Water Cycle

The Water Cycle

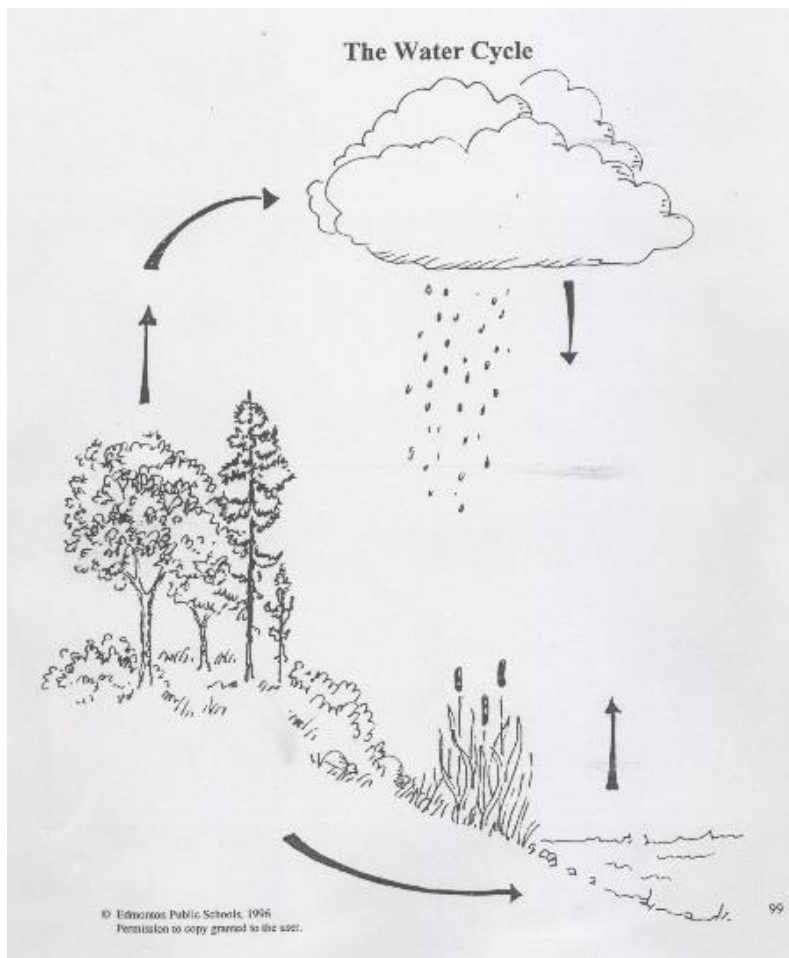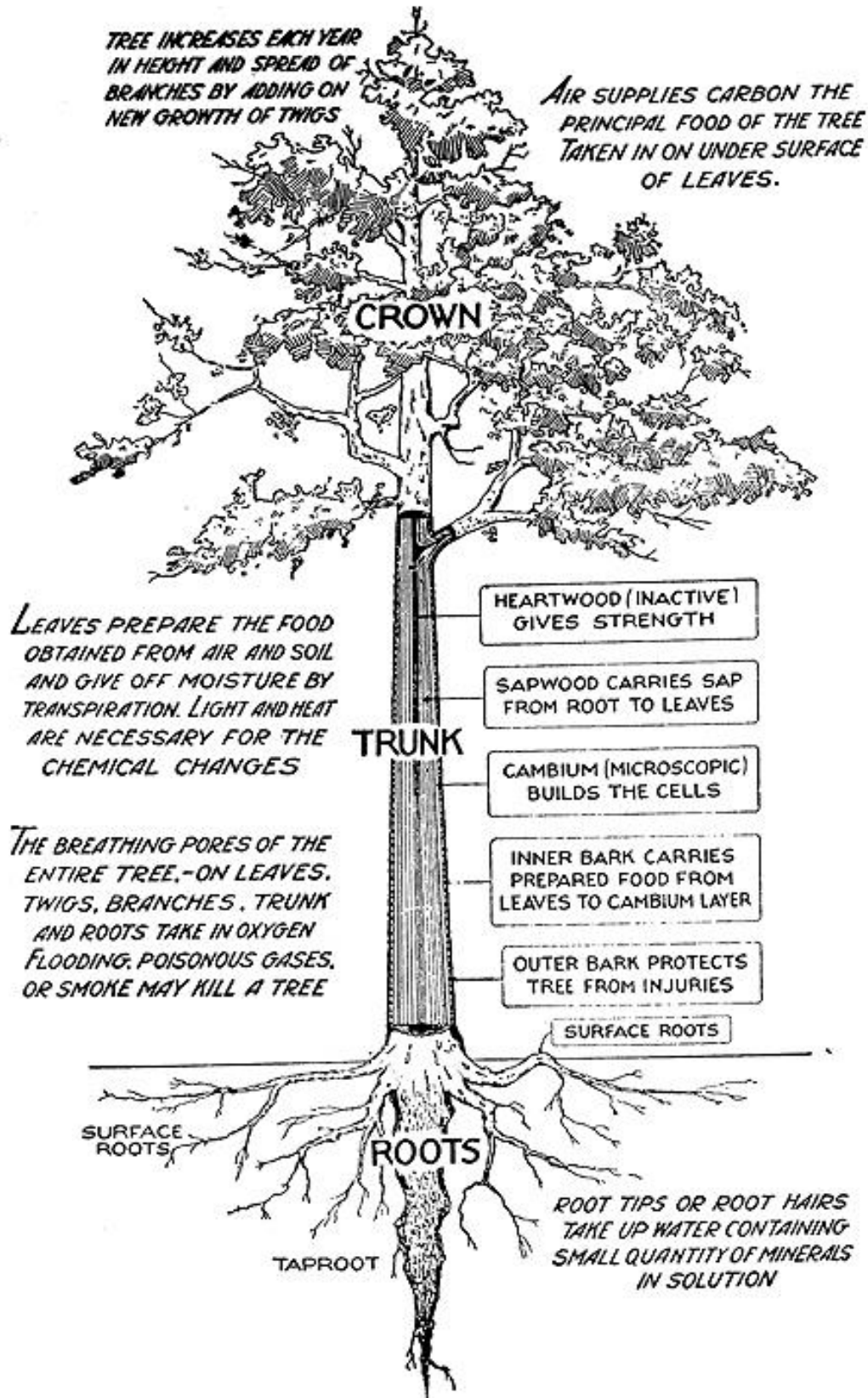© Edmonton