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Photosynthesis and respiration lab answer key worksheet answers key free

Photosynthesis and Respiration
 How do the processes of photosynthesis and cellular respiration relate to each other?

Model 1 - Comparison of Photosynthesis and Respiration

1. Write the general equation for photosynthesis.
 2. Write the general equation for cellular respiration.

Place the organisms in the correct trophic levels to complete the pyramid for a **terrestrial ecosystem**. You have already placed all the organisms in the table below for the pyramid of **energy**.

Organism	1 st Order Homotroph (amount of energy)	2 nd Order Homotroph (amount of energy)	3 rd Order Homotroph (amount of energy)
Decomposer (Fungi)	0.1	0.1	0.1
Producer (Plants)	100	10	1
Primary Consumer (Squirrel)	10	1	0.1
Secondary Consumer (Snake)	1	0.1	0.01
Tertiary Consumer (Eagle)	0.1	0.01	0.001

Now you can ask yourself, "How well does the energy transfer from one trophic level to the next?" To do this you can compare a "transfer efficiency" between each trophic level. To do this you divide the energy at energy level by the energy at the lower trophic level. This gives you a ratio that you can use for while you answer as a decimal. Complete this for all three of your ecosystems.

EXAMPLE:
 1st Order Homotroph (amount of energy) = 100 units of energy
 Primary Consumer (amount of energy) = 10 units of energy
 Transfer Efficiency = 10 / 100 = 0.1

Ecosystem	1 st Order Homotroph (amount of energy)	2 nd Order Homotroph (amount of energy)	3 rd Order Homotroph (amount of energy)
Desert	100	10	1
Grassland	100	10	1
Coastal Lake	100	10	1

you round-off your numbers above which of the following decimal numbers most closely represent?

A. 0.23 B. 0.10 C. 0.30 D. 0.01

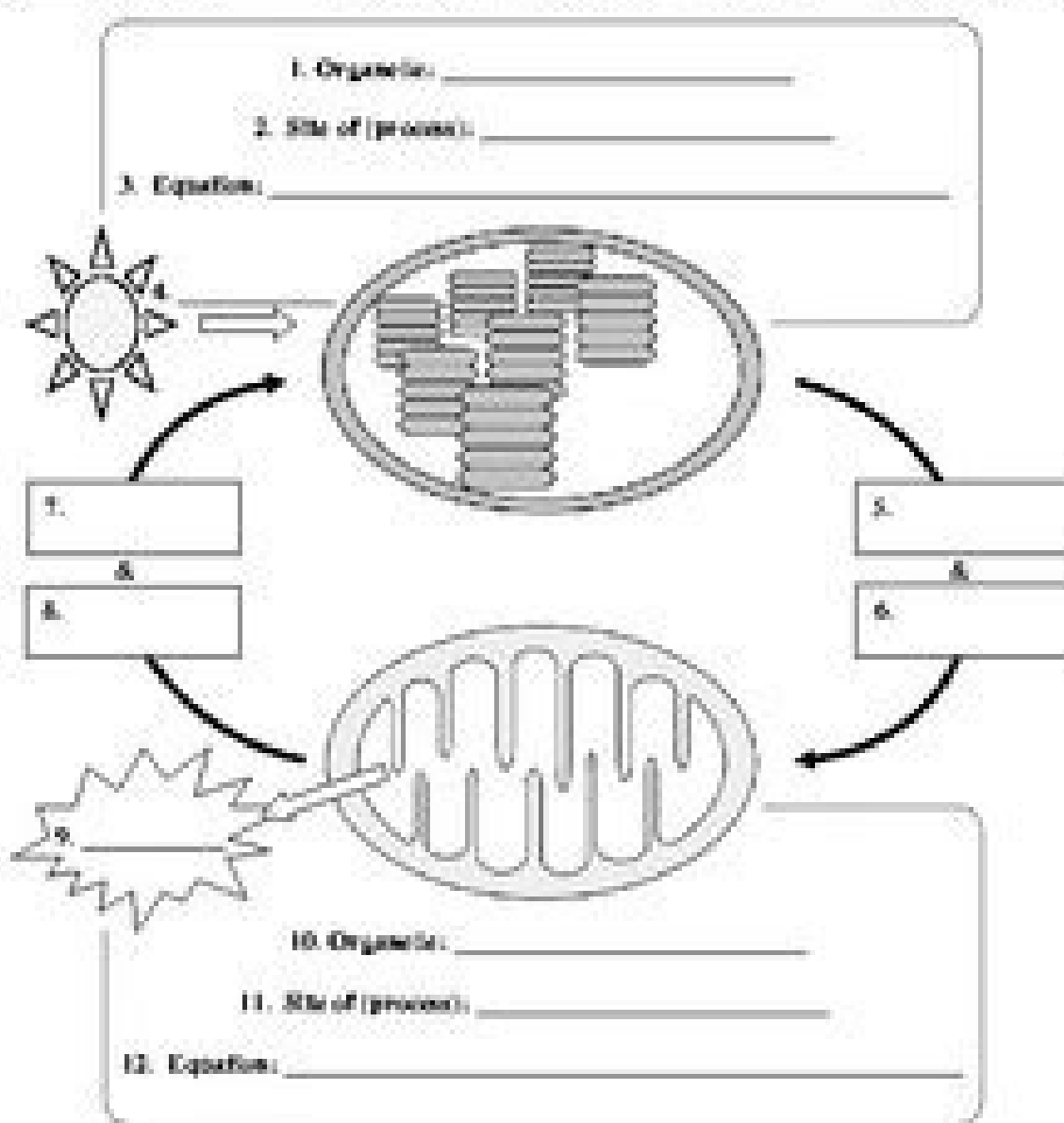
Exercise shows you that 10% of energy from the lower level is available to the next level. This information complete the flow chart below that shows how much energy will be found at each level for the general ecosystem has been done for you.

