

ACTIVE READING WORKSHEETS

PHOTOSYNTHESIS**The Calvin Cycle**

Read the passage below, which covers topics from your textbook. Answer the questions that follow.

The Calvin cycle has four major steps that occur within the stroma of the chloroplasts.

Step 1. CO_2 diffuses into the stroma from the surrounding cytosol. An enzyme combines each CO_2 molecule with a five-carbon carbohydrate called RuBP. The product is a six-carbon molecule that splits immediately into a pair of three-carbon molecules known as 3-PGA.

Step 2. Each molecule of 3-PGA is converted into another three-carbon molecule, G3P, in a two-part process. First, each 3-PGA molecule receives a phosphate group from a molecule of ATP. The resulting compound then receives a proton from NADPH and releases a phosphate group, producing G3P. In addition to G3P, these reactions produce ADP, NADP^+ , and phosphate. These three products can be used again in the light reactions to synthesize additional molecules of ATP and NADPH.

Step 3. One molecule of G3P is used to make organic compounds.

Step 4. Most of the G3P is converted back into RuBP in a complicated series of reactions. These reactions require a phosphate group from another molecule of ATP, which is changed into ADP. By regenerating the RuBP that was consumed in Step 1, the reactions of Step 4 allow the Calvin cycle to continue operating.

Read each question and write your answer in the space provided.

SKILL: Identifying Main Ideas

1. Summarize the main events that occur in each step of the Calvin cycle on the lines provided.

a. Step 1

b. Step 2

c. Step 3

d. Step 4

Read the question and write your answer in the space provided.

SKILL: Vocabulary Development

2. The prefix *cyto-* means “cell.” The suffix *-logy* means “study.” How does knowledge of these word parts help define *cytology*?

Circle the letter of the phrase that best completes the sentence.

3. If the RuBP consumed in Step 1 was not regenerated in Step 4 of the Calvin cycle, then
- a. CO₂ would stop diffusing into the stroma.
 - b. the cycle would speed up because of an increase in CO₂ molecules.
 - c. the plant cell would lack G3P molecules.
 - d. the plant cell would stop bonding carbon atoms from CO₂ into organic compounds.