Appendix B

Plant Illustration Cards
   Leaf and Flower Card
   Seed Test Card
Setting Up Your Experiment
Photosynthesis Game, directions, board and pieces
The following illustrations show a sample of some of the plants you can find in the Aleutian/Pribilofs. Not all of these plants are found everywhere in this region. Nor are all plants in the region illustrated here.

The FLORA OF ALASKA illustrations (numbers 1-60) show a proportional scale. A 1/3 scale means, for example, that the drawing could be multiplied 3X and would show the plant at actual size.

Names are given in this order, alphabetized by species/genus:

Latin
Unangam Tunuu when available (UT page number from the Aleut Dictionary/Unangam Tunudgusii)
(common name, Unangam Tunuu)
Common name

This symbol, ☹ means the plant is considered very toxic. A range of toxic effects are known in some plants in this region. Never eat any unknown plant or berry. Be certain of the identity of a plant before you eat it. Taste a wild plant only under the supervision of a parent or a caregiver.

This symbol ☿ means this plant is recommended for use in ACTIVITY TWO, Section Three.

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Plant drawings 61-66 were provided by R. W. Tyler and used by permission.
Unangam Hitnisangin

**Achillea borealis**
Chngaatudaäch (UT 148)
Saahmikaadax W (UT 351)
(hairy, shaggy)
Northern yarrow

**Aconitum maximum**
Aanasnaadam ulaa E (UT 71)
Maamanuqidaäch W (UT 273)
(bumblebee’s house)
Monkshood

**Anemone narcissiflora**
Chišudangiix (aahmaaqiix) E (Golodoff)
Slukam aahmaaqi W (UT 369)
(seagull flower, white flower)
Narcissus-flowered anemone, May flower, white flower

**Angelica lucida**
Saaqdiigamax E (UT 353)
Saaqduäch W (UT 353)
Angelica, St. Paul Putchki, Wild parsnip

**Arctostaphylos uva-ursi**
Ulaqin E (UT 434)
Winterberry, kinnikinnick, bearberry

**Artemisia unalaskensis**
Sixsiqax (UT 358)
Wormwood
**Unangam Hitnisangin**

1. **Caltha palustris**
   - *Anim kangaa* (Golodoff)
   - *Lake top*
   - Marsh marigold, cowslip

2. **Campanula chamissonis**
   - *Kulukala* E (UT 248) [r]
   - *Kulukuli* W (UT 248) [r]
   - *Little bells*
   - Bluebell, harebell

3. **Campanula lasiocarpa**
   - *Kulukala* E (UT 248) [r]
   - *Kulukuli* W (UT 248) [r]
   - Bluebell, harebell

4. **Castilleja unalaschcensis**
   - *Aanisnaadam qahtungin* E (UT 71)
   - *Bumble bee’s favorite food*
   - Coastal paintbrush, honey flower

5. **Claytonia sibirica**
   - *Chiłtam chiqulqunagii* E (UT 139)
   - *Chiłtam aahmaaghii* W (UT 138)
   - *Rain flower in some places*
   - Spring beauty

6. **Cochlearia officinalis**
   - Scurvy grass, spoonwort
**Conioselinum chinense**
- **Chikigluux E (UT 141)**
- **Chikigux W (UT 141)**
- **Qalngaaqim saq(u)daa E (UT 353)**
  (raven’s parsnip)
  Hemlock parsley

×\( \frac{1}{3} \)

**Cornus suecica**
- **Aġđiikam aahmaaqi W (UT 37)**
  (Ptarmigan’s flower)
  Dwarf dogwood, bunchberry, Lapland or Swedish dwarf cornel

×\( \frac{1}{2} \)

**Empetrum nigrum**
- **Qaayum qaxkichluu E (UT 314)**
  (blackberry)
- **Aangsoox W (UT 90)**
- **Qaayux (UT 314)**
- **Kidnam qaayuu (UT 237)**
  (bush of moss)
  Crowberry, mossberry, blackberry

×\( \frac{1}{2} \)

**Dactylorhiza aristata**
- **Key flower, purple orchid**

×\( \frac{1}{3} \)

