

Name _____

Date _____

Photosynthesis Virtual Experience

To answer the questions listed below, use **start a new Photosynthesis Interactive game** the found at <https://biomanbio.com/HTML5GamesandLabs/PhotoRespgames/photointeractivehtml5page.html>

Navigation Hints: double click on the buttons to enter each phase and use your arrow keys to navigate when necessary.



Leaf Anatomy

1. Where did you first pilot to? _____
2. Where did you pilot to next? These are the cells that are primarily responsible for doing photosynthesis. _____
3. This is the organelle that performs photosynthesis. _____
4. What are the green disks called where light-dependent reactions happen?

5. What is the fluid surrounding the green disks? This is where the light-independent Calvin Cycle takes place. _____

Light-dependent Reactions

Note: Drag and drop the substances as you go through the simulation.

1. Where do light-dependent reactions happen?
2. What are the steps of the light-dependent reactions?
 - a. _____ strikes _____ in Photosystem II which causes electrons to become excited and gain energy.
 - b. These excited electrons then begin to travel down the proteins of the _____
_____.
 - c. _____ is split to replace electrons lost by Photosystem II. _____ and _____ are also produced in the process.
 - d. The excited _____ continue their way down the Electron Transport Chain.
 - e. As the electrons travel, their energy is used to pump hydrogen ions (H^+) across the membrane into the thylakoid space. This results in a high concentration of H^+ in the _____ and a lower concentration in the _____.
 - f. The diffusion of H^+ ions through ATP synthase causes it to rotate. This rotation allows ATP synthases to join Phosphate (Pi) to ADP producing _____.
 - g. It will be used during the light-independent Calvin Cycle as an energy source to help produce _____.
 - h. Now back to the electrons...the electrons continue travel down the Electron Transport Chain to Photosystem I.
 - i. Light strikes _____ causing electrons to become excited & re-energized.
 - j. These electrons continue down a second _____.
 - k. These electrons are used to reduce _____ to form NADPH. _____ is an electron and H^+ carrier.
 - l. _____ carries the H^+ and electrons to the _____ where they will be used in the light-independent Calvin Cycle to make organic molecules like _____.
3. IN SUMMARY, the light-dependent reactions of photosynthesis make _____ and _____ that are used in the light-independent Calvin Cycle to make organic compounds like _____. Also, notice that the light-dependent reactions use _____ and make _____.

Light-independent Calvin Cycle

Note: Drag and drop the substances as you go through the simulation.

1. Where do the light-independent reactions of the Calvin Cycle take place?

2. What are the steps of the light-independent Calvin Cycle?
 - a. During carbon fixation, _____ (CO₂) is attached to ribulose biphosphate (RuBP) by the enzyme _____ in order to form two molecules of 3- phosphoglycerate (PGA) for each carbon dioxide (CO₂) added.

 - b. During the reduction phase, each molecule of _____ is reduced with the addition of H⁺ ions and electrons from NADPH to form G3P also known as PGAL (phosphoglyceraldehyde). This requires energy from _____.

 - c. PGAL is the final product of the light-independent Calvin Cycle. One molecule of _____ will leave the Calvin Cycle and be used to form organic compounds like _____, which is a simple sugar.

 - d. The other molecules of _____ are used to regenerate _____ so that the light-independent Calvin Cycle can continue. The chemical reactions that regenerate RuBP require energy to occur. This energy comes from _____.

 - e. The light-independent _____ can now start over again with carbon fixation. All molecules of NADP⁺ and ADP are recycled to the _____ to be reused in the light dependent reactions.

3. IN SUMMARY, the light-independent Calvin Cycle of photosynthesis makes _____. To do so it must use ATP forming _____ and NADPH forming _____. Also, notice that the light-dependent reactions use _____ gas.

SCORE SHEET

Please record your scores below.

Leaf Anatomy: _____%

Light-dependent Reactions: _____%

The Calvin Cycle (Light-independent reactions): _____%

Quiz: _____%