Name: _____

Tale of the Masked Pigments:

Coming to an Autumn Near You

WHY LEAVES CHANGE COLOR

Every autumn, chemical reactions occur in the cells of leaves that make the beautiful fall colors of reds, purples, yellows and oranges. The tree's food making process of photosynthesis takes place in the leaf, where numerous cells contain chlorophyll. This extraordinary chemical absorbs energy from sunlight and uses it to transform carbon dioxide and water into carbohydrates (such as sugars and starches).

Chlorophyll isn't the only pigment that trees use to make carbohydrates. Along with the green pigment are the yellow orange pigment carotene, and the orange to red pigment xanthophyll. Most of the year these pigments cannot be seen because they are masked by the great amounts of green chlorophyll. Anthocyanin is yet another pigment that can be formed during certain conditions. Anthocyanin gives leaves a red or purple color.

In Native American legend, spirit hunters in the sky killed the "Great Bear" (a constellation from their culture) during the autumn. The bear's blood dripped over the forests, changing the leaves from green to red.

There are two general types of trees: deciduous trees and evergreens. Deciduous trees undergo a color change, and evergreens stay green year round. Deciduous trees have broad leaves with more surface area. Examples of deciduous trees include dogwood, sumac, maple, hickory, birch, and oak. The leaves of evergreen trees are specially designed "needles" that prevent water loss and are less sensitive to the colder temperatures. Evergreens, such as pines, spruces, firs, hemlocks, and cedars, remain green or greenish year round. This is because evergreens never stop producing chlorophyll. The needle-like leaves may stay for two to four years.

The color changes are due to a chemical change as the winter months approach. In the fall, there are changes in daylight and temperature. Less sunlight and colder temperatures cause the leaves to stop making sugar. This is because low temperatures signal a sort of "tree hibernation mode" that destroys chlorophyll. Other factors that affect fall colors besides temperature are light intensity and water supply.

During the fall, a new layer of cells, called the abscission layer, forms where the leaf meets the twig. This slows down the flow of water to the leaf, causing the chlorophyll to break down. As the chlorophyll lessens, pigments that were once masked (such as carotene and xanthophyll) can finally be seen.

At the same time, other chemical changes are taking place- the formation of red anthocyanin pigments. Anthocyanin is typically formed because sugars get trapped inside the leaf when the abscission layer forms. Unlike carotene and xanthophyll, anthocyanin is not present yearlong. The best fall colors are produced by cool nights (but not freezing), followed by sunny days. This is because more anthocyanin is produced with these conditions.

Only a few regions of the world have a splendid fall display. Eastern North America is favorable for vivid fall colors, and parts of western North America have bright coloration (especially in the mountains). Eastern Asia and southwestern Europe also have a colorful fall.

Questions

1. What are deciduous trees?

2. What factors affect the color of leaves as the seasons change?

3. Name some types of trees that have leaves that change color.

4. What are some other types of trees that do NOT change color?

Fill out the table using the text to match the pigment with the color it produces:

PIGMENT	COLOR
5.	Green
6. Carotene	
7.	Orange to red
8. Anthocyanin	

9. What is the better statement: Leaves change color OR leaves lose their green? Explain.

10. What is the abscission layer?

11. Is anthocyanin always present in leaves? How is anthocyanin formed?

12. Using a combination of your answers above, as well as information from the text, provide an explanation as to why leaves change color in the fall:

Unit 1: Characteristics of Life

13. List and describe the seven characteristics of Life.

14. How would you describe if an object is living or not.

15. What is the length of the pencil?

Unit 2: Biochemistry

1. What is the most important element in biochemistry?

2. What are the six elements found in biomolecules?

3. Define dehydration synthesis. Does it build or break down molecules? Are bonds made or broken? Is water added or removed?

4. Define hydrolysis. Does it build or break down molecules? Are bonds made or broken? Is water added or removed?

5. The structure of a protein is 3 dimensional. Because of this, the chain of monomers called _____ must _____and _____ before the protein is functional.
6. What is an enzyme? What does it do in chemical reactions?

