Section 3: Photosynthesis in Detail

Study Guide A

Key Concept

Photosynthesis requires a series of chemical reactions.

Vocabulary

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| --- | --- |
| photosystem | ATP synthase |
| electron transport chain | Calvin cycle |

Main Idea: The first stage of photosynthesis captures and transfers energy.

 1. The function of the light-dependent reactions is to \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ energy.

 2. Photosystems are groups of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that capture and
transfer energy.

 3. The two molecules that carry energy to the light-independent reactions are \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_.

 4. Using the diagram on the next page, put each letter from the statements below into a box to show the seven steps of the light-dependent reactions.

a. ATP synthase produces ATP.

b. Chlorophyll (in the thylakoid membrane) absorbs energy from sunlight, and energized electrons enter the electron transport chain.

c. Energized electrons leave the electron transport chain and are used to produce NADPH.

d. Energy from electrons in the transport chain is used to pump hydrogen ions across the thylakoid membrane.

e. Hydrogen ions flow through a channel coupled to ATP synthase.

f. More energy is absorbed and transferred to electrons.

g. Water molecules are broken down. Oxygen is released as waste and electrons enter chlorophyll.

Study Guide A continued

Main idea: The second stage of photosynthesis uses energy from the first stage to make sugars.

 5. The Calvin cycle uses energy from the light-dependent reactions to convert \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into sugars.

Vocabulary Check

Circle the word or phrase that best completes the statement.

 6. The electron transport chain is a series of proteins / carbohydrates in the thylakoid membrane along which energized electrons travel.

 7. The first part of an enzyme’s name tells you about its function. All enzymes end with the suffix *-ase.* Therefore, ATP synthase is an enzyme that synthesizes / synchronizes ATP.

 8. The word cycle tells you that the chemical reactions of the Calvin cycle go from one to another with a beginning and an end / with no beginning or end.