Public Schools, 1996
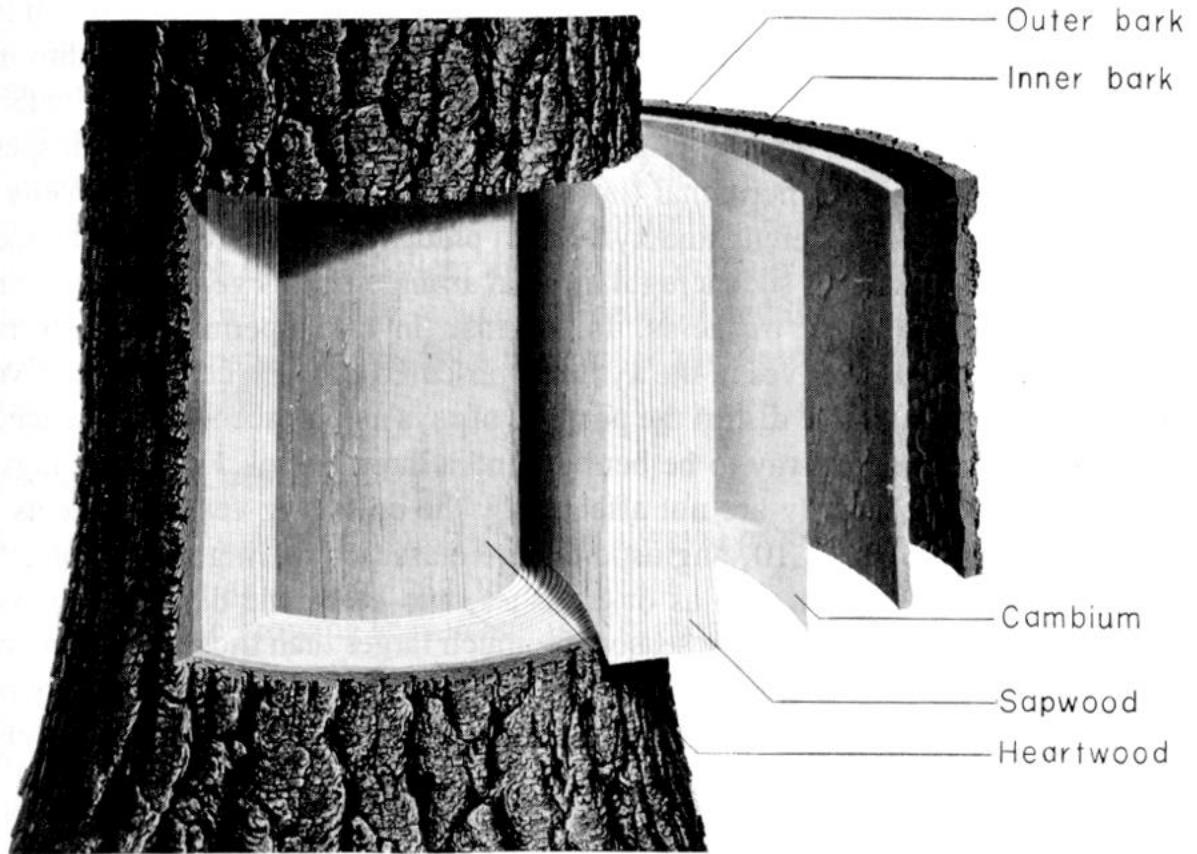Permission to copy granted to the user.

