Sugar Factory

Name: _____ **Period:** _____ **Date:** _____

Open **peebedu.com** and navigate to **Sugar Factory**. Click the **Let's Make Sugar!** button to begin. Read the introduction popup, which outlines six steps for producing glucose through light-dependent reactions, the Calvin cycle, and glucose synthesis.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: *Click "Water the Plant" and "Provide Sunlight & CO2" to generate molecules. Drag 2 H2O into the Thylakoid Membrane slots and click it to run the light reactions. Then drag 3 CO2, 3 ATP, and 2 NADPH into the Calvin Cycle slots, click the Calvin Cycle to produce G3P, drag 2 G3P into the Glucose Synthesis zone, and click it to produce glucose.*

(A) (1 pt) **Describe** the chemical reaction that cells use to build larger molecules from smaller molecular subunits.

(B) (1 pt) **Explain** why water is produced as a byproduct when smaller molecules are bonded together to form glucose.

(C) (1 pt) **Predict** how a decrease in available CO2 would affect the rate of glucose production by plants.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

> **Simulation Task:** *Complete one full cycle of the Sugar Factory — add water, provide sunlight and CO2, run the light reactions, the Calvin Cycle, and glucose synthesis. After producing glucose, answer the quiz question confirming glucose is a carbohydrate. Then repeat the cycle to accumulate at least 2 glucose molecules.*

(A) (1 pt) **Describe** the role of monosaccharides in the formation of complex carbohydrates.

(B) (1 pt) **Explain** why organisms store glucose as polysaccharides rather than as individual glucose molecules.

(C) (1 pt) **Represent** the molecular relationship between glucose monomers and a polysaccharide.

Draw your diagram here.

(D) (1 pt) **Explain** how a prolonged decline in glucose production by autotrophs could affect consumer populations at multiple trophic levels.

1.4.A.1