7. Fill in the following chart:

Organic Molecule	Monomer	Function	Examples	Structure
Carbohydrate				
Lipid				
Protein				
Nucleic Acid				

8. Define the following terms and name a cell type in which they are found:

   Glycogen-

   Starch_

   Cellulose-

9. What elements are found in a:

   Protein -

   Nucleic Acid -

   Carbohydrate -

   Lipid –

10. What is the difference between a monosaccharide, a disaccharide and a polysaccharide?

11. List 4 characteristics of a saturated fat.

12. List 4 characteristics of an unsaturated fat.

13. What type of bond stores energy? Why are there more of these bonds in a saturated fat?

14. What types of foods would be high in
    a. Carbohydrates –
    b. Lipids –
    c. Proteins -
15. Describe the following types of bonds:
    a. Covalent -
    b. Ionic -
    c. Hydrogen -

<u>Unit 3: Cells</u>

1. List the three parts of the cell theory.

a

b

c

2. Match each organelle with the correct function.

Answer	Organelle	Function
EX: G	Nucleus	A. The site of protein synthesis (where proteins are made)
	Cell Wall	B. Packages and distributes proteins
	Ribosome	C. Provides structure and support for the cell
	Chloroplast	D. Hold all organelles in place, chemical reactions occur here
	Vacuole	E. Converts solar energy into chemical energy
	Mitochondria	F. Produces ATP from glucose
	Golgi Apparatus	G. Contains DNA, control center of the cell
	Cell Membrane	H. Stores materials in the cell, especially water in plants
	Cytoplasm	I. Aids in the movement of chromosomes during cell division
	Centriole	J. Controls what enters and exits the cell
	Smooth ER	K. Aids in cellular digestion
	Rough ER	L. Makes lipids for the cell.
	Cytoskeleton	M. Provides structure and support for all cells.
	Lysosome	N. Shapes and modifies newly made proteins.
	Nucleolus	O. Sounds the nucleus and keeps it intact.
	Nucleoplasm	P. Makes up the cytoskeleton.
	Nuclear Membrane	Q. Makes ribosomal subunits.
	Chromoplast	R. Contains all pigments except green.
	Leucoplast	S. The main storage area in a plant cell.
	Central Vacuole	T The fluid interior of the nucleus.
	Microtubules and Microfiliments	U. Starch storage

3. What are the five features shared by all cells?

4. What are the major differences between plant cells and animal cells? What organelles are present in each that may not be present in the other?

5. Fill in the chart below

Characteristic	Bacteria	Virus
Type of genetic material		
Description of Structure		
Is it alive? Explain		
How does it reproduce?		

6. What is the difference between a prokaryotic cell and a eukaryotic cell? Complete the table below to help your thinking.

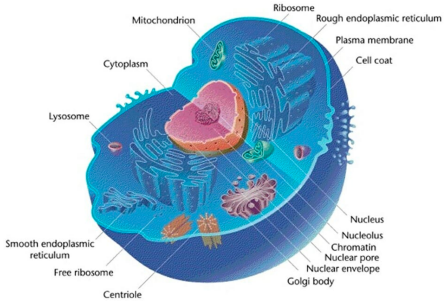
TYPE OF	HAS A NUCLEUS? YES OR NO	HAS ORGANELLES? YES OR NO	HAS DNA? YES OR NO LOCATION?	HAS A CELL MEMBRANE CYTOPLASM?	EXAMPLES
EUKARYOTE					
PROKARYOTE					

7. The origin of what two organelles is explained by the theory of endosymbiosis?

8. Summarize the theory of endosymbiosis using your own words.

9. List the four pieces of evidence supporting the theory of endosymbiosis.
10. Answer the following questions using the diagrams

