

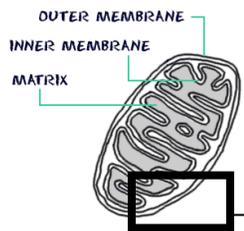
## Cellular Respiration Worksheet 1

1. What are the 3 phases of the cellular respiration process? **Glycolysis, Krebs Cycle, Electron Transport Chain.**
2. Where in the cell does the glycolysis part of cellular respiration occur? **Cytoplasm**
3. Where in the cell does the Krebs (Citric Acid) cycle part of cellular respiration occur? Mitochondrion
4. Where in the cell does the electron transport part of cellular respiration occur? Mitochondrion
5. How many ATP (net) are made in the glycolysis part of cellular respiration? 2 ATP
6. How many ATP are made in the Krebs's cycle part of cellular respiration? 2 ATP
7. How many ATP are made in the electron transport part of cellular respiration? 32-34 ATP
8. In which phase of cellular respiration is carbon dioxide made? Krebs Cycle
9. In which phase of cellular respiration is water made? Electron Transport System (Chain). It picks up the hydrogens and makes water.
10. In which phase of cellular respiration is oxygen a substrate (an input)? Electron Transport System (Chain)
11. In which phase of cellular respiration is glucose a substrate (an input)? Glycolysis
12. What would happen to the cellular respiration process if the enzyme for one step of the process were missing or defective? Entire process would stop and would produce all ATP anaerobically.
13. What is the overall reaction for fermentation in yeast?  $\text{Glucose} \longrightarrow \text{Alcohol} + \text{CO}_2 + 2 \text{ATP} + \text{heat}$
14. What is the overall reaction for lactic acid fermentation?  $\text{Glucose} \longrightarrow \text{Lactic Acid} + 2 \text{ATP} + \text{heat}$
15. Only a small part of the energy released from the glucose molecule during glycolysis is stored in ATP. How is the rest of the energy released? (HINT: It is a product in the overall reaction for cellular respiration.)  
It is released as heat.

## Biology: Cellular Respiration Worksheet 2

16. What are the 2 metabolic pathways a cell can use and what determines which pathway is used?  
Aerobic Cellular Respiration and Anaerobic Cellular Respiration. Depends upon the presence or absence of oxygen.
17. Write the overall equations for Alcoholic fermentation, Lactic Acid fermentation, and Aerobic cellular respiration.
- Glucose  $\longrightarrow$  Alcohol + CO<sub>2</sub> + 2 ATP + heat  
Glucose  $\longrightarrow$  Lactic Acid + 2 ATP + heat  
 $C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{enzymes}} 6CO_2 + 6H_2O + 36 - 38 \text{ ATP}$
18. What are the 3 phases of the Aerobic cellular respiration process?  
Glycolysis, Krebs Cycle, Electron Transport Chain
19. Where in the cell does the glycolysis part of cellular respiration occur? Why?  
Cytoplasm – enzymes to convert glucose to pyruvate are present
20. Where in the cell does the Krebs (Citric Acid) cycle part of cellular respiration occur? Why?  
Mitochondrion – necessary enzymes are present there
21. Where in the cell does the electron transport part of cellular respiration occur? Why?  
Mitochondrion - necessary enzymes are present there.
22. How many ATP are made in the glycolysis part of cellular respiration? 2 ATP
23. How many ATP are made in the Krebs cycle part of cellular respiration? 2 ATP
24. How many ATP are made in the electron transport part of cellular respiration? 32-34 ATP
25. In which phase of cellular respiration is carbon dioxide made? Krebs cycle
26. What are NAD<sup>+</sup> and FAD? What do they do and what do they become?  
Hydrogen and electron carriers that carry the H<sup>+</sup> and electrons to Electron Transport Chain to convert ADP + P<sub>i</sub>  $\longrightarrow$  ATP. They become NADH AND FADH<sub>2</sub> when they pick up the hydrogens during Glycolysis (NADH only), and the Krebs Cycle.
27. In which phase of cellular respiration is water made? Electron Transport Chain
28. What would happen to the cellular respiration process if the enzyme (aka catalyst) for one step of the process was missing or defective? Entire process would stop.
29. Where does the process of fermentation take place? Cytoplasm
30. What are the products of lactate fermentation? Lactic acid + heat
31. What are the products of ethanol fermentation? Alcohol + CO<sub>2</sub> + heat

