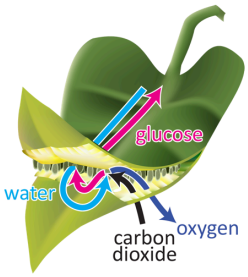
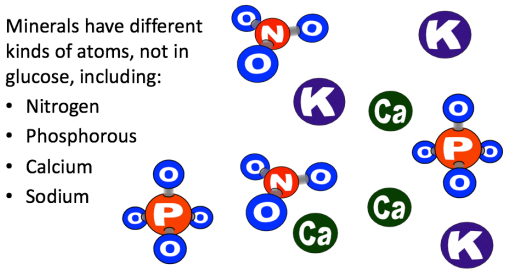
5.1: Tracing the Processes of Potatoes Growing: Biosynthesis Directions

Materials:

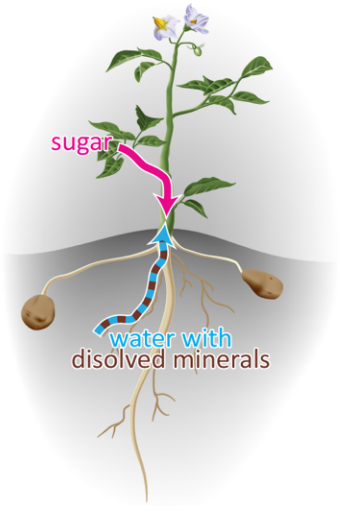
- 1 Potato poster (11 x 17)
- 1 mineral marker
- 2 nickels
- 5 pennies

Procedure:

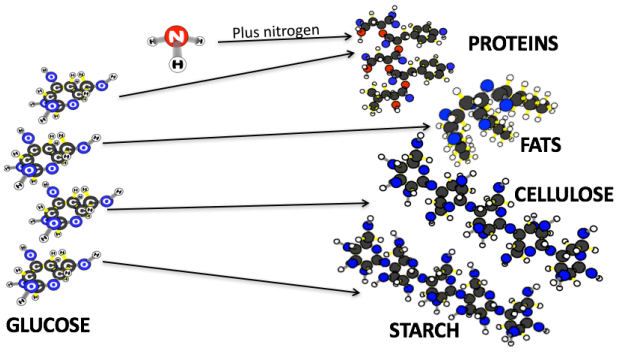




1. **Place your 5 pennies in the circle for the leaves.** You do not need your nickels yet. Your pennies represent the glucose molecules that the potato plant made through photosynthesis. You can trace how the glucose molecules in the potatoes' leaves move and changes to provide matter and energy for all its cells.
2. Potato plants also need minerals from the soil. Minerals in the soil dissolve in water and enter into the plant's roots. **Place your mineral marker in the roots.** The minerals in the soil have types of atoms that are not in glucose molecules.



3. Sap moving through the phloem carries sugar from the leaves to all parts of the potato. **Choose a cell somewhere in the potato plant and move your 5 pennies there.** The minerals dissolved in water move through the xylem to all parts of the potato. **Move your mineral marker to the same cell as your pennies.** These small molecules (the sugar) enter the cells, but don't come out. The cells combine some of the sugar molecules with oxygen to release energy. *What is that process called? What happens to the carbon atoms in those molecules?*



4. But plant cells use food in two ways. In addition to providing energy, the sugar molecules provide materials that cells use to grow and divide. In the cells, the sugar molecules are built into large organic molecules. For example, in a series of steps, glucose molecules and nitrogen atoms from soil minerals can be combined into protein. This process is called biosynthesis and results in growth. **Exchange your five pennies and mineral marker for a nickel to represent the process of biosynthesis.**

Stop and think: The glucose molecules with C-C and C-H bonds are combined into large organic molecules. *Based on this, what type of energy is present in the large organic molecules after biosynthesis? Has the energy changed? Watch the animation of biosynthesis in the PowerPoint.*