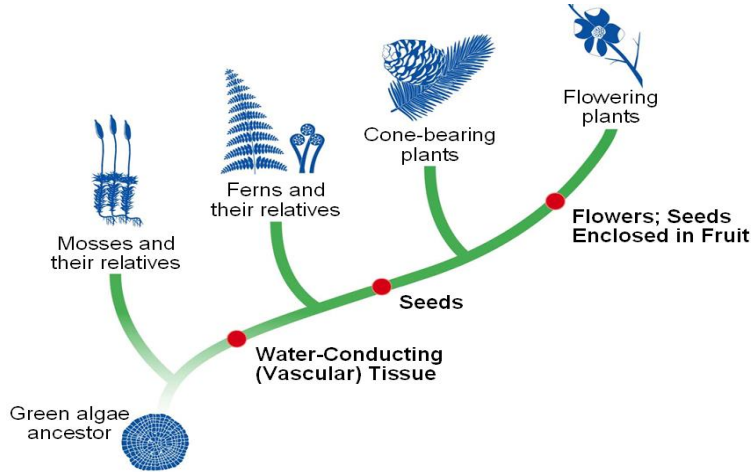
Unit 9: Plant Notes

A. Typical Plant Cell
   1. 3 differences from animal cell: _____

B. Plant Characteristics
   1. _____- made of many cells
   2. Eukaryotes- have nucleus & membrane bound organelles
   3. Cell Walls - made of _____(complex carbohydrate)
   4. _____- make own energy through _____



C. Evolution of Plants
   1. _____ and liverworts
      i. Earliest to evolve to live on land
      ii. Non vascular – _____
      iii. Live close to ground
      iv. No stems or roots
      v. Use _____ to move water throughout the plant
      vi. Water needed for _____
      vii. _____ are produced!

   Adaptation: _____ Plants
      viii. Better adapted to live on land
      ix. Bigger and _____
      x. Have vascular tissues for transport
         1. _____ – moves _____ up from roots to leaves
         2. _____ – moves _____ (glucose) down from leaves to roots
      xi. Have roots and shoots (stems)
      xii. XYLEM & PHLOEM
         1. Uses adhesion and cohesion
         2. _____- water molecules sticking to something else
         3. _____- water molecules sticking to each other

   2. _____
      i. Have Vascular Tissue (medium plants)
      ii. _____ plants that reproduce with _____
      iii. Leaves are called _____

   Adaptation: Seeds
      iv. Zygote surrounded by a protective covering
      v. Can stay in a state of _____ (no growth) for long periods.
      vi. Dormancy ends with _____ or early growth

vii. Only need water for a seed to germinate, no light

3. _____
   i. Produce "_____" or unprotected seeds in _____
   ii. Have vascular tissue
      1. Generally taller plants
   iii. _____- pollen from male cone is transferred to female cone
   iv. Seeds dispersed (moved) by _____, animals and water

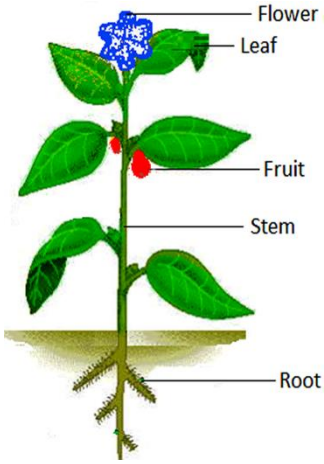
Adaptation: Flowers

   v. _____
   vi. Also known as blossom
   vii. Increases _____ of seed
      1. Seeds through germination produce _____ (early leaves)

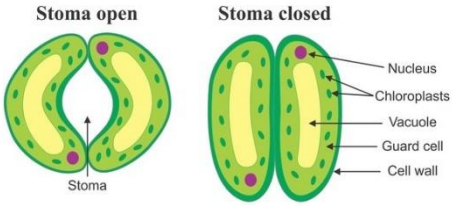
4. _____
   i. Produced protected seeds enclosed in an _____ or _____
   ii. Has vascular tissue
      1. Generally taller plants
   iii. Pollination- Pollen from the male _____ is transferred to the female _____ of another flower.
   iv. Seeds are usually dispersed through _____
   v. Monocots vs. Dicots →