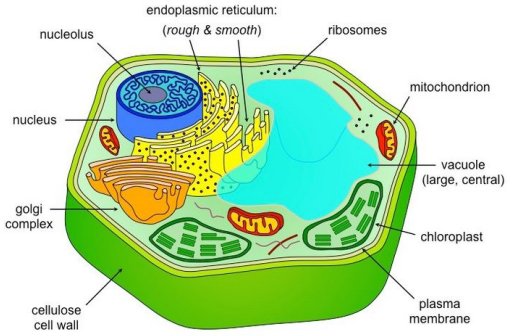
Figure 1



a Figure 1 is a _____ cell because

b Figure 1 is also a/an _____ cell because

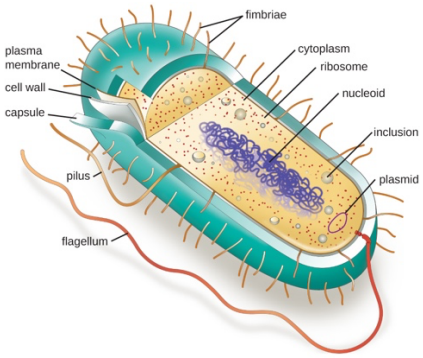
Figure 2



c Figure 2 is a _____ cell because

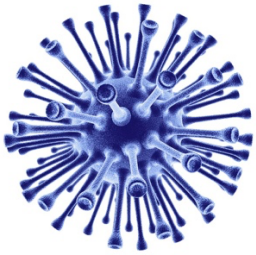
d Figure 2 is also a/an _____ cell because

Figure 3



e Figure 3 is a _____ which is a _____ cell because it

Figure 4



f Figure 4 is a _____. It is not a cell; in fact it is not alive

11. Be able to label a diagram of a virus and a bacterium.

12. Explain the difference between the lytic and lysogenic cycle.

13. List three bacterial shapes.

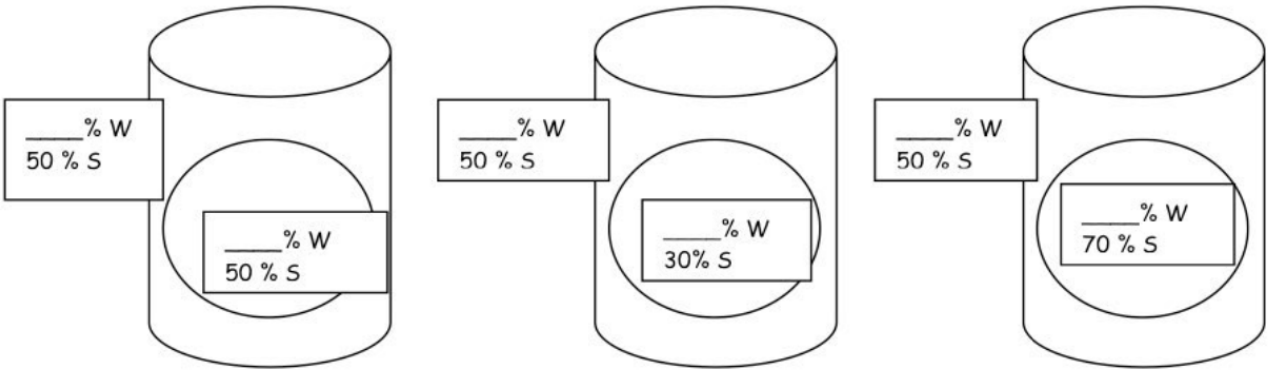
14. List three ways in which bacteria are grouped.

15. Fill in the following chart:

Type of Transport	High to low? Or low to high?	Energy needed?	Examples
Passive			
Active			

16. Describe how substances are moved in diffusion. How does this relate to osmosis?

17. Do the following beaker problems. For each fill in the % water, draw arrows to show water movement, and tell what will happen to the cell (shrink, swell, stay the same). What type of solution is the cell in (Isotonic, hypertonic or hypotonic)? Will the cell undergo cytolysis, plasmolysis or neither? Be able to show all your work



18. Complete the chart:

	Direction of water movement	Effect on cell
More H20 in cell than outside cell		
Less H20 in cell than outside cell		
Equal amount of H20 in cell and outside cell		

19. Describe the structure of a phospholipid.

20. Describe the difference between endocytosis and exocytosis. Are these active or passive transport?

21. List and describe the two types of endocytosis

22. Define facilitated diffusion. Is this passive or active transport?

23. Explain the three parts of the cell theory.

24. Explain the contributions of the following scientists to the cell theory:

    a Hooke
    b Brown
    c Schleiden
    d Schwann
    e Leeuwenhoek
    f Virchow

25. Be able to label the parts of a compound light microscope

MICROSCOPE PARTS

Label the diagram of microscope below!