1. Trees take in water through their roots
2. Water is transported up through the trunk to the leaves
3. Leaf endings release water vapor (transpiration)
4. Water which is transpired by plants enters the atmosphere and cools (forming clouds)
5. Water also enters the atmosphere by the process of evaporation.
6. Dirt particles and various chemicals are left behind as vapor rises
7. Cooling of water vapor (condensation) forms precipitation
8. Precipitation falls to Earth as rain, sleet, snow or hail.
9. Precipitation lands on the ground or remains on the surface and collects in streams, rivers, and lakes.
10. Plants use water as part of the process of photosynthesis.
11. The cycle repeats over and over.

Parts of a Tree

TREE INCREASES EACH YEAR IN HEIGHT AND SPREAD OF BRANCHES BY ADDING ON NEW GROWTH OF TWIGS

AIR SUPPLIES CARBON THE PRINCIPAL FOOD OF THE TREE TAKEN IN ON UNDER SURFACE OF LEAVES.

CROWN

LEAVES PREPARE THE FOOD OBTAINED FROM AIR AND SOIL AND GIVE OFF MOISTURE BY TRANSPIRATION. LIGHT AND HEAT ARE NECESSARY FOR THE CHEMICAL CHANGES

THE BREATHING PORES OF THE ENTIRE TREE,—ON LEAVES. TWIGS, BRANCHES, TRUNK AND ROOTS TAKE IN OXYGEN FLOODING. POISONOUS GASES. OR SMOKE MAY KILL A TREE

TRUNK

HEARTWOOD (INACTIVE) GIVES STRENGTH

SAPWOOD CARRIES SAP FROM ROOT TO LEAVES

CAMBIUM (MICROSCOPIC) BUILDS THE CELLS

INNER BARK CARRIES PREPARED FOOD FROM LEAVES TO CAMBIUM LAYER

OUTER BARK PROTECTS TREE FROM INJURIES

SURFACE ROOTS

SURFACE ROOTS

ROOTS

TAPROOT

ROOT TIPS OR ROOT HAIRS TAKE UP WATER CONTAINING SMALL QUANTITY OF MINERALS IN SOLUTION

Tree Bark

Outer bark
Inner bark
Cambium
Sapwood
Heartwood

Tree Parts

- **Roots**
  - Absorb water and nutrients from soil
  - Store sugar and anchor the tree in the ground
- **Trunk/stem**
  - Supports the grown and gives the tree its shape and strength
  - Consists of a network of tubes that run between the roots and leaves
    - This is how nutrients from the soil reach the leaves
- **Crown**
  - Leaves and branches at the top of the tree
- **Bark**   Outer bark and Inner Bark
  - Outer Bark protects the tree from insects extreme temperature, desease and storms
  - Inner barks (phloem): Caries sugar and nutrients (sap) from the leaves to the rest of the tree.
- **Cambium** – Between the outer bark and the inner bark
  - A very thin layer of growing tissue that produces new cellsxcylem, phloem or more cambium.
- **Xylem or sapwood** has a network of thick walled cells that bring water and nutrients up from the roots to the leaves and other parts of the tree.
- **Heartwood**: As the tree grows, Xylem cells die to form the heartwood.
  - The heartwood supports the tree to give it its strength.

Types of Trees: **Coniferous** or **Deciduous**

Deciduous trees shed their leaves before the cold or dry season.
Coniferous trees have needle-shaped leaves.
  Needles are green all year long
  Cone bearing trees
Tamarack is both coniferous and deciduous

Deciduous or Coniferous?