	Monocots	Dicots
Seeds	Single cotyledon	Two cotyledons
Leaves	Parallel veins	Branched veins
Flowers	Floral parts often in multiples of 3	Floral parts often in multiples of 4 or 5
Stems	Vascular bundles scattered throughout stem	Vascular bundles arranged in a ring
Roots	Fibrous roots	Taproot

D. Plant organ systems
   1. Roots - _____
      i. Example: taproots, fibrous roots
   2. Shoots - _____
      i. Example: leaves, stems, flowers, fruit



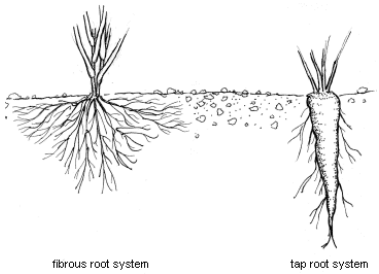
E. Plant Organs
   1. Leaves
      i. Makes food for the plant (glucose)
      ii. Contains organelles called _____
         1. Where photosynthesis takes place and glucose is made
         2. Inside the chloroplast is the pigment _____ that absorbs light
            a. All light is absorbed _____ for green!
      iii. Leaves- structure
         1. _____ is a waxy covering on the top of leaves that help prevent transpiration
         2. _____ are openings on the bottom of the leaves
            a. Allows CO_2 to enter and Oxygen to exit for _____ (plant equivalent of breathing)
            b. Water is also lost through these openings
            c. _____ open and close the stomata to prevent too much transpiration
            d. In the _____ plants keep stomata _____, otherwise they will _____ too much water and dry out



e. In the _____ plants can keep stomata _____ to remove _____ water

2. Stem
    1. Carries food and water through the plant
    2. _____ for the elevation of leaves, fruits and flowers
    3. Stem keeps the leaves in the light
    4. Contains xylem and phloem for nutrient and water movement
    5. _____ nutrients or carbohydrates
        a. Underground stems called _____

3. Roots
    1. Carries water from the soil to the plant
    2. Water and Nutrients are _____ through the roots
    3. _____ a plant to the ground to keep it from moving
    4. Types of roots
        a. _____- reach _____ underground
        b. _____- spread out and follow the water close to the _____



4. Flower or cone
    i. _____
    ii. Ovary turns into _____ on flowering plants

F. Plants vs. Humans
    1. Reproduction: Plants and humans use _____. They have male and female reproductive structures; the _____ come together to fertilize
    2. Transport: vascular system vs. Cardiovascular system; plants transfer water and minerals through _____ _____ while humans use the _____.
    3. Response: Both humans and plants use _____ to control their bodies

G. Plant Hormones
    1. Hormones signal for things to happen just like in humans
        i. Promote and inhibit cell division
        ii. Control Growth of plant organs
        iii. This system maintains the plant's _____
        iv. Ex. Ethylene _____

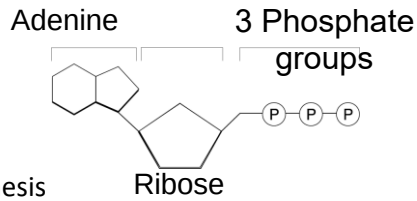
H. Plant Responses (_____tropism)
    1. _____tropism
        i. Plant responds to _____ stimulus using hormone auxin by growing _____ the light source.

    2. _____tropism
        i. Plant responds to _____ by roots growing down and leaves/stems growing _____.

    3. _____tropism
        i. Plants respond to _____ or physical contact

Unit 9: Photosynthesis Notes

- Energy and Life
  - Autotrophs and Heterotrophs
    - _____ use light energy to produce food Ex: all _____
    - _____ obtain energy from_____ they consume Ex: all animals
- REMEMBER: Cellular Respiration Review
  - _____ Makes ATP in the _____
- _____ (plants) and _____ (animals) do this process
  - ATP for Photosynthesis comes from light energy
  - Chemical Energy and ATP
    - Storing Energy – _____
    - Releasing Energy - _____ → _____



