<table>
<tr><th>Know</th><th>Do</th></tr>
<tr><td>

- The location, function, products, reactants, enzymes, and ATP production associated with all steps of aerobic cellular respiration.
- The location, function, products, reactants, enzymes, and ATP production associated with all steps of anaerobic cellular respiration.
- Compare aerobic cellular respiration in the mitochondria to photosynthesis in the chloroplast.
- The structure of ATP and how it is used and generated throughout the process of respiration.
- The relationship between metabolism and energy transfer.

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Summative:

- **SEP8: Obtaining, Evaluating and Communicating Information:** Interpret or develop models for Glycolysis, Fermentation, Bridge Reaction, Krebs Cycle, & ETC.
- **SEP6: Construct an Explanation:** When given a diagram or scenario (for Glycolysis, Fermentation, Bridge Reaction, Krebs Cycle, & ETC), construct an explanation regarding transfer of energy (oxidation/reduction).
- **SEP5: Using Mathematics and Computational Thinking:** Analyze and interpret data related to the respiration rate of various organisms of various sizes. In addition, calculate respiration rates based on given data.

Practice/Formative:

- **Obtaining, Evaluating and Communicating Information:** Glycolysis, ETC
- **Using Mathematics and Computational Thinking:** Cellular Respiration Lab and Fermentation Lab
- **Construct an Explanation:** Glycolysis, Krebs

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<tr><th>Understand</th></tr>
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Energy and Matter: Flows, Cycles, and Conservation: Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

Structure and Function: The way an object or living thing is shaped and its substructure determine many of its properties and functions.

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Reading Guidance For "Know" (unit vocabulary is in **bold**)

I. Describe the location, function, reactants, products (**pyruvate**), enzymatic actions, and **ATP** production for **glycolysis**. (7.1, 7.2)

II. Describe the location, function, reactants, products, enzymatic actions, and ATP production for **Intermediate Step (Bridge Reaction)**. (7.1, 7.3)

III. Describe the location, function, reactants, products, enzymatic actions, and ATP production for **Krebs cycle** (**Citric acid cycle**). (7.1, 7.3)

IV. Describe the location, function, reactants, products, membrane proteins, & enzymatic actions for **Electron Transport Chain**. Explain how the **chemiosmosis** model generates ATP. (7.1, 7.4)

V. Describe the connection between glycolysis and the **fermentation** reactions (**alcoholic** and **lactic acid**) in **anaerobic respiration**. Describe the location, function, reactants, products, and enzymatic actions for each step. Be able to summarize inputs and outputs for the entire anaerobic process including ATP production. (7.5)

VI. Compare and contrast the processes of **aerobic cellular respiration** in the mitochondria and photosynthesis in the chloroplast. (pg 175 - pg176)

VII. Identify and explain the significance of **redox reactions**, **oxidative phosphorylation**, **substrate-level phosphorylation**, **decarboxylation**, and **hydrolysis** in the biochemical pathways of aerobic cellular respiration. (6.2, 7.1)

VIII. Apply the first law of thermodynamics to the relationship between **exergonic** reactions, **endergonic** reactions, **catabolism**, **anabolism** and energy transfer (ATP & heat). (6.2, 7.1)

IX. Describe the structure of ATP. Explain how the hydrolysis and regeneration of ATP relates to **metabolism**. (6.3)

Reading Guidance For "Do"

A. Conduct an experiment and analyze the data to determine the effect of various factors on the rate of cellular respiration using probes. (Pea Lab)

SEP 5 -- Using Mathematics and Computational Thinking			
Exceeding	**Meeting**	Approaching	Developing
I can use mathematics and computational thinking using all success criteria in unfamiliar contexts AND/OR making connections to related science concepts	**I can use mathematics and computational thinking using all success criteria in familiar contexts**	I can use mathematics and computational thinking using some success criteria in familiar contexts	I can use mathematics and computational thinking in familiar contexts with support

- ☐ Choose/develop proper data from text, table, chart, or graph.
- ☐ Perform calculations accurately.
- ☐ Connect mathematical information and data trends to biological principles.

SEP 6 - Constructing Scientific Explanations			
Exceeding	**Meeting**	Approaching	Developing
I can construct explanations and design solutions using all success criteria in unfamiliar contexts AND/OR making connections to related science concepts	**I can construct explanations and design solutions using all success criteria in familiar contexts**	I can construct explanations and design solutions using some success criteria in familiar contexts	I can construct explanations and design solutions in familiar contexts with support

- ☐ Make an appropriate claim using the information given in the prompt.
- ☐ Select the proper information (text or models) or data to provide evidence for the claim.
- ☐ Provide reasoning that connects the evidence to the claim and incorporates scientific vocabulary/principles from our course.

SEP 8 - Obtaining, Evaluating and Communicating Information			
Exceeding	**Meeting**	Approaching	Developing
I can obtain, evaluate and communicate information using all success criteria in unfamiliar contexts AND/OR making connections to related science concepts	**I can obtain, evaluate and communicate information using all success criteria in familiar contexts**	I can obtain, evaluate and communicate information using some success criteria in familiar contexts	I can obtain, evaluate and communicate information in familiar contexts with support

- ☐ Use words, tables, diagrams, and graphs, to communicate understanding about a system under study and/or course content.
- ☐ Describe connections between multiple concepts or features embedded a model (or multiple models)
- ☐ Recognize the major features of experimental design and communicate it clearly.