**Drosera rotundifolia**
- **Sundew**

×\( \frac{3}{4} \)
<table>
<thead>
<tr>
<th>Plant Illustration Cards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Epilobium angustifolium</strong></td>
</tr>
<tr>
<td><em>Kimliiya</em> E (UT 239)</td>
</tr>
<tr>
<td><em>Chikayaasi</em> W (UT 140)</td>
</tr>
<tr>
<td>Fireweed</td>
</tr>
<tr>
<td><strong>Eriphorum russeolum</strong></td>
</tr>
<tr>
<td><em>Tumgišiix</em> E (UT 406)</td>
</tr>
<tr>
<td><em>Lagim ichkuusiix</em> W (UT 170)</td>
</tr>
<tr>
<td>(land goose's [Canada goose] toilet paper)</td>
</tr>
<tr>
<td>Cotton flowers, cotton grass</td>
</tr>
<tr>
<td><strong>Geranium erianthum</strong></td>
</tr>
<tr>
<td><em>Chunusiix</em> E (UT 154)</td>
</tr>
<tr>
<td><em>Chuhnusiix</em> E &amp; W (UT 154)</td>
</tr>
<tr>
<td>Wild geranium, cranesbill</td>
</tr>
<tr>
<td><strong>Fritillaria camschatcensis</strong></td>
</tr>
<tr>
<td><em>Alugam kangaa</em> (UT 230)</td>
</tr>
<tr>
<td>(overground portion of)</td>
</tr>
<tr>
<td><em>Alugax</em> (UT 57)</td>
</tr>
<tr>
<td>(root bulb of)</td>
</tr>
<tr>
<td><em>Sarana</em> E (UT 353)</td>
</tr>
<tr>
<td>Stinky flower, chocolate lily, black lily</td>
</tr>
</tbody>
</table>
**Unangam Hitnisangin/Unangam Hitnisangis/Aleut Plants**

**PLANT ILLUSTRATION CARDS**

---

**Geum calthifolium**
- **Amiduŋ E** (UT 59)
- **Hamiduŋiış W** (UT 59)
- Avens

**Heracleum lanatum**
- **Saaqudaŋ E** (UT 353)
- **Taağan ‘giix W** (UT 384)
- **Putchki** (UT 353) [r]
- Cow parsnip, wild celery, putchki

**Geum calthifolium**
- **Amiduŋ E** (UT 59)
- **Hamiduŋiış W** (UT 59)
- Avens

**Honckenya peploides**
- **Isuğim aningin E** (UT 77)
- (hair seal's lupine root)
- Beach greens, scurvy grass, seabeach sandwort

---

**Iris setosa s.**
- **Nuusnučhuuđan E** (UT 285)
- (small scissors)
- **Umsutuudaŋ W** (UT 442)
- Iris

**Lathyrus maritimus**
- **Chugum aahmağii W** (UT 151)
- (sand flower)
- Purple beach pea, seaside pea

**Leptarrhena pyrolifolia**
- **Aliksiisiiŋ** (UT 54)
- Leather-leaved saxifrage

---

**124**
Leymus mollis, formerly known as Elymus mollis

Qugam cha[chhuu Attuan (UT 331)
Qugam chach[kuu W (UT 331)
(basket grass)
Wild rye, beach rye

Ligusticum scoticum

Qanisan (UT 309, 737)
Pitruuskin (UT 287) [r]
Beach lovage, wild parsley

Lupinus nootkatensis

Haniṅ E & Attuan (UT 77)
(lake)
Ahniṅ W (UT 77)
Lupine

Lycopòdium clavàtum

Qugam cha[chuu Attuan (UT 331)
Qugam chach[kuu W (UT 331)
(demon’s belt)
(devil’s apron)
Common club moss

Menyanthes trifoliata
Buckbean, bogbean

Mertensia maritima
Oysterleaf
### Unangam Hitnisangin/Unangam Hitnisangis/Aleut Plants