TYPES OF TREES		
	DECIDUOUS	**CONIFEROUS**
Shedding of leaves	- shed leaves in fall	- shed continuously. (Most do not shed leaves in one season).
Shape of leaves	- broad-leafed or needle shaped	- needle-shaped leaves
Water retention	- leaves waxy topside and large surface area on underside, causing moisture loss	- thick, waxy coating reduces water loss from transpiration
Temperature resistance	- do not withstand temperature extremes	- do withstand temperature extremes

Deciduous - loses its leaves in the fall.

Coniferous - cone baring trees.

* A larch (tamarack) is both deciduous and coniferous. It loses its leaves in the fall and is also cone baring.

Leaf Classifications

   Make sure you review the leaf classification booklet – Available on Weebly

Leaves are the part of a tree most commonly used to identify it. Variations in leaves are used to divide trees into groups. The following characteristics are most often considered:

• **Leaf type**: simple (single leaf), compound (leaves grouped on a single branch), or needle

• **Compound leaf arrangements**: alternate, opposite or in pairs, whorl or spiral, basal or in bundles, in groups of a specific number, or double compound (compound groups arranged in a larger compound grouping)

• **Leaf margins**: entire or smooth, lobed, revolute, regularly toothed, irregularly toothed, fine toothed, coarse-toothed or serrated, wavy or scalloped

• **Leaf shape**: linear, oblong, oval, ovate, cordate (heart shaped), lobed, deltoid (triangular), orbicular (round), 4-sided needle, flattened needle

• **Needle Arrangements**: single, double, bundles of five, clusters of more than five, flat, scalelike

Leaf Parts
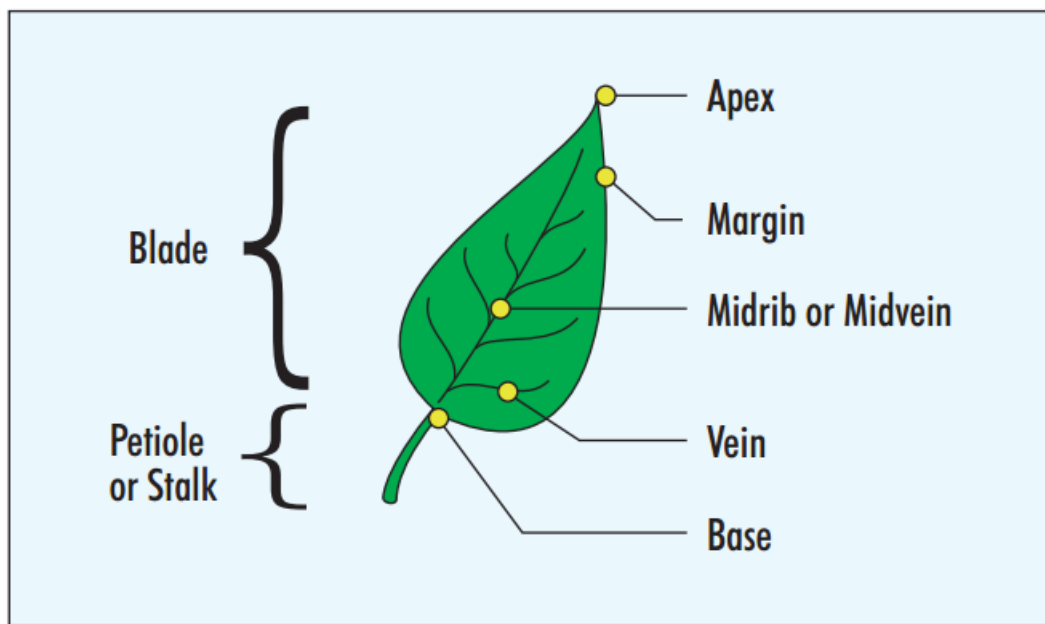
Leaf Arrangements

Simple leaf shape – one leaf on each petiole.
Compound leaf shape – more than one blade on each petiole.
Double compound shape – several blades attached to several petioles.

Leaves can be classified by their **arrangement on a twig**.
      Opposite, alternate, whorled, and basal.

Bark can be smooth or rough.
Most trees bark change color and thickens as the tree ages.
      Bark can be reddish, brown, grey or white.
      Patterns – scaly patches, horizontal, vertical, horizontal and wavy, and vertical and scaly.

Tree shapes

      Triangle or cone shape, oval shape, circle shape, a spreading sheape or a rectangular shape.

Branching patterns

      Whorled, opposite, alternate, or spiral arrangement.

Branches Patterns 2 can also be arranged in relation to the trunk

      Excurrent – branches go all the way up the trunk
      Decurrant – trunk is split to form two or three main branches
      Columnar – branches all cluster at the top of the trunk.
Tree shape may be influenced by being in lots of wind, not a lot of water, on a slope, etc.

