

# Key

## COMPARISON OF PHOTOSYNTHESIS AND CELLULAR RESPIRATION

	PHOTOSYNTHESIS	CELLULAR RESPIRATION
FUNCTION	to make glucose	to make ATP
LOCATION	leaf/mesophyll/chloroplast	mitochondria
REACTANTS	$6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light}$	$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
PRODUCTS	$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	$6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$
EQUATION	$6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$
REQUIREMENTS	$\text{CO}_2, \text{H}_2\text{O}, \text{light}, \text{chlorophyll}$	$\text{C}_6\text{H}_{12}\text{O}_6, \text{O}_2, \text{mitochondria}$
WHERE IT OCCURS	LR=thylakoid CC=stroma	G=cytoplasm; Kc+ETC=mito

## COMPARISON OF FERMENTATION TO CELLULAR RESPIRATION

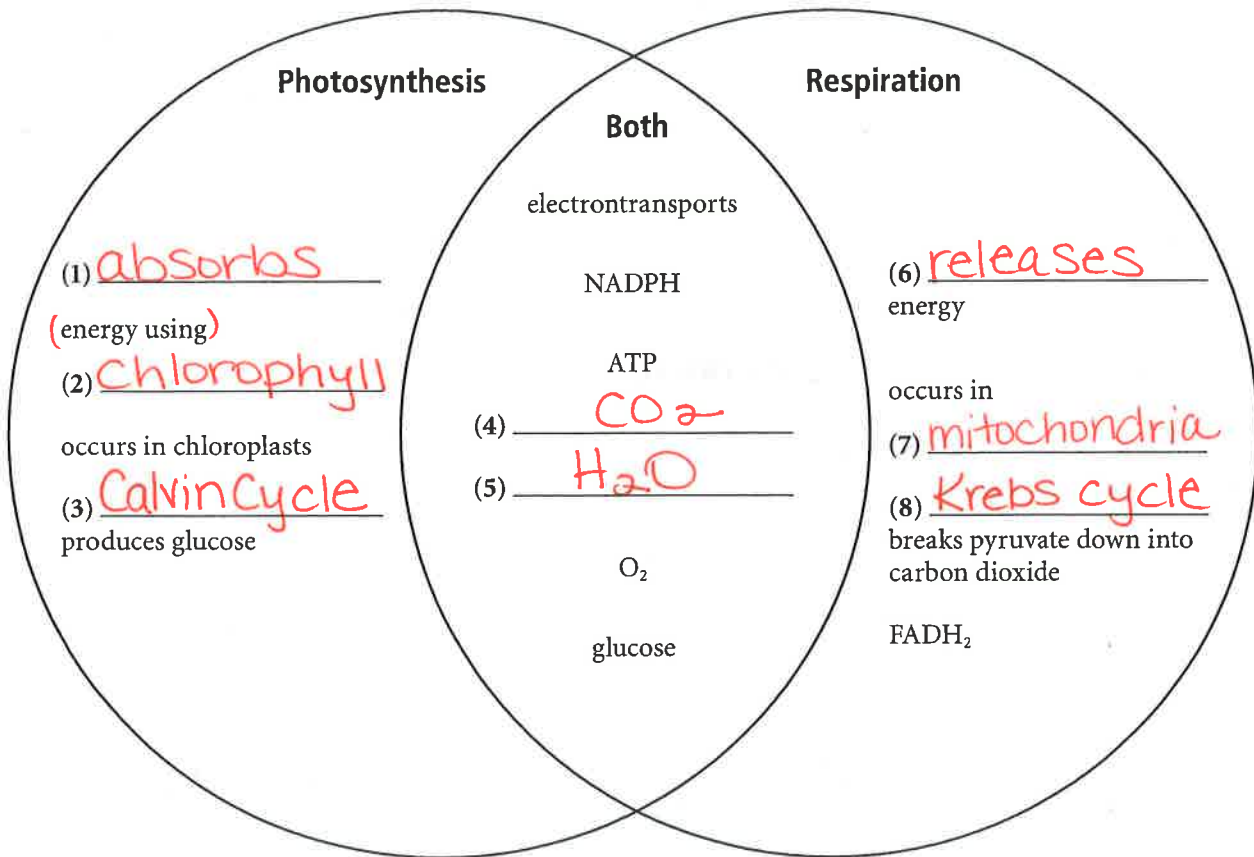
LACTIC ACID	ALCOHOLIC	CELLULAR RESPIRATION
<b>GLUCOSE</b> ↓ <u>glycolysis</u> (pyruvic acid) ↓ <u>lactic acid</u> + <u>2 ATP</u>	<b>GLUCOSE</b> ↓ <u>glycolysis</u> (pyruvic acid) ↓ <u>ethyl alcohol</u> + <u><math>\text{CO}_2</math></u> + <u>2 ATP</u>	<b>GLUCOSE</b> ↓ <u>glycolysis</u> (pyruvic acid) ↓ <u>Krebs Cycle</u> + <u>Electron Trans.</u> + <u>Chain</u> <u>38 ATP</u>

O<sub>2</sub>  
+  
mito.

