**Topic Review Guide**: Energy Exchanges

**To Think About**: How do living things use energy and matter to survive in an ecosystem? In what ways do communities interact within their environments that result in the movement of matter and energy?

**Watch:**

**First:** [Mr. Andersen’s “Life Requires Free Energy” video](http://viewpure.com/JBmykor-2kU&list=PLFCE4D99C4124A27A&index=16)

**Then**: [Mr. Andersen’s “Photosynthesis and Respiration” video](http://viewpure.com/0IJMRsTcwcg&list=PLFCE4D99C4124A27A&index=17)

**Last:** [Mr. Andersen’s “Photosynthesis” video](http://viewpure.com/g78utcLQrJ4&list=PL7A750281106CD067&index=39)

**Read:** Chapter 6.1, Hillis et al. Principles of Life, 1st edition (2012), pages 100-106

**Then**: Chapter 6.2-6.4, pages 106-113

**Last**: Chapter 6.5-6.6, pages 113-120

**Supplementary Resources**: Click the links below for more information to help you learn more about this lesson.

* Hillis et al.: [Photophosphorylation](http://bcs.whfreeman.com/hillis1e/#667501__674136__)
* Virtual Cell Animation: [Photosynthesis (Light Reactions)](http://vcell.ndsu.nodak.edu/animations/photosynthesis/index.htm)
* Wiley’s Interactive Concepts in Biochemistry: [Photosynthesis](http://www.wiley.com/college/boyer/0470003790/animations/photosynthesis/photosynthesis.htm)
* University of Vermont: [Photosynthesis Animation](http://dendro.cnre.vt.edu/forestbiology/photosynthesis.swf)

**Listen and Look**: Here is a list of key terms and concepts you will hear about and see during these podcasts and chapter readings. Get to know them! Be able to connect them to one another using a concept map.

**KEY TERMS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Free energy | ATP | Exergonic reaction | | Endergonic reaction | |
| Metabolism |  | | Krebs cycle | |
| Oxidation | Reduction | Phosphorylation | | Oxidative phosphorylation | |
| NAD/NADH |  | 1st law of thermodynamics | | 2nd law of thermodynamics | |
|  |  | Electron transport chain | | Stroma | |
| photosynthesis | NADP/NADPH | Thylakoid | | Light-dependent reaction | |
| Photon (of light) |  | Photophosphorylation | | Light-independent reaction | |

**Recall and Review:** Use the lecture in the video and your textbook reading to help you answer these questions

1. **Explain** why photosynthesis considered to be an anabolic, endergonic process.
2. **Explain** the role of chlorophyll and other pigments in the photosynthetic process.
3. **Identify** the source of electrons for the photosynthetic process.
4. In plants, the light-dependent reactions occur on thylakoid membranes inside the chloroplast.  **Describe** where these reactions occur in photosynthetic prokaryotes.
5. **Compare and contrast** the electron transport chains of photosynthesis to those in cellular respiration.
6. **Create** a t-chart that **describes** the similarities and differences between the Calvin cycle and the Krebs cycle.

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| Learn More: For more information about energy exchanges and how they make the world go round, check out the links below:   * NOVA—[Illuminating Photosynthesis: Help the process of photosynthesis along in this game](http://www.pbs.org/wgbh/nova/nature/photosynthesis.html) * John Kyrk: [Glycolysis Animation](http://www.johnkyrk.com/glycolysis.html) * John Kyrk: [Oxidative Phosphorylation Animation](http://www.johnkyrk.com/mitochondrion.html) * John Kyrk: [Krebs Cycle Animation](http://www.johnkyrk.com/krebs.html) |