Name _____ Teacher _____ Date _____

Matter Movement Inside a Growing Potato Plant

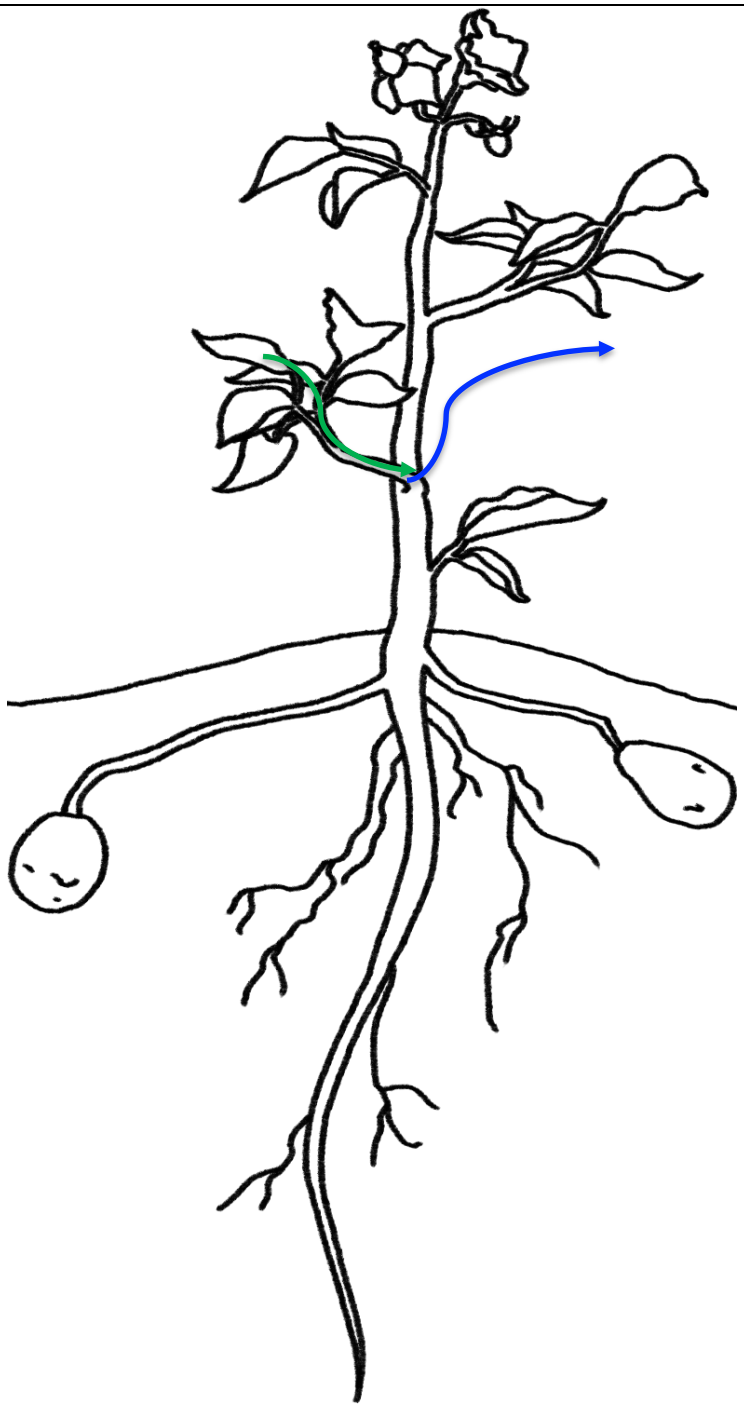
Note: The Matter Tracing Tool is designed to be used three times during the unit: after completing the Explanation Tools for each process—cellular respiration, photosynthesis, and biosynthesis.

- *Each time, students will add arrows and notes to the first page, building a more complete picture of how carbon-containing molecules move through the plant's leaves, stem, and roots.*
- *Each time, students will also complete one of the boxes on the second page, explaining how a specific process in the cells transforms matter and energy.*

So this assessing tool repeats the first page three times, showing the steps in building up the picture of how carbon moves through the plant's leaves, stem, and roots.

