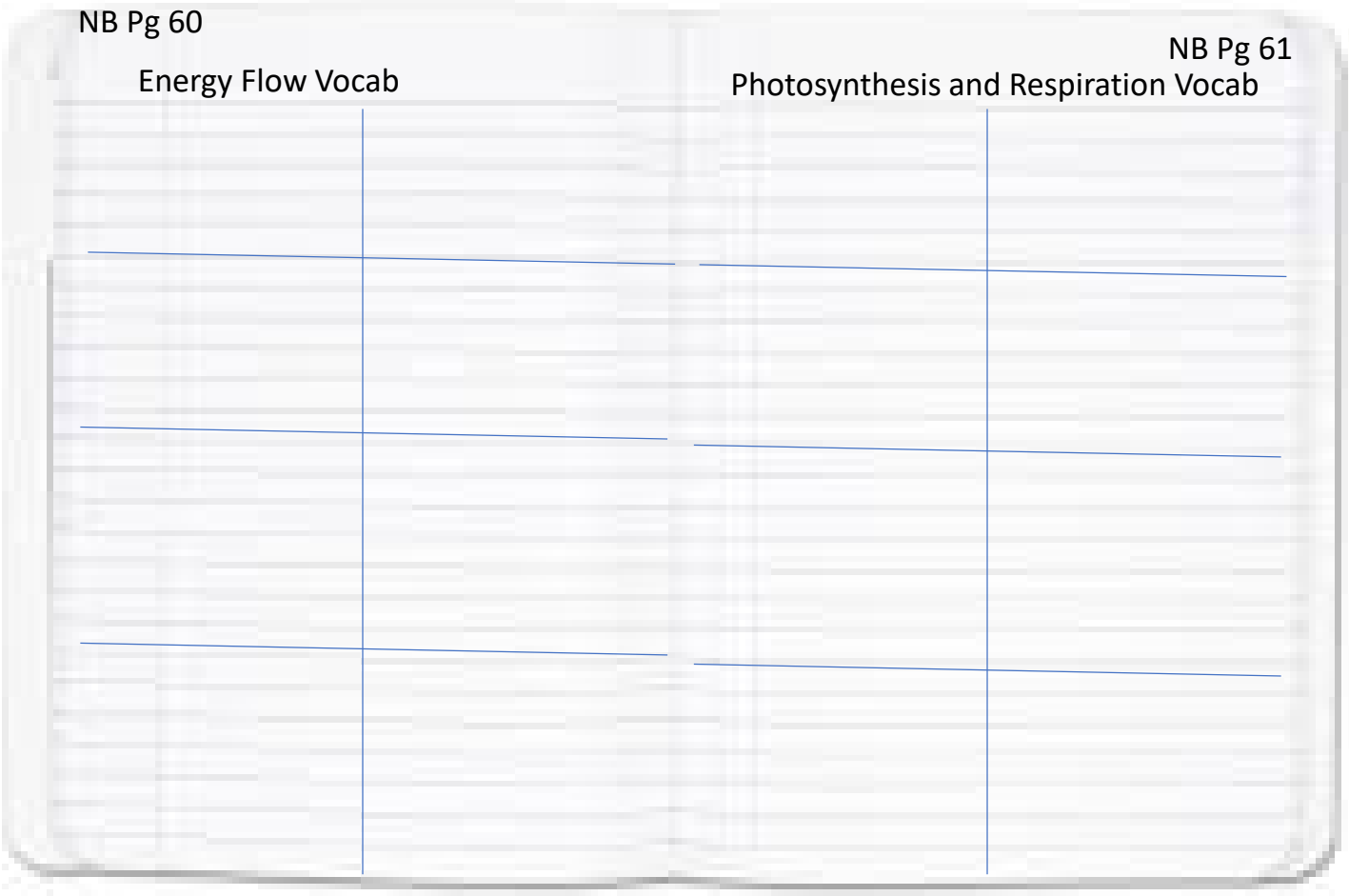
You can create a flash card page where each word needs a definition, flap, and picture.

NB Pg 60

Energy Flow Vocab

NB Pg 61

Photosynthesis and Respiration Vocab



Energy Flow

1. Food Chain
2. Food Web
3. Biomass
4. Energy Pyramid
5. Biomass Pyramid
6. Pyramid of numbers
7. Reservoir
8. Fossil Fuel

Either create a flash card page with all of these words. Include Definition, Picture, Word in any way you want

OR

Photosynthesis and Respiration

1. Molecule
2. ATP (Adenosine triphosphate)
3. Photosynthesis
4. Chloroplast
5. Cellular Respiration
6. Aerobic
7. Anaerobic
8. Mitochondrion

Follow the prompts from page 87-88 and 141-142

DSJ Pg 54
Monday

What does it mean when I say “Energy cannot be created or destroyed. The form of energy may change, but the amount of energy does not.” How does this relate to ecology?

NB Pg 62

Food Web Roles

Herbivore

Carnivore

Omnivore

Detritivore

Producer

Consumer

NB Pg 63

Food Web, Food Chain, and Trophic Levels

Quick Write:

Food Chain

Define:

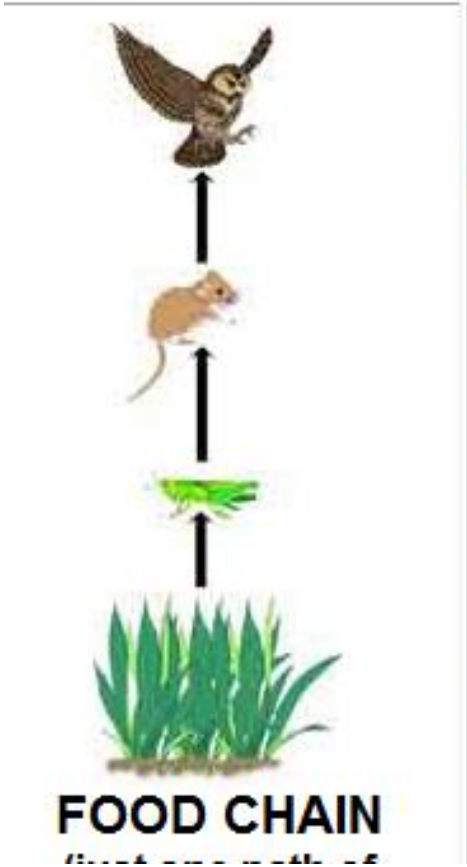
Drawing:

Food Web

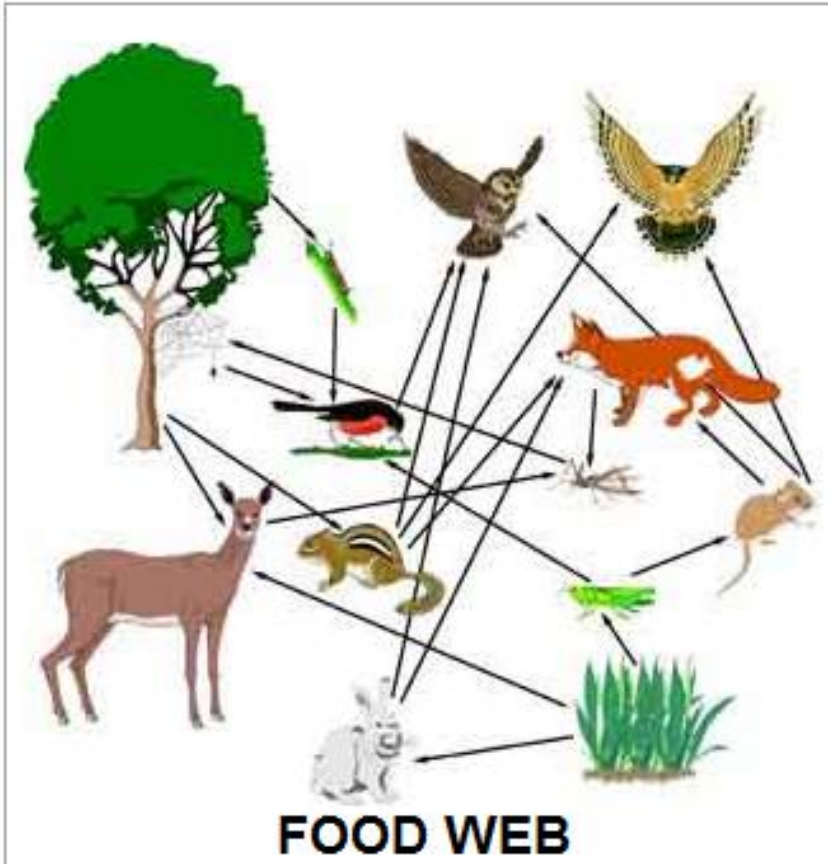
Define:

Drawing

Create another food chain and label all of the roles:



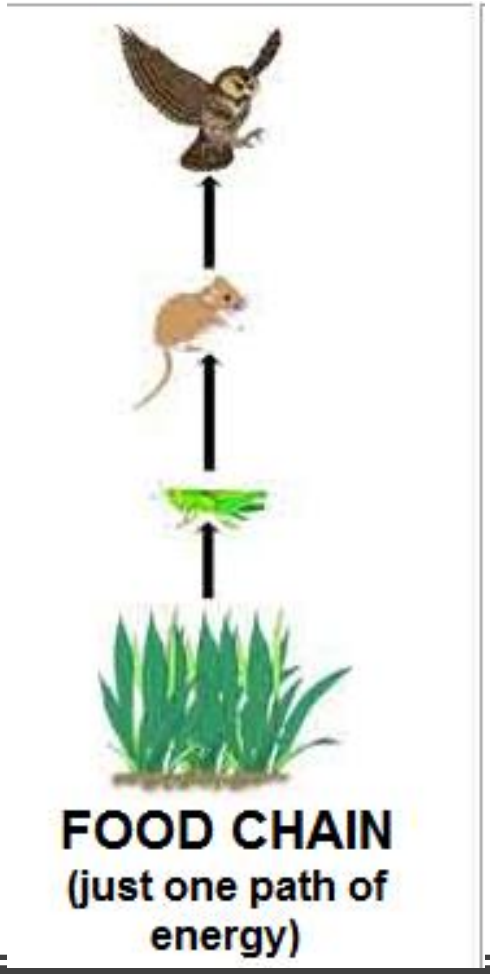
FOOD CHAIN



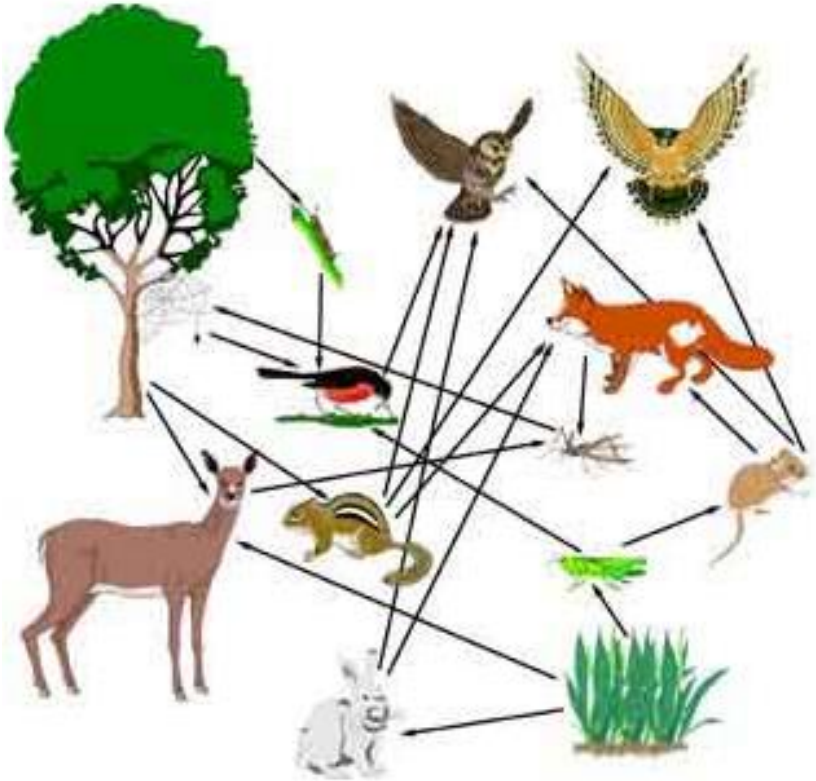
FOOD WEB

Food Chain vs Food Web

Quick write: What's the difference between a food web and food chain?



Food Chain: A single flow of energy between organisms



FOOD WEB
(everything is connected!)

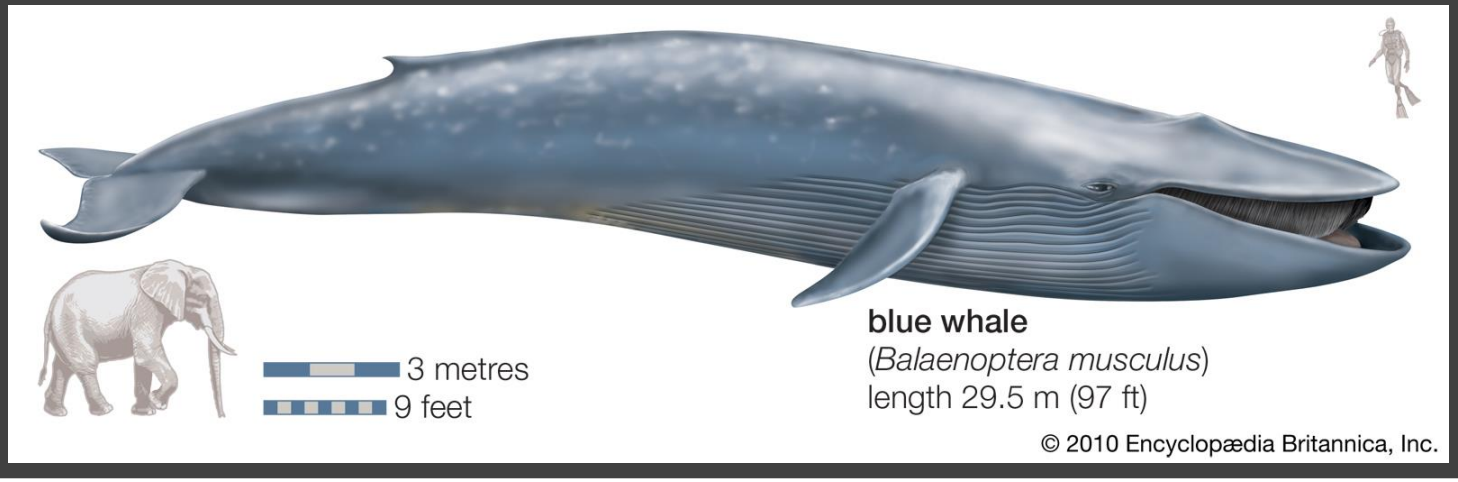
Food Web: Multiple food chains linked together

To Dos

- Look up the roles in the food webs and write one sentences explaining what they are AND draw a picture of an example on Nb page 62
- Create a food chain and label all of these roles
- Do the assignment in your computer (or page 144 in text book)

DSJ Pg 54
Tuesday

Why do blue whales, the largest animals in the world, feed on tiny krill?



NB Pg 64

Energy Pyramids

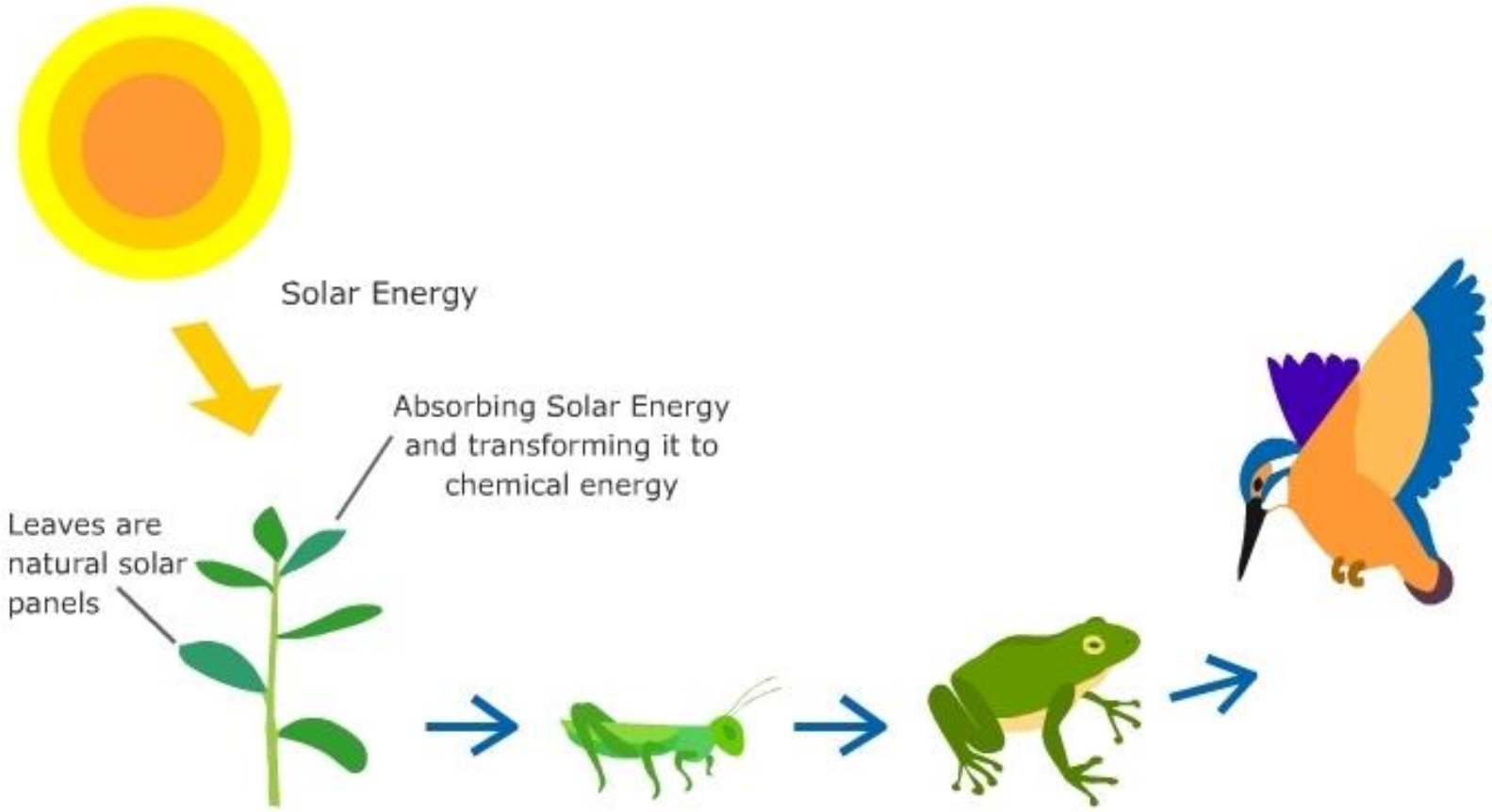
NB Pg 65

Trophic Levels
Food Chain

Original Source of Energy:

<u>Energy Transfers</u>
Producers:
Primary Consumers:
Secondary Consumers:
Tertiary Consumers:
Trophic Levels:

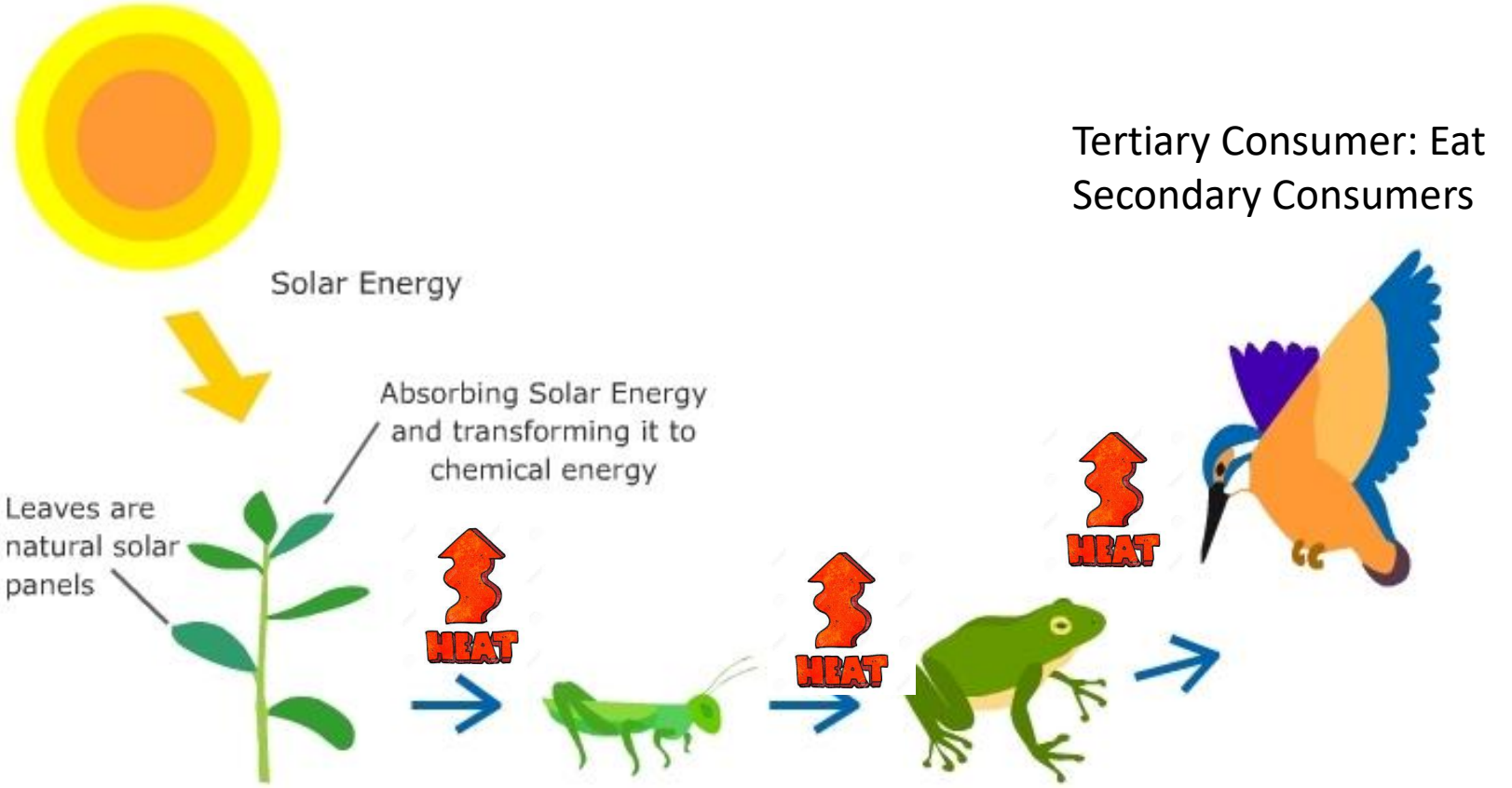
<u>10% Rule</u>



Copy your food chain over from yesterday

What's missing when it comes to an energy source?

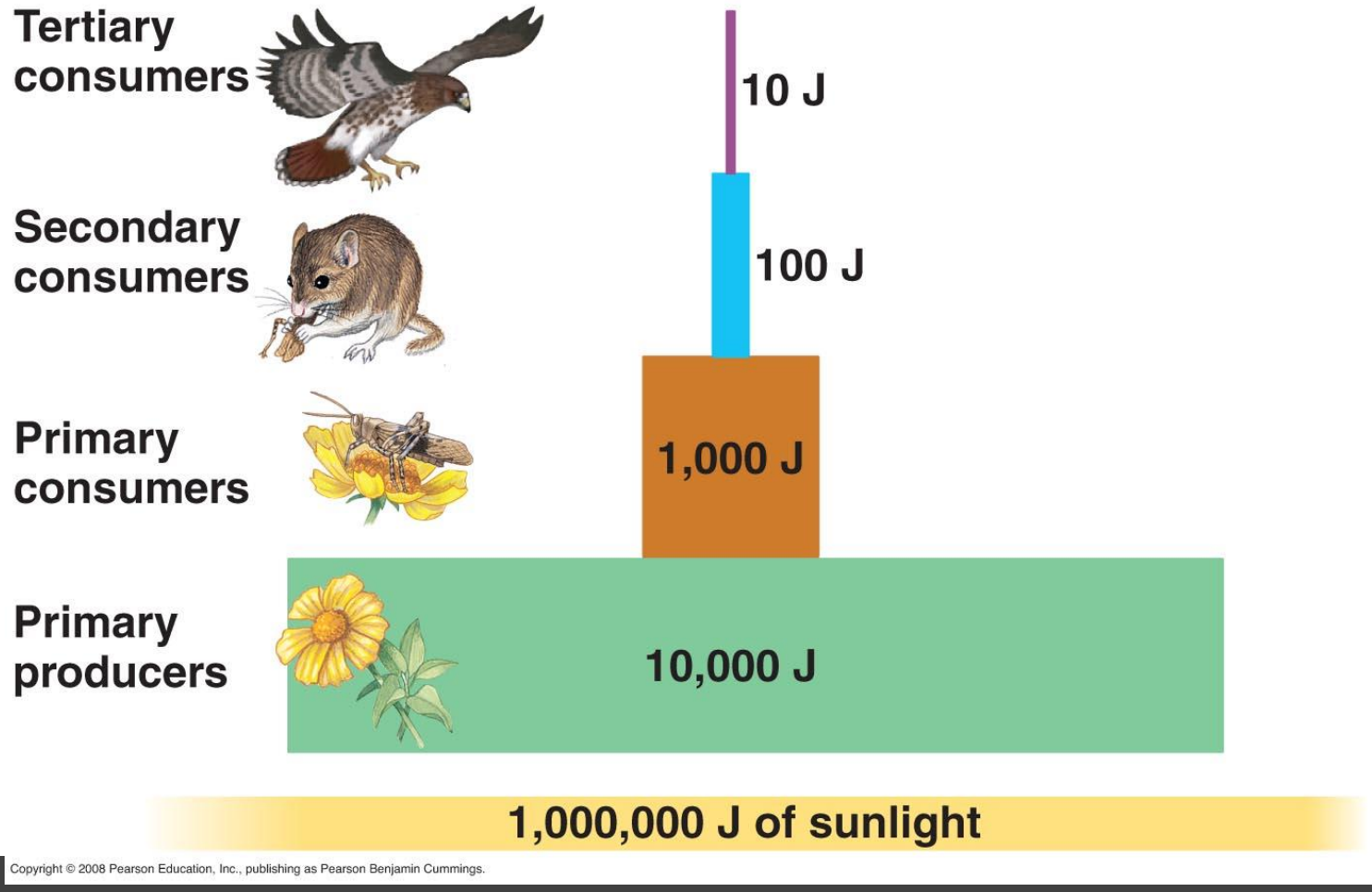
Which ones are your Producers? Consumers?



Trophic Levels: The levels that energy is transferred up in the food chain

10% Rule

Every time energy is transferred from one trophic level to the next, only 10% of that energy is available to the animal eating it.



Copy this on page 64 and answer

Why are elephants (the largest land animal) herbivores?

DSJ Pg 54
Wednesday

What does it mean to be an animal that is lower in the trophic levels?

Today

Finish the digital assignment or text book page 143-153, 57-58 (skip anything that involves calculations AND the hands on activity)

On the computer, under self check, do the check points.

Finish Vocab

Get everything stamped!

DSJ Pg 54
Thursday

How are you feeling this morning? Happy? Stressed? Excited? Tired?
On a scale of 1-10, how would you rate your level of being relaxed for the month of October?

NB Pg 66

Water Cycle

NB Pg 67

Nitrogen Cycle

NBpg. Top Half 66

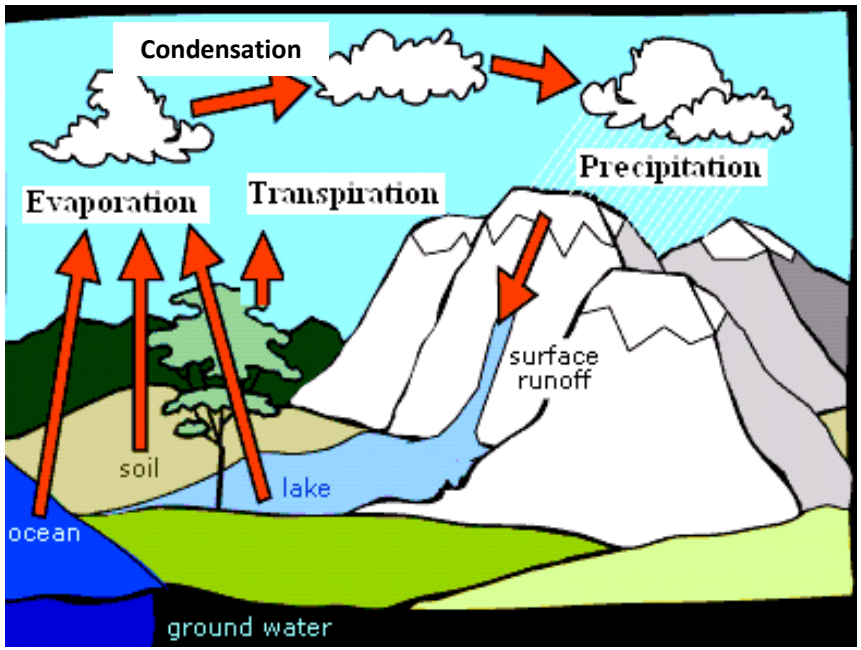
Water Cycle

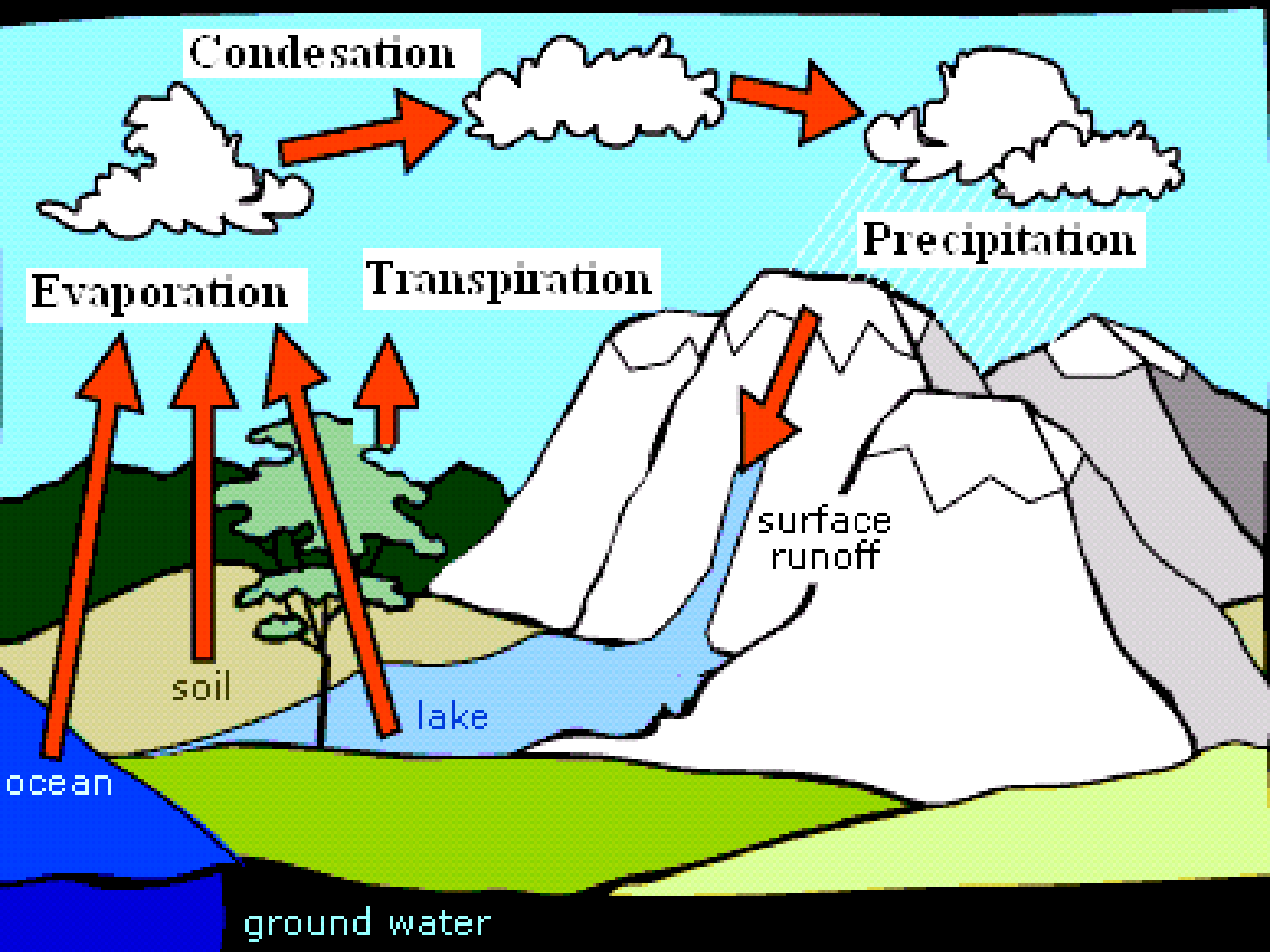
1. ***Evaporation*** occurs when warm water turns into water vapor (gas) and ***Transpiration*** is when plants lose water through their leaves, or like when we sweat.

2.Condensation occurs when water vapor cools and turns back into water droplets.

3.Precipitation falls from the clouds to Earth

4. ***Ground water***: and runs down to the ocean, seeps into the ground, or makes lakes.