Tree Cookies

Interpret the growth of a young tree, examine each year's growth, locate scars that separate old and new growth.

    a. **Tree rings (annual rings)**

- Close tree rings – poor growing conditions
- Far tree rings – good growing conditions.

    b. Trees form new wood in the spring and summer

- **Springwood is lighter than summerwood**

    c. Growth of rings is affected by

- **Weather, amound of growing space, soil condition, insect attacks, fire**.

    d. Know how to read the tree rings to tell the history of the tree.
    e. Wonderville - the Tree Game (http://www.wonderville.ca/asset/tree-cookies)

Tree cookie practice sheet:

Determining the Life of a Tree
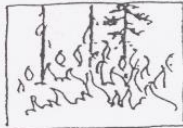

Construction

Insect Attack

Drought

Dead Branch

Growing On A Slope

Fire

From the situations illustrated above, list 2 possible incidents which may have caused each of the following variations in tree rings.
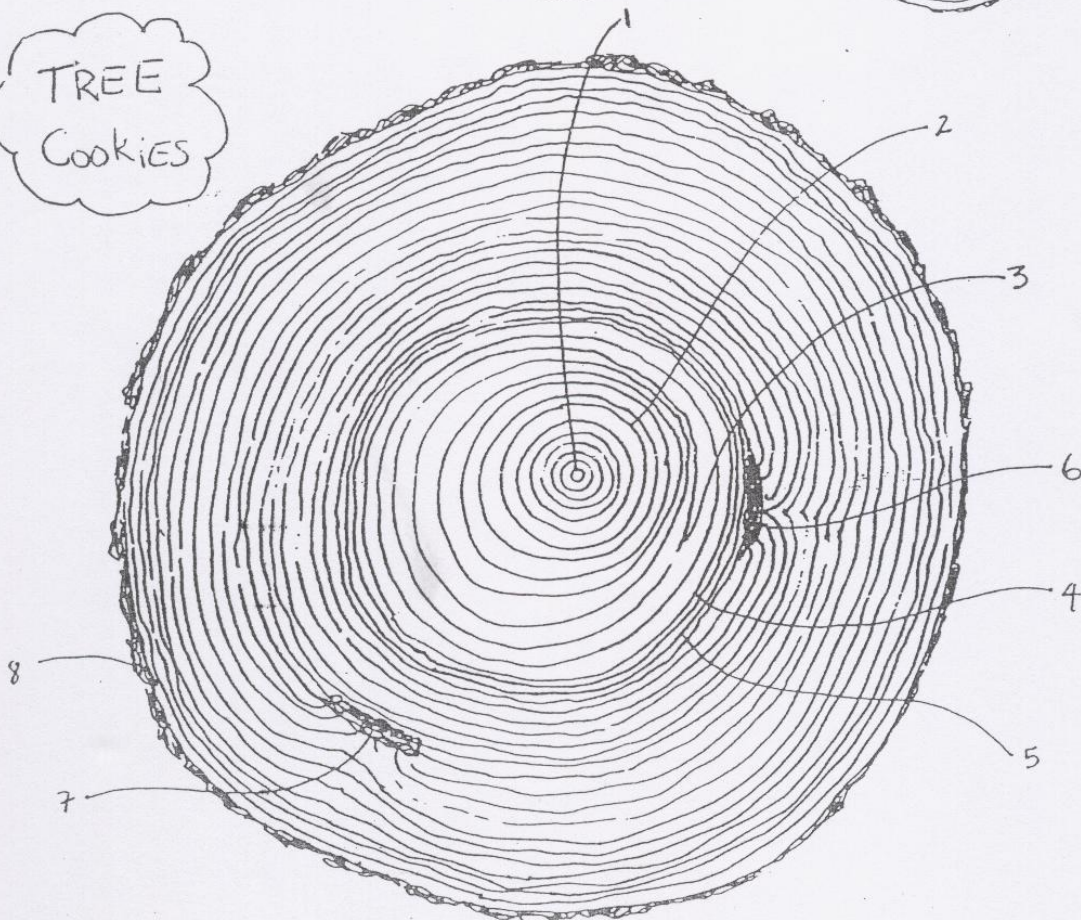
A.

B.

C.

D.

TREE
Cookies

1

2

3

6

4

8

5

7

In addition, make sure you can answer the following (we will go over it in class):

How has forest use changed over the years? Will we use trees and forests in the same way in the future?

Identify human actions that can enhance or threaten the existence of forests.

Identify other issues that affect forests. (Notes posted on Weebly).