

Fixing Dario's Notebook: Eight Claims About Producers

Learning target: I can find the errors in a student's notes about how producers get matter and energy, explain what went wrong in each one, and rewrite the notes correctly.

Error analysis

About 35 min

Individual

MS-LS1-6 · practice

writing

independent practice

Name _____

Date _____

Period _____

Directions

Dario took notes during the lesson, but he mixed up several ideas. Read each numbered entry. One entry is completely correct; the rest each contain at least one error. For each entry, decide whether it is right or wrong. If it is wrong, say exactly what went wrong and rewrite the entry so it is correct. If it is right, say why. Then answer the synthesis questions at the end.

You will need: This worksheet, Pencil

Dario's notebook: Capturing the Sun's Energy — Entry 1. Plants get their food from the soil. Their roots pull food up through the stem, which is why farmers add fertilizer. **Entry 2.** In photosynthesis, sunlight is changed into sugar. The more sunlight a leaf gets, the more sugar atoms it has. **Entry 3.** Leaves are green because chlorophyll absorbs green light better than any other color. **Entry 4.** Plants take in carbon dioxide through tiny openings in their leaves, and the oxygen they make leaves through the same openings. **Entry 5.** During the day a plant only does photosynthesis. At night it switches over to using sugar for energy, and that is the only time it gives off carbon dioxide. **Entry 6.** The equation is $6 \text{CO}_2 + 6 \text{H}_2\text{O} + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 3 \text{O}_2$. It is three oxygen molecules because the sugar keeps half of the oxygen for itself. **Entry 7.** The energy from the sun is locked inside the sugar molecule. When the molecule breaks, the energy pops out. **Entry 8.** Starch and cellulose are completely different substances from sugar, so a plant must absorb them from the ground.

Part A: Diagnose and rewrite each entry

1. Entry 1. Right or wrong? If wrong: what did Dario confuse, and what is the correct version? (Think about what 'food' means for a plant and what fertilizer actually supplies.)

2. Entry 2. Right or wrong? If wrong: find the word that treats energy as if it were matter, and rewrite the entry so that matter and energy are kept apart.

3. Entry 3. Right or wrong? If wrong: explain what chlorophyll actually does with green light compared with red and blue light, and rewrite the entry.

4. Entry 4. Right or wrong? Explain your decision with one piece of evidence from this chapter.

5. Entry 5. Right or wrong? If wrong: what does a plant's cells do with sugar during the day, and why does the plant still seem to 'only' give off oxygen then? Rewrite the entry.

6. Entry 6. Right or wrong? If wrong: count the oxygen atoms on each side of Dario's equation and show the mismatch, then write the correct equation.

7. Entry 7. Right or wrong? If wrong: what has to happen for the stored energy to be released, and what other substance is needed? Rewrite the entry.

8. Entry 8. Right or wrong? If wrong: where do starch and cellulose actually come from, and how are they related to sugar? Rewrite the entry.

Part B: Find the pattern

Most mistakes in science notes are not random. A single confused idea can produce several wrong sentences. Look back over the entries you marked wrong and sort them.

9. Sort the wrong entries into the three root causes. An entry may fit more than one row. In the second column write one sentence per row.

Entry numbers that share this root cause	What Dario would need to understand instead
Root cause A: treating energy as if it were a substance	
Root cause B: thinking matter can appear or disappear	
Root cause C: thinking plants 'switch' between processes	

10. Write a short note to Dario (4 to 6 sentences) that explains the **one** idea which, if he understood it, would fix the largest number of his entries. Name the entries it fixes and give him a way to check himself next time.

Three test questions

When you are unsure whether an entry is wrong, run these three tests. Test 1: Does it say light or energy turns into stuff, or stuff turns into energy? Energy is not a substance. Test 2: Count atoms: do any atoms appear or disappear? They never do. Test 3: Does it say a plant stops using sugar, or stops needing something, at some time of day? A plant's cells use sugar for energy every hour of the day and night. If an entry fails a test, you have found the error.

Write the ninth entry

Write a new notebook entry of your own about biofuels that contains exactly one hidden error of the 'energy is a substance' type or the 'matter appears from nowhere' type. Trade with a partner and diagnose each other's entry. Then write a sentence explaining why the error you planted is tempting: what everyday experience makes it feel true?