Condesation
Precipitation
Evaporation
Transpiration
surface
runoff
soil
lake
ocean
ground water

Bottom Half
NBpg.66

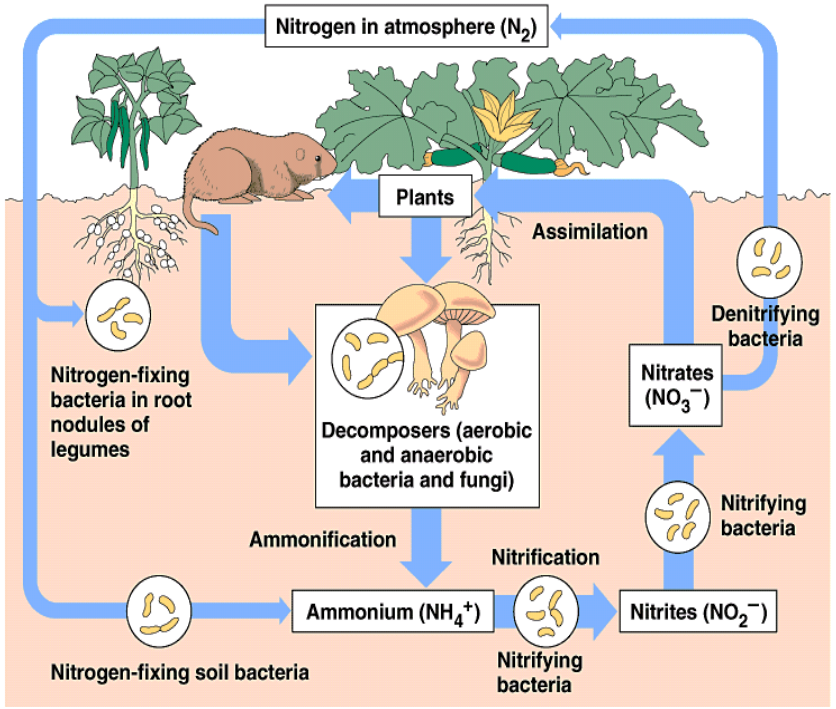
Nitrogen Cycle

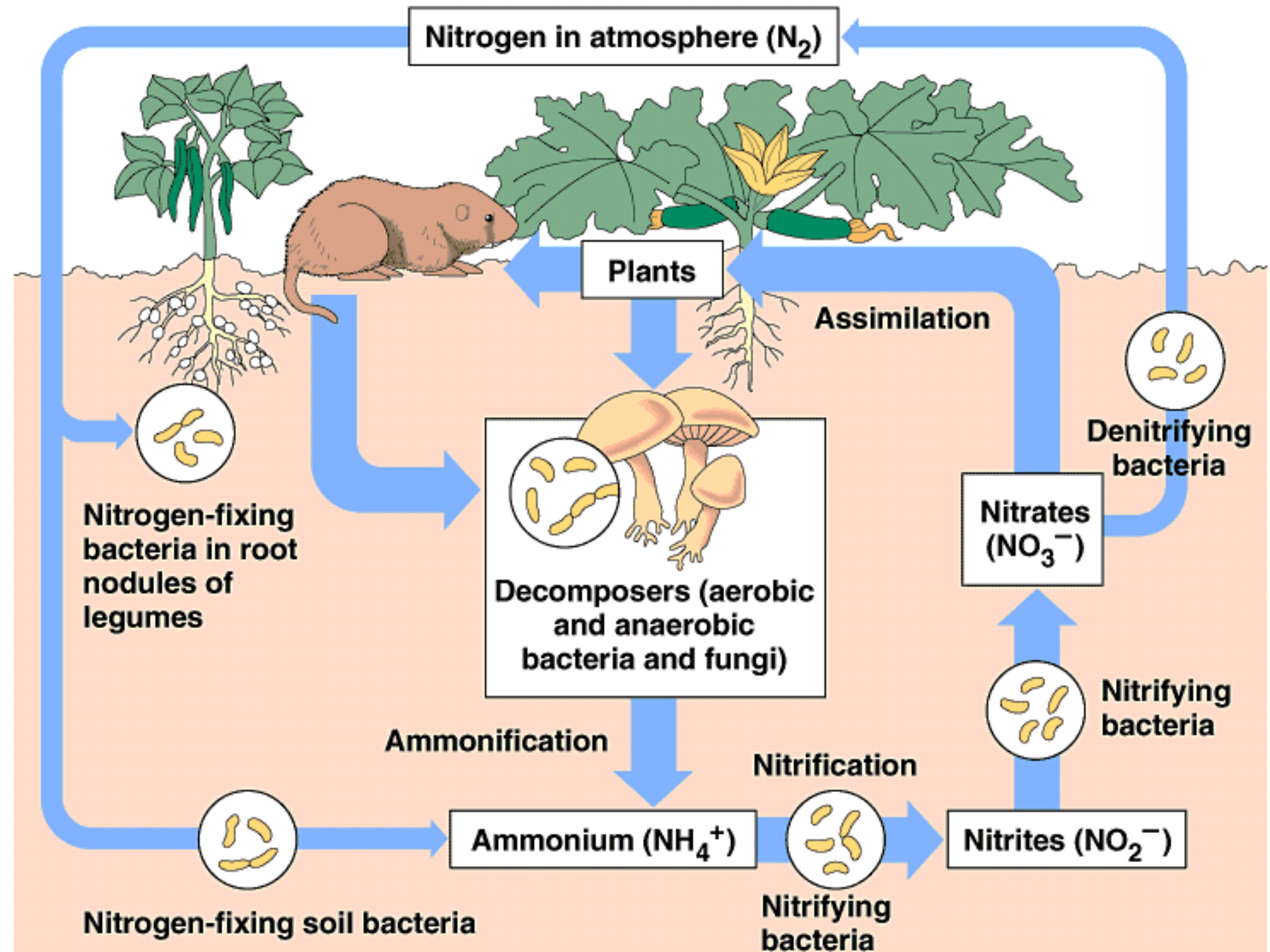
1. N2 travels → bacteria in soil for ***nitrogen fixation:***
   N2 → ammonium (NH3)

2. Decomposers for ***nitrification***= NH3 →nitrites or nitrates.

3. Plants use nitrates to grow → Animals eat the plants to grow

4. Plants and animals die = ***decomposition*** → N2 returns to the soil and atmosphere.




Nitrogen in atmosphere (N_2)
Plants
Assimilation
Denitrifying bacteria
Nitrogen-fixing bacteria in root nodules of legumes
Decomposers (aerobic and anaerobic bacteria and fungi)
Nitrates (NO_3^-)
Nitrifying bacteria
Ammonification
Nitrification
Ammonium (NH_4^+)
Nitrites (NO_2^-)
Nitrogen-fixing soil bacteria
Nitrifying bacteria















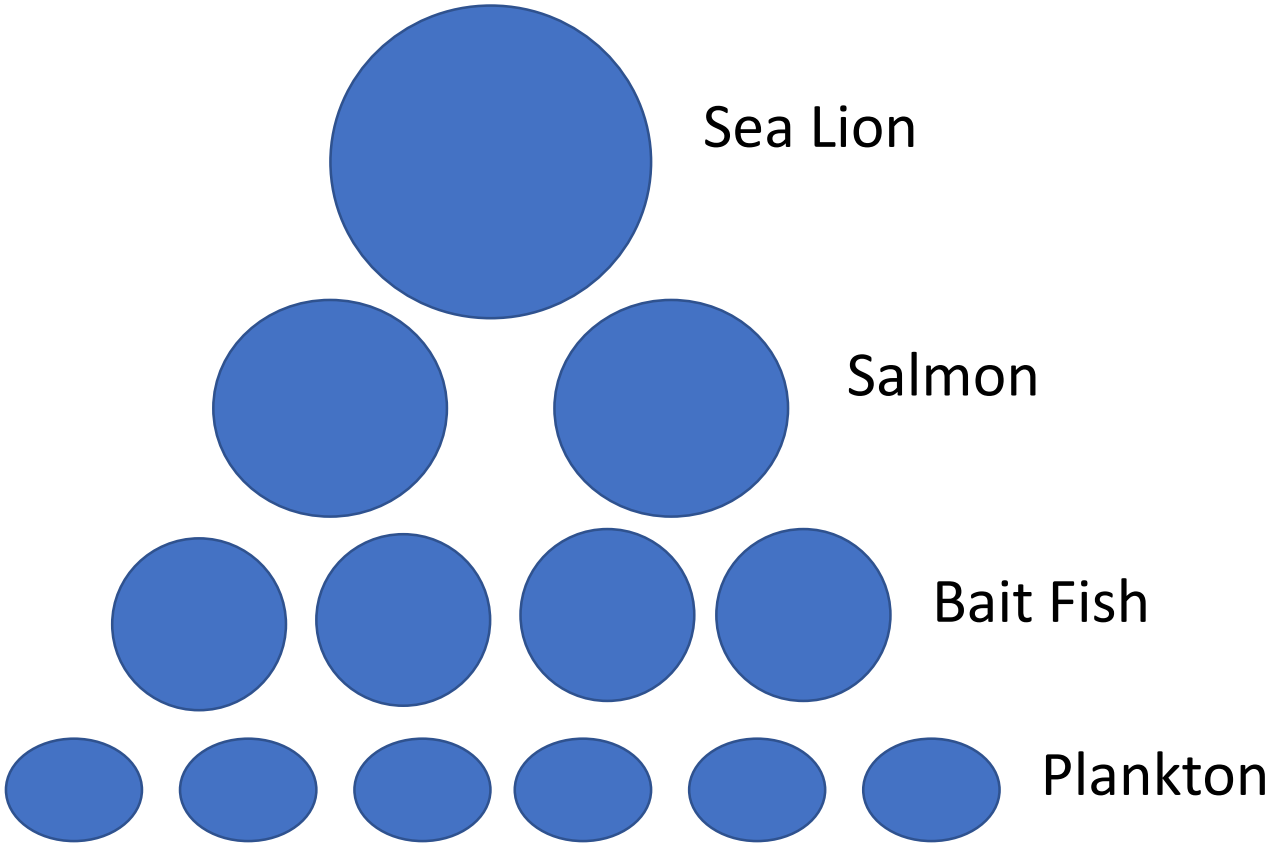


DSJ Pg 54
Friday

Farmers need lots of nutrients (especially nitrogen) for their crops. What can a farmer do when his soil runs out of nutrients and fertilizers aren't an option?

Biomagnification Lab

Set up the cups to represent a pyramid with the largest predator at the top and the smallest at the bottom



1. Start with a small amount of mix in each of the plankton cups (about a spoonful)- This represents the uptake of food the plankton take.

2. Small bait fish feed on plankton. Now ‘feed’ the small bait fish by pouring the cups into the small bait fish cups.

3. Salmon feed on small bait fish. Now ‘feed’ the salmon by pouring the small bait fish cups into the salmon cups.

4. Sea Lions eat salmon. Now ‘feed’ the sea lion by pouring the salmon cups into the sea lion cup.

5. Examine the content of the sea lion. Answer the questions.

NB page 68

Biomagnification Model

Draw a model of the movement of toxins through the food chain. Color and label.

Beads= toxins

Include: Producers, Primary Consumer, Secondary Consumers, and Tertiary Consumers

NB Page 69

Biomagnification Lab

1. List the organisms from lowest trophic levels to highest

2. What happened to the primary consumers after their first meal? Did they receive any toxins?

3. What happens if they eat multiple times a day?

4. When the top predator ate one meal, what were his toxins levels? What happens when he continues to eat each day in regards to the toxin? Explain.

Science Literacy Challenge:

5. Look up the word Bioaccumulation. What does this have to do with biomagnification?

6. Using the words biomagnification and bioaccumulation, explain how humans can be affected by toxins in the water.

DSJ Pg 70
Monday

During our Biomagnification lab, what happened to the top predator?

_____

DSJ Pg 70
Tuesday

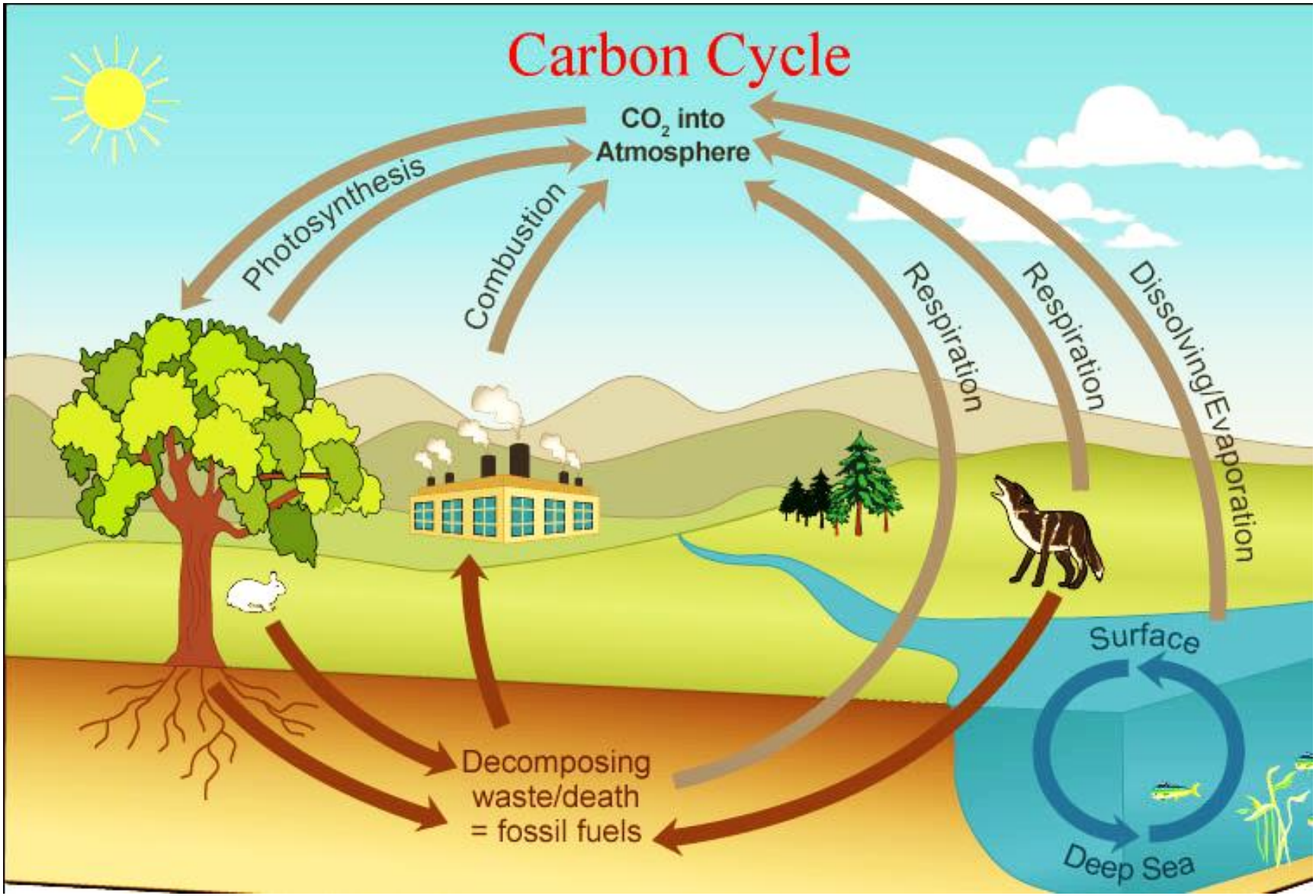
What does a plant need in order to make its own food? What 'food' does it make?

DSJ

Carbon Cycle

Photosynthesis:

Respiration:


Carbon Cycle
CO_2 into Atmosphere
Photosynthesis
Combustion
Respiration
Respiration
Dissolving/Evaporation
Surface
Deep Sea
Decomposing waste/death = fossil fuels

NBpg. 71

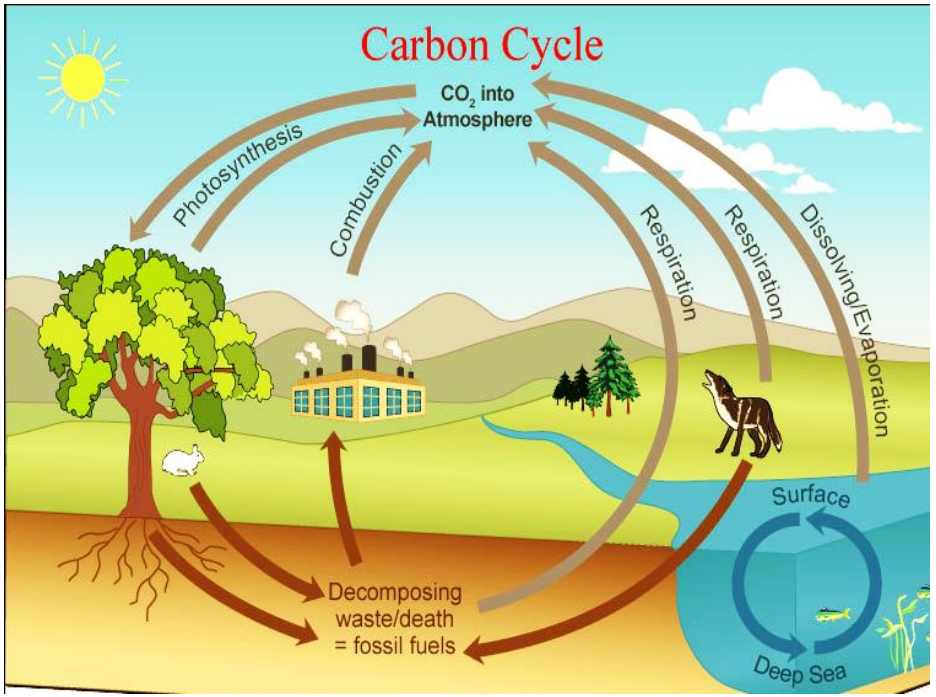
Carbon Cycle

1. Plants use CO2 from the air for photosynthesis.

2. Animals eat the plants and breathe in O2 and exhale CO2

3. Plants and animals die → decompose

4. Nutrients → soil for fossil fuel and releases C into the atmosphere.



DSJ Pg 70
Wednesday

How are fossil fuels responsible for an imbalance in the carbon cycle?

HABs
NB pg 72

1. What are Harmful Algal Blooms and what organisms causes them?
2. What are the conditions that are required for HABs to form?
3. What is the new equipment being used to detect HABs? How do they work?
4. What is “nutrient pollution?”
5. How are HABs related to the Nitrogen Cycle?
6. How are HABs dangerous for people?
7. What can people do to help reduce HABs?
8. Write a 8 sentence paragraph connecting bioaccumulation, biomagnification, the nitrogen cycle, and the carbon cycle. Explain how these all together can lead to HABs and be bad for wild life and humans.

