Plants (Photosynthesis)

Essential Question: What structures on plants help them survive? Why are plants essential to us and other animals?

Description: *Students will study and investigate the structure of plants that help them survive. Then students will then get an overview of photosynthesis and perform an experiment to show how it works.*

Standards:

4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Materials provided by classroom teacher classroom teacher:

- Spinach leaves (1 per student)
- Straws (1 per student)
- Clear plastic cups (1 per student)
- Baking soda
- Dish soap

Advanced Preparation for classroom teacher:

- If time, prepare the baking soda/water solution in advance.
- The solution is 1 teaspoon of baking soda to every 300 mL of water. Mix well.
    - Easier way to do it: Take an empty 2 L bottle, fill it with water, add 6 ¾ teaspoons of baking soda.
- Add in a drop of dish soap.
    - If you made the 2 L bottle, just add in 3 drops of dish soap.
- Gently mix the dish soap, trying not to create a lot of bubbles.

Program Connection Information

Please use an external microphone (conference style) rather than the integrated one in the computer for the audio for your class and locate it centrally in the room. It can be difficult for the Greenbush teacher to hear the students using the computer microphone and therefore it reduces the interactive nature of the lesson. It is fine to use the computer webcam for your video source though.

All classes will take place using Zoom desktop video. If your building is already set up to use a desktop video application with a computer, simply open a browser and enter https://greenbush.zoom.us/j/6913388482 in the URL space. You may need to download Zoom launcher software (free download) if you don't already have it. This needs to be done in advance of the lesson.

If using a Polycom video conferencing unit (or any legacy type video conferencing unit) to connect to a ZOOM conference, make sure the unit is in "encrypted mode" then dial the following IP on the internet: 162.255.37.11 or 162.255.36.11 and once connected, they will ask for a MEETING ID: enter 6913388482 (for Kenzie at Science Center).

It's always a good idea to touch base with your district technology facilitator prior to your program to make sure all systems/equipment are in place and operational and no firewalls that might prevent you from connecting to Zoom.

Once you connect, you will enter a Zoom waiting room. Your Greenbush teacher will admit you into the final meeting room.

Classes take place at the following times:

9:00-9:45
10:00-10:45
12:15-1:00
1:15-2:00
2:15-3:00

If you log in during one of those times, you may connect during another class' lesson. If you do, please check your connection to make sure things are working properly and then leave the meeting until your scheduled time by selecting "End Meeting" in the lower right corner of your Zoom screen and click on "End Meeting". You will need to rejoin the meeting at your scheduled time. This prevents your site from interfering with the lesson currently in progress. After your lesson is finished, please leave the meeting.

If you have questions, please call Kenzie Heatherly at Greenbush (620-724-6281).

Prior to the IDL lesson, please review these cooperative learning strategies. Due to social distancing, we will only practice partner communication to follow distancing guidelines.

Round Robin

Each member of the team takes a turn sharing orally with the team.

Rally Robin

With a partner, students take turns sharing brief oral responses.

Timed Pair Share

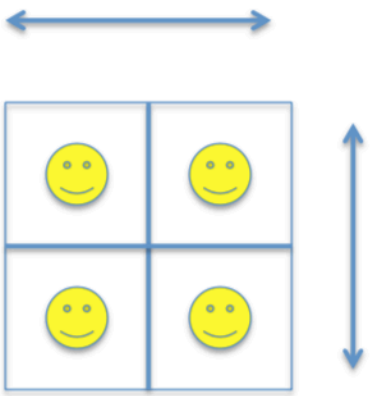
In pairs, students share with a partner for a predetermined time while the partner listens. Then partners switch roles.

Stand Up, Hand Up, Pair Up

Students move around with hands in the air and quickly find a partner with whom to share or discuss. Once students find a partner, they give each other a "high five" and stand together, ready for the next instructions.

More terms to know –

Shoulder Partner: The person sitting on the student's right or left.



Face Partner: The person sitting facing the student.

Photosynthesis Experiment

-Students will make their own cup to compare to my cup I make on the zoom.

- 1) Have the solution already made.
- 2) Pour the solution into the cups, just about a third of the cup.
- 3) Using the straw, cut out 10 leaf discs from the spinach leaves.
- 4) Talk about the solution, baking soda has carbon dioxide to just start photosynthesis. The soap helps dissolve the waxy, liquid-repelling coating on the leaves.
- 6) Put the leaf discs into your cup.
- 7) The students leaf disks are floating but in my cup they are sinking, why?
- Explanation: The leaves in the students cups still have oxygen that they have previously made stored in between their cells. The oxygen causes the discs to float. When I used the syringe, I was able to create a vacuum to pull out the air, so that the leaf discs did not have any leftover oxygen. This caused the discs to sink.

If you have access to a syringe or multiple syringes, you can do a more complex experiment with your students. The link below is a video showing it.
https://www.exploratorium.edu/snacks/photosynthetic-floatation

- 1) Have the solution already made.
- 2) Pour the solution into the cups, just about a third of the cup.
- 4) Using the straw, cut out 10 leaf discs from the spinach leaves.
- 5) Talk about the solution, baking soda has carbon dioxide to just start photosynthesis. The soap helps dissolve the waxy, liquid-repelling coating on the leaves.
- 6) Put the leaf discs into your cup.
- 7) The partner with the light cup will either put their cup in a window or under a lamp.
- 8) The partner with the dark cup with find something to cover up their cup to block out light. (Bowl, another cup, bag, anything that doesn't let light in)
- 9) When the experiment is started, set a timer for 15 minutes.
- 10) After the timer goes off, have the students bring the cups back to their desks and examine what happened.

- Explanation: The leaf discs in the light cup should have floated and the ones in the dark cup should have not. The leaves in the light were able to produce oxygen, which caused them to float to the top. The leaves in the dark were not able to perform photosynthesis, with no oxygen they don't float to the top.

For this extra experiment, you will need the following extra materials:

- Tape (just enough to label the cups 'light' and 'dark'
- Lamp (if you don't have a window in your classroom)
- Syringe/syringes