#### PLANT ILLUSTRATION CARDS

<table>
<thead>
<tr>
<th>Number</th>
<th>Image</th>
<th>Common Name</th>
<th>Scientific Name</th>
<th>English Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td><img src="image1" alt="Mimulus guttatus" /></td>
<td>Yellow monkey flower</td>
<td>Mimulus guttatus</td>
<td>Qaxatux E (UT 294) Kulukuunchikas W (UT 248) [r (little bells)]</td>
</tr>
<tr>
<td>38</td>
<td><img src="image2" alt="Papaver alaskanum" /></td>
<td>Alaska poppy</td>
<td>Papaver alaskanum</td>
<td>×½</td>
</tr>
<tr>
<td>39</td>
<td><img src="image3" alt="Pedicularis langsdorffii" /></td>
<td>Lousewort</td>
<td>Pedicularis langsdorffii</td>
<td>×½</td>
</tr>
<tr>
<td>40</td>
<td><img src="image4" alt="Phyllodoce aleutica" /></td>
<td>Aleutian heather</td>
<td>Phyllodoce aleutica</td>
<td>×3/3</td>
</tr>
<tr>
<td>41</td>
<td><img src="image5" alt="Plantago macrocarpa" /></td>
<td>Common plantain</td>
<td>Plantago macrocarpa</td>
<td>×½</td>
</tr>
<tr>
<td>42</td>
<td><img src="image6" alt="Platanthera dilatata" /></td>
<td>Bog candle, White orchid</td>
<td>Platanthera dilatata</td>
<td>×1/3</td>
</tr>
</tbody>
</table>
**Polygonum viviparum**
*E* (UT 146) (resembling fish eggs (tops))
*Qulunguchiisis* W (UT 335)
*Makaarisa* [r] (UT 272)
*Quguchuudux* (edible root of *E*) (UT 333)
Alpine bistort, knotweed

**Platanthera convallariaefolia**
*Chagitxa* W (UT 126) (white orchid)
Cornflower, green bog orchid

**Polystichum aleuticum**
Aleutian shield fern

**Potentilla**
*Sagaadada* E (UT 346) Cinquefoil

**Ranunculus bongardi**
*Chiitam chinguudgii* E (UT 138)
*Chiitam aahmaaggi* W (UT 138) (rain flower in some places)
Bongard buttercup

**Rhododendron camtschaticum**
Kamchatka rhododendron, moss rose
Rubus arcticus  L. 
ssp.stellatus (Sm.)

Hamax E (UT 61)
Haamachiyian (E 1834)
Aamchiyian (E 1909)
Aahmaadan (Golodoff:11/10/2000)
Nagoonberry

Rubus chamaemorus

Aqamdaq E (UT 95)
Quuniidas W (UT 337)
Cloudberry

Rubus spectabilis

Alagnaq E (UT 49)
Salmonberry

Rumex acetosella

Sheep sorrel

Rumex fenestratus

Aal(u)ngaayaq E (UT 58)
Aluungiqq W (UT 58)
Rhubarb, sorrel, sour dock

Salix arctica

Chuyaq E (UT 157)
Taguigungiq W (UT 382)
Arctic willow
**Saxifraga punctata**

(= *S. nelsonia D. Don*)

Cordate-leaved saxifrage, brook saxifrage

**Senecio pseudo-arnica**

*Aläğ um achidan alngaayuu E (UT 55)*

*Uxchuğaadaa* E (UT 417)

*Uxchuuda* W (UT 417)

Seabeach sunflower, ragwort

**Streptopus amplexifolius**

*Taangadgusin* E (UT 393)

*Taangachizas* W (UT 393)

(water container)

Watermelon berry, cucumber stalk, twisted stalk

**Vaccinium ovalifolium**

*Unignan* E (UT 445)

(also *Unigan* (Goldoff))

High bush blueberry

**Vaccinium uliginosum**

*Uğiidgin* E (UT 424)

Muğuzaalğı W (UT 278) [r]

Alpine blueberry, lowbush blueberry

**Vaccinium vitis-idaea**

*Kiika* E (UT 238)

*Tuyangis* W (UT 412)

*Itim  uğuu* (A also *Rubus stellatus* UT 218)

*Mlusniika* (UT 278) [r]

