CO₂ Carbon in Pines (1 of 2)

NAME:

The southeastern United States is home to many different species of pine trees, specifically: loblolly, slash, longleaf, and shortleaf pines. Pine forests are important for many reasons. They provide wildlife habitat, recreation, and clean water, and as you have learned, the trees store carbon as they grow. In the Southeast, pine trees are commonly grown in plantations to provide wood products, such as timber and paper.

Foresters and scientists measure pine trees with a method similar to the one you used on the trees in your schoolyard. Using this information they can determine how much carbon is stored in a certain area of the forest. The trees that are grown on a plantation are usually similar in size and age. This allows foresters to measure a small sample of trees and then use those numbers to estimate carbon storage for the entire area.

To estimate how much carbon typically exists in one hectare of pine forest in the southeastern United States, you will use data collected by high school students during a field trip to a pine forest sample plot in North Central Florida.

In a plot that measures 1/40th of a hectare, the students measured ten trees and found that the trees have an average diameter of 25.7 centimeters and an average height of 32.5 meters. Because the trees in this area are generally the same species, age, and size, we can use their average data to estimate the amount of carbon contained within one hectare of this forest.
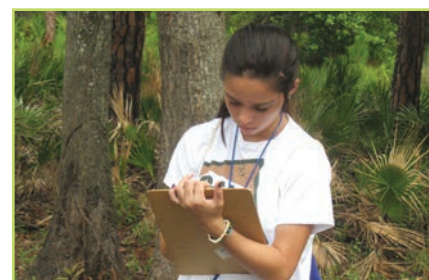
Students measure tree height and diameter on a sample plot of slash pine trees in