

Using Stored Energy: Mastery Check

Learning target: I can show what I know about how producers and consumers get matter and energy, how cellular respiration releases energy from food, how food molecules become fuel, storage or body, and how photosynthesis and cellular respiration are related.

Retrieval and mastery check

About 40 min

Individual

MS-LS1-7 · assesses

MS-LS1-6 · supports

independent practice

writing

Name _____

Date _____

Period _____

Directions

Answer every item on your own without notes. For multiple-choice items, circle one letter. For true or false items, write the word and, if false, one phrase that fixes it. For numeric items, show the calculation. For the drawing item, label every arrow. Finish with the synthesis paragraph in Part B; it is worth as much as four short items, so leave at least ten minutes for it.

You will need: This worksheet, Pencil, Calculator

Part A: Retrieval (12 items)

1. Which organism is a consumer?
 - ☐ A. An oak tree building sugar in its leaves
 - ☐ B. A single-celled alga floating near the ocean surface
 - ☐ C. A shelf fungus absorbing the molecules of a fallen log
 - ☐ D. A grass plant storing starch in its roots
2. Which list gives the reactants and products of cellular respiration correctly?
 - ☐ A. Reactants: carbon dioxide and water. Products: sugar and oxygen.
 - ☐ B. Reactants: sugar and oxygen. Products: carbon dioxide and water, with energy released.
 - ☐ C. Reactants: sugar and carbon dioxide. Products: oxygen and water.
 - ☐ D. Reactants: oxygen and water. Products: sugar and carbon dioxide.
3. True or false: A plant's root cells carry out cellular respiration and take in oxygen from air pockets in the soil.
 - ☐ True ☐ False Explain your thinking:

4. Most of cellular respiration takes place inside cell structures called _____, which are found in plant cells, animal cells and many single-celled organisms.

5. One sugar molecule contains 6 carbon atoms. When it is fully rearranged by cellular respiration, how many carbon dioxide molecules form, and how many oxygen atoms are in those carbon dioxide molecules altogether? Show the multiplication.

6. Explain the difference between breathing and cellular respiration in two sentences, and say how they are connected.

7. Which food molecule releases the most energy per gram and is used for long-term energy storage?

- ☐ A. Sugar
☐ B. Starch
☐ C. Fat
☐ D. Protein

8. A rabbit grows new muscle. Where did the carbon atoms in that new muscle come from? Be specific.

9. Oxygen is a product of one process and a reactant of another. Which pair is correct?

- ☐ A. Product of cellular respiration; reactant of photosynthesis
☐ B. Product of photosynthesis; reactant of cellular respiration
☐ C. Product of digestion; reactant of photosynthesis
☐ D. Product of photosynthesis; reactant of digestion

10. A snack contains 10 g of carbohydrate and 5 g of fat. Using 4 kcal per gram for carbohydrate and 9 kcal per gram for fat, calculate the total energy in kilocalories.

11. True or false: When a squirrel's cells break down sugar, part of the sugar's mass is converted into energy, which is why the squirrel loses mass.

☐ True ☐ False Explain your thinking:

12. Draw a model of one animal cell carrying out cellular respiration. Show two arrows entering (label the two reactants), two arrows leaving (label the two products), the structure where most of the reaction happens, and the word 'energy' with an arrow to one thing the cell uses it for.

Part B: Synthesis

13. Trace one carbon atom on a round trip: it starts in a carbon dioxide molecule in the air, becomes part of an oak tree, is stored in an acorn, is eaten by a squirrel, and returns to the air. Name the process at each step where the atom is rearranged into a new molecule, say where energy enters the story and where it leaves, and explain why the atom is never used up even though the energy is.

Before you start

Read all thirteen items first and put a dot beside the four you feel most sure about; do those first to build momentum. For q13, plan on scrap paper with five boxes in a row (air, leaf, acorn, squirrel, air) and write the process name on each arrow before writing sentences. If you blank on a term, describe what it does; a correct description earns most of the credit.

Flip the trip

After finishing q13, write a second paragraph that follows an oxygen atom instead of a carbon atom, starting in a water molecule in the oak tree's roots and ending in a water molecule that the squirrel breathes out. Then explain in two sentences why the energy that reached the squirrel cannot be sent back to the sun, even though the atoms can return to the air.