Lingonberry, low-bush cranberry, cowberry
**Cladina rangiferina**
(formerly Cladonia rangiferina)
Huquqluŋ W (UT 449)
It⟨aygim kidngaa E (UT 237)
Kigyam aliːγa Attuan (UT 237)
Reindeer moss

**Fucus sp.**
Kangadgiŋ (UT 231)
Kangadgim chuqii (UT 231)
(stalk of bladderwrack)
Bladderwrack, rockweed

**Nereocystis luetkeana**
Tmagiŋ (UT 399)
bull kelp

**Porphyra sp.**
Nori, laver, red laver, teal nori

**Alaria sp.**
Qahnguŋ W (UT 311)
Ribbon kelp

**Ulva sp.**
iiquŋ E (UT 210)
Ikluŋ W (UT 189)
Sea lettuce
### Leaf Arrangement:
1. Opposite: leaves in pairs at opposite sides of the stem.
2. Whorled: three or more leaves arranged wheel-like around the stem.
3. Alternate: leaves one above the other on opposite sides of the stem.
4. Basal: leaves at or near the bottom of the stem.

### Leaf margins (edges)
1. Toothed: when the indentations on the margin look like a saw.
2. Lobed: when the indentations on the margin are deeply cut.
3. Smooth or entire: when the margin of the leaf is not cut or toothed.

### Veins:
1. Pinnate: when the veins of about equal size lead off from the mid vein toward the margin.
2. Palmate: when the more prominent veins radiate from a point at or near the base of the leaf.
3. Parallel: when the veins of about equal size extend from the base to the tip.

### Parts of a typical flower
1. Petals - delicate colored parts.
2. Sepals - protect the flower.
3. Stamen - the male part of the flower that produces pollen.
4. Pistil - the female part of the flower that produces seeds.
APPENDIX PLANT CARDS

SEED TEST CARD
Investigate one or more of your seeds using these tests:
Wind test: Hold the seed in the air and let it drop. If it drifts, it shows how a seed can travel by wind.

Water test: Drop seeds into a cup of water, and stir. The ones that float show how seeds can travel by water.

Hitchhiker test: Put a stuffed animal on top of each seed. Press down, then lift up the animal. The seeds that stick show how seeds can travel by sticking to an animal.

SEED TEST CARD
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### EXPERIMENT FORM

**SETTING UP YOUR EXPERIMENT**

1. What do (did) you observe?

2. What are you asking about what you observe(d)?

3. Idea (hypothesis) you are testing: What is your idea about an answer for your question?

   The Hypothesis is an educated guess based on background knowledge.

   (will happen)  (must have a reason)

4. a. What variable will you change in your experiment?

   b. What will remain constant in your experiment?

5. Make a sketch of the set-up for your experiment. Label all materials and state all conditions. List the materials you need.

   **Materials needed:**
Unangam Hitnisangini
Unangam Hitnisangis/Aleut Plants

APPENDIX: EXPERIMENT FORM

a. What specific things will you observe?

b. What measurements will you make?

c. What plan do you have for recording your data? (Data may be reported using various methods such as pictures, words, charts and graphs)

7. Sketch a sample data table for your experiment.
   For example:

8. Do the results of the experiment support your idea (hypothesis)? Did you answer the question? Conclusions:
   My hypothesis was ________ because ________.
   (correct or incorrect)  (reason relating to hypothesis)

Was this a FAIR TEST? (did only one thing get tested at a time?) Why or why not? (What, if anything, would you change to make your results more valid?)

Can you repeat this experiment at least 3X? Why or why not?
**SETTING UP YOUR EXPERIMENT:** SAMPLE COMPLETED FORM BASED ON “DIRTY A SOCK.”

1. What do (did) you observe?
   *We observed dirt and mud being collected on the socks/boots*

2. What are you asking about what you observe(d)?
   *Will the seeds we collected with our socks/boots grow when we plant them?*

3. Idea (hypothesis) you are testing: What is your idea about an answer for your question?
   *The seeds we collected will grow if they have a dormant period (have been frozen and thawed).*
   The Hypothesis is an educated guess based on background knowledge.
   *I think the frozen seeds will grow because they will have a dormant/inactive period.*

4. a. What variable will you change in your experiment?
   *Freezing and thawing: temperature*
   b. What will remain constant in your experiment?
   *Water and oxygen*

5. Make a sketch of the set-up for your experiment. Label all materials and state all conditions. List the materials you need.

---

**Materials needed:**
- wild seeds
- planting container
- water
- freezer
- ruler
- soil
- plastic food wrap
- measuring cup

An identical container has been set up with another sock. It is labeled SOCK B. SOCK B was put in a freezer on the day it was planted and removed periodically. On the 8th day after planting, it was left outside the freezer.
APPENDIX: EXPERIMENT FORM

6. During the experiment (Procedure):
   a. What specific things will you observe?
      *Germination and growth of the collected seeds*
   b. What measurements will you make?
      *Numbers of plants*
      *Size of plants*
   c. What plan do you have for recording your data? (Data may be reported using various methods such as pictures, words, charts and graphs)
      *Graph of number of plants recorded daily*
      *Chart of plant height*

7. Sketch a sample data table for your experiment.
   For example:

   ![Data Table Diagram]

   **SOCK B**
   Number of plants
   AUGUST 1, 2, 3, 4, 5, 8, 9,10,11,12,15,16,17,18,19,22,23,24,25,26
   **SOCK A**

8. Do the results of the experiment support your idea (hypothesis)? Did you answer the question? Conclusions: *Too soon to know*
   My hypothesis was ____________ because ________________________.
   (correct or incorrect) (reason relating to hypothesis)

9. Was this a FAIR TEST? (did only one thing get tested at a time?) Why or why not?
   (What, if anything, would you change to make your results more valid?)

10. Can you repeat this experiment at least 3X? Why or why not?
The Leaf Food Factory

You are the chemical messengers in a plant leaf.

Your job is to collect the atoms needed to make food for the plant. The food for the plant is a simple sugar. To make the simple sugar,

- you need 6 carbon atoms (\(\text{C}\))
- and 12 hydrogen atoms (\(\text{H}\))
- and 6 oxygen atoms (\(\text{O}\)).

You collect these atoms of carbon, hydrogen and oxygen in water molecules (\(\text{H}_2\text{O}\)) and carbon dioxide molecules (\(\text{CO}_2\)).

You also need 6 units of sunlight to complete the chemical change from water and carbon dioxide to sugar.

**TOTAL NEEDED TO COMPLETE THE GAME:**

- 6 units of sunlight
- AND
  - 6 molecules of water (\(\text{H}_2\text{O}\))
  - WHICH = 12 atoms of hydrogen
  - and 6 atoms of oxygen
- AND
  - 6 molecules of carbon dioxide (\(\text{CO}_2\))
  - WHICH = 6 atoms of carbon and 12 atoms of oxygen.
The winning combination: \( \text{C}_6\text{H}_{12}\text{O}_6 \).

This is the chemical formula for the simple sugar molecule that is the basic food for the plant.

You cannot make a sugar molecule unless you also have one unit of sunlight for every water molecule and carbon dioxide molecule. That means you will need 6 water molecules and 6 carbon dioxide molecules and 6 sun units to make one sugar molecule. You must have sunlight to make the chlorophyll in the leaf excited about doing its photosynthesis. When you have all 6 units of sunlight, you can change the water and carbon dioxide molecules into the sugar you need for your food—and for the food for all the rest of the animal world.

Your job is critical to all animal life on the planet. You are the food producer. All the animals, including the humans, rely on you to survive. You must succeed.

Perhaps you already know about **molecules** and **atoms**. Just in case you have forgotten, here is a brief reminder.

The atom is one of the basic units of matter. Everything around us is made up of atoms. An atom is very tiny—more than a million times smaller than the thickness of a human hair! Atoms are the building blocks of the simplest elements, such as **hydrogen**, **oxygen**, and **carbon**.

Molecules are more complex than atoms and are made of two or more linked atoms. Water, for example, is a molecule made of two atoms of hydrogen linked to one atom of oxygen. Oxygen is an atom and it is also a molecule. The oxygen in the air we breathe is actually two oxygen atoms linked together. That is why it has the **chemical formula** \( \text{O}_2 \).

Scientists use chemical formulas to show atoms connected into molecules. For example, a water molecule is made from 2 hydrogen atoms and one oxygen atom. Its chemical formula is written \( \text{H}_2\text{O} \). The chemical formula \( \text{CO}_2 \) represents carbon dioxide.

Atoms link together in molecules through strong attractive forces called **bonds**. For example, in this illustration, the lines stand for the bonds between the atoms. These atoms are combined to make a simple sugar called glucose. Count the atoms and see how this illustration compares to the chemical formula for the simple sugar in this game: \( \text{C}_6\text{H}_{12}\text{O}_6 \).
RULES:
Each board can hold 4 players. Each player should provide a playing piece. Playing pieces can be coins, rings, nuts, small bottle caps, stones or other small objects. Put the playing pieces on the START space.

Arrange the atoms:
Each player begins with 3 molecules of water (H₂O) and 3 molecules of carbon dioxide (CO₂). How many atoms total is that?

<table>
<thead>
<tr>
<th>H</th>
<th>O</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

Each player should organize his/her atoms into molecules of water (H₂O) and carbon dioxide (CO₂).

- Put all the remaining H and 1/3 of the O in the water resources box.
- Put all the remaining C and 2/3 of the O in the air resources box.
- Put the units of sunlight in the light box.

Stack the challenge cards, question sides up, on the challenge space on the board.

Set the die by the board.
Roll a die to see who goes first. The highest number goes first. For each move, roll the die and move the number of spaces shown.

Each space on the board has directions. Some directions ask you to collect water molecules or carbon dioxide molecules, and some directions tell you to give up your water or carbon dioxide. Other directions tell you to select a challenge card or allow you to trade your molecules and units of sunlight.

CHALLENGE CARDS: When you land on a space that says “Time for a Challenge Card,” you must draw a card from the Challenge Card stack. Read the question aloud and then answer the question. After you have answered, turn the card over and read the correct answer. If you answered correctly, you may collect one unit of sunlight. If you answered incorrectly, you must sacrifice one unit of sunlight or one set of atoms that make a water molecule AND one set of atoms that make a carbon dioxide molecule. (You will return the unit of sunlight to the light box OR put 2 Hydrogen atoms and one oxygen atom—H₂O—in the water resources box AND you will put one carbon atom and 2 oxygen atoms—CO₂—in the air resources box.) Put the used Challenge Card under card stack so it can be used again.

When you land on a BALANCE SPACE, you may trade your resources. You may trade as much as you want any time you land on a BALANCE SPACE, but you are NOT REQUIRED to make a trade. If you do make a trade:

- one unit of sunlight = one H₂O AND one CO₂
- one unit of sunlight = two H₂O
- one unit of sunlight = two CO₂
- one CO₂ = one H₂O

The first player who finishes receives a primary food-maker reward, and then helps the other players complete their collection. All players continue until all players have completed their collection and made a simple sugar.
AIR COMMAND CENTER
Collect 2 molecules of carbon dioxide (CO₂).

CHLOROPHYLL COMMAND CENTER
Collect 2 units of sunlight.

Time for a CHALLENGE CARD.
If you answer correctly, you win double. If you answer incorrectly, you lose double.

The water level is good in the xylem. Collect 2 molecules of water (H₂O).

Night is coming. Low light levels. Go back 2 spaces.

It has rained. Hooray. Water is flowing up the xylem. Collect 2 molecules of water (H₂O).

OOPS. Some insects are eating on your leaf and have ruined many stomata. Return one molecule of carbon dioxide (CO₂) to the Air Resources Box.

Go directly to the CHLOROPHYLL COMMAND CENTER and collect 2 units of sunlight.

Air Command Center
Collect 2 molecules of carbon dioxide (CO₂).

Balance Space

Balance Space
You have learned that there is no water coming from the roots. Return one molecule of H₂O to the Water Resources Box.

The xylem are clogged by insects. No water is getting through. Return one molecule of H₂O to the Water Resources Box.

A little creature took a bite out of your stem. You have lost some of the important xylem and phloem tubes. Go back 3 spaces.

There has been a volcanic eruption. Your leaf is covered in ash. Your stomata are closed tight. Return 2 molecules of CO₂ to the Air Resources Box.

WATER COMMAND CENTER
Collect 2 molecules of water (H₂O).

You have learned that there is no water coming from the roots. Return one molecule of H₂O to the Water Resources Box.

Time for a CHALLENGE CARD. If you answer correctly, you win double. If you answer incorrectly, you lose double.

Each time you pass Start, collect one unit of sunlight.
### APPENDIX

<table>
<thead>
<tr>
<th></th>
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<th>O</th>
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</table>

The table represents a pattern of symbols, possibly indicating different types of plants or other classification.
<table>
<thead>
<tr>
<th>CHALLENGE CARD 1</th>
<th>QUESTION: What plant food ingredient comes into the leaf through the stomata?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHALLENGE CARD 7</td>
<td>QUESTION: What animals depend on the food the plants produce?</td>
</tr>
<tr>
<td>CHALLENGE CARD 2</td>
<td>QUESTION: What is the name of the tubes that carry water from the roots to the leaf?</td>
</tr>
<tr>
<td>CHALLENGE CARD 8</td>
<td>QUESTION: What is the chemical formula for a simple sugar?</td>
</tr>
<tr>
<td>CHALLENGE CARD 3</td>
<td>QUESTION: What is the name of the tubes that carry food (simple sugars) from the leaves to the rest of the plant?</td>
</tr>
<tr>
<td>CHALLENGE CARD 9</td>
<td>QUESTION: What is the name for the mouth-like pores that open to let in carbon dioxide ($CO_2$) and let out oxygen ($O$) and water ($H_2O$)?</td>
</tr>
<tr>
<td>CHALLENGE CARD 4</td>
<td>QUESTION: In addition to giving strength to the leaf’s structure, what do the veins do in the leaf? (2-part answer)</td>
</tr>
<tr>
<td>CHALLENGE CARD 10</td>
<td>QUESTION: What is the name of the food transportation tube of the plant’s main plumbing system?</td>
</tr>
<tr>
<td>CHALLENGE CARD 5</td>
<td>QUESTION: What does chlorophyll do in the leaf?</td>
</tr>
<tr>
<td>CHALLENGE CARD 11</td>
<td>QUESTION: What is left over when water and carbon dioxide are changed through photosynthesis into a simple sugar?</td>
</tr>
<tr>
<td>CHALLENGE CARD 6</td>
<td>QUESTION: What happens to the food the leaf produces? Fill in the blank. The plant uses the food or _____________ it for later use.</td>
</tr>
<tr>
<td>CHALLENGE CARD 12</td>
<td>QUESTION: What is the name for the chemical change of the sun’s light energy into food in the plant?</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
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<td>----------</td>
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</tr>
<tr>
<td>1</td>
<td><strong>Carbon dioxide</strong> is the plant food ingredient that comes into the leaf through the stomata.</td>
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<tr>
<td>2</td>
<td>The tubes that carry water from the roots to the leaf are named <strong>Xylem</strong>.</td>
</tr>
<tr>
<td>3</td>
<td>The tubes that carry food (simple sugars) from the leaves to the rest of the plant are named <strong>Phloem</strong>.</td>
</tr>
<tr>
<td>4</td>
<td>The veins (a.) carry food and (b.) carry water.</td>
</tr>
<tr>
<td>5</td>
<td>Chlorophyll <strong>traps and packages the sun's energy</strong>.</td>
</tr>
<tr>
<td>6</td>
<td>The plant uses the food or <strong>stores</strong> it for later use.</td>
</tr>
<tr>
<td>7</td>
<td><strong>All animals</strong> depend on the food the plants produce.</td>
</tr>
<tr>
<td>8</td>
<td>The chemical formula for a simple sugar is $C_6H_{12}O_6$.</td>
</tr>
<tr>
<td>9</td>
<td>The name for the mouth-like pores that open to let in carbon dioxide ($CO_2$) and let out oxygen (O) and water ($H_2O$) is <strong>stomata</strong>.</td>
</tr>
<tr>
<td>10</td>
<td>The name of the food transportation tube of the plant's main plumbing system is <strong>phloem</strong>.</td>
</tr>
<tr>
<td>11</td>
<td>Oxygen is leftover when water and carbon dioxide are changed through photosynthesis into a simple sugar.</td>
</tr>
<tr>