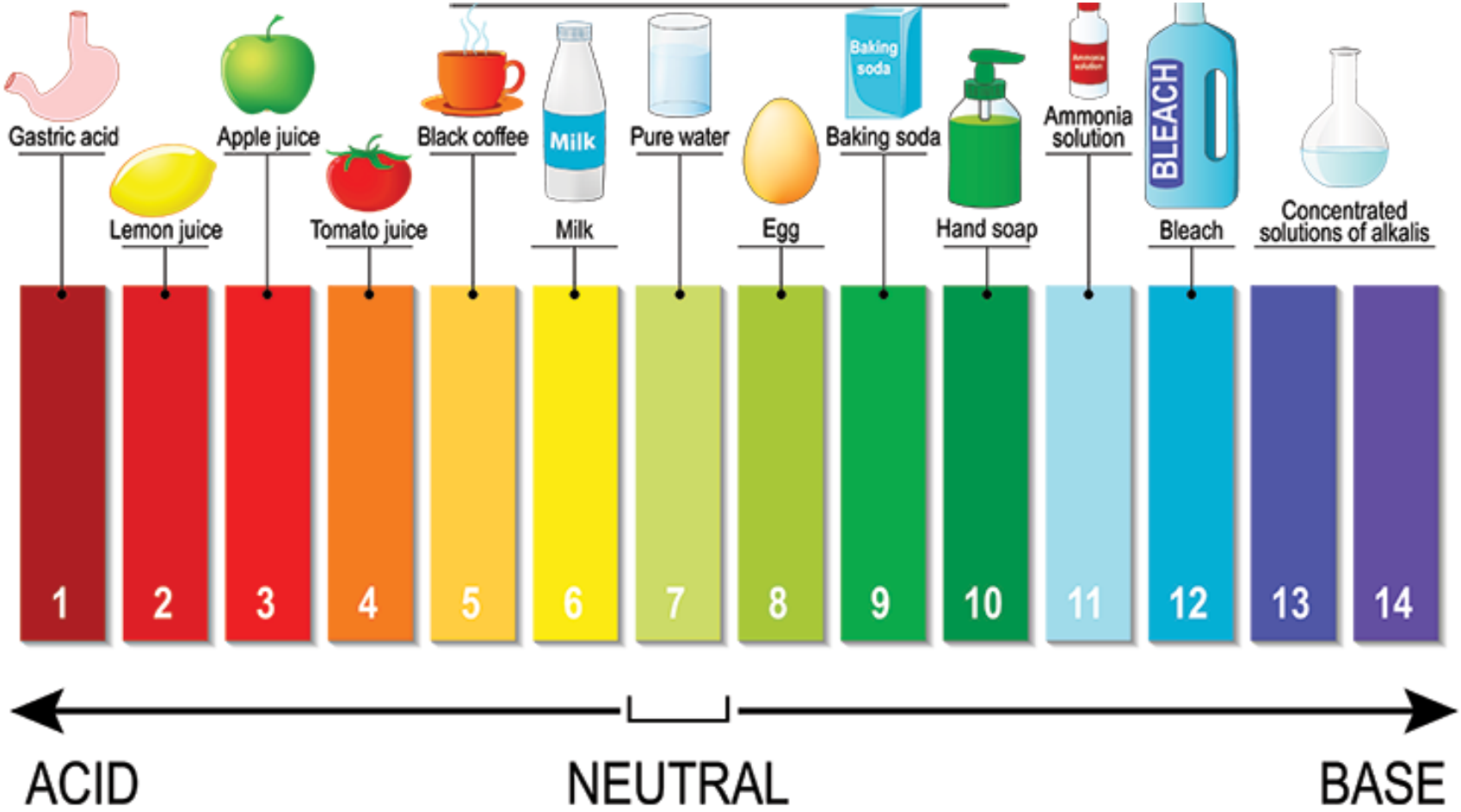
DSJ Pg 70
Thursday

What is “nutrient pollution”?

Ocean Acidification NB Pg 73

- https://oceanservice.noaa.gov/facts/acidification.html

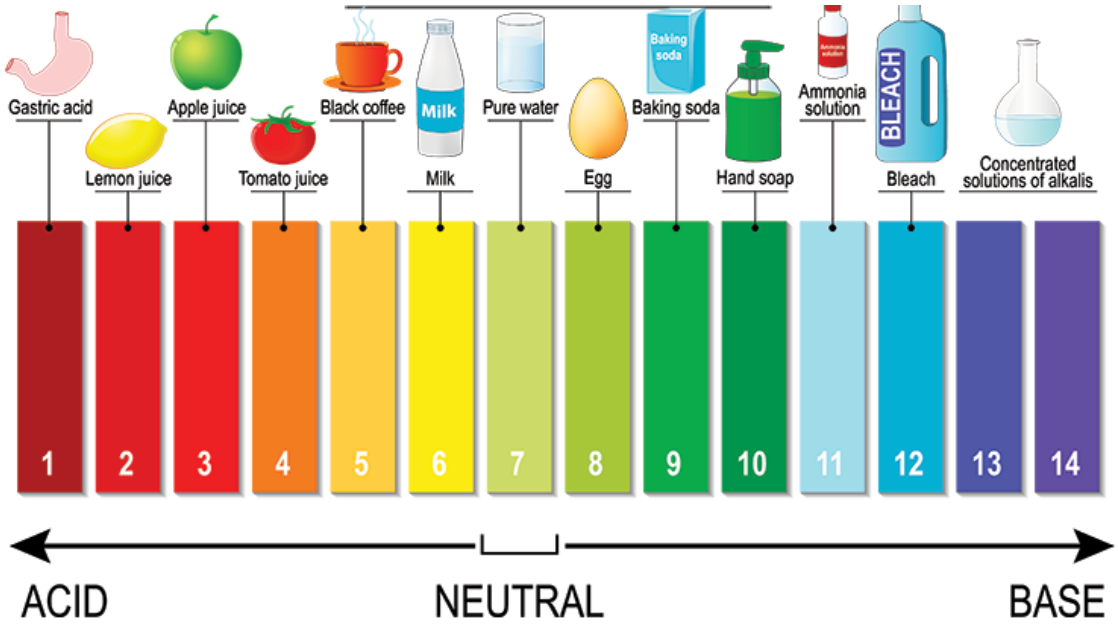
pH scale


Gastric acid
Lemon juice
Apple juice
Tomato juice
Black coffee
Milk
Pure water
Egg
Baking soda
Hand soap
Ammonia solution
Bleach
Concentrated solutions of alkalis
1
2
3
4
5
6
7
8
9
10
11
12
13
14
ACID
NEUTRAL
BASE

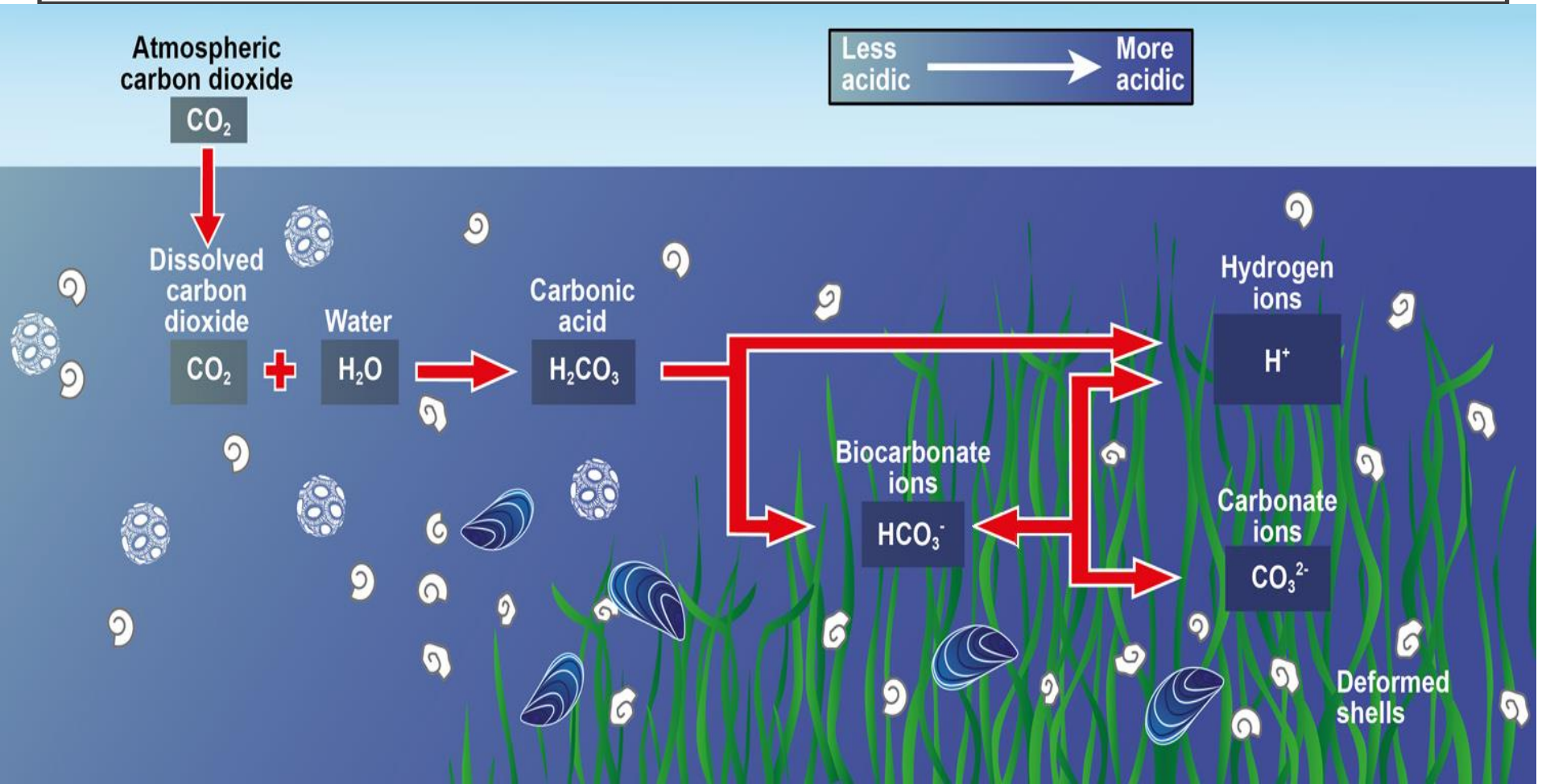
pH scale

pH is measured by the amount of Hydrogen ions (H+) in a solution

The more acidic something is, the lower the pH number. The more basic something is, the higher the pH



So how does CO2 make the ocean more acidic?



DSJ Pg 70
Thursday

What is causing the weakening of shells in animals?

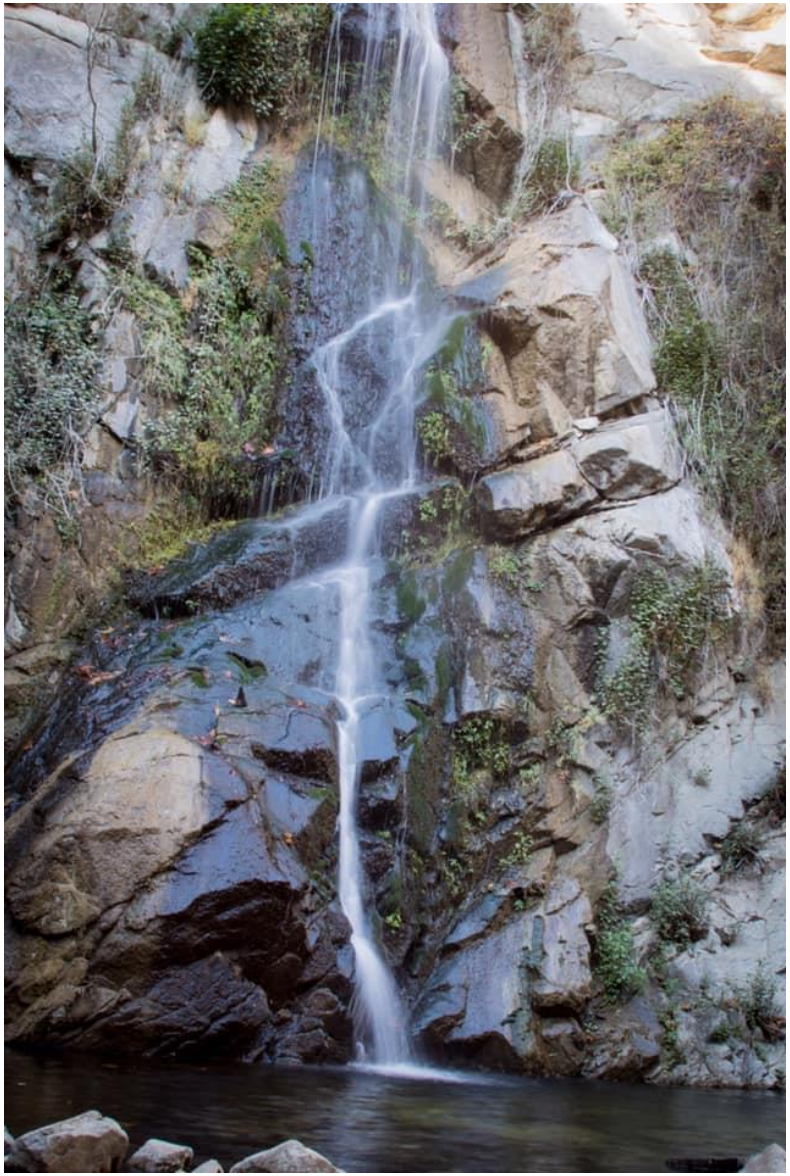
Sink and Source

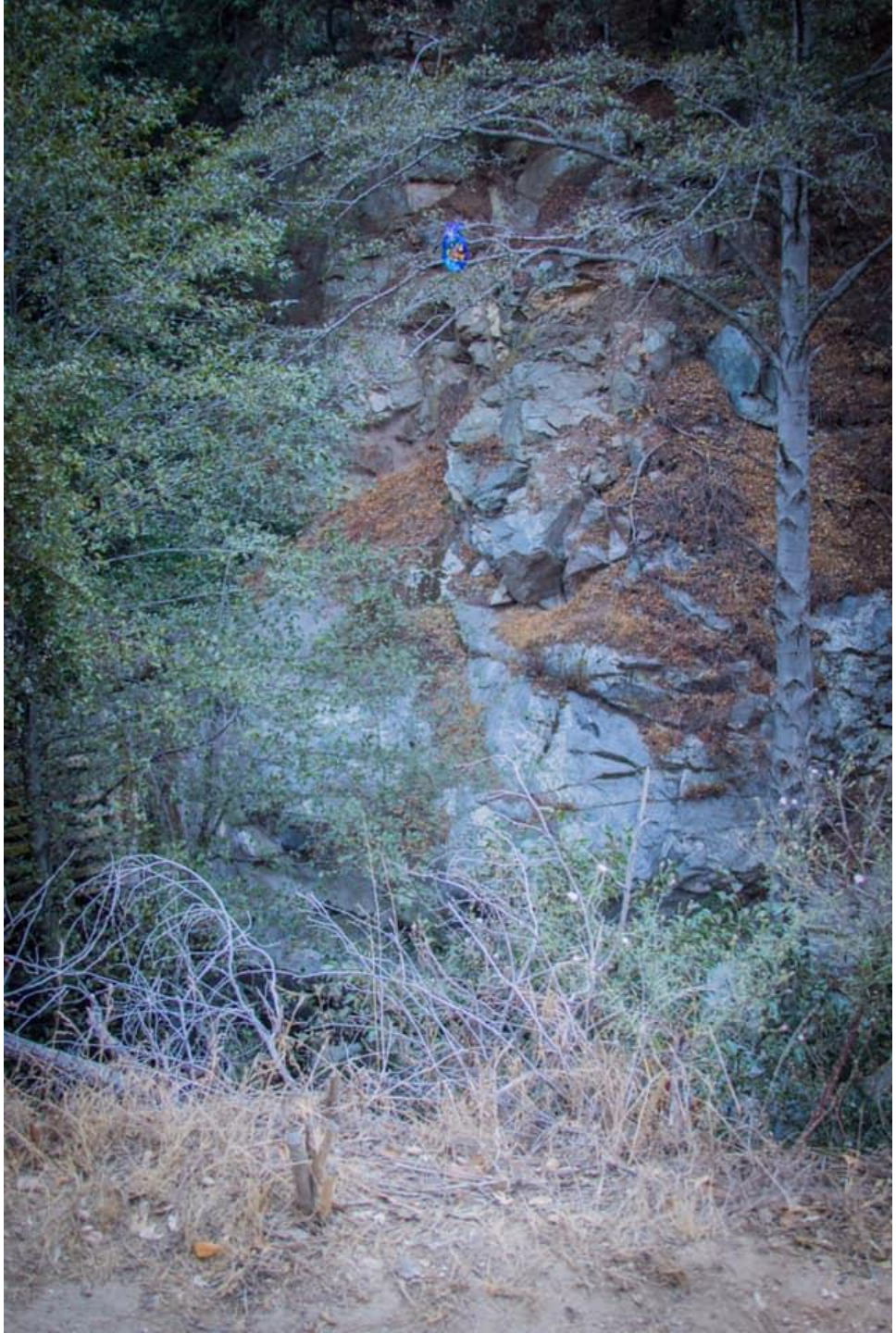
Source-gives off carbon, like water coming from the faucet

Sink- Takes away carbon and locks it up

DSJ Pg 70
Tuesday

In which sink is carbon stored in the most? What is the amount stored there?





