Name: _____ Class: _____ Date: _____

5.3 Grading the Explanations Tool: How does a cell in the root of a potato plant use food to grow and divide?

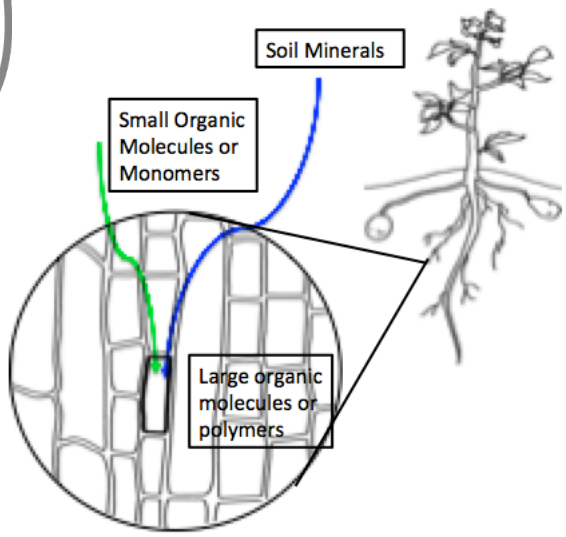
*This worksheet has "grading" in the title because at this point, students can be held accountable for correct answers. Level 4 (correct) responses to the questions are in **blue bold italics** below. There are also comments about common Level 2 and Level 3 responses to help you with grading and making decisions about what to emphasize in future lessons.*

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 review their Evidence-Based Arguments Tools. Establish the purpose for completing the tool as developing a complete explanation for the unit phenomenon.*
2. *Private thinking and writing: Students complete the Explanations Tool individually.*
3. *Partner or small group work: Students share and compare ideas in pairs/small groups, with the goal of improving their explanations.*
4. *Sharing ideas in whole-class discussion: Class discussions serve to elicit, clarify, and compare explanations from individual students and/or student groups*
5. *Consensus-seeking discussion accompanied by public writing: Class discussions focus on coming to consensus around a correct, coherent explanation that answers the Three Questions while addressing the 4 steps. We recommend that students revise their explanations in a different colored pen/pencil.*

The Matter Movement Question



Draw and label arrows that show molecules moving into and being used into the root cell.

- Show and label molecules with carbon atoms moving into the root cell
- Label the molecules that stay in the root cell

Level 4:

- ***An arrow showing small organic molecules or monomers going into the root cell***
- ***An arrow showing soil minerals going into the root cell***
- ***A label showing large organic molecules (or polymers) staying in the root cell.***

1 point for each correct arrow/molecule. 3 points total.

Name the chemical change that potato cells use to build large organic molecules:
Biosynthesis

1 point for correct answer

The Matter Change Question

What molecules are <u>carbon</u> atoms in before the chemical change?

What molecules are <u>carbon</u> atoms in after the chemical change?

Small organic molecules (or monomers such as amino acids, sugars, and fatty acids)
1 point for correct answer.

What <u>other</u> molecules are needed?
Soil minerals
1 point for correct answer.

Chemical Change

Large organic molecules (or fats/lipids, and proteins).
1 point for correct answer.

What <u>other</u> molecules are produced?
Water
1 point for correct answer

The Energy Question

What forms of energy go in to this chemical change?
Chemical ene
1 point for corr

Energy Transformation

What forms of energy come out of this chemical change?
Chemical energy.
1 point for correct response.

Explain in words: How does cell in a potato plant use food to grow larger and divide? (*Answer on the back*).

Use this Explanations Tool to help guide your written explanation, being 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: Small organic molecules (or monomers, such as amino acids, sugars, fatty acids, and glycerol) and soil minerals enter the root cell.***
2. ***Matter change: The small organic molecules and soil minerals are combined to make large organic molecules (or polymers, such as carbohydrates, fats/lipids, and proteins).***
3. ***Energy change: The chemical energy stored in the C-C and C-H bonds in the small organic molecules (monomers) stays in these bonds when they are combined into large organic molecules (polymers).***
4. ***Matter movement: The cell grows bigger and may eventually divide as more large organic molecules (polymers) are made.***

Level 2 and 3 responses may describe cells using small organic molecules to grow but focus on the small organic molecules being used for energy in order for the cell to grow and divide.

1 point for each correct part of the answer
4 points total