Here is a detailed lesson plan on Photosynthesis for Class 7, Tamil Nadu Board:

Lesson Title: Photosynthesis

Grade/Class: Class 7

Subject: Science

Board: Tamil Nadu

Objectives:

1. To explain the process of photosynthesis.
2. To describe the importance of photosynthesis.
3. To identify the factors affecting photosynthesis.

Introduction:

Have you ever wondered how plants grow and thrive in the environment? How do they produce their own food? The answer lies in a process called photosynthesis. Photosynthesis is the process by which plants, algae, and some bacteria convert light energy from the sun into chemical energy in the form of organic compounds, such as glucose.

The Process of Photosynthesis:

Photosynthesis occurs in specialized organelles called chloroplasts, which are present in plant cells. Chloroplasts contain a green pigment called chlorophyll, which absorbs light energy from the sun. The overall equation for photosynthesis is:

$6CO_2 + 6H_2O + \text{light energy} - C_6H_{12}O_6 \text{ (glucose)} + 6O_2$

The process of photosynthesis can be divided into two stages: Light-dependent reactions and Light-independent reactions.

Light-dependent Reactions:

In this stage, light energy is absorbed by pigments such as chlorophyll and converted into ATP and NADPH. This stage occurs in the thylakoid membrane of the chloroplast and requires light energy.

Light-independent Reactions (Calvin Cycle):

In this stage, the energy from ATP and NADPH is used to convert CO_2 into glucose. This stage occurs in the stroma of the chloroplast and does not require light energy.

Factors Affecting Photosynthesis:

1. **Light:** Light is the energy source for photosynthesis. Increasing light intensity can increase the rate of photosynthesis.
2. **Temperature:** The optimal temperature for photosynthesis is between 20-30degC. Higher temperatures can lead to a decrease in photosynthesis rate.**
3. **Water:** Water is the reactant for photosynthesis. A lack of water can limit photosynthesis.
4. **Carbon dioxide:** CO_2 is the source of carbon for photosynthesis. Higher CO_2 concentrations can increase the rate of photosynthesis.

Importance of Photosynthesis:

1. **Production of Food:** Photosynthesis produces glucose, which is used by plants to produce energy and develop.
2. **Oxygen Production:** Photosynthesis produces oxygen as a byproduct, which is released into the atmosphere.
3. **Supports Life:** Photosynthesis supports life on Earth by providing energy and organic compounds for other organisms.

Beyond the Textbook:

1. **C4 and CAM Plants:** Some plants, such as C4 and CAM plants, have adapted to survive in environments with limited water or CO2 availability. These plants have modified photosynthetic pathways to optimize their growth.
2. **Artificial Photosynthesis:** Scientists are working to develop artificial photosynthetic systems that can convert sunlight into chemical energy. This could potentially provide a sustainable source of energy.

Conclusion:

In conclusion, photosynthesis is the process by which plants, algae, and some bacteria convert light energy into chemical energy. It is a crucial process that supports life on Earth. Understanding the factors that affect photosynthesis can inform strategies for improving crop yields and developing sustainable energy sources.

Assessment:

1. Short-answer questions on the process of photosynthesis and its importance.

2. Essay question on the factors affecting photosynthesis.

3. Diagram-based question on the structure of chloroplast and thylakoid membrane.

Extension Activity:

Conduct an experiment to investigate the effect of light intensity on photosynthesis using a plant, a lamp, and a light meter. Measure the rate of photosynthesis under different light intensities and analyze the results.