NB Pg 76

Photosynthesis and Respiration Wheel

NB Pg 77

Plant vs animal

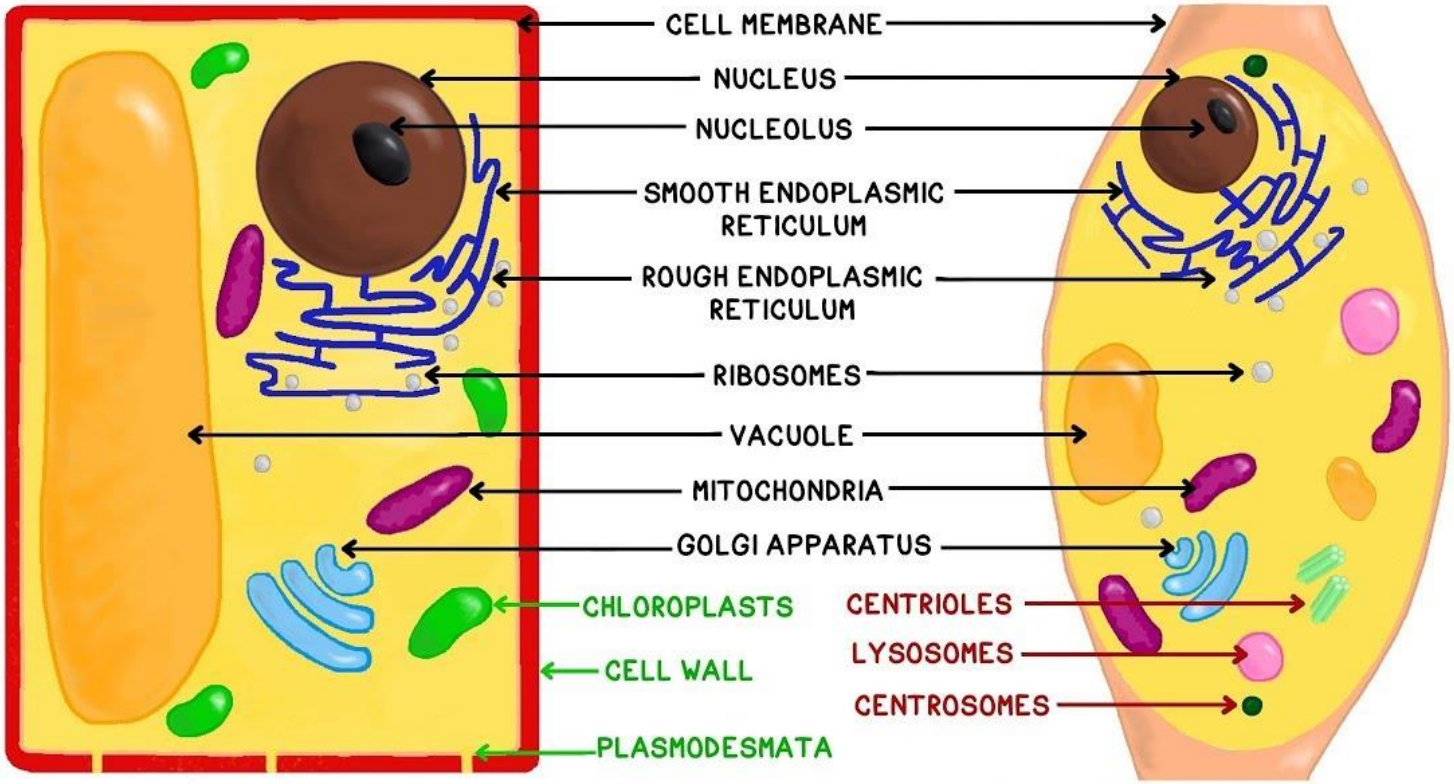
Plant vs Animal

City Job

Cell City

Cell Organelle	Location (plant, animal, both)	Job in cell	City Job
Chloroplast			
Mitochondria			
Cell Wall			
Ribosome			
Golgi Apparatus			
Nucleus			
Nuclear Envelope			
Lysosome			

PLANT VS. ANIMAL CELLS



DSJ Pg 70
Wednesday

Why are mitochondria like the power plant of the cell?

NB Pg 78

NB Pg 79

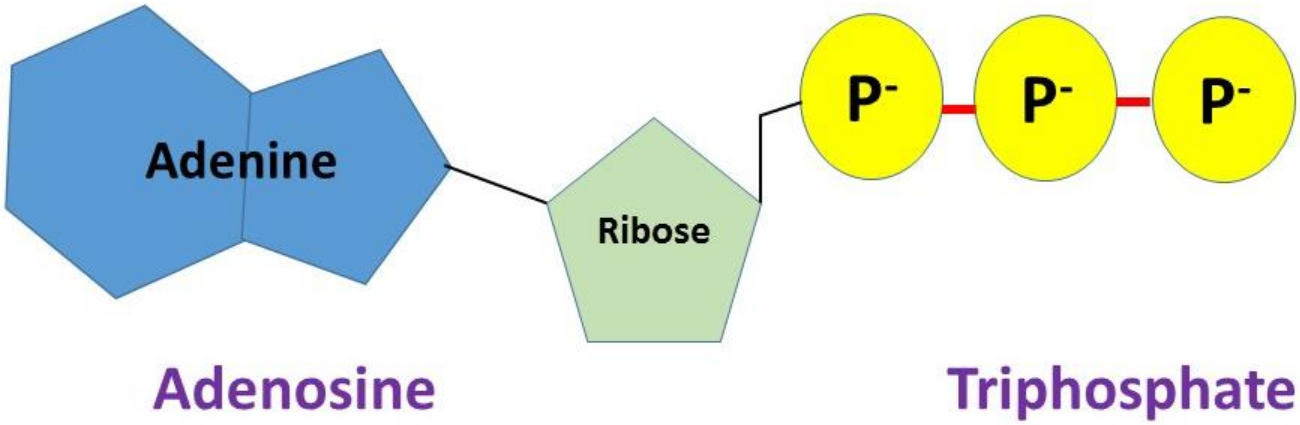
Inputs, outputs, and storage

Energy Storage in the cell

Inputs and outputs

Photosynthesis

Respiration

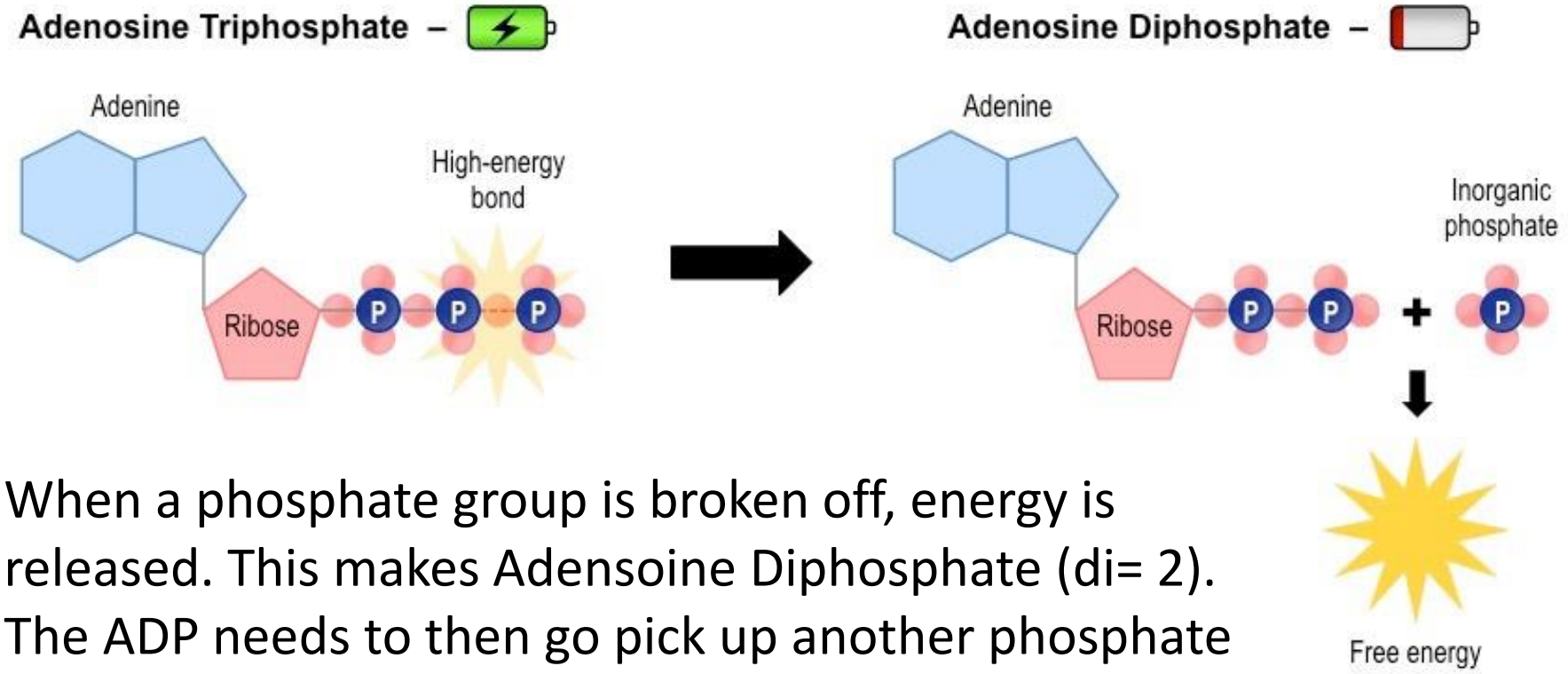


Energy Sources

- Energy for cells is stored in something called Adenosine triphosphate (tri = 3- phophates)
- Energy is stored in the bonds of the three phosphate groups.

ATP -> ADP -> ATP

Draw and Copy

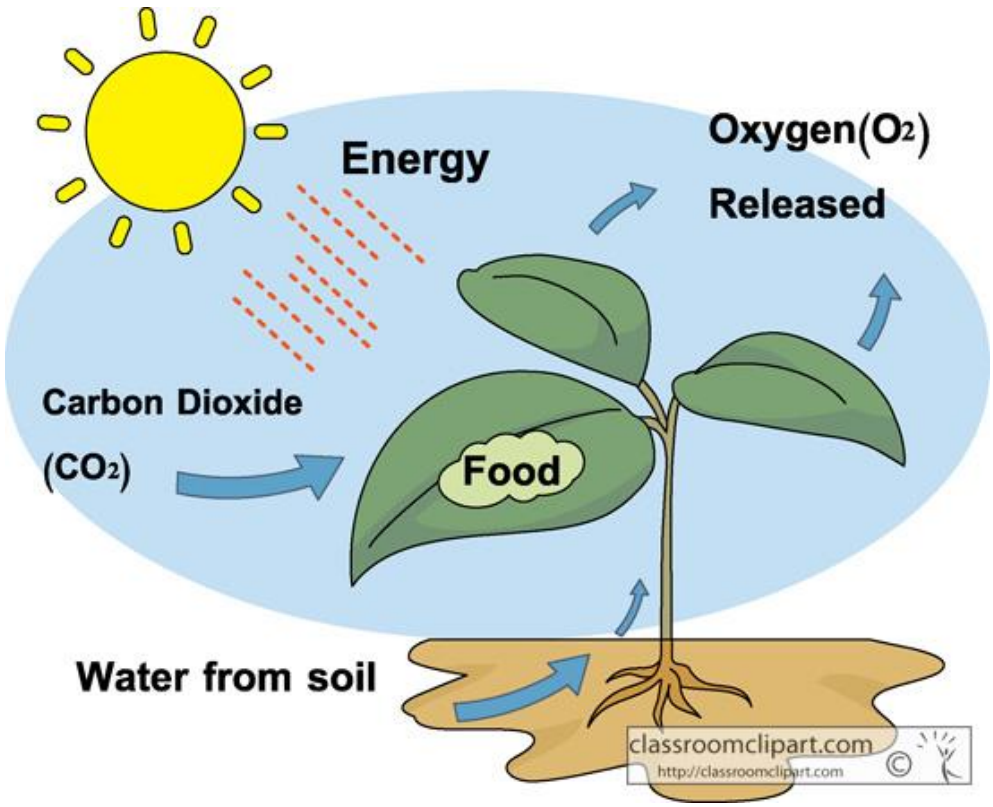


When a phosphate group is broken off, energy is released. This makes Adensoine Diphosphate (di= 2). The ADP needs to then go pick up another phosphate group to turn back into ATP (this to come).

Inputs and Outputs

- Inputs are what go IN a system
- Outputs are what come OUT of a system

- Think about a plant that lives…What goes in for them to live? What comes out?



- This process is **<u>photosynthesis</u>**

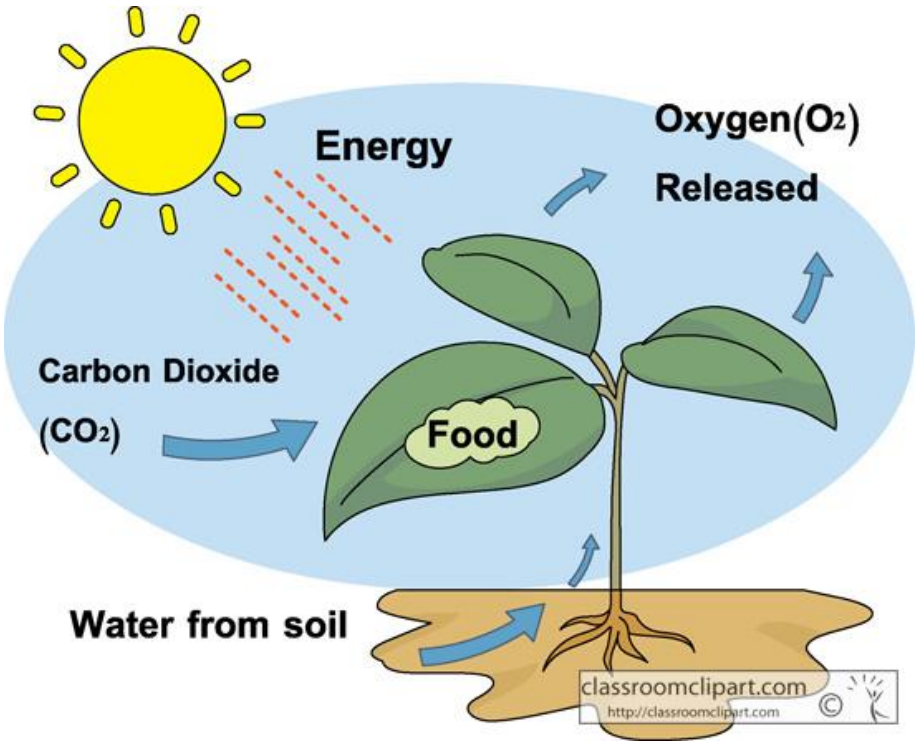
SUNLIGHT

$CO_2 + H_2O \rightarrow O_2 + C_6H_{12}O_6$

Carbon Dioxide + Water → Oxygen + Sugar

Inputs **Outputs**

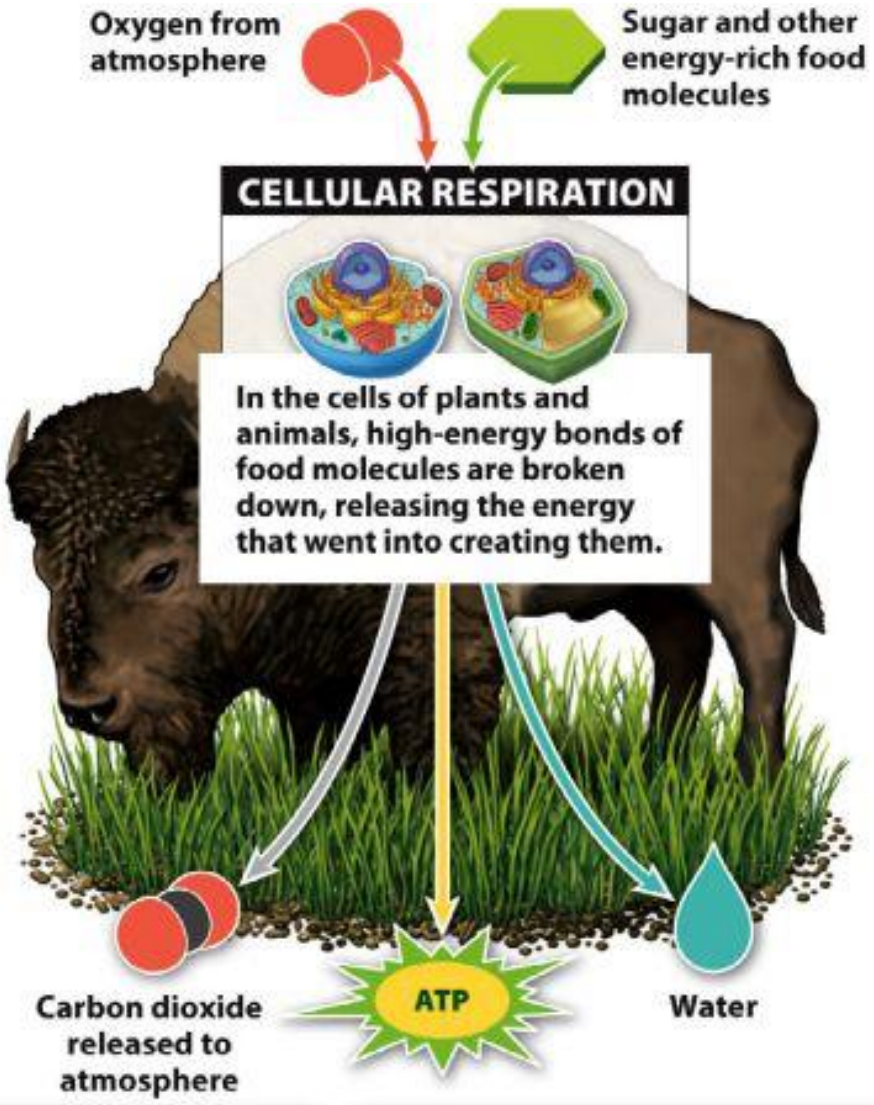
Reactants **Products**



What about animals?

- What are our inputs and outputs?