<td>12</td>
<td><strong>Photosynthesis</strong> is the name for the chemical change of the sun's light energy into food in the plant.</td>
</tr>
<tr>
<td>CHALLENGE CARD 13</td>
<td>QUESTION: What is the chemical formula for a water molecule?</td>
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<tr>
<td>CHALLENGE CARD 14</td>
<td>QUESTION: What is the chemical formula for carbon dioxide?</td>
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<tr>
<td>CHALLENGE CARD 15</td>
<td>QUESTION: What is the chemical formula for the oxygen in the air we breathe?</td>
</tr>
<tr>
<td>CHALLENGE CARD 16</td>
<td>QUESTION: Oxygen is the name for a molecule and an atom. True or false?</td>
</tr>
<tr>
<td>CHALLENGE CARD 17</td>
<td>QUESTION: Make up a question about photosynthesis to ask one other player. You can look at your background information on photosynthesis to help you. If s/he gives the correct answer, you both win. If s/he gives the incorrect answer, the other players win. No cheating!</td>
</tr>
<tr>
<td>CHALLENGE CARD 18</td>
<td>QUESTION: Make up a question about photosynthesis to ask one other player. You can look at your background information on photosynthesis to help you. If s/he gives the correct answer, you lose. If s/he gives the incorrect answer, you win. No cheating!</td>
</tr>
<tr>
<td>CHALLENGE CARD 19</td>
<td>QUESTION: Name one of the two main substances that come out of the leaf through the stomata.</td>
</tr>
<tr>
<td>CHALLENGE CARD 20</td>
<td>QUESTION: Animals cannot make their own food. True or false?</td>
</tr>
<tr>
<td>CHALLENGE CARD 21</td>
<td>QUESTION: The main food factories in plants are the flowers. True or false?</td>
</tr>
<tr>
<td>CHALLENGE CARD 22</td>
<td>QUESTION: The reverse of photosynthesis in a plant is respiration. True or false?</td>
</tr>
<tr>
<td>CHALLENGE CARD 23</td>
<td>QUESTION: A leaf has only a few stomata. True or false?</td>
</tr>
<tr>
<td>CHALLENGE CARD 24</td>
<td>Question: Plants cannot move at all! True or False?</td>
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**APPENDIX GAME**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tr>
<td>13</td>
<td>ANSWER: the chemical formula for a water molecule is $H_2O$.</td>
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<tr>
<td>14</td>
<td>ANSWER: The chemical formula for carbon dioxide is $CO_2$.</td>
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<td>15</td>
<td>ANSWER: The chemical formula for the oxygen in the air we breathe is $O_2$.</td>
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<td>16</td>
<td>ANSWER: True: Oxygen is the name for a molecule and an atom.</td>
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<td>17</td>
<td>DID YOU GIVE THE CORRECT ANSWER?</td>
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<td>18</td>
<td>DID YOU GIVE THE CORRECT ANSWER?</td>
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<td>19</td>
<td>ANSWER: One of the two main substances that comes out of the leaf through the stomata is <strong>oxygen</strong>. OR ANSWER: One of the two substances that comes out of the leaf through the stomata is <strong>water</strong>.</td>
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<td>20</td>
<td>ANSWER: It is <strong>true</strong> that animals cannot make their own food</td>
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<tr>
<td>21</td>
<td>ANSWER: It is <strong>false</strong> that the main food factories in plants are the flowers. Leaves are the main food factories.</td>
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<td>22</td>
<td>ANSWER: It is <strong>true</strong> that the reverse of photosynthesis in a plant is respiration.</td>
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<td>23</td>
<td>ANSWER: It is <strong>false</strong> that a leaf has only a few stomata.</td>
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<tr>
<td>24</td>
<td>ANSWER: It is <strong>false</strong> that a leaf cannot move at all. Leaves move to take advantage of the best light.</td>
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