32. Draw and label a mitochondrion and include all of the parts that are used during cellular respiration.



**Crista (plural cristae)**

\_\_\_\_\_



## Photosynthesis & Cellular Respiration Worksheet



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

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

- |  |                 |
|--|-----------------|
| __J__ 1. Organisms that make their own food  | A. Chloroplasts |
| __A__ 2. Site of photosynthesis  | B. Anaerobic    |
| __M__ 3. Process occurs in a mitochondrion   | C. Aerobic      |
| __D__ 4. $C_6H_{12}O_6$  | D. Glucose      |
| __B__ 5. Processes that do not require oxygen  | E. Light energy |
| __C__ 6. Processes that require oxygen   | F. Glycolysis   |
| __H__ 7. Adenosine diphosphate   | G. Energy       |
| __I__ 8. Energy storing molecule   | H. ADP          |
| __L__ 9. Enzyme responsible for fixing carbon dioxide to RuBP (5 carbon molecule)              | I. ATP          |
| __E__ 10. Absorbed by chlorophyll  | J. Autotrophs   |
| __F__ 11. The anaerobic process of splitting glucose and forming two molecules of pyruvic acid | K. NADPH        |
| __G__ 12. The ability to do work   | L. Rubisco      |
| __K__ 13. Hydrogen ion and electron carrier produced in Photosystem I                          | M. Kreb's 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   | 2 ATP + Alcohol + $CO_2$ + heat           | Yeast and bacteria       |
| Lactic Acid Fermentation | 2 ATP + Lactic Acid + heat                | Animals in muscle tissue |

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                    | 32-34                  |
| <b>Total ATP per 1 glucose = 36-38</b>      |                        |

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

| <u>Phases</u>     | <u>Starting Molecule(s) (INPUTS)</u>                                       | <u>Product(s) (OUTPUTS)</u> |
|-------------------|--|-----------------------------|
| Light Dependent   | H <sub>2</sub> O + Light Energy + ADP + P <sub>i</sub> + NADP <sup>+</sup> | O <sub>2</sub> , ATP, NADPH |
| Light Independent | CO <sub>2</sub> + ATP + NADPH  | PGAL                        |

5. What is the balanced chemical equation of photosynthesis?



6. What is the balanced chemical equation of cellular respiration?



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

The outputs of photosynthesis are the requirements for the inputs of cellular respiration

## Protein Synthesis Review Worksheet

1. How are DNA and mRNA alike?

Both use Adenine, cytosine, and guanine. Both make complementary base pairings.

DNA: A-T; G-C

mRNA: A-U; G-C

2. How are DNA and mRNA different? Fill in the table below.

| DNA                                  |                       | mRNA                               |
|--------------------------------------|-----------------------|------------------------------------|
| <b>Double stranded</b>               | <b>Shape</b>          | <b>one single strand</b>           |
| Adenine, Thymine, Guanine, Cytosine. | <b>Nitrogen bases</b> | Adenine, Uracil, Guanine, Cytosine |
| <b>Deoxyribose</b>                   | <b>Sugars</b>         | <b>Ribose</b>                      |
| <b>nucleus</b>                       | <b>Location</b>       | <b>cytoplasm</b>                   |

### Transcription: DNA to mRNA:

1. How many strands of mRNA are transcribed from the two “unzipped” strands of DNA?  
\_\_\_\_\_1\_\_\_\_\_

2. If the following were part of a DNA chain, what mRNA bases would pair with it to transcribe the DNA code onto mRNA? G-G-A-T-C-G-C-C-T-T-A-G-A-A-T-C  
\_\_CCUGGGCUUA GUAA

3. If DNA is described as a double helix, how should mRNA be described? SINGLE STAND

4. How are the accuracy of DNA and mRNA codes assured? Enzymes such as DNA and RNA polymerase check for the correct bonding pattern.

### Translation: mRNA to PROTEIN:

5. Name and describe the three types of RNA’s involved in protein synthesis?

- ✓ rRNA : Ribosomal RNA – make up Ribosomes
- ✓ mRNA: Complementary base pair of DNA. Created in Transcription
- ✓ tRNA: Carries amino acids to mRNA during translation

6. What is located at EACH end of a tRNA molecule?

\_\_\_\_\_amino acid\_\_\_\_\_ [Type a

7. Where must an mRNA attach before protein production can begin? \_\_\_\_\_Ribosome\_\_\_\_\_

8. How many bases are needed to specify an mRNA codon? \_\_\_\_\_3\_\_\_\_\_

9. If a strand of mRNA contain the sequence, U-A-G-C-U-A-U-C-A-A-A-U, what tRNA anticodons would be needed to translate the sequence?A-U-C-G-A-U-A-G-U-U-U-A

10. How does mRNA get out of the nucleus?

\_\_\_\_\_Through nuclear pore\_

11. What is the difference between an amino acid and a protein? \_\_\_proteins are composed of amino acids which are bonded together in peptide bonds by the process of dehydration synthesis.

12. What type of bond is formed between amino acids? \_\_\_Peptide bond\_

### Protein Synthesis Flow Chart

Directions: Fill in the flow chart below, using the following words: **Amino acids, mRNA, mRNA codon, nucleus, nuclear pore, peptide bonds, ribosome, transcription.**

The first part of protein synthesis is

