Objectives

Today’s lesson provides students with a simple introduction to photosynthesis and a broad overview of light energy and pigments.

Students should come away from today’s lesson understanding that:

1. Once autotrophs acquire energy from the sun, it is stored in organic compounds, such as glucose, during a process called photosynthesis.
2. A biochemical pathway is a series of reactions where the product of one reaction is the reactant of the next.
3. Chloroplasts are double membrane organelles with an inner membrane folded into disc-shaped sacs called thylakoids.
4. Sunlight, or white light, is made of different wavelengths or colors carrying different amounts of energy.
5. A pigment is a substance that only absorbs certain wavelengths.
6. Chlorophyll, the most common pigment in plants and algae, only absorbs red, blue, or violet light.

# Bell Work

1. As each student enters, pass out the bell work.
2. Give the students about 5-10 minutes to finish these, then discuss their answers.

# Lesson

* Pass out the Student Notes.
* **Go to slide 1 (*The Energy of Life*) of the 6.1 PowerPoint.**
* Using the following lesson, go through and explain the Energy of Life.
* **Go to slide 2 (*Capturing Energy*) of the 6.1 PowerPoint.**

 ***Capturing Energy***

All organisms require energy.

Autotrophs are organisms that obtain energy directly from the sun.

Once acquired, the energy is stored in organic compounds, such as glucose, during a process called **photosynthesis**.

6CO2 + 6H2O + energy 🡪 6O2 + C6H12O6

* **Go to slide 3 (*Biochemical Pathways*) of the 6.1 PowerPoint.**

***Biochemical Pathways***

Photosynthesis and cellular respiration are **biochemical pathways**, series of reactions where the product of one reaction is the reactant of the next.

In photosynthesis, CO2 (carbon dioxide) and H2O (water) are combined to form C6H12O6 (glucose)
and O2 (oxygen).

In cellular respiration, O2 (oxygen) is used to burn C6H12O6 (glucose) and release CO2 (carbon dioxide), H2O (water), and ATP (energy).

* **Go to slide 4 (*Chloroplasts*) of the 6.1 PowerPoint.**

***Chloroplasts***

***Tip:*** *Explain that the light dependent reactions are one of the stages of photosynthesis.*

Chloroplasts in plant and algal cells absorb light energy from the sun during the **light dependent reactions** of photosynthesis.

Chloroplasts are double membrane organelles with an inner membrane folded into disc-shaped sacs called **thylakoids**.

* **Go to slide 5 (*Thylakoids*) of the 6.1 PowerPoint.**

 ***Thylakoids***

Thylakoids occur in stacks called **grana**.

Grana are connected to each other and surrounded by a gel-like material called **stroma**.

Light-capturing pigments in the grana are organized into **photosystems**.

* **Go to slide 6 (*Light Energy*) of the 6.1 PowerPoint.**

***Light Energy***

Light travels as waves and packets called **photons**.

A **wavelength** of light is the distance between 2 consecutive peaks or troughs.

Sunlight, or white light, is made of different wavelengths or colors carrying different amounts of energy.

A **prism** separates white light into 7 colors called the **visible spectrum**.

* **Go to slide 7 (*Pigments*) of the 6.1 PowerPoint.**

***Pigments***

When light strikes an object, it is absorbed, transmitted, or reflected.

***Tip:*** *Explain that chlorophyll appears green because it* ***reflects*** *green light.*

A **pigment** is a substance that only absorbs certain wavelengths.

When all colors are absorbed, the object appears black. When all colors are reflected, the object appears white. If only one color is reflected, the object appears that color.

* **Go to slide 8 (*Pigments in Chloroplasts, 1 of 2*) of the 6.1 PowerPoint.**

 ***Pigments in Chloroplasts***

Thylakoids contain a variety of pigments.

**Chlorophyll** is the most common pigment in plants and algae.

**Chlorophyll a** and **chlorophyll b** are the two most common types of chlorophyll in autotrophs.

Chlorophyll absorbs only red, blue, and violet light.

* **Go to slide 9 (*Pigments in Chloroplasts, 2 of 2*) of the 6.1 PowerPoint.**

Chlorophyll b absorbs colors or light energy not absorbed by chlorophyll a.

The light energy absorbed by chlorophyll b is transferred to chlorophyll a in the light reactions.

**Carotenoids** are yellow, orange, and red accessory pigments in the thylakoids.

# Reinforcement

1. Pass out the 6.1 Student Activity.

# Exit Survey

1. Pass out the Exit Survey. This will take about 5-10 minutes to complete.

# Homework

1. Instruct the students to finish the drawing they started in class today and to read over their notes.