

## Grading 4.2 Explanations Tool: How does a cell in a potato plant use glucose for energy to move and function?

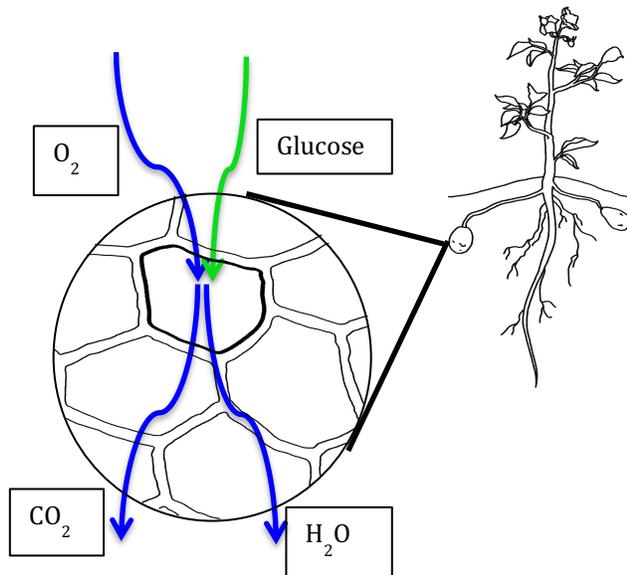
*This worksheet has “grading” in the title because at this point, students can be held accountable for correct answers. Level 4 (correct) responses to the questions are in **blue bold italics** below.*

*Red italics suggest ways to grade student responses by giving them points for correct or partially correct answers. There are 14 points total on this worksheet.*

*Carbon TIME Discourse Routine around the Explanations Tool:*

- 1. Introduction: Students return to their Evidence-Based Arguments Tools.*
- 2. Private Writing: Students complete the Explanations Tool individually.*
- 3. Sharing Ideas: Students share and compare ideas in pairs/small groups, with the goal of developing their explanations.*
- 4. Consensus-seeking discussion accompanied by public writing: Scaffold writing a successful explanation for each individual student. Class discussions focus on coming to consensus around a coherent explanation. Refer to the Three Questions Explanation Checklist on the second page of the Three Questions Handout during this discussion. We recommend that students record class ideas in a different colored pen/pencil.*

The Matter  
Movement  
Question



**Draw and label** arrows that show molecules moving into, through, and out of a cell in a potato plant.

- Show molecules with carbon atoms moving into and out of the cell.
- Show other relevant molecules

*Grading arrows*

- *1 point for arrow labeled "glucose," "sugar," or " $C_6H_{12}O_6$ " going into the plant cell*
- *1 point for arrow labeled "oxygen" or " $O_2$ " going into the plant cell*
- *1 point for arrow labeled "carbon dioxide" or " $CO_2$ " going out of plant cell*
- *1 point for arrow labeled "water" or " $H_2O$ " going out of plant cell*

*4 points total*

**The Matter  
Change  
Question**

Name the chemical change that allows cells to move and function: **Cellular respiration**  
*1 point*

Write the chemical equation for this change:  **$C_6H_{12}O_6 + 6 O_2 \rightarrow 6 CO_2 + 6 H_2O$**  *1 point*

What molecules are carbon atoms in before the chemical change?

**Glucose**  
*1 point for correct answer*

What other molecules are needed?

**Oxygen**  
*1 point for correct answer*

**Chemical  
Change**

What molecules are carbon atoms in after the chemical change?

**Carbon Dioxide**  
*1 point for correct answer*

What other molecules are produced?

**Water**  
*1 point for correct answer*

**The Energy  
Change  
Question**

What forms of energy go into this chemical change?

**Chemical energy**  
*1 point for correct answer*

**Energy  
Transformation**

What forms of energy come out of this chemical change?

**Motion (or cellular function) and heat energy**  
*1 point for correct answer*

**Explain in words:** How does a cell in a potato plant use glucose for energy to move and function? (Answer on back).

*Use this Explanation Tool to help guide your written explanation, be sure to answer the Three Questions.*

Remember: **Atoms last forever** (so you can arrange atoms into new molecules, but can't add or subtract atoms).  
**Energy lasts forever** (so you can change forms of energy, but energy units can't appear or go away).

**Level 4 responses should include answers to each of the four numbered steps on the Three Questions poster and handout:**

- 1. Matter movement: Glucose (and other small organic molecules) are produced by the chloroplasts in the cell.**
- 2. Matter change: Glucose reacts with oxygen to produce carbon dioxide and water.**
- 3. Energy change: Chemical energy in glucose is transformed into motion and into other forms of chemical energy (e.g. ATP) for other cell functions. All eventually becomes heat energy.**
- 4. Matter movement: Carbon dioxide and water leave the cell.**

*1 point for each correct part of the answer*

*4 points total*