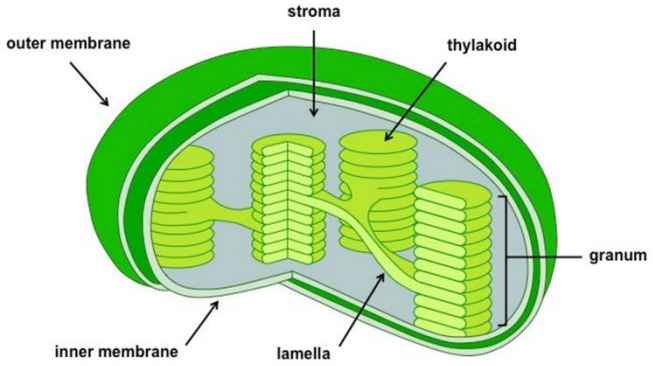
- Using Biochemical Energy
  - ATP is used to power all cell activities including photosynthesis
  - ATP - basic _____ source of _____ cells, both plants and animals
    - By _____ between the _____ & _____ phosphate, energy is _____
  - Adenosine Triphosphate - _____ - high energy compound
  - Adenosine Diphosphate - _____ - low energy compound
- Investigating Photosynthesis
  - Plants use the energy of sunlight to convert _____ and _____ _____ into _____ and high energy _____
    - Van Helmont's Experiment - Plant growth & weight comes from water and CO_2 in the air
    - Priestley's Experiment - plants produce O_2
    - Jan Ingenhousz - Light is necessary for plants to live and produce O_2 and sugar (this led to the photosynthesis equation)
- Photosynthesis Equations and Reactants and Products
  - _____ + _____ → _____ + _____

Light

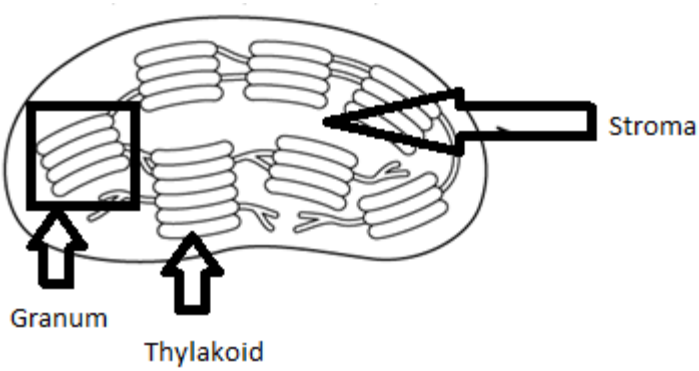
Carbon dioxide + water → sugars + oxygen

Reactants	Products
Carbon Dioxide	Sugar
Water	Oxygen

- Photosynthesis Location
  - Takes place in the chloroplasts of the cell
  - Parts of the Choloroplast:



        - _____ - stack of thylakoid
        - _____ - photosystems are clusters of pigments that absorb light energy. Found in sac-like photosynthetic membranes. Light-dependent reaction occurs here
        - _____ (space) = Light independent reaction called Calvin Cycle takes place here
    - Light and Pigments- why the plant is green
        - _____-a and chlorophyll-b are _____ in a chloroplasts



- Two reactions in photosynthesis (inside the chloroplast)

Process	Location	Reactants	Products
Light dependent reactions (Photosystem II & I)	Thylakoid	Water	ATP NADPH Oxygen
Light independent reactions (Calvin Cycle)	Stroma	ATP NADPH Carbon Dioxide	Glucose

- _____
    - Summary: Photosystem II & I, light collecting pigments in thylakoid membrane, send ATP and NADPH to the stroma.
    - Excited electrons are passed to electron transport chain (similar to Cellular Respiration)
    - What is given off?
        - _____, _____, _____ & _____
        - NADPH and ATP are high energy and will be used in the dark reaction cycle.
    - Inside a _____
        - Photo II - Light hits chlorophyll in the thylakoid membrane, H+ is a carrier forced into membrane, electron moves through the ETC
        - Electron Carriers Photo I and re-energizes ATP & NADPH
- The _____ - occurs in the stroma (Light _____ Reaction)
    - Summary: High energy sugars are the product of Calvin Cycle, uses CO_2, and ATP & NADPH from Photo I to make sugar_____.
        - _____- ribulose bisphosphate, 5C starts and ends Calvin Cycle. Combines with CO_2
        - _____ – phosphoglyceric acid, 3C
        - _____ - phosphoglyceraldehyde
- Photosynthesis vs. Cellular Respiration
- The _____ of one are used as the _____ of the other: