Biology

L1 Entry Event: Taxes and Bans

Entry Event Goal: Have students start thinking about the impact that taxes/bans could have on human behavior.

<u>Directions for Teacher:</u>
Put each issue on an index card or small piece of paper and give each pair or group a different issue. Have students quickly research issue to figure out the general idea and then brainstorm and research the different perspectives and or effects of their assigned issue--economic, social, political, and/or scientific. Students divide up the work in their group (One focuses on economic effects, one on social and so forth) and then share out what they found to create a bigger picture. Share out is very informal and we know that it will not be a complete picture of the issue because of their time limitations. They should use evidence from as many of the perspectives as they can when formulating an argument for or against the policy. They should also attempt to answer the question: Does the policy affect behavior?

Possible taxes/bans to use:

- Plastic bag ban
- Styrofoam ban
- Smoking ban
- Cigarette tax
- Alcohol timeframe ban
- Location of gambling facilities
- Bans on dog breeds
- Taxes on lottery winnings
- Marijuana tax
- Violent video game tax

Biology

Teacher Instructions for Timeline of Food Regulations

Goal: Students will explore scientific, social, political, and economic dimensions of the issue of a fat tax, by investigating historic trends in government promotion of health and nutrition. **Note: The information students collect today will be used as evidence later in the unit when they are asked to argue for or against a fat tax.*

Part 1:

In small groups have students choose one of the following nutrition guidelines promoted by the U.S. government.

- Basic 7
- Basic 4
- My Pyramid
- WIC
- Philadelphia Soda Tax
- SNAP
- Healthy Hunger Free Kids Act
- Food Guide Pyramid
- My Plate
- US Dietary Guidelines

On green paper have students summarize the guideline their group chose. It should include:

- Date it was implemented
- Summary of what it intended
- Summary of what it promoted and what it discouraged
- Sources used

Have the students place the paper on the timeline (based on the date of implementation). As a class discuss the following questions:

- Where did you find resources? How did you determine if they were to be trusted?
- What was interesting or surprising about the recommendations you researched?
- What was interesting or surprising about the other recommendations on the timeline?
- What patterns or trends do you see in the recommendations?
- Do these patterns or trends tend to make you support or oppose a fat tax? Why?

Part 2:

Have the students (in the same small groups) choose one international food related event to explore:

- World War 1
- Dust Bowl
- Diet-Heart Hypothesis
- 7 Countries Study
- McGovern Committee
- Green Revolution
- World War 2
- Norwegian Butter Crisis
- Noakes Trial

On blue paper have the students summarize the event your group chose. It should include:

- Date it was implemented
- Summary of what it intended
- Summary of what it promoted and what it discouraged
- Sources used

Now have students examine their issue from different perspectives, ask them to write a summary of how each perspective interpreted the issue. Have them place the different summaries on corresponding colors of paper.

Perspective:	**Paper Color:**
Political	Pink
Scientific	Red
Economic	Orange
Social	Yellow
Other	Lavender

Ask the students to place the different colored papers under the appropriate date on the timeline. Then address the following questions as a class:

- Were the types of sources used to explore these events different than the ones you used for the U.S. regulations? If yes, in what way?
- How do you think other historical events influenced the event you researched?
- What trends do you see in regulations and events concerning food and health?
- Do these patterns or trends tend to make you support or oppose a fat tax? Why?

Energy Budget Virtual Lab

**Students will need access to their 7-day food log, assigned in Lesson 1. It might be helpful to have copies of a sample food log for those students who don't bring one, so that they are still able to complete this part of the unit.*

Goal: Students will be able to

- Describe the relationship between food intake and exercise output, in terms of an energy budget.
- Explain how a person's choices about what and how much to eat, and how much to exercise can lead to imbalances in the person's energy budget.
- Explain how imbalances between a person's energy intake and energy output can result in changes in the person's body weight.

**See the Student Handout for Instructions for the Virtual Lab*

As students complete the lab, guide them to make sense of the relationships between: energy and calories; energy/calorie intake and energy/calorie output; and energy budgets and dietary choices. Through the virtual lab activity, help them to arrive at these concepts (*Note that the italicized information is intended as background information for teachers and may exceed what students should be expected to know)*:

- **A calorie is a unit of energy.**
- The body requires a specific amount of energy (often measured in calories) to perform basic life processes. We refer to these processes collectively as **metabolism**.
- **Metabolic energy requirements vary** among people, and vary over time for the same person. This is because the amount of energy for basic life processes depends upon many factors, which vary from person to person (e.g., height, gender, age, and body shape), and many of which change frequently (air temperature, eating & digestion, etc.).
- For any person, these metabolic energy requirements can be estimated as a value (often measured in calories) called the **Basal Metabolic Rate (BMR**). *Most common estimations of BMR are calculated using a person's height, age, weight, and gender. A more accurate (though more difficult and expensive) way to estimate BMR can be calculated using measurements of O_2 and CO_2 from a person's breath.*
- Although some activity requires more energy than others (e.g., running requires more than studying) **ALL activity (even sleep) requires energy (calories), which comes from the food we eat**.
- When determining how many calories we should eat to supply our energy needs, we must **estimate our BMR and add the amount of energy needed for activities that we routinely do. That number is the real number of calories in our energy budget**.
- **Different macromolecules have different energy densities (measured as calories per gram).** A 1-gram portion of pure carbohydrate contains approximately 4 calories of energy, and the same can be said for protein. 1 gram of pure Lipids (dietary fats) contain approximately 9 calories. *This is the reason that fats are said to be more "calorie dense" than calories and protein, although foods high in any of these macromolecules also tend to offer different levels of satiety.*
- **Choosing what to eat involves more than simply balancing an energy budget**. What is important is not simply how many calories or macromolecules we eat. Foods are combinations of macromolecules (and also contain many other valuable

components such as vitamins, minerals, antioxidants, and fiber). These combinations are digested at different rates and are used for different purposes. Some of our food supplies our energy needs, while some of it is used build structures in our body's cells, and to keep cellular activities running smoothly and properly.

- Macromolecules that we eat (carbohydrate, protein, and fat) get taken apart in the body before we can use them. Some of what we eat provides the energy needed to supply our BMR and to support our activity throughout the day, and some gets used to build structures for our cells. **When we take in more calories of food energy than we need for these purposes, we have an energy excess**. Our bodies reassemble the broken-down macromolecules into forms that allow it to store energy for later. Our bodies store energy as glycogen (a carbohydrate for short term energy storage) or lipids (for longer-term energy). This is how we gain body fat.
- **When we use more energy than we take in from the food we eat during the day, we have an energy deficit.** Our bodies are able to make up for this deficit by breaking down the reassembled lipids it has stored as body fat. This is how we lose body fat.
- Eating more than we use, or using less than we eat, leads to weight gain. On the other hand, eating less than we use, or using more than we eat, leads to weight loss. **The key to maintaining a healthy weight is eating and using the same amounts of energy.**

Modelling Photosynthesis and Cellular Respiration

GRADE LEVELS	5^{th} – 10^{th}
SUBJECTS	Life Sciences; Physical Sciences
DURATION	Preparation: 1 hour; Activity: 1 hour
SETTING	Classroom

Objectives

Through this kinesthetic model, students will learn:

1. that plants need carbon dioxide, water, and sunlight to carry out photosynthesis.
2. that photosynthesis produces sugar molecules that store energy.
3. that plants and animals can use that energy after breaking apart the sugar molecules through cellular respiration.
4. that plants exchange gasses through the stomata and land vertebrates exchange gasses through the lungs.

Materials

egg cartons (6 per group)
ping-pong balls (36 per group)
"energy tokens" (24 per group)
three signs, one that says "stomata", one that says "stem", and one that says "lungs"

Teacher Background

Photosynthesis is an essential process in plants. Through this process, energy from light is converted into a form that can be used by the plant. The energy is stored in sugar molecules. Animals (including humans) are not able to make this conversion, so we depend on plants to provide energy in a form that our bodies can use.

Plants take in water through the roots and carbon dioxide (CO_2) through the **stomata**. A pigment called chlorophyll, found in green parts of the plant such as leaves and green stems, captures energy from the sun. All three of these components—water, CO_2, and light—are required in order for photosynthesis to occur. Oxygen is produced as a waste product.

Cellular respiration is also an essential process, and takes place in all living things. Through this process, large molecules, such as the sugar molecules produced by photosynthesis, are broken down so that the energy stored within them can be used by the organism. Oxygen is required in order for this to occur, and CO_2 and water are produced as waste products.

Since both plants and animals do cellular respiration, they both need to take in oxygen from the air and release CO_2 and water into the air. In plants, this occurs through the stomata. In land vertebrates (like humans) this happens through the lungs. (Other animals have other methods, like gills, tracheoles, etc.)

In this activity, students will act out both processes (photosynthesis and cellular respiration), providing a tangible illustration of what components are needed for each process, as well as what the waste products are.

Preparation

Teacher Tip: *Gathering and preparing these materials will be time-consuming the first time you do the activity. However, all of the materials can easily be stored and reused year after year. See page 7 for pictures of the complete set-up!*

1. **Determine how many groups you will have.** Each group will need 4 – 6 students. (If you are short on supplies, groups as large as 8 students could work.) You will need 36 ping-pong balls, 24 energy tokens, and 6 egg cartons for each group.

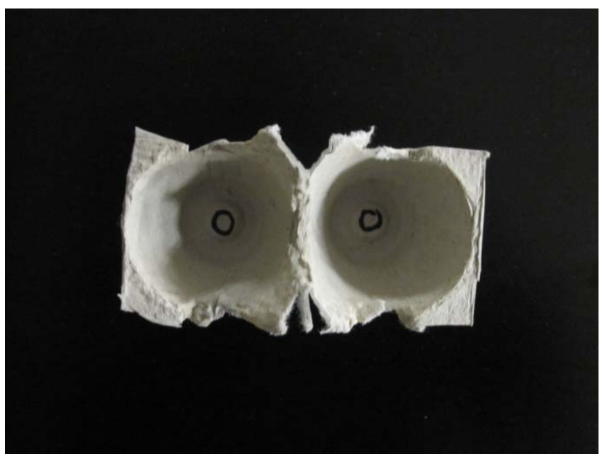
2. **Prepare ping-pong balls.** These will represent carbon, hydrogen, and oxygen atoms. Use a sharpie to label the ping-pong balls. For each group of students, you will need 6 balls labeled “C”, 12 balls labeled “H”, and 18 balls labeled “O.”

3. **Collect egg cartons.** These will be used to structure the molecules that students will be constructing. (Ask students to bring in egg cartons from home for a few weeks before the activity to help collect enough.) You will need 6 egg cartons for each group.

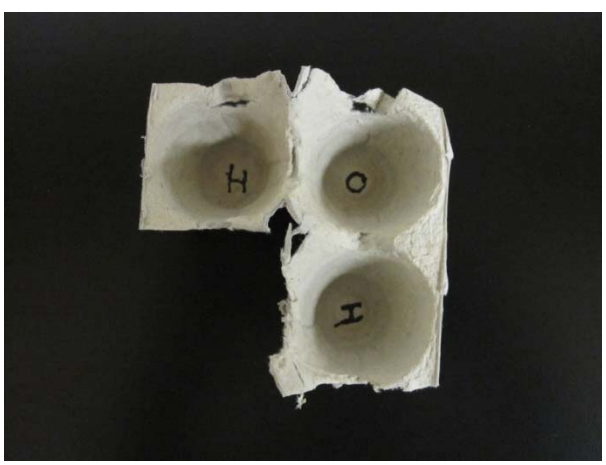
4. **Prepare the egg cartons.** Cut the egg cartons apart into the shapes shown. These shapes will “frame” the molecules that students will assemble. Label the inside of each compartment to show what atom should be placed in it. Note that the shapes of the O_2, CO_2 and H_2O frames are roughly accurate; however, the shape of the sugar molecule is greatly simplified.

Each group needs 6 CO_2 frames:

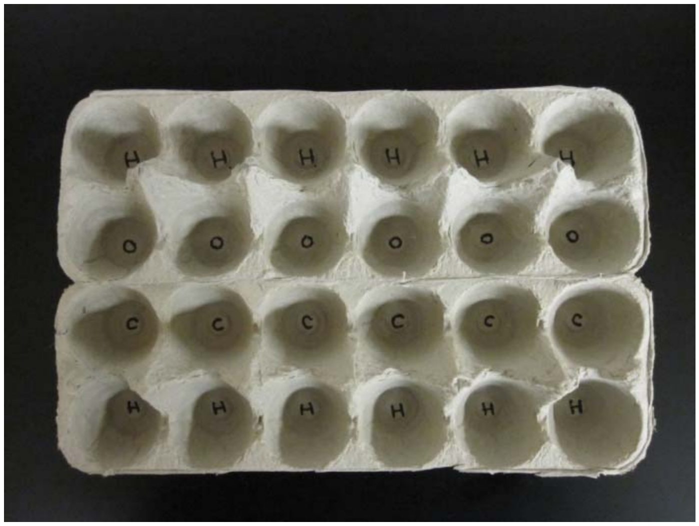
Oxygen in the atmosphere is normally found in the form of O_2 (two oxygen atoms bonded together). Each group needs 6 O_2 frames:



Each group needs 6 H_2O frames:



The sugar (glucose) produced by photosynthesis is made of 6 carbons, 12 hydrogens, and 6 oxygens. Each group needs one sugar frame:



5. **Prepare "energy tokens."** These should be small squares of paper or cardstock (about 2 inches by 2 inches is ideal). Each group of students will need at least 24 energy tokens. Prepare them for the simulation start by folding in half to represent "light energy."

6. **Post signs in the classroom.** These label areas for the simulation. The door will be the "STOMATA" and the sink (or a place of your choice) will be the "STEM".

7. **Prepare filled H_20 and $C0_2$ "molecules."** As you describe the simulation to your students, you'll place the water near the sink, the carbon dioxide in the hallway, and the empty oxygen frames in the hallway, too.

Part One: Photosynthesis

Your Task: Build a sugar molecule in a leaf cell!

Review (or introduce) some necessary prior knowledge:

1. Review (or introduce) the term **photosynthesis**. This is the process that plants use to get energy (whereas humans and other animals get energy by eating food). Through photosynthesis, plants create sugar molecules that store energy for them to use later. Some of the sugar molecules become part of the structure of the plant in the form of cellulose.
2. Have students discuss with a partner what they think plants need in order to do photosynthesis. Let them brainstorm ideas, then tell them they will discover this through the activity.
3. Review (or introduce) the concept of **stomata**, which are small openings on the underside of the leaf. When the stomata are open, air can move in and out of the leaf. When they are closed, the inside of the leaf is sealed off from the outside air.
4. If appropriate for your students, review the difference between **atoms** and **molecules**. An atom is the smallest possible piece of a pure substance, like carbon or hydrogen. A molecule is made of two or more atoms bonded together.

Set the stage:

❖ Explain that the classroom will represent a leaf, and that each table within the classroom will represent a cell within the leaf. Students will be working in groups to build a sugar molecule in their cell.

Explain the materials and room layout:

1. Give each group an empty **sugar frame**. Look at labels in the frame. Review what atom each letter represents. *(C = carbon. H = hydrogen. O = oxygen.)*
2. Tell students the **carbon atoms** will be coming from carbon dioxide molecules (CO_2). Where is CO_2 found? *(In the air.)* How does CO_2 gets into the leaf? *(CO_2 in the air enters the leaf through the stomata.)* Tell students that the classroom represents the leaf and the area outside the room represents the air surrounding the leaf. Open the door and place filled CO_2 molecules just outside.
3. The **hydrogen atoms** will be coming from water molecules (H_2O). How does water get into the leaf? *(It is drawn from the soil into the roots, up the stem, and into the leaf.)* Place the filled H_2O molecules under the sign.
4. Some of the **oxygen atoms** will come from CO_2 molecules and some from H_2O molecules.
5. Show students the **energy tokens**. Explain that sugar molecules store energy. To represent this, students will have to pack an energy token under each atom in the sugar frame. Ask students where the leaves get this energy. *(From sunlight.)* However, the energy in light is not in a form that can be used by a plant. Show students the folded energy tokens. Folded in a rectangle, they represent "light energy" from the sun. Folded in a triangle, they represent "chemical energy" that they plant can use. (See photo on page 7 to clarify.)

Explain that plants convert energy from one form to another so that it can be stored in sugar molecules. Act as the sun and will sprinkle the "light energy" tokens around the room.

Explain roles and rules:

1. Students will have to work together within their groups to gather the things they need and put the sugar molecule together. ***Teacher Tip:*** *You can decide whether to assign a role to each student or to let the groups work out the process on their own.*
2. Actions:
   - **Sugar molecule must be completed.** As the materials are gathered, take atoms from the CO_2 and H_2O molecules and place them in the appropriate places in the sugar frame.
   - **Carbon dioxide molecules must be carried to the cell.** Bring CO_2 molecules from the outside area to the table.
   - **Water must also be carried to the cell.** Bring these molecules from the sink to the table.
   - **You have to get rid of empty frames**. Put them where they belong!
   - **Energy must be collected and converted into a usable form.** Gather energy tokens to the table and convert them from "light energy" into "chemical energy." Pack an energy token under each atom in the sugar molecule. This represents the energy stored in the bonds within a sugar molecule.
   - **Atoms cannot be wasted.** When you take apart a molecule, take all the atoms out of the frame. For example, you can't take the hydrogen out of the water frame and leave the oxygens in. Without the hydrogen, it's not a water molecule anymore.
   - **Leftover atoms go from the cell to the air.** At the end of the activity, the only thing students should have on their table is the completed sugar molecules. Any leftover materials need to be taken out of the leaf and expelled into the air.
   - **Only fetch one thing at a time.**
   - **You can split up the tasks**, but STILL only one thing at a time!

Procedure

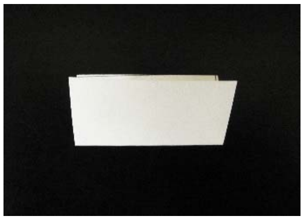
Once students are clear on what to do and where to find the materials, have them start building sugar molecules. **Teacher Tip:** *Now is a good time to put the empty 0_2 molecule containers in the hallway.*

Discussion

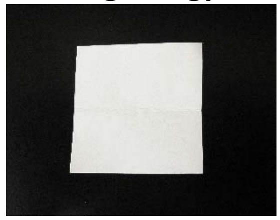
After the simulation, discuss some of these questions:

- What did the plant need to do photosynthesis? *(Carbon dioxide, water, and light energy)*
- Where did it get those things? *(Carbon dioxide from the air outside the leaf, water taken up from the soil, and light energy from the sun)*
- Where did the oxygen come from? Where do it go? *(Oxygen was leftover after the carbon and hydrogen had been used from the CO_2 and water; the oxygen went out through the stomata into the air)*
- Is the air outside the cell any different than it was before? *(After photosynthesis, the air contains less CO_2 and more oxygen)*

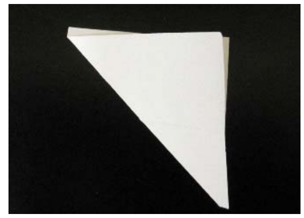
Converting energy tokens:



This token represents light energy.



To convert it, unfold...

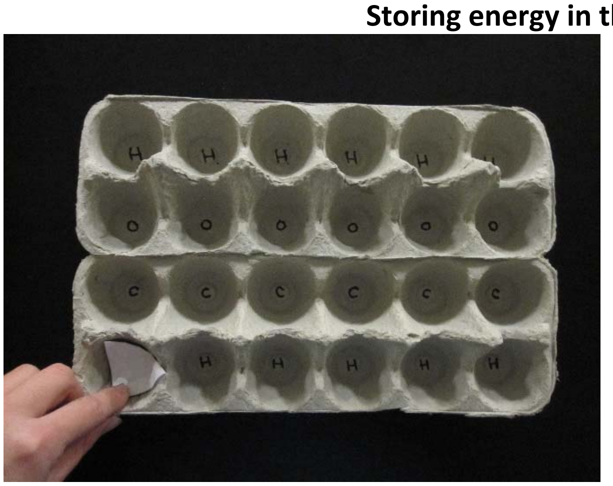


...and refold. Now it represents chemical energy.

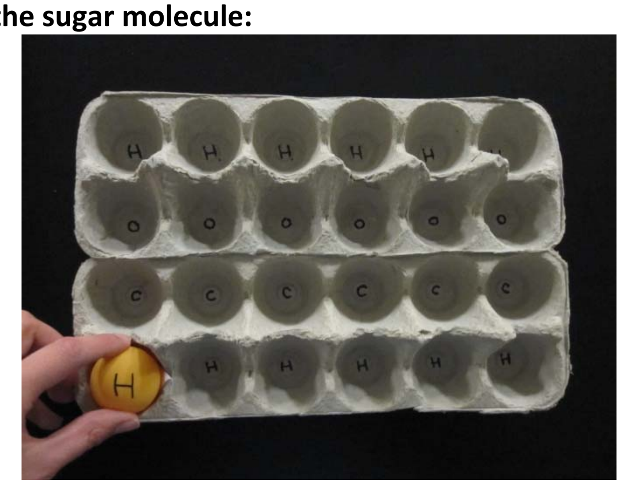
Summary of materials before photosynthesis:

The energy tokens (showing the "L.E." side) should be scattered around the classroom.		Empty oxygen frames should be located in the hallway, outside of the door labeled "stomata."
The water molecules should be located below a sign reading "stem."		
The carbon dioxide molecules should be located outside of the door labeled "stomata."		Each group of students should have an empty sugar frame at their table.

Storing energy in the sugar molecule:



Pack an energy token under each atom of the sugar molecule by placing the token in the spot...



...and then placing the appropriate ping-pong ball atom on top of it. Repeat until the tray is full.

Extension
If desired, you can emphasize the ingredients that are needed for photosynthesis by repeating the activity with limited access to the different components. This also highlights some ways that plants can be affected by the environment.

In each scenario, start by putting all materials back in their original starting places. Tell students the scenario, remove access to one resource, and let them try to produce a sugar molecule. They will soon realize they can't do it without light/ CO_2 / H_2O. Ask students why this is so.

Round 2: Take away all the energy tokens. Tell the students the sun has gone down and no light is available. They must try to produce a sugar molecule without light, while still following all the rules. Do they think it's possible? [Try → fail → discuss!]

Round 3: Close the door. Tell students the stomata have closed and no air is able to enter or exit the leaf. They must try to produce a sugar molecule with no air. [Try → fail → discuss!]

Round 4: Remove all the water molecules from the stem area. Tell students there is a drought and there is no water for the plant to take up from the soil. They must try to produce a sugar molecule without water. [Try → fail → discuss!]

Part Two: Cellular Respiration

Your Task: Find something cells need to break down sugar, so we can use energy from our sugar molecule!

Introduction
1. Let's **use** some of the energy that they stored in their sugar molecules.
2. Tell students that when cells break down sugar to access energy, they release CO_2 and water. However, there is a piece missing—they need to get something in addition to sugar to make this happen. Their task is to discover what that is and how to get it.
3. Give groups empty CO_2 and H_2O frames. Tell them success is achieved when these molecules are complete and released in to the air as byproducts.

Procedure
Round 1: plants
- Give them time to break apart the sugar molecule, remove the energy tokens, and try to make the CO_2 and H_2O molecules. Leave the door (stomata) open and the oxygen atoms from earlier outside.
- Students will find that they need oxygen in order to complete the molecules, and should figure out that they can get it from the "air" outside the leaf.
- The CO_2 and H_2O molecules should then be taken out the stomata (released into the air.)

Round 2: animals

- ❖ Reassemble the sugar molecules for this round and put all materials back in their starting places.
- ❖ Explain that animal cells need energy, and also get it by breaking apart sugar molecules. BUT animal cells can't make their own sugars the way plant cells can. So where do animals get the sugar they need? *(By eating plants.)*
- ❖ Tell students that the leaf they are a part of is about to be swallowed by a hungry herbivore. The leaf is getting chewed up and digested. Then the sugar molecules that were contained within the leaf are passed to cells in the body.
- ❖ Take down the "stomata" sign and the "stem" sign. Tell students that the classroom now represents the animal's body. Each table is a cell within the animal. The cells need to break apart the sugars to release energy so the animal has can use it to keep moving around. Just like in plants, the process will release CO_2 and water. What are they missing to make this happen? *(Oxygen.)* Where will the animal get that oxygen? *(By breathing it in.)* Put a new sign over the door that says "lungs."
- ❖ Now go through the respiration process again. This will be the very same process as it was for plants—the only difference is that oxygen enters through the lungs instead of the stomata. Students should bring oxygen in through the lungs (door) and release the CO_2 and H_2O produced in the process out through the lungs.

Optional: Discuss vocabulary

- ❖ If desired, discuss the terms *respiration* and *cellular respiration*. This can be confusing since they refer to different but related processes.
- ❖ The task students were doing at the tables—breaking apart sugar to release energy—is called **cellular respiration**. It's a metabolic process—essentially a chemical reaction.
- ❖ The task of bringing O_2, CO_2, and H_2O molecules to and from the cell is called **respiration**. It's not a chemical reaction, it's simply the exchange of gasses (CO_2, H_2O, O_2, etc.) between cells and the environment.
- ❖ The process of **cellular respiration** is exactly the same in plants and in animals.
- ❖ The process of **respiration** differs between plants and animals. In plants, gas is exchanged passively through the stomata. In land-dwelling vertebrates (like humans), gas is exchanged actively through the lungs. (Other animals have other methods, like gills, tracheoles, etc.)