Key points for cellular respiration (choosing a stem cell as an example for all cells in the plant):

- ***Small organic molecules travel to the cells from the leaves***
- ***Carbon dioxide travels from the cells to the edges of the plant and into the air.***
- ***Oxygen is also a reactant; water is also a product of cellular respiration***



1. Draw colored arrows to show movement of carbon-containing molecules. When the molecules move to or from every cell in the plant, you can choose one cell as an example.

Key: Color of arrows for:

- Large organic molecules (LOM)

red

- Small organic molecules (sugar or glucose)

green

- Carbon dioxide (CO_2)

blue

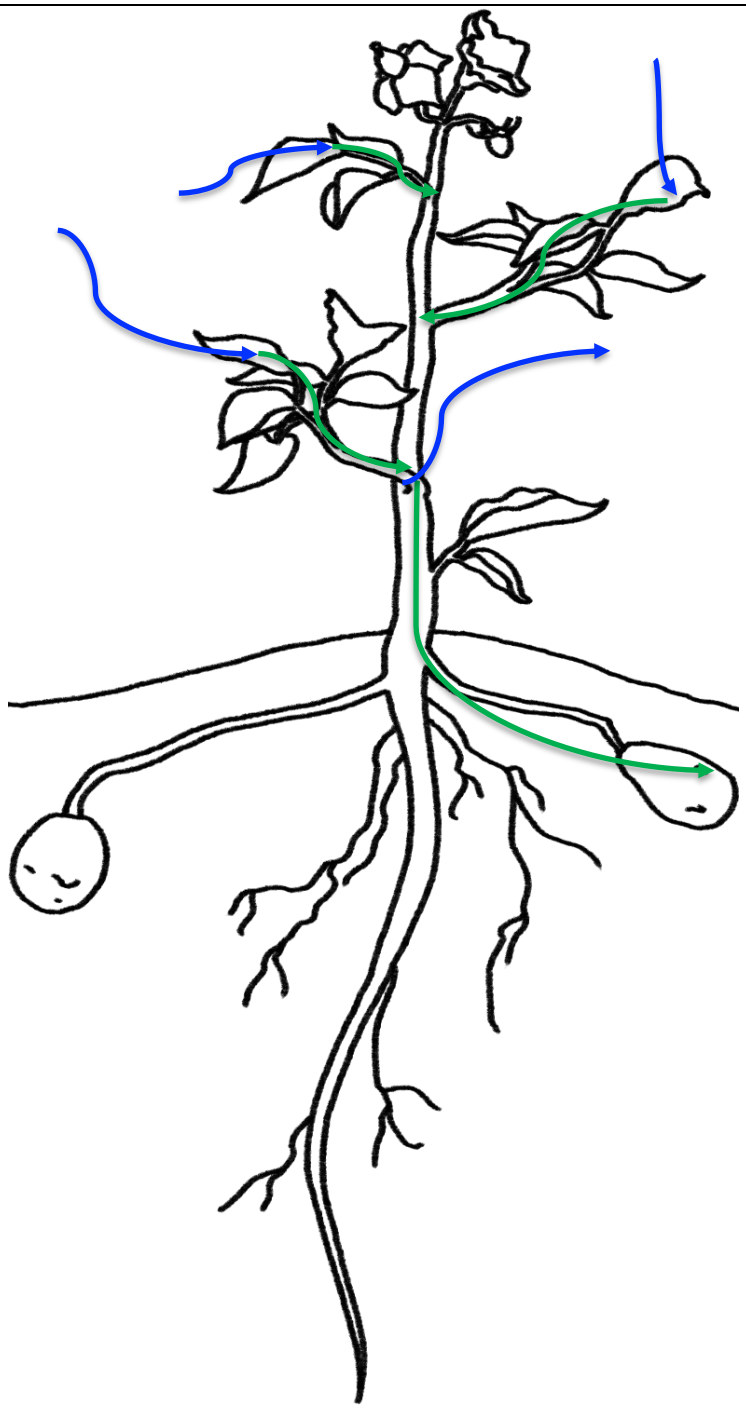
2. Use the space below to list other molecules that also move through the plant (you don't need to draw arrows).

oxygen (O_2)

water (H_2O)

Key points for photosynthesis (taking place only in the leaves):

- ***Carbon dioxide from the air and water from the soil and roots go into leaf cells***
- ***The leaf cells make glucose or sugar from CO_2 and water (also producing oxygen)***
- ***Sugar travels through plant systems to all plant cells[1]***



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Key: Color of arrows for:

- Large organic molecules (LOM)

red

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2. Use the space below to list other molecules that also move through the child's body (you don't need to draw arrows).

