CYCLING OF MATTER

How much Carbon is Stored in a local Tree?

Name: _____ Date: _____ Block: _____

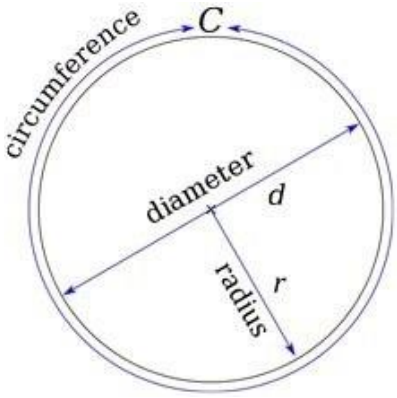
Introduction: In this lesson you will measure a variety of trees on the school's campus and collect data about each of the trees you sample and observe. As part of the data collection, you will identify the trees and conduct a series of calculations for those trees observed. You will work in groups of 3-4 and utilize the Allometric Coefficients for Common North American Trees chart. These comparisons will help you gain an understanding of the importance and responsibility as citizens of this region to protect and conserve trees.

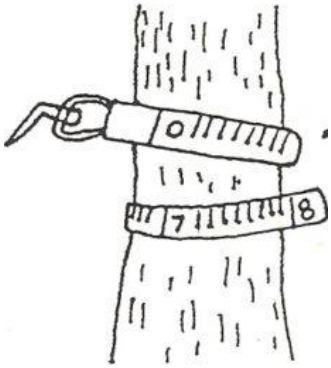
Procedure:

1. With your data sheet and group, walk around the school's campus in the designated area(s) and observe, measure, and calculate **four (4)** trees in the area. **The trees will already be marked for you!**

2. Complete the calculations in your data tables below. **Measurements are in centimeters (cm)**

3. Answer the questions at the end of the lab.





How to do the calculations:

I. **Circumference**: the measurement all the way around the tree.

II. **Diameter (D):** $\frac{\text{Circumference}}{3.14}$

III. **Allometric coefficients** are on your chart. There are two: **"a" coefficient** and **"b" coefficient**

IV. **Biomass (M):** use the formula $M = aD^b$ ← "b" coefficient

"a" coefficient ↗

V. **Mass of Carbon stored**:

- Hardwoods: Biomass (M) X **0.521**
- Softwoods: Biomass (M) X **0.498**

VI. **Amount of CO_2 Stored:** Mass of Carbon Stored X **3.67**

VII. **Amount of tree Carbon:** *1 metric ton =* ***1000kg***
1 metric ton = ***2,205 lbs***

If the trees on campus are NOT listed on the allometric coefficient sheet, please choose a North American tree and conduct the calculations for that tree.

Data Chart:

Tree #1

Tree **Species** Name: _____

Tree **Common** Name: _____

Hardwood or Softwood: _____

Circle one: Is the tree in an area that is:

Sunny Shady Partial Sun & Shade

Bark Description:

Leaf Drawing:

Circumference of tree: _____(cm)

Diameter (D) of tree: _____(cm)

Allometric Coefficients:

"a" coefficient: _____

"b" coefficient: _____

Biomass (M): _____ (kg)

Mass of Carbon stored:

Hardwood: _____**(kg)**

-OR-

Softwood: _____**(kg)**

Amount of CO_2 absorbed & stored: _____(kg)

Amount of Tree carbon: _____(kg)

Amount of tree Carbon: _____(lbs)

Tree #2

Tree **Species** Name: _____

Tree **Common** Name: _____

Hardwood or Softwood: _____

Circle one: Is the tree in an area that is:

Sunny Shady Partial Sun & Shade

Bark Description:

Leaf Drawing:

Circumference of tree: _____(cm)

Diameter (D) of tree: _____(cm)

Allometric Coefficients:

"a" coefficient: _____

"b" coefficient: _____

Biomass (M): _____ (kg)

Mass of Carbon stored:

Hardwood: _____**(kg)**

-OR-

Softwood: _____**(kg)**

Amount of CO_2 absorbed & stored: _____(kg)

Amount of Tree carbon: _____(kg)

Amount of tree Carbon: _____(lbs)

Tree #3

Tree **Species** Name: _____

Tree **Common** Name: _____

Hardwood or Softwood: _____

Circle one: Is the tree in an area that is:

Sunny Shady Partial Sun & Shade

Bark Description:

Leaf Drawing:

Circumference of tree: _____(cm)

Diameter (D) of tree: _____(cm)

Allometric Coefficients:

"a" coefficient: _____

"b" coefficient: _____

Biomass (M): _____ (kg)

Mass of Carbon stored:

Hardwood: _____**(kg)**

-OR-

Softwood: _____**(kg)**

Amount of CO_2 absorbed & stored: _____(kg)

Amount of Tree carbon: _____(kg)

Amount of tree Carbon: _____(lbs)

Tree #4

Tree **Species** Name: _____

Tree **Common** Name: _____

Hardwood or Softwood: _____

Circle one: Is the tree in an area that is:

Sunny Shady Partial Sun & Shade

Bark Description:

Leaf Drawing:

Circumference of tree: _____(cm)

Diameter (D) of tree: _____(cm)

Allometric Coefficients:

"a" coefficient: _____

"b" coefficient: _____

Biomass (M): _____ (kg)

Mass of Carbon stored:

Hardwood: _____**(kg)**

-OR-

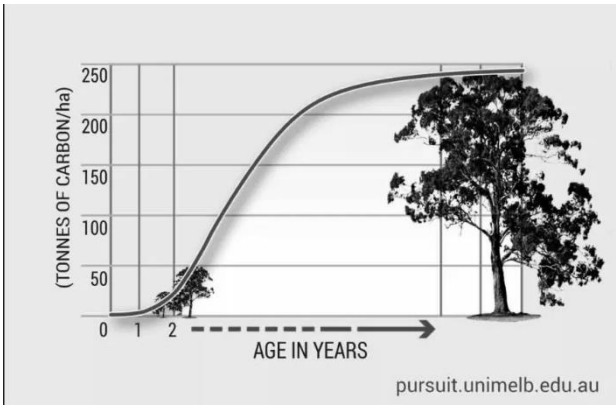
Softwood: _____**(kg)**

Amount of CO_2 absorbed & stored: _____(kg)

Amount of Tree carbon: _____(kg)

Amount of tree Carbon: _____(lbs)

Conclusion: ANSWER IN COMPLETE SENTENCES!

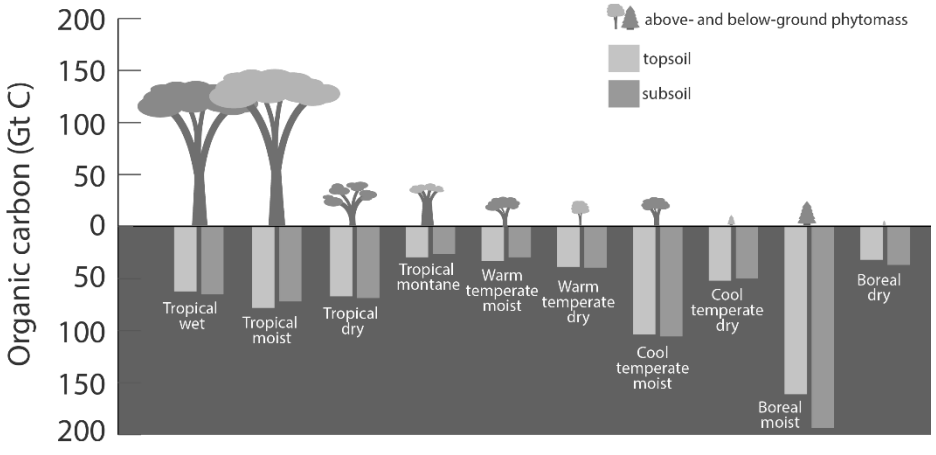


1. For how long will the carbon in each of those trees be stored?

2. How does carbon storage relate to growth? What does carbon content tell us about the age of the tree?

3. Does all carbon that is taken up by the tree end up in the tree as storage? If not, where does some of the carbon go?

Tree storage vs. Carbon Sequestration: Stored carbon is the amount of carbon that exists in a tree's leaves, wood, stem, roots, and bark at a particular point in time. Because older trees are larger than younger trees, they are able to store more carbon. Knowing the amount of carbon stored in a tree and the tree's age allows scientist to calculate the rate of **carbon sequestration**. This represents the net intake of carbon storage over a period of time.



6. Note the diagram above, why would trees such as pines and conifers be more efficient at sequestrating carbon?

7. Other than urban trees, what other type of land would sequester carbon?

8. Where does carbon go after it leave a tree?