Name _____ Class/Period _____ Date _____

Photosynthesis & Cellular Respiration

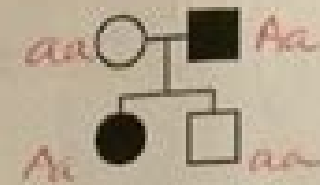
Directions: Identify each organelle shown below. Identify the energy transformation process that occurs within each organelle and write the general equation that summarizes the process. Finally, identify the reactants and products of cellular respiration and photosynthesis to show the relationship between the two processes. A word bank is provided for identifying and labeling the diagrams below. The summary equations are not included in the word bank.

Carbon Dioxide (CO ₂)	Cellular Respiration	Chloroplast	Energy (ATP)	Glucose (C ₆ H ₁₂ O ₆)
Oxygen (O ₂)	Mitochondrion	Photosynthesis	Sunlight	Water (H ₂ O)



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- c) Write the genotypes next to the symbol for each person in the pedigree to the right assuming that it is for a dominant trait.
 d) Is it possible that this pedigree is for an autosomal dominant trait? **Yes**



- e) What can you conclude from these two examples about the parents of a person that has a dominant characteristic?
- If a person has a dominant trait, the parents will not have the trait.
 - If a person has a dominant trait, the parents might have the trait or they might not have it.
 - 1** If a person has a dominant trait, at least one of the parents will have the trait.
 - If a person has a dominant trait, both of the parents will have the trait.

2. We will determine if the pedigree below can be for a trait that is autosomal dominant. Use "A" and "a" as you did for the pedigrees above.

- a) Write the genotype of each individual next to the symbol.
 b) Is it possible that this pedigree is for an autosomal dominant trait? **Yes**



- c) In conclusion, can two individuals that have an autosomal dominant trait have unaffected children?
- If two individuals have a dominant trait, none of their offspring will have the trait.
 - 2** If two individuals have a dominant trait, their offspring might or might not have the trait.
 - If two individuals have a dominant trait, their offspring will have the trait.

Autosomal Recessive

3. We will determine if the pedigree below can be for a trait that is autosomal recessive. Use the following designations:

A = normal
 a = the trait (a genetic disease or abnormality)

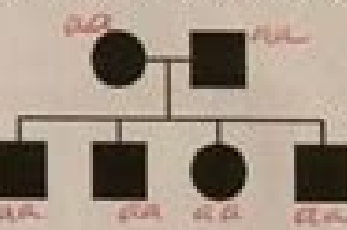
- a) Assuming that the trait is recessive, write the genotype of each individual next to the symbol.



- b) Is it possible that the pedigree above is for an autosomal recessive trait? **No**

c) Assuming that the pedigree below is for a recessive trait, write the genotype next to the symbol for each person.

- d) Is it possible that this pedigree is for an autosomal recessive trait? **Yes**



- e) If a trait is autosomal recessive, what can you conclude about the children if both parents are affected? (Circle the correct answer below.)