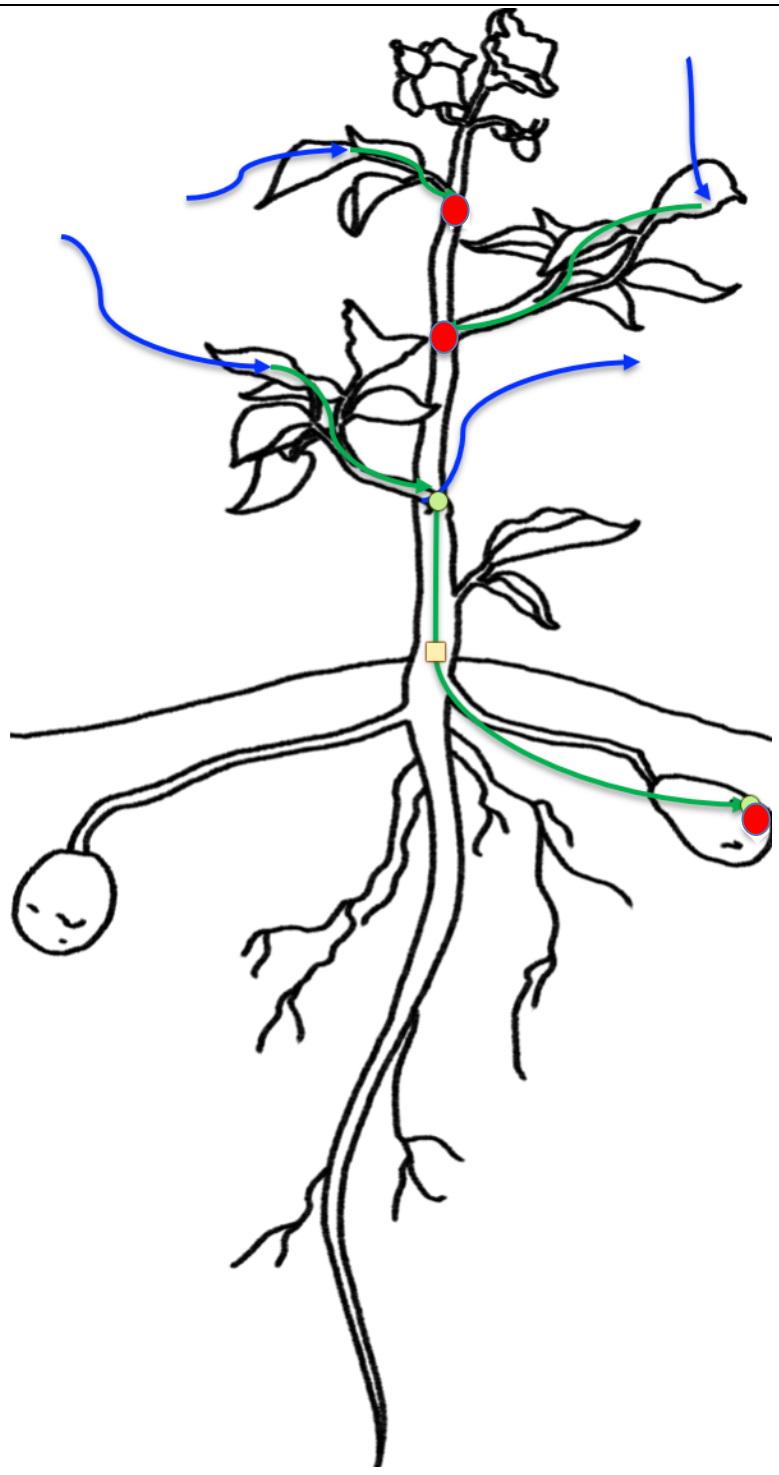
oxygen (O_2)

water (H_2O)

[1] Some technical notes: (a) the sugar that travels to body cells is actually sucrose, a disaccharide that the cells break back down into monosaccharides, (b) the system that carries sugar is the phloem.

Key points for biosynthesis (taking place in all plant cells):

- ***Sugar travels through plant systems to all plant cells***
- ***Plant cells grow by making large organic molecules from sugar and soil minerals***
- ***(Optional: Water is also produced when large organic molecules are formed)***



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Key: Color of arrows for:

- Large organic molecules (LOM)

red

- Small organic molecules (SOM)

green

- Carbon dioxide (CO_2)

blue

2. Use the space below to list other molecules that also move through the child's body (you don't need to draw arrows).

oxygen (O_2)

water (H_2O)

Soil minerals (N, P, S, etc.)

Matter and Energy Changes in a Growing Plant

Explain three processes that change matter and energy as a child eats, moves, grows, and breathes by answering the Three Questions for each process.

Photosynthesis

Matter Movement in: Where molecules are coming from: _*CO_2 from air, water from soil*_

Matter Change:

Reactants: _*CO_2 + water)*_

Products: _*sugar or glucose*_

Energy Change:

From ___*light energy*_____

To ___*chemical energy*_____

Matter Movement Out: Where molecules are going to: _*plant systems that carry them to cells*_

Biosynthesis for growth

Matter Movement in: Where molecules are coming from: _*leaves and plant systems*_

Matter Change:

Reactants: _*glucose & minerals*_

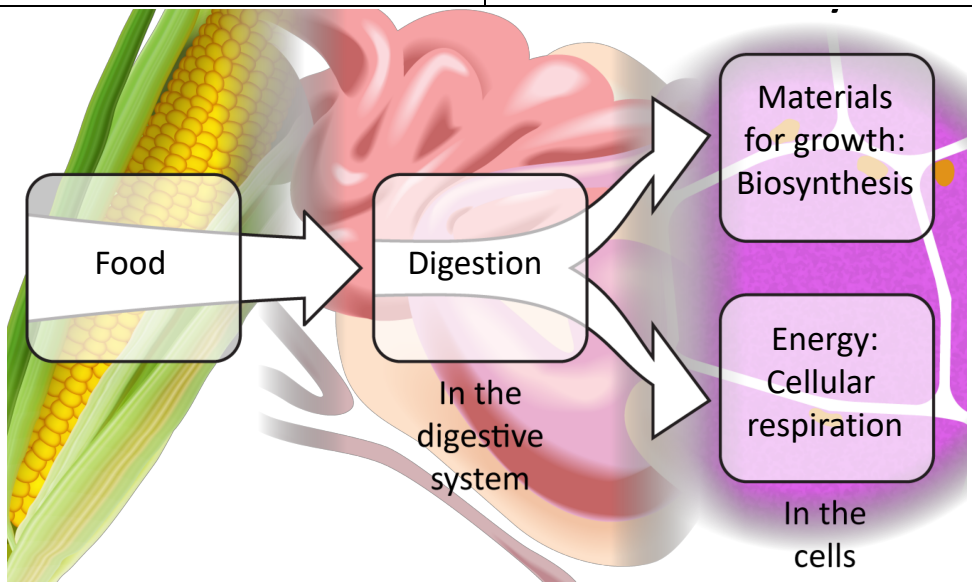
Products: __*large organic molecules (+ water)*_

Energy Change:

From ___*chemical energy*_____

To _____*chemical energy*_____

Matter Movement Out: Where molecules are going to: _*large organic molecules stay in cells as they grow*_



Cellular Respiration for energy

Matter Movement in: Where molecules are coming from: _*glucose from leaves and plant systems, oxygen from air*_

Matter Change:

Reactants: _*glucose (small organic molecules), oxygen*_

Products: _*carbon dioxide, water*_

Energy Change:

From ___*chemical energy*_____

To _*heat, energy for movement and cell functions*_

Matter Movement Out: Where molecules are going to: _*out from plant surfaces to aair*_