

1. What are rules about atoms? What are examples of atoms?  
**Atoms cannot be created or destroyed. Atoms join to make molecules. Atoms make up the mass of all things.**  
**Examples: C-carbon, N- nitrogen, O-oxygen, H- hydrogen**

2. What are rules about energy? What are examples of energy?  
**Energy cannot be created or destroyed. Energy can be transferred from one place to another or transformed from one type to another.**  
**Examples: chemical energy, light energy, motion/kinetic energy, heat energy**

3. Can atoms become energy or can energy become atoms? Explain.

**Energy cannot become atoms and atoms cannot become energy.**

4. Complete the following chart for proteins, fats (lipids) and carbohydrates

Polymer	monomer	type of atoms in this molecules	type of energy stored
<b>Carbohydrates (starch, cellulose)</b>	<b>Glucose</b>	<b>C, H, O</b>	<b>Chemical</b>
<b>Proteins</b>	<b>Amino Acids</b>	<b>C, H, O, N, P, K</b>	<b>Chemical</b>
<b>Lipids (fats,oils)</b>	<b>Glycerol &amp; Fatty Acids</b>	<b>C, H, O</b>	<b>Chemical</b>

5. Describe how each of the following enter, move through, are used and/or leave the plant.
  - a. Carbon dioxide **Carbon Dioxide is in the air. It enters through the stomata (pores) in the leaves and moves to the cells where it is used in photosynthesis to build glucose.**
  - b. Water **Water enters through the roots and moves through the xylem to all parts of the plant. It carries nutrients and glucose. It is used in photosynthesis to build glucose.**
  - c. Oxygen **Oxygen enters through the stomata or is produced by photosynthesis. The plant can use it for cellular respiration to release the stored energy in glucose.**
  - d. Soil minerals **Minerals such as nitrogen, potassium and phosphorus are found in the soil and carried in through the roots. They move to all cells to become part of the amino acids that build proteins.**

6. Trace the path of glucose through a plant (where is it formed, what is it used for)

**Glucose is formed in the chloroplast of the cells during photosynthesis. It can then move through the phloem cells to all part of the plant to be used in Cellular Respiration for energy or in Biosynthesis to build more cells.**

7. Where does photosynthesis occur in a plant?

**Photosynthesis occurs in the chloroplast of the leaf cells.**

8. Where does biosynthesis occur in a plant?

**Biosynthesis occurs in all cells so they can grow and divide to make new cells and a larger plant.**

9. Where does cellular respiration occur in a plant?

**Cellular respiration occurs in all cells to provide energy for a cell's functions.**

10. A plant grows and gains mass.
- Where do the carbon atoms come from? ***The carbon atoms come from carbon dioxide.***
  - What types of molecules are formed using carbon atoms? ***The carbon atoms are used to build glucose and then other large organic molecules.***
  - Where do oxygen atoms come from? ***The oxygen atoms come from the CO<sub>2</sub> and H<sub>2</sub>O.***
  - What types of molecules are formed using oxygen atoms? ***The oxygen atoms can be used to form O<sub>2</sub> that is released or they can become part of the glucose.***
  - Where do hydrogen atoms come from? ***The hydrogen atoms come from the water. (H<sub>2</sub>O)***
  - What types of molecules are formed using hydrogen atoms? ***The hydrogen atoms become part of the glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>)***
  - Where do minerals come from? ***The minerals are in the soil, they get dissolved in water and carried in through the roots.***
  - What types of molecules are formed using minerals? ***Amino acids which make up proteins are formed using C, H, O and minerals.***
11. Trace the path of energy during the following:
- Photosynthesis ***Light energy from sun is converted into chemical energy in the glucose***
  - Biosynthesis ***Chemical energy in the small organic molecules (monomers) stays as chemical energy in the newly formed large organic molecules (polymers)***
  - Cellular Respiration ***The chemical energy in the glucose is converted into motion and heat energy.***
12. What is the job of each part of the plant (relate each part to gaining mass, making food, or providing energy for functioning)?
- Root ***the roots absorbs water which is used for photosynthesis, it also carries the minerals used in biosynthesis.***
  - Stem ***The stem contains phloem and xylem cells that transport materials around the plant.***
  - Leaf ***The leaf contains cells that do photosynthesis.***
  - Seed ***The seed contains the embryo to grow a new plant.***
  - Flower ***The flower is the reproductive organ where pollination happens to produce new seeds.***
13. In the LIGHT, carbon dioxide gas moves into plant leaf cells and oxygen gas moves out. What do you think happens in the DARK? ***In the dark the carbon dioxide moves out and oxygen moves in.***
14. Explain your answer for #13. What causes carbon dioxide or oxygen to move in or out of plant leaf cells in the dark? ***The Carbon dioxide moves out because the plant is performing cellular respiration.***

15. Grass needs energy to live and grow. How does it get its energy? ***The grass gets its energy from the stored energy in the glucose which came from the light energy.***
16. What type of energy is stored in a living tree? ***Chemical*** \_\_\_\_\_
17. Is that energy still present in a dead tree? \_\_\_\_\_ ***Yes*** Explain your answer: ***The dead tree is still made of large organic molecules that contain chemical energy.***