- If both parents are affected, none of the children will be affected.
- If both parents are affected, the children might or might not be affected.
- 3** If both parents are affected, all of the children will be affected.

4. We will determine if the pedigree below can be for a trait that is autosomal recessive. Use "A" and "a" as you did for the previous example.

- a) Write the genotype of each individual next to the symbol.



- b) Is it possible that this pedigree is for an autosomal recessive trait? **Yes**

- c) If a trait is autosomal recessive, what can you conclude about the children of two parents that are not affected?

- If two parents have a dominant trait, the children will not have the trait.
- 2** If two parents have a dominant trait, the children might or might not have the trait.
- If two parents have a dominant trait, the children will have the trait.

Name _____ Date _____

Photosynthesis

Fill in the blanks with the correct words from the song *Photosynthesis*.

Air, water, sunlight equals _____ for plants through _____
 give us oxygen and take in our _____

Complete each sentence with facts from the song.

- All _____ things need food.
- _____ get food differently than people do.
- Plants change carbon dioxide into _____ to use as their fuel.
- The three things plants use to create their own food are _____ and _____.
- _____ is the process through which plants get their energy.
- Plants have _____ to look up water from the soil.
- _____ is the chemical that makes plants green.
- Plants store carbon dioxide and _____ for energy.
- Plants take in carbon dioxide and release _____ for humans to breathe.
- True or false: Humans can live without plants. _____