# Concept Mapping

## Photosynthesis and Respiration

Complete the Venn diagram about photosynthesis and respiration. These terms may be used more than once: absorbs, Calvin cycle, chlorophyll, CO<sub>2</sub>, H<sub>2</sub>O, Krebs cycle, mitochondria, releases:



11. Which equation BEST summarizes the process of photosynthesis?

- a.  $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$
- b.  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \xrightarrow{\text{light}} \text{CO}_2 + \text{H}_2\text{O}$
- c.  $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- d.  $\text{CO}_2 + \text{ADP} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 + \text{ATP}$

12. Color is a property of flowers that is determined at least partly by genes. If a flower appears red to you, it is because the flower

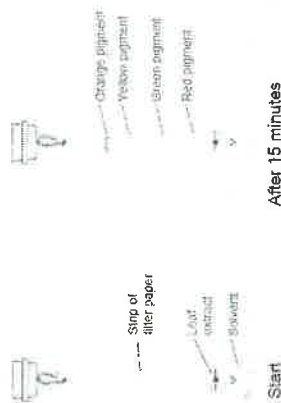
- a. Absorbs red light
- b. Reflects red light
- c. Reflects red light
- d. Diffracts red light

13. Most of the energy used by life on Earth comes from

- a. The moon
- b. The rotation of the Earth
- c. The rotational pulling

14. Which of these is required during aerobic respiration?

- a. Boron
- b. Carbon
- c. Nitrogen
- d. Oxygen



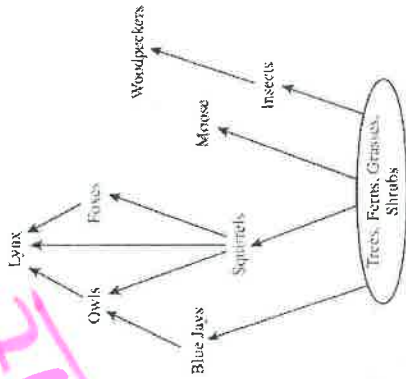
15. The illustration shows the results of a chromatography of leaf extract lab. Which statement best describes these results?

- a. This leaf contain at least 4 different pigments
- b. This leaf has more yellow pigment than green pigment
- c. The green pigment is more dense than the orange pigment
- d. The red pigment is less dense than the yellow pigment

**Assessment Questions - Photosynthesis and Cellular Respiration**

1. On the food web below, the least amount of energy would be located at which trophic level ?

- a. Ferns
- b. Lynx
- c. Owls
- d. Squirrels

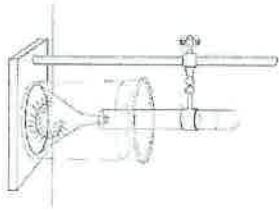


2. In a typical energy pyramid with four levels labeled 1 through 4 from bottom to top, how much more or less energy is available at level 3 than at level 1?

- a. 10 times less
- b. 10 times more
- c. 100 times less
- d. 100 times more

3. Which process occurs in the chloroplasts of cells?

- a. Cellular respiration
- b. Photosynthesis
- c. Protein synthesis
- d. Reproduction

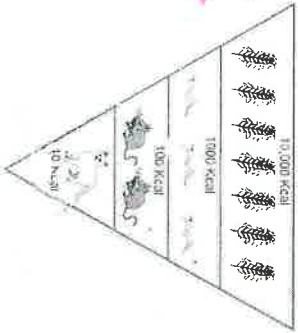


4. The apparatus used above is to collect oxygen from the *Elodea* plant. Which factor is most responsible for the production of oxygen?