Draw your own example showing inputs and outputs for an animal



Cellular Respiration

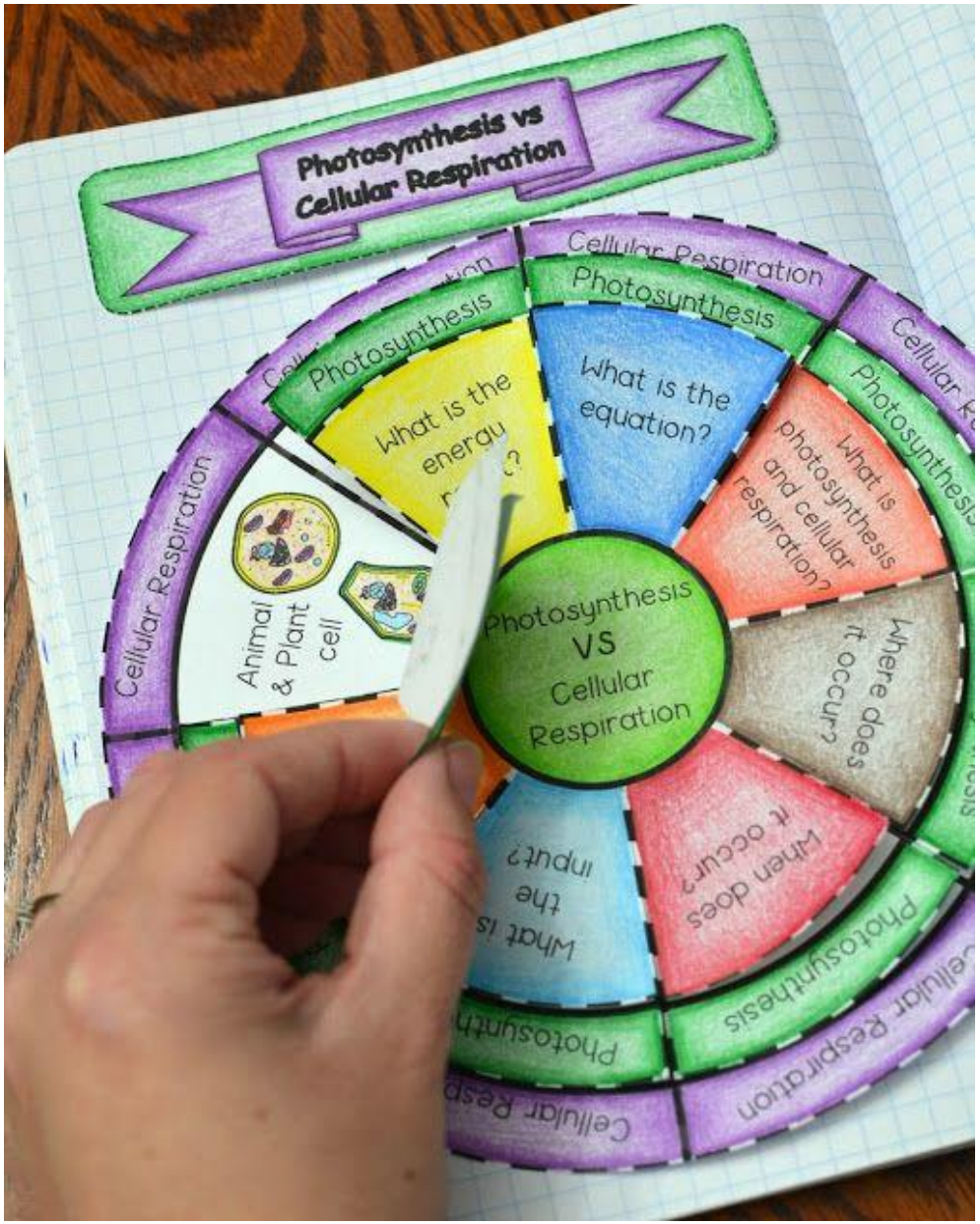
$O_2 + C_6H_{12}O_6 \rightarrow CO_2 + H_2O + ATP\ (Energy)$

Oxygen + Sugar → Carbon Dioxide + Water+ Energy

Inputs — Outputs

Reactants — Products

Photosynthesis and Respiration Wheel
NB Pg 76



Questions for top of wheel

- Definitions
- Inputs
- Outputs
- Where it occurs
- Equations
- Energy stored or released
- What type of cell
- When does it occur

DSJ Pg 70
Thursday

If white light is all of the colors, why does a green shirt look green, or blue look blue, etc?

NB Pg 78

Inputs, outputs, and storage

Energy Storage in the cell

Inputs and outputs

Photosynthesis

Respiration

NB Pg 79

Photosynthesis

Where it takes place

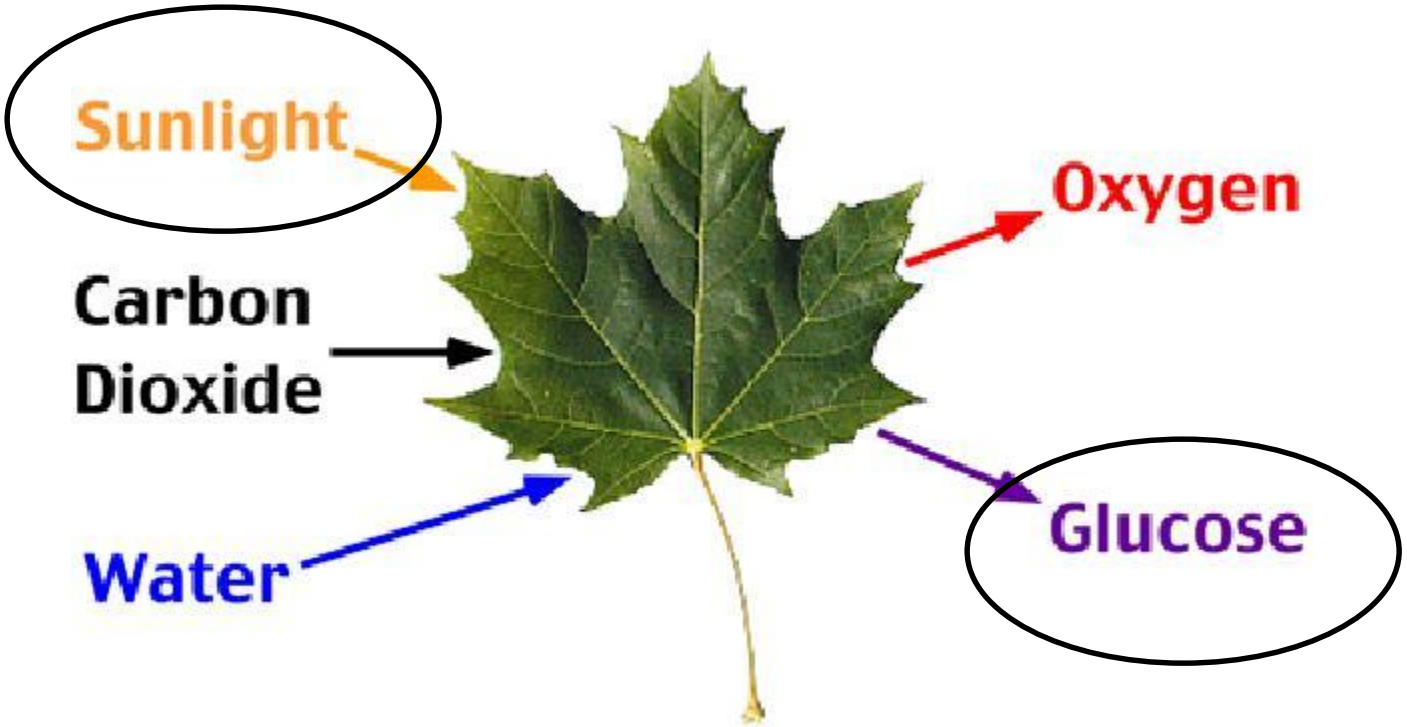
Chloroplast

Light and Dark Reactions

Wheel- Definition

What is photosynthesis?

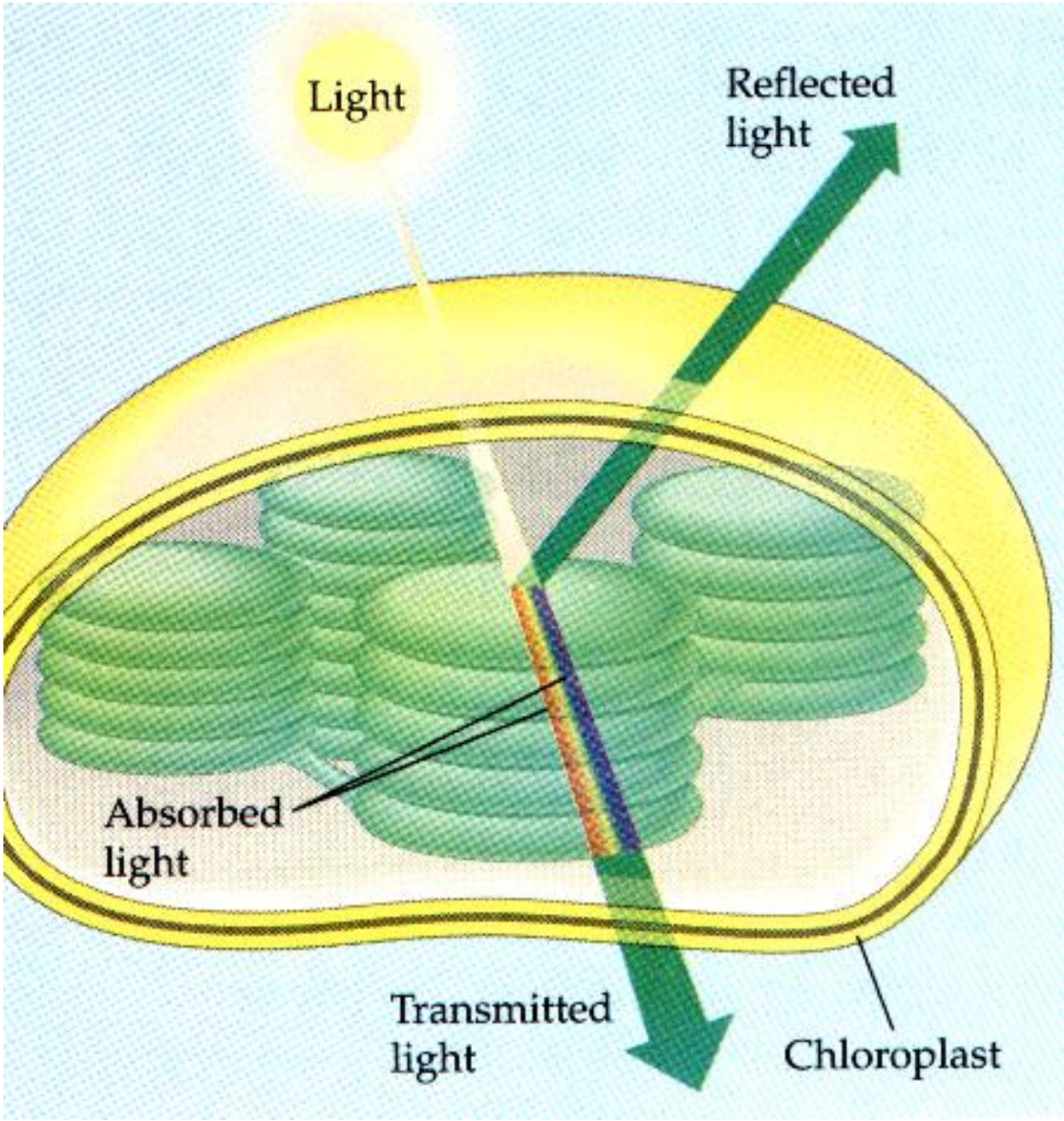
- Photosynthesis is the process by which the energy of sunlight is converted into the energy of glucose

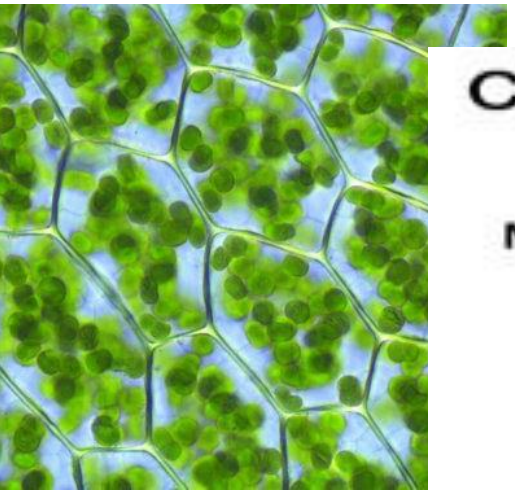


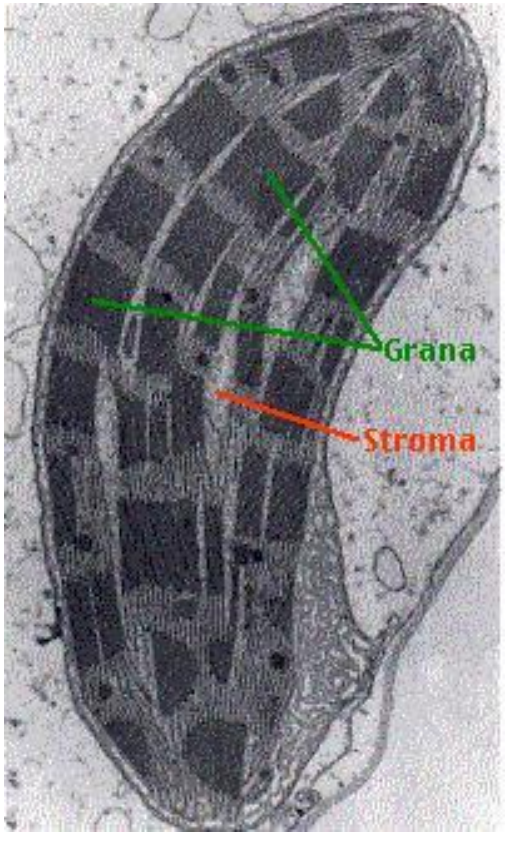
NB Page 79

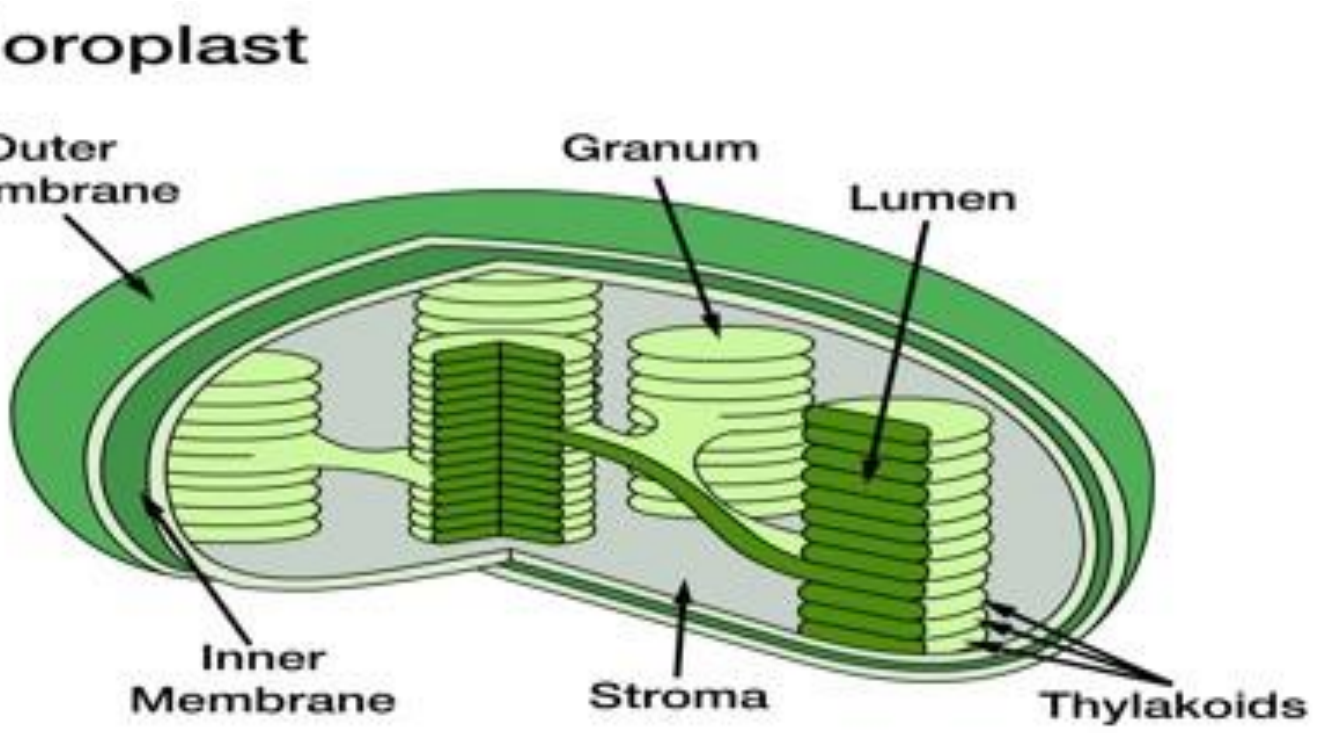
Where does photosynthesis happen?

- Photosynthesis occurs in the chloroplasts of plants
- Chlorophyll is the pigment inside the chloroplast
- Pigments absorb some wavelengths of light and reflect others





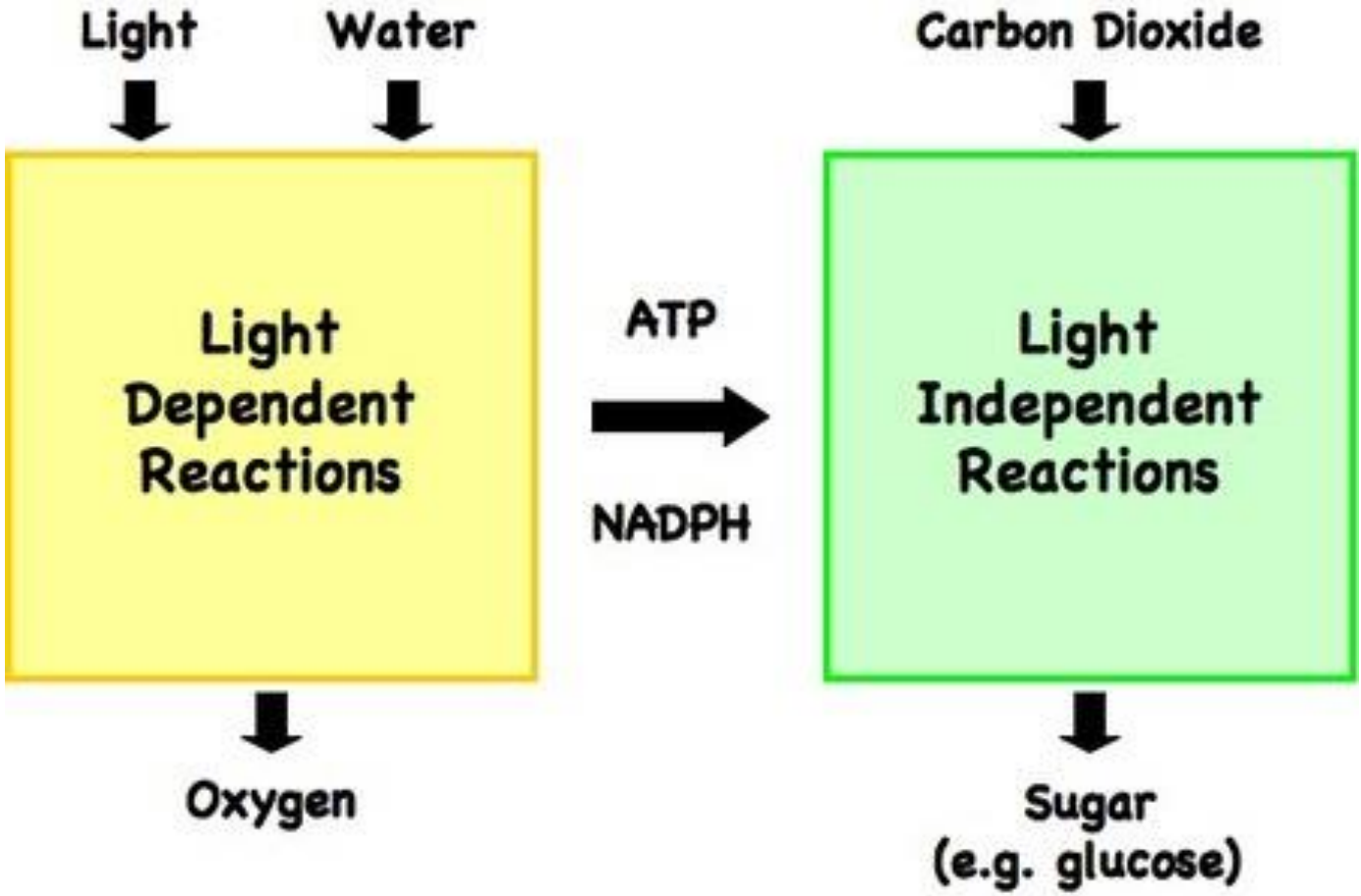




Draw and label

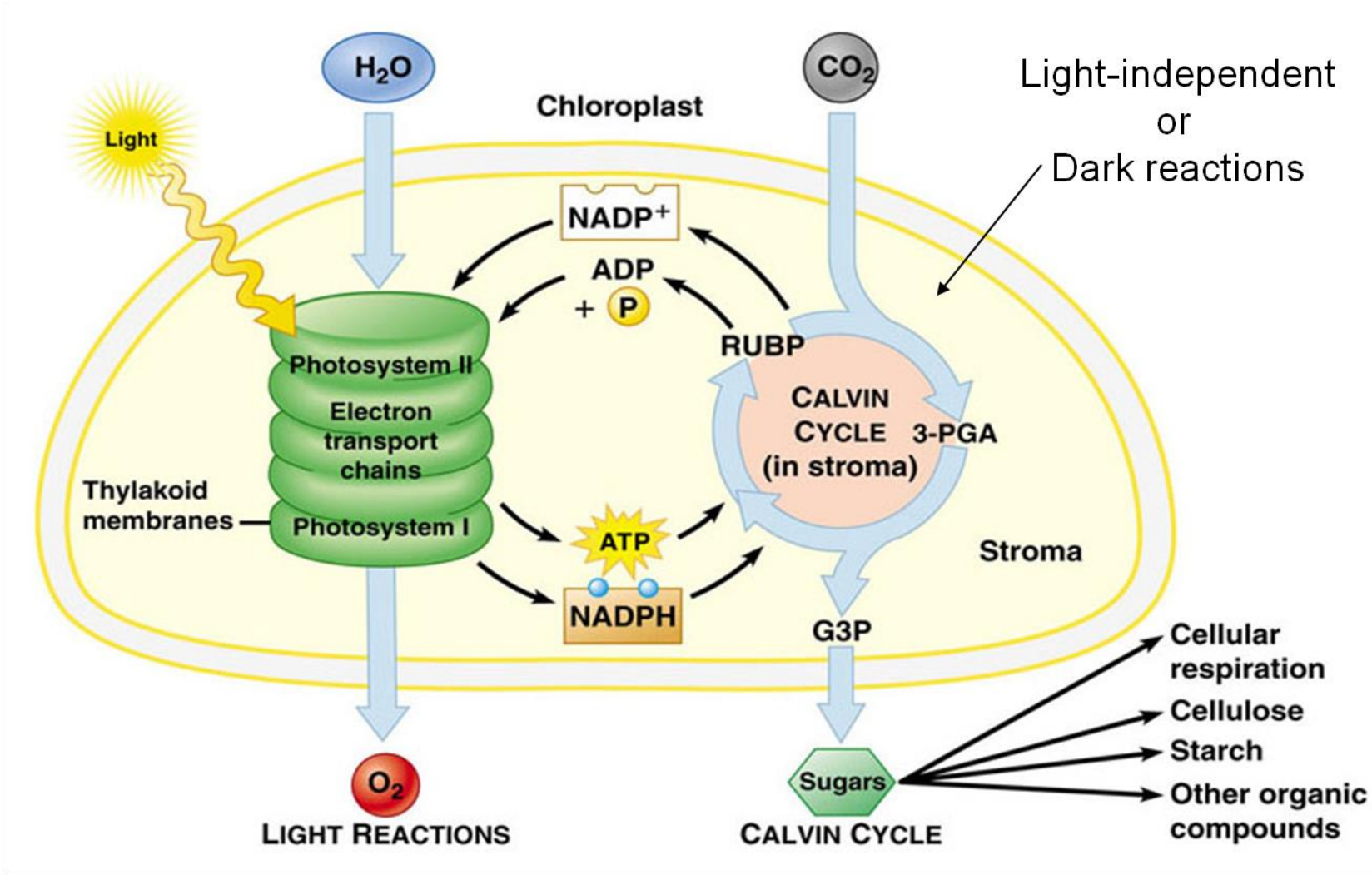
Where Photosynthesis takes place

Where do the outputs come from?

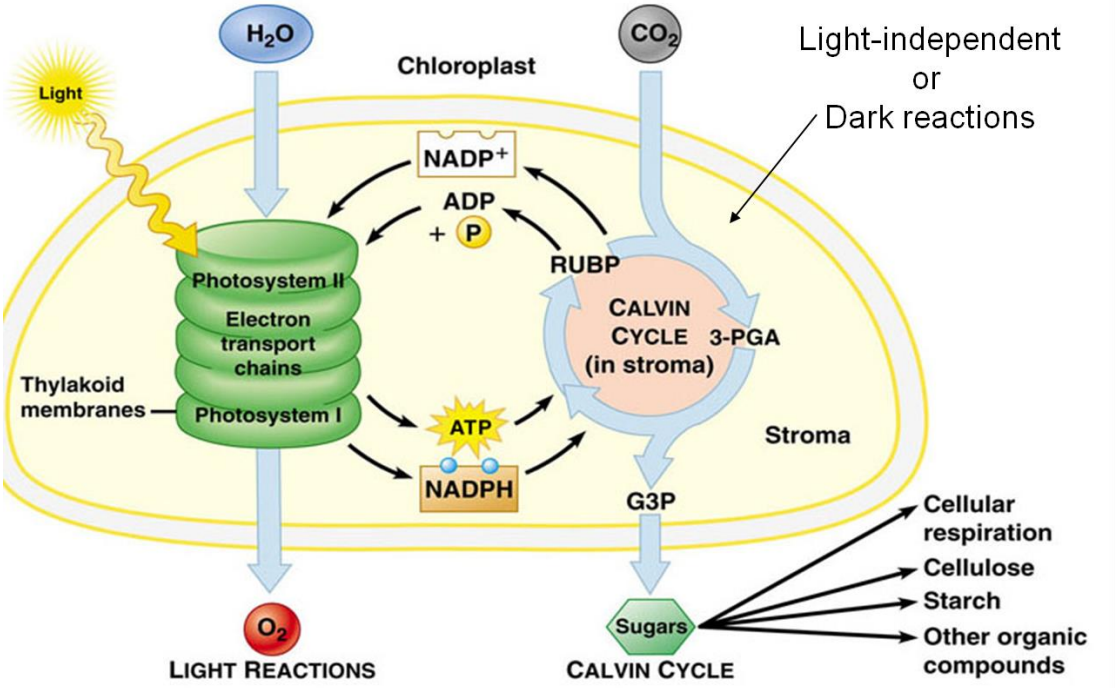


Draw and label
NBPG 79

Photosynthesis summary



Photosynthesis summary



Light Reactions and Dark Reactions

There are two stages in photosynthesis: The light Reactions and the Dark Reactions (light independent reactions)

There are different inputs and outputs for each

<u>Light reactions</u>

Inputs:

Outputs:

<u>Dark Reactions:</u>

Inputs:

Outputs:

DSJ Pg 70
Friday

Which input does our oxygen come from when looking at photosynthesis?

NB Pg 80

NB Pg81

Respiration

Where and why it takes place

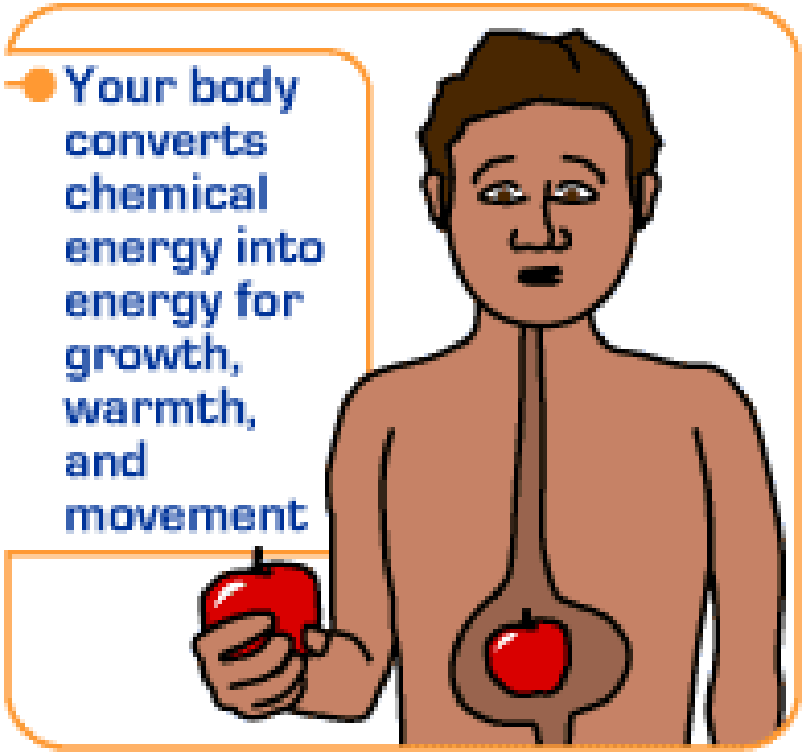
Glycolysis

Krebs Cycle and Electron Transport Chain

Wheel- Definitions

What is Cellular Respiration?

- Cellular respiration is the process by which the energy of glucose is released in the cell to be used for life processes (movement, breathing, blood circulation, etc…)

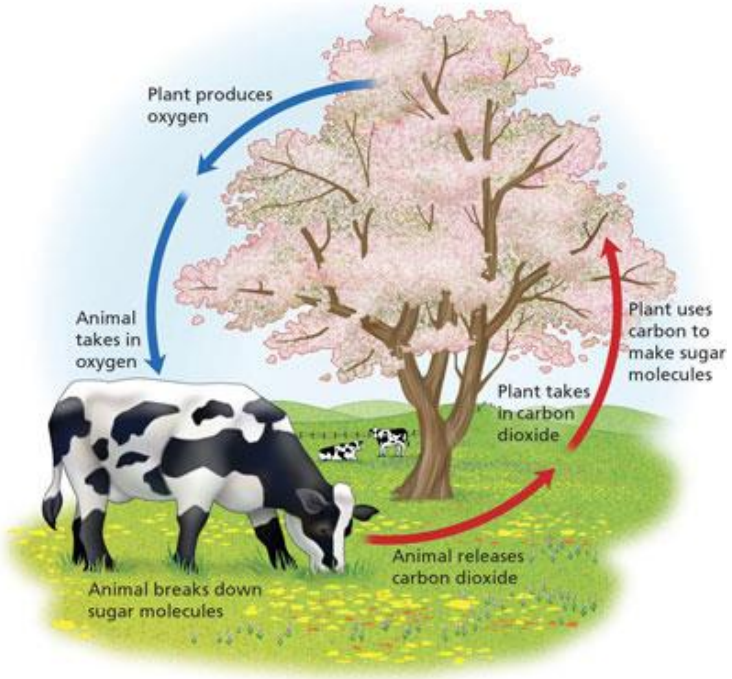


NB Page 80

Why do we need cellular respiration?

ATP (adenosine triphosphate): How cells store and use energy

- Cells require a constant source of energy for life processes but keep only a small amount of ATP on hand.
- Cells can regenerate ATP as needed by using the energy stored in foods like glucose.
- The energy stored in glucose by photosynthesis is released by cellular respiration and repackaged into the energy of ATP.



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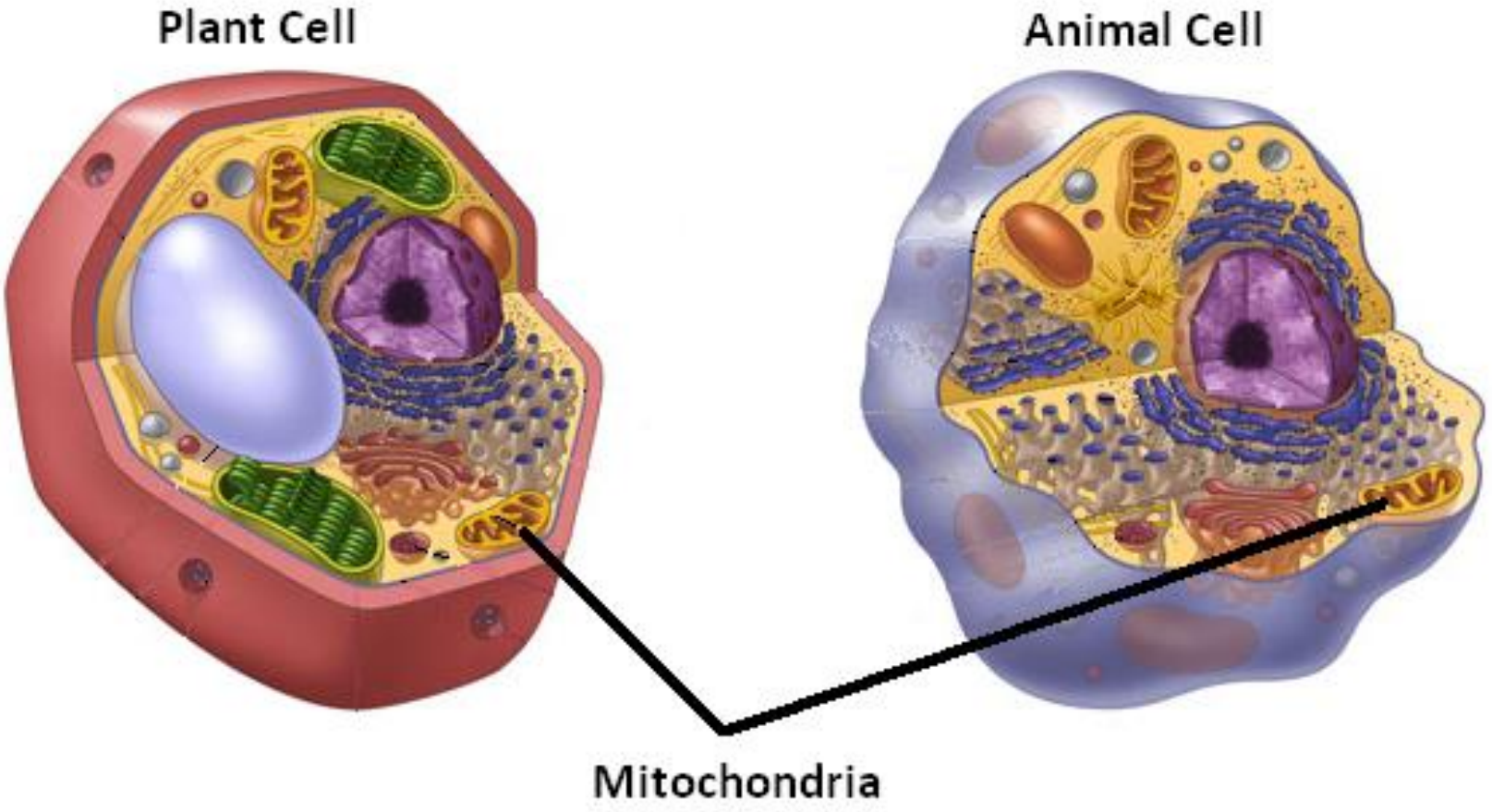
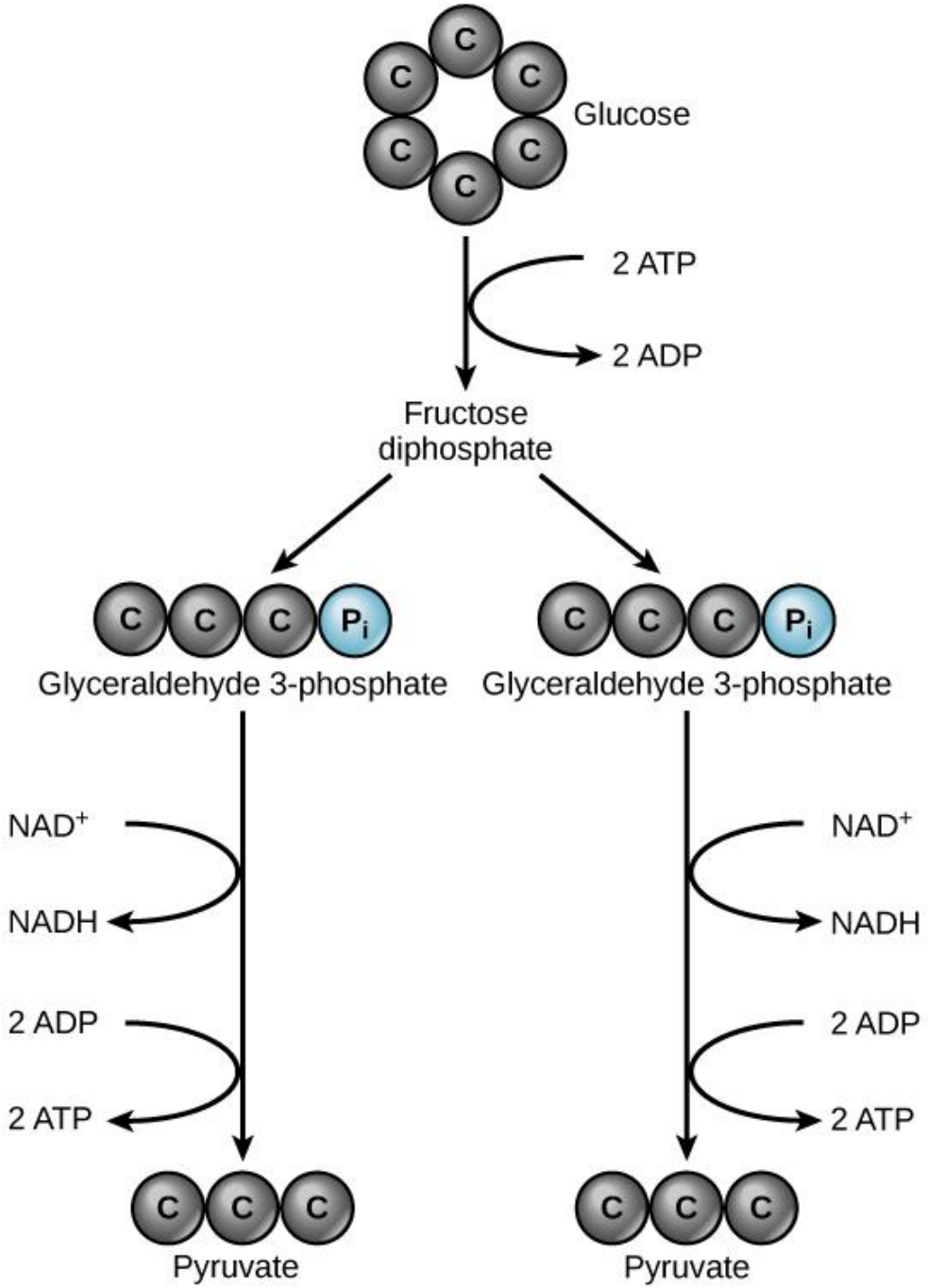
Where does cellular respiration happen?

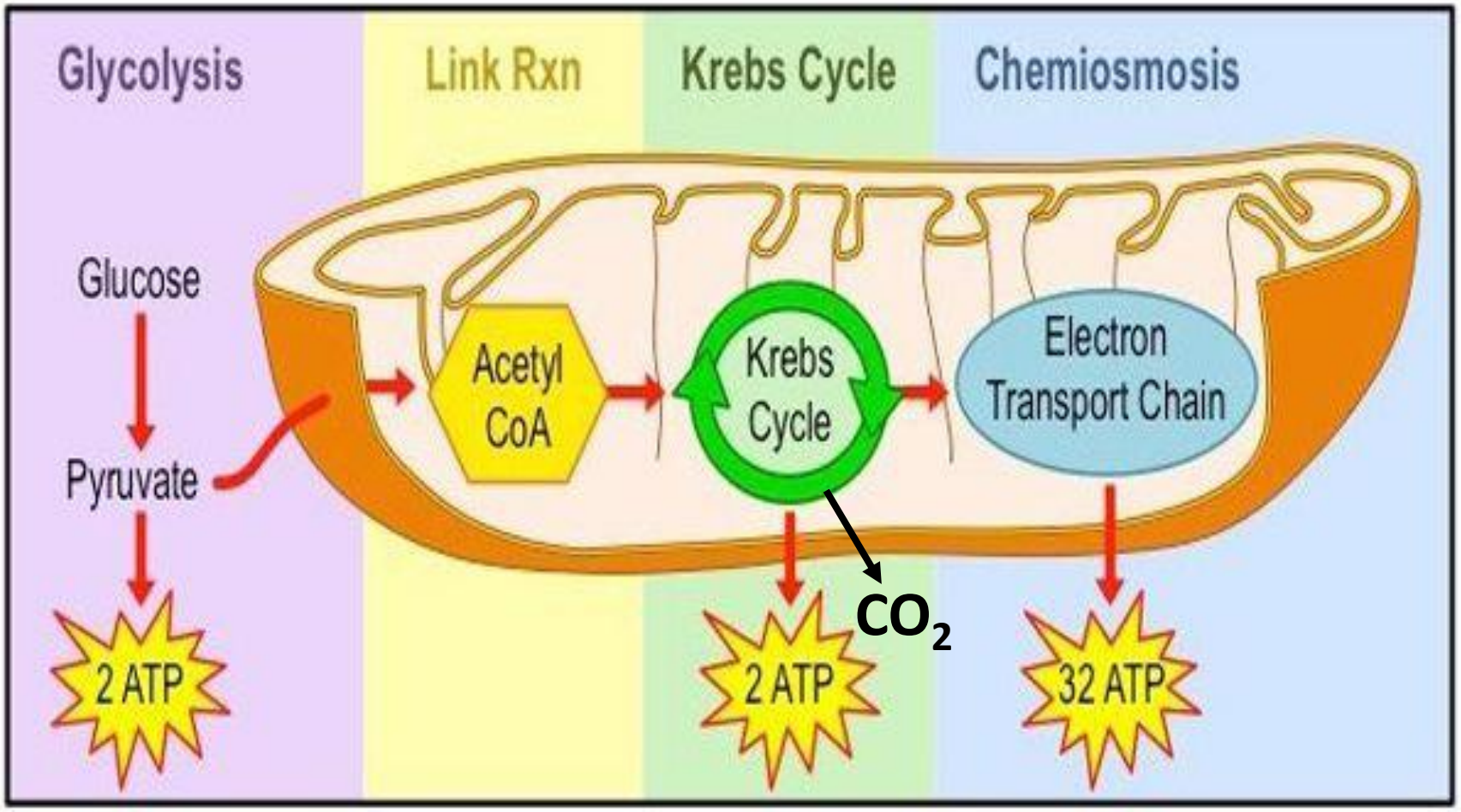
- Respiration occurs in the mitochondria and cytoplasm of ALL cells and can take place either with or without oxygen present.



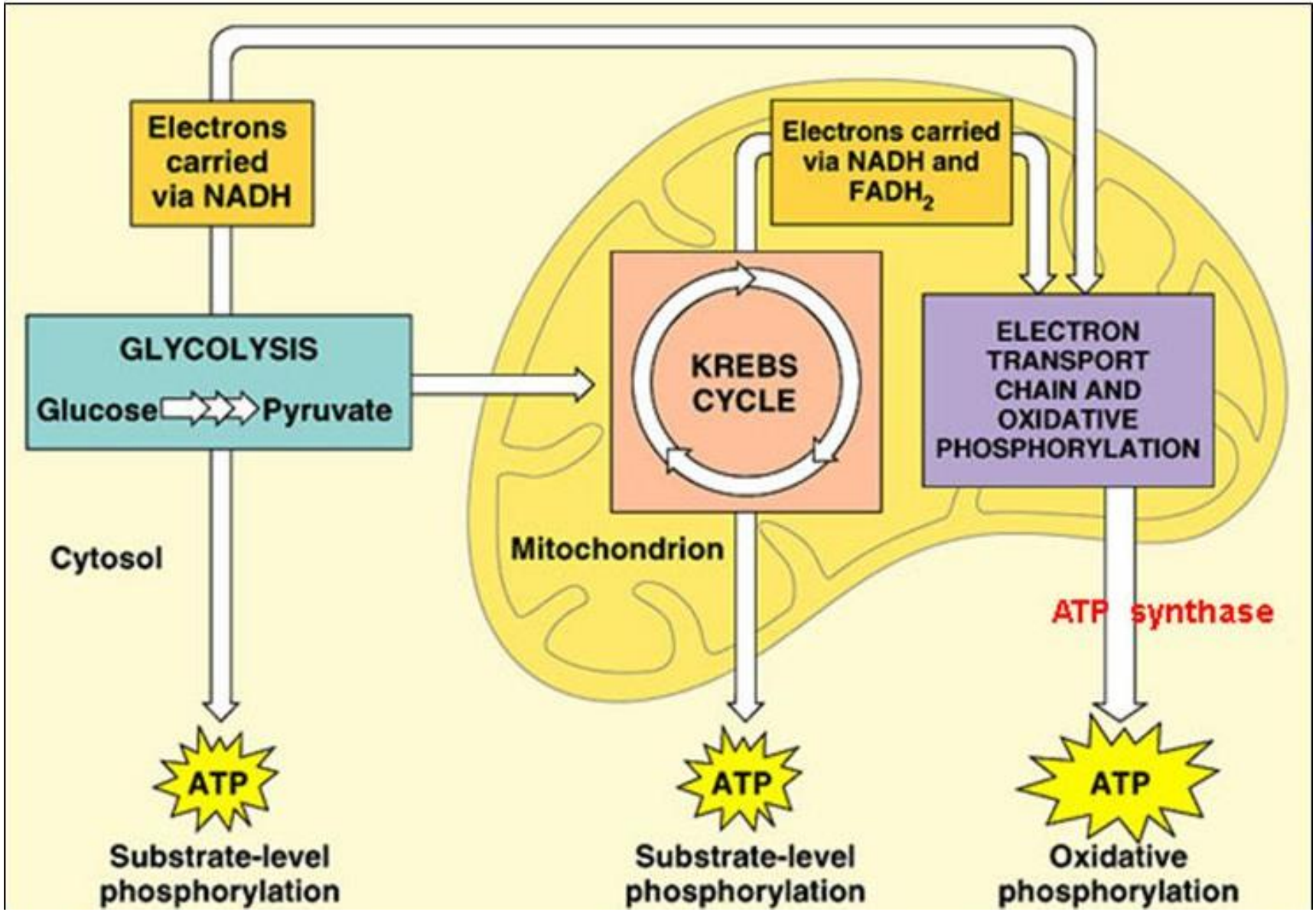
Glycolysis

Glycolysis is the splitting of glucose $C_6H_{12}O_6$. Because there are 6 carbons, they are split into two 3-carbon chains called pyruvate.





The majority of ATP production takes place in the Electron Transport Chain. Oxygen is the final receptor of electrons.


Electrons carried via NADH
Electrons carried via NADH and $FADH_2$
GLYCOLYSIS
Glucose
Pyruvate
KREBS CYCLE
ELECTRON TRANSPORT CHAIN AND OXIDATIVE PHOSPHORYLATION
Cytosol
Mitochondrion
ATP synthase
ATP
ATP
ATP
Substrate-level phosphorylation
Substrate-level phosphorylation
Oxidative phosphorylation

DSJ Pg 81
Monday

Where is the majority of ATP made during cellular respiration?

NB Pg 82

NB Pg83

Aerobic vs Anerobic Respiration

Results/Data:

Trials

	1	2	3	4	5	6	7	8	9	10
# of times YOUR hand closed										

Questions:

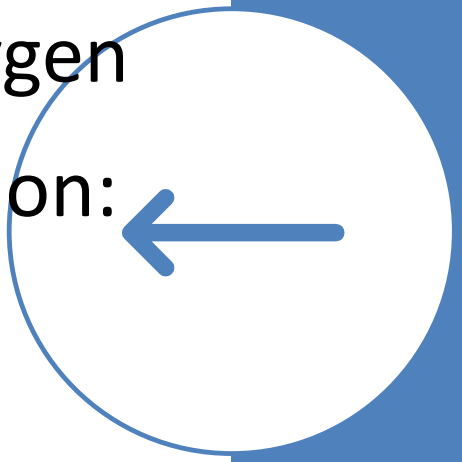
NB Page 83

Title:
Aerobic vs Anaerobic Respiration

What is aerobic respiration?

Cellular respiration that requires oxygen

General formula for aerobic respiration:



$C_6H_{12}O_6 + 6O_2 \rightarrow 6\,CO_2 + 6H_2O + \text{Energy}$

glucose + oxygen → carbon dioxide + water + energy

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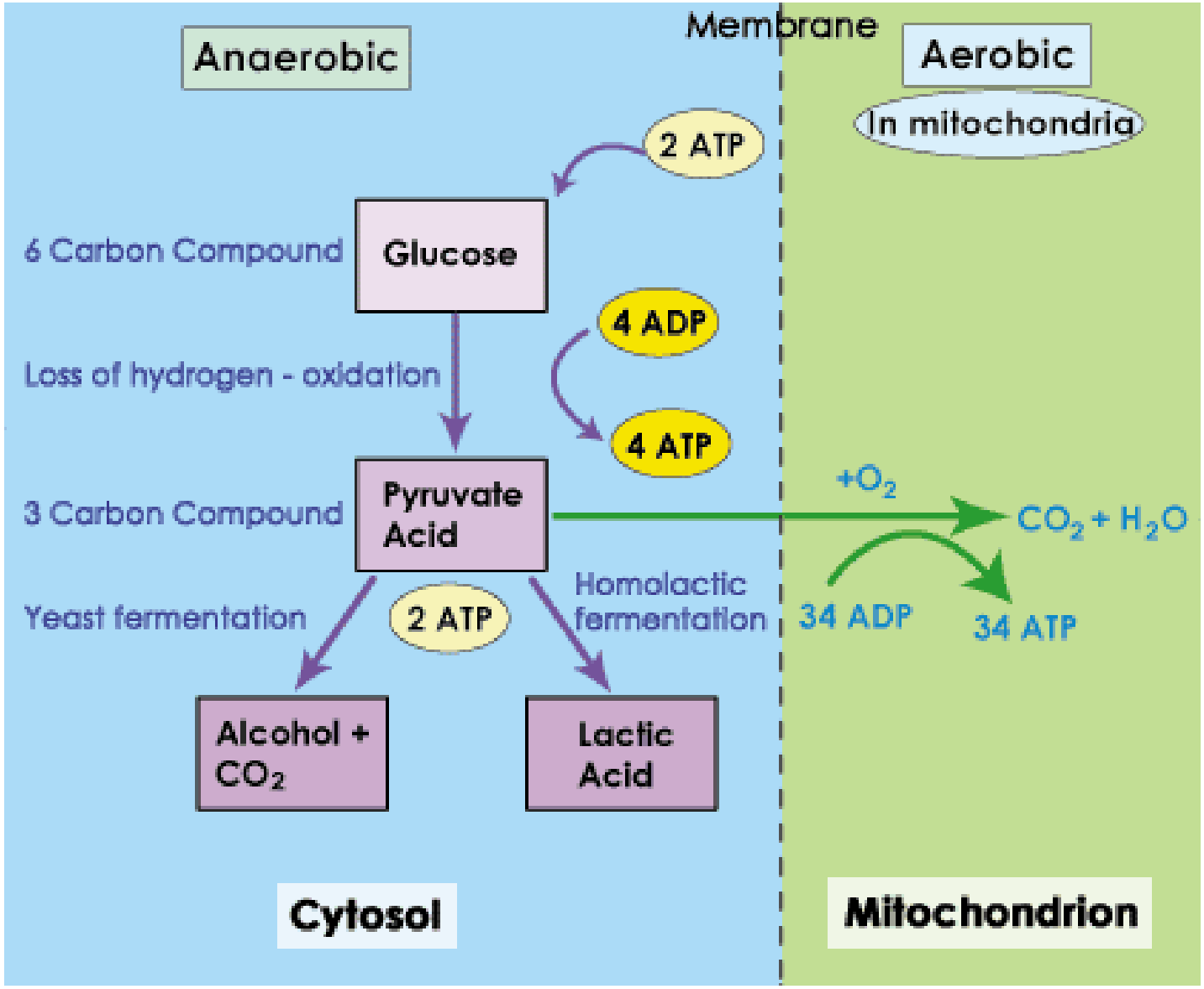
What is anaerobic respiration?

Anaerobic respiration occurs when no oxygen is available to the cell

Also called fermentation.

There are 2 types of fermentation: Alcohol and Lactic Acid


Anaerobic
Membrane
Aerobic
In mitochondria
2 ATP
6 Carbon Compound
Glucose
4 ADP
Loss of hydrogen - oxidation
4 ATP
3 Carbon Compound
Pyruvate Acid
+O2
CO2 + H2O
Yeast fermentation
2 ATP
Homolactic fermentation
34 ADP
34 ATP
Alcohol + CO2
Lactic Acid
Cytosol
Mitochondrion

NB Page 83

What is alcoholic fermentation?

- Alcoholic fermentation—occurs in bacteria, yeast, and plants.
- It produces alcohol, carbon dioxide and a small amount of energy.

NB Page 83

What is lactic acid fermentation?

- Lactic acid fermentation—occurs in muscle cells
- Lactic acid is produced in the muscles during rapid exercise when the body cannot supply enough oxygen to the tissues—causes burning sensation in muscles

Anerobic Respiration

Results/Data:

Trials

	1	2	3	4	5	6	7	8	9	10
# of times YOUR hand closed										

Analysis and Conclusion Questions:

1. What do “aerobic” and “anaerobic” mean?
2. What produces more ATP energy? Aerobic or Anaerobic Respiration?
3. What type of cellular respiration were your hand muscles using before squeezing and what type of cellular respiration were your hand muscles using once you started to get sore?

Before:_____After: _____

4. Did squeezing your hand get easier or harder to do over the ten trials? Explain.
5. At what point in the experiment do you think that your muscle cells converted from aerobic respiration to lactic acid fermentation? (Refer to your graph).
6. Why did your muscles start to get sore after a while?