Critical Thinking: Explain your answer to question number 10. _____

Explain how scientists know the oxygen level in the atmosphere has changed because of plants. The energy accumulated in Stage 1 is used to drive Stage 2. After all (or most) of the disks are floating, put the cups in the dark (a shoebox or a closet) and monitor for the next 15 minutes. To learn more about the free Microsoft Word app, visit the Microsoft store. ¡A disfrutar! Nuestros videos de matemáticas son nuevos y se están traduciendo. Plants need energy to grow, and all living things need energy to survive. Put a finger on the end of the syringe, and draw the plunger back slightly, creating a partial vacuum. The bubbles should cause the disks to float. What is the process of cellular respiration? ANSWER Cellular respiration is the chemical process that occurs when an organism breaks down the food it has stored (sugars and fats) and uses it for energy. A great extension activity is to add aquatic animals to this experiment and see how the added respiration affects the color change. Describe the oxygen/carbon dioxide cycle using plants and animals. ANSWER In a fishbowl, there is a fish and a plant. If you don't add a ton of bromothymol blue, and only leave the fish in for 24 hours the fish will not be harmed. Hopefully you are ready to start this experiment! If you have any questions, drop them in the comments below! (PS- Looking for other respiration or photosynthesis ideas? Law of conservation of mass DEFINE Mass is neither created nor destroyed in chemical reactions. Cyanobacteria DEFINE A microorganism that uses the process of photosynthesis to make food and is often called blue-green algae. As we walk around the room and discuss experimental design, students will begin to see that each group will set up their test tubes the same way, the only difference being if their tubes get left in the light or wrapped in foil and put in the dark for 24 hours. Two notes: I got asked how much bromothymol blue to add to the test tubes. Give an example. ANSWER A chemical reaction is when you put some things together and you get something new—like when we mixed baking soda with vinegar and made gas bubbles. Why don't the leaves in the baking soda solution continue to produce oxygen in the dark? Push the plunger almost to the bottom but don't crush the disks. We need oxygen from the air to stay alive. The light reaction is used to convert sunlight into chemical energy stored in ATP and another energy storage molecule called NADP. If the light-independent reaction can run without light, why does oxygen production (and presumably glucose production) stop? Head to these blog posts! Photosynthesis & Respiration Lesson PDFs Generate Student Link Discussion Questions What do plants make through the process of photosynthesis? ANSWER Plants use photosynthesis to make food (sugar) and oxygen gas. Besides plants, what are examples of other organisms that use photosynthesis? ANSWER Some bacteria, such as cyanobacteria, go through photosynthesis and so do algae. Next, I asked my students what will happen when we leave these in the light for 24 hours. Results! When students come in the following day they will pick up their test tube rack and fill out their data tables on what happened. Why do the leaves begin to sink again in the dark? $\text{NaHCO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3 + \text{NaOH}$ $\text{H}_2\text{CO}_3 \rightarrow \text{H}_2\text{O} + \text{CO}_2$ (gas) Materials: Fresh spinach leaves Metal paper hole punch 10 mL or larger plastic syringe (without needle) - get one from your local pharmacy Baking soda solution (dissolve some baking soda powder in water) Liquid dish soap solution (dissolve 5 mL in 250 mL of water) 3 clear plastic cups or beakers (250 mL to 500 mL) Cup 1: Detergent solution Cup 2: Baking soda solution (treatment) Cup 3: Water (control) Light source (fluorescent is good because it produces light without much heat) Methods: Use the metal hole punch to cut out 20 circular disks from the fresh spinach leaves, 10 for a control and 10 for a treatment. Give an example of how matter flows through a system. ANSWER Matter flows through a system like a food chain. Water DEFINE A substance that is made from two hydrogen atoms and one oxygen atom and is needed to sustain life. Vocabulary Photosynthesis DEFINE The chemical process in which carbon dioxide and water combine, using energy from the Sun, to make sugar and oxygen. The basic reaction is: $6 \text{CO}_2 + 12 \text{H}_2\text{O} + \text{e}^- \rightarrow 2 \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2$ carbon dioxide + water + light energy → glucose + oxygen Oxygen molecules are colored to show their fate. Where do living things get energy? Finally, we could experimentally vary the light intensity to demonstrate the effect of light intensity on the process. When we dissolve baking soda (NaHCO3) in water, carbonic acid (H2CO3) and sodium hydroxide (NaOH) are formed. If you would like to add more or less that is fine, as they add the same amount to each test tube for consistency. I added elodea and a goldfish to each flask. Some or all of the submerged disks should begin to float within about 15 minutes Questions: How does the suction help the leaf disks to sink? Turn on a bright light, and monitor the disks every minute. Oxygen from water becomes free O2 Photosynthesis has two stages. We want the gas to stay in the water, not escape. Molecule DEFINE A group of atoms bonded together. I had trouble finding snails in Arizona, so I went to my local pet store and picked up two feeder goldfish. Give an example of when a plant or animal might use energy they have stored. ANSWER When we run around or workout, we are using stored energy. Control or treatment For the treatment, draw up a small amount ~1 mL of detergent solution, and then draw the baking soda solution up to ~3-5 mL. For the control, draw up a small amount ~1 mL of detergent solution, and then draw the water up to ~3-5 mL. Point the syringe upward, tapping the sides, so that any air bubbles rise, and gently squeeze the syringe until liquid begins to come out. While we cannot prove in this experiment that the bubbles are oxygen without a gas probe, we can demonstrate, by use of a control, that the bubbles only form when the leaves are submerged in a sodium bicarbonate solution (which releases CO2) and not when they are submerged in pure water. How does the detergent help the leaf disks to sink? Trees use stored energy when they do not have any leaves. They use energy to move and do things. ANSWER Living things get energy from food. doc file: You need the Microsoft Word program, a free Microsoft Word viewer, or a program that can import Word files in order to view this file. XWhat are the reactants and products of photosynthesis? Why do humans breathe in oxygen and breathe out carbon dioxide? We can also