- Sugar was present in the liquid
- The presence of light stimulated photosynthesis
- The plant has a large amount of mitochondria
- The liquid contained the oxygen for the plant to absorb

5. In the food pyramid below, how much energy is being passed on from one level to the next?

- 1%
- 10%
- 25%
- 50%

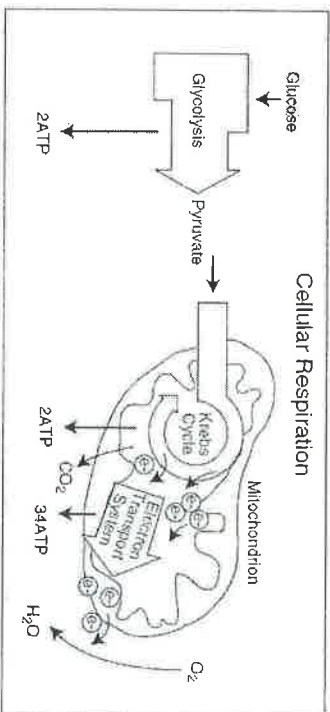


6. The process of cellular respiration

- Is performed only by organisms that are capable of photosynthesis
- Occurs before plants are able to carry out photosynthesis
- Occurs only in animals
- Breaks down food into ATP

7. The process summarized by the equation begins in the cytoplasm of a cell and ends in the

- Cytoplasm
- Mitochondria
- Endoplasmic reticulum
- Cell membrane



8. The diagram above depicts cellular respiration. Which of the following gives the stages in the correct order?

- Electron Transport Chain, Krebs Cycle, Glycolysis
- Glycolysis, Electron Transport Chain, Krebs Cycle
- Glycolysis, Krebs Cycle, Electron Transport Chain
- Krebs Cycle, Glycolysis, Electron Transport Chain

9. Pigments that absorb light are found in stack like membranes called

- Chlorophyll
- Thylakoids
- Stroma
- Golgi apparatus

10. Which characteristic of chlorophyll BEST accounts for its function in photosynthesis?

- It is in an organelle found only in the cells of autotrophic organisms
- It absorbs energy from light and transfers it to electrons
- It is located in the chloroplasts
- There are two main types - a and b



# Photosynthesis & Cellular Respiration Worksheet



Name: Key Period: \_\_\_\_\_

Vocabulary: Match the phrases on the left with the term that best fits. **Use answers only one time.**

- |  |                  |
|--|------------------|
| <u>J</u> 1. Organisms that make their own food   | A. Chloroplasts  |
| <u>A</u> 2. Site of photosynthesis   | B. Anaerobic     |
| <u>F</u> 3. Process occurs in a mitochondrion  | C. Aerobic       |
| <u>D</u> 4. $C_6H_{12}O_6$   | D. Glucose       |
| <u>B</u> 5. Process does not require oxygen  | E. ATP           |
| <u>C</u> 6. Process requires oxygen  | F. Krebs's cycle |
| <u>I</u> 7. Adenosine diphosphate  | G. Glycolysis    |
| <u>E</u> 8. Energy storing molecule  | H. Energy        |
| <u>G</u> 9. The anaerobic process of splitting glucose and forming two molecules of pyruvic acid ( <u>pyruvate</u> ) | I. ADP           |
| <u>H</u> 10. The ability to do work  | J. Autotrophs    |

Directions: Answer each of the following questions in a clear and concise manner.

1. Compare and discuss how cells store energy and release energy using ATP. Be specific! You may draw the cycle.



2. Compare lactic acid fermentation and alcoholic fermentation by describing what pyruvic acid is changed in to. Be sure to include what type of organism each one takes place in.

	<u>What is pyruvic acid changed into?</u>	<u>Organism:</u>
Alcoholic Fermentation	ethyl alcohol and $CO_2$	yeast + bacteria
Lactic Acid Fermentation	lactic acid	muscles + bacteria



3. Name the three processes of aerobic cellular respiration. How many ATP's does each process produce, and what is the total ATP produced from one glucose?

<u>3 Processes of Cellular Respiration:</u>	<u># ATP produced:</u>
Glycolysis	2
Krebs Cycle	2
Electron Transport Chain	34
Total ATP per 1 glucose = <u>38</u>	

4. Name the two stages of photosynthesis and list the starting molecule(s) and ending molecule(s) of each.

<u>Stages</u>	<u>Starting Molecule(s)</u>	<u>Product(s)</u>
Light Reaction	sunlight, H <sub>2</sub> O, ADP, NADP <sup>+</sup>	O <sub>2</sub> , ATP, NADPH
Calvin Cycle	CO <sub>2</sub> , ATP, NADPH	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> , ADP, NADP <sup>+</sup>

5. What is the general chemical equation of photosynthesis?



6. When and why does our body use lactic acid fermentation?

When muscles run out of O<sub>2</sub> due to extensive exercise; to make small amounts of ATP

7. Explain how the equations for photosynthesis and aerobic respiration compare.

the products of one are the reactants of the other