Plants are autotrophs because their cells have the ability to go through the process of photosynthesis.

**PART ONE: Review of the Visible Spectrum of Light:**
1. What colors make up white?

2. What colors make up black?

3. When light strikes a green leaf, what colors are reflected?

4. When light strikes a green leaf, what colors are absorbed?

5. Why do leaves turn colors in the fall?

**PART TWO: What is the chemical equation of photosynthesis?**

1. What are the raw materials needed for photosynthesis to occur?

2. What are the products produced during photosynthesis?

3. What provides the source of energy to power this process?

**Critical Thinking:** Why might talking to plants help them to grow more effectively?
Critical Thinking Application: What color of the visible spectrum of light promotes photosynthesis most effectively?

The solid line on the graph below shows the absorption of light by chlorophyll at various colors of the spectrum. This type of graph is called an absorption spectrum. Scientists obtain an absorption spectrum by shining light of a particular color at a sample of chlorophyll suspended in water. The amount of light shone at the sample is compared with the amount that shines through the sample. This allows scientists to determine how much light the chlorophyll absorbed. The process is continued with different colors of light until data have been gathered on the entire visible spectrum.

The dashed line on the graph shows the rate of photosynthesis at various colors of light. This type of graph is called an action spectrum. Scientists obtain an action spectrum by shining light of a particular color on a plant and measuring and recording the rate at which the plant gives off oxygen. This process is also continued for the entire visible spectrum of light.

![Graph showing absorption and action spectra of chlorophyll](image)

1. What is the independent variable of this experiment?

2. What is happening to the rate of photosynthesis at the “peaks” (high points) of the graph?

3. What is happening to the rate of photosynthesis in the “valleys” (low points) of the graph?

4. If you were a horticulturist (a scientist that grows plants), which two colors of light bulbs would be the best choice to install in your greenhouses if you are trying to help your plants grow more quickly?

5. If you were a horticulturist, which two colors of light bulbs would be the worst choice to install in your greenhouses if you are trying to help your plants grow more quickly?

6. Predict the rate of photosynthesis of a plant grown in white light by placing an “X” on the graph. Will it be a high or low rate? Explain.