demonstrate that the bubbles only form in the presence of strong light, by moving the experiment into the dark and making further observations. doc file: You need the Microsoft Word program, the Microsoft Word app, or a program that can import Word files in order to view this file. For comparison purposes, each lab group that does this procedure should report the time at which half (5) of the disks is floating. Stage 1 requires light. Why do we use the half-way mark as a point of comparison rather than the point at which all the disks are floating? Why don't the leaf disks soaking in the water (control) float? Pour the contents of control and treatment syringes into two labelled clear plastic cups. Oxygen from CO2 ends up in glucose. The fish uses oxygen from the water and releases carbon dioxide. After you remove the light and place the cups in the dark, the treatment disks should stop undergoing photosynthesis and the disks should begin to sink. Photosynthesis is one of the most important anabolic chemical reactions that allows life to exist on Earth. The gases keep getting changed over and over. In the example below, that time would be about 11.5 minutes. What are some ways organisms use that energy? Why do the leaf disks in the baking soda solution (treatment) begin to float? Yes, the atmosphere is still changing because we keep putting other things in the air, like pollution. With water, light energy from the sun, and carbon dioxide from the air, photosynthetic organisms are able to build simple sugars. As more photosynthetic organisms started to grow, the oxygen levels started to rise. The next day we came in and saw both flasks were a shade of bluish green (somewhere in the middle of the two flasks began). Swirl the liquid to try to keep the disks from sticking to each other or the sides of the cups and then let them sit. Only left. What process are we doing? How do the processes of photosynthesis & cellular respiration work together in a plant cell? This action forces the liquid into the interior of the leaf. Organisms that can make their own food are called autotrophs, and are at the base of the food chain. Experiment: We will conduct a simple experiment using spinach leaves to demonstrate that, in the presence of light and carbon dioxide, leaf tissues produce gas bubbles. Cellular respiration DEFINE The chemical process in which stored energy is broken down so it can be used by an organism to survive when there is no food source available. What is the purpose of the baking soda solution? If you can get your hands on some small snails, they will fit great into the test tubes. What is a chemical reaction? Product DEFINE A substance that is formed after a reaction has occurred. They will see that the elodea did photosynthesis in the light, and cellular respiration in the dark.** (see note below)**One thing you will have to discuss with your students: Plants are doing cellular respiration in the day time as well, but since photosynthesis is also occurring the indicator stayed blue. Watch this video of the process to make sure you're doing it right. Count how many disks are floating during each of the next 15 minutes. Reading Material DIY Activity Guide Lesson Plan Teacher Guide Google Forms Online Quiz Game Quiz PDF Exit Ticket ¡Bienvido a Generation Genius en español! Todos los videos de ciencia ahora doblados a español, incluyendo los materiales para maestros. Special Bonus: Get a \$5 Amazon gift card within 1 day if you join now. Give an example of a gas and how something used it. ANSWER Gas is all around us and is called air. You can use this Excel spreadsheet to record your data and it will auto-generate a graph for you. The carbonic acid then breaks down into water and carbon dioxide gas, which is why dissolving baking soda in water causes it to fizz. Repeat until the leaf disks are suspended in the solution. Only cards left. Try it now. Results: In the light, you should expect to see the disks in the control solution (water) stay on the bottom, but the disks in the treatment solution (baking soda) should begin to rise as they use the CO2 to undergo photosynthesis and produce oxygen bubbles. What is the purpose of the light reaction? Reactants DEFINE A substance that is part of a reaction and goes through a change. What is the process of photosynthesis? ANSWER Photosynthesis is the chemical process in which plants and other organisms combine carbon dioxide and water, using energy from the Sun, to produce sugar and oxygen. Could our atmosphere still be changing? ANSWER Scientists have studied bubbles trapped in glaciers, which showed that oxygen levels a long time ago were very low. Chloroplasts DEFINE An organelle (part of a cell) that contains chlorophyll and where photosynthesis takes place. Also- make sure to fill the test tubes to the top and cap them tightly, or use parafilm to cover the tops. The Sun makes the plant grow, then a rabbit eats the plant, and then a different animal eats the rabbit. Animals get their food from eating plants and other animals. To learn more about the free Microsoft Word Viewer, visit the Microsoft Word website. Record how many disks remain floating after each minute until all (or most) of them have sunk. The plant then uses that carbon dioxide, water, and sunlight to make sugar and then it releases oxygen back into the water. References: 20Biology/Biology%20Assignments/AP%20BIOLOGY%20Lab%204.htm Unit 04 - Photosynthesis and Respiration Topic Four: Photosynthesis and Respiration Key Equations: Photosynthesis: Carbon Dioxide + Water + Light -> Glucose + Oxygen Respiration: Glucose + Oxygen -> Carbon Dioxide + Water + ATP Key Words: Reactants Products Photosynthesis Organic Chemical Energy Respiration ATP Usable Energy Chemical Bonds Chloroplast Guard Cells Homeostasis NEED HELP DOWNLOADING: PPT file: You need Microsoft PowerPoint to view this file. Separate the two parts of the syringe, drop 10 of the spinach disks inside, reassemble the syringe. (Matemáticas en español en 2022) Teachers! Start a free trial & we'll send your gift card within 1 day. Plants get their food by using carbon dioxide, water, and sunlight to make sugar. I filled up two large Erlenmeyer flasks with water and bromothymol blue, and turned one yellow. Stage 2 can work in the light or in the dark. The light-independent reaction or Calvin Cycle takes carbon dioxide and fixes it in three-carbon molecules which will eventually be synthesized into glucose. I have each group add 1mL to each tube. Compare the similarities and differences between how plants and animals get the food they need for survival. ANSWER Plants and animals both need food to survive. Carbon dioxide DEFINE A gas that contains one carbon atom and two oxygen atoms. Watch this demonstration to see how to make the leaf disks sink. Download a free PowerPoint viewer for PC or Macintosh.

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