Next Generation Science Standards

Disciplinary Core Ideas

Grade Five

LS1.C: Organization for Matter and Energy Flow in Organisms

- Plants acquire their material for growth chiefly from air and water.

PS3.D: Energy in Chemical Processes and Everyday Life

- The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).

Middle School
LS1.C: Organization for Matter and Energy Flow in Organisms
- Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use.

PS3.D: Energy in Chemical Processes and Everyday Life
- The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen.
- Cellular respiration in plants and animals involves chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials.

High School
LS1.C: Organization for Matter and Energy Flow in Organisms
- The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.

Science and Engineering Practices
- Using Models

Crosscutting Concepts
- Systems and System Models
- Energy and Matter

Performance Expectations
Remember, performance expectations are not a set of instructional or assessment tasks. They are statements of what students should be able to do after instruction. This activity or unit is just one of many that could help prepare your students to perform the following hypothetical tasks that demonstrate their understanding:

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

Experimental Design Rubric

Category	3	2	1	0
Purpose 2 pts	N/A	The purpose of the lab or the question to be answered during the lab is clearly identified and stated.	The purpose of the lab or the question to be answered during the lab is erroneous or irrelevant.	No Question is stated.
Hypothesis 2 pts	N/A	Hypothesized relationship between the variables and the predicted results is clear and reasonable.	Hypothesized relationship between the variables and the predicted results has been stated, but appears to be based on flawed logic.	No hypothesis has been stated.
Materials 2 pts	N/A	All materials and setup used in the experiment are clearly and accurately described.	Most of the materials and the setup used in the experiment are accurately described.	Many materials are described inaccurately OR are not described at all.
Variables 3 pts	Independent and Dependent variables are clearly described with all relevant details.	All variables are clearly described but possible switched in description.	Variables not correctly identified.	No description.
Procedure 3 pts	Procedures are listed in clear steps. Procedure is precise and repeatable.	Procedures are listed in a logical order, but steps are not numbered and/or are not repeatable.	Procedures are listed but are not in a logical order or are difficult to follow.	Procedures do not accurately list the steps of the experiment.
Data 6 pts	Accurate representation of the data in tables and/or charts. Calculations are correct and clearly displayed.	Accurate representation of the data in tables and/or charts. Layout is difficult to understand.	Accurate representation of the data in written form, but no clear table format or calculations.	Data are not shown OR are inaccurate.
Graph 6 pts	Graph is clearly titled and labeled. Graph clearly represents the correlation of variables.	Graph is missing label or title. Data is clearly depicted.	Graphic correlation of the data is incorrect. Labels are missing or incorrect.	No graph is present.
Conclusion 9 pts	Conclusion includes whether the data and analysis supported the hypothesis, possible sources of error, and possible improvements.	Conclusion includes whether the findings supported the hypothesis. Data analysis is poor or lacking. Validity and discussions for future improvements are present.	Conclusion includes what was learned from the experiment. Data analysis is poor or lacking. Validity and discussions for future improvements are lacking.	No conclusion was included in the report OR shows little effort and reflection.
TOTAL	Comments:			/33 points

Questions for Teacher-Facilitated Discussion with Students

**note: Consider documenting student responses with technology such as Poll Everywhere, Google Forms or Padlet*

Before we start watching Globesity:

- *What is a bigger problem in our world: hunger or obesity*?
- *What does "malnourished" mean?*
  - *What does someone look like when they are malnourished?* (try to elicit conversation that malnourished doesn't necessarily mean starving or skinny…)
- What are some nutrition-related/diet-related conditions/diseases/disorders that you know of?

Link to documentary: http://topdocumentaryfilms.com/globesity-fats-new-frontier/

** watch from beginning through the section about China*

After watching the Globesity segment:

- *Why do you think the issue of obesity has replaced hunger in some areas of the world?*
- *Why do you think that researchers say obesity is as bad for our health as tobacco and alcohol?*
- *What are some specific examples of changes in diet that are leading to rapid increases in obesity?*
- *What do you think can be done to prevent this transition from hunger to obesity in developing countries?*
- *What do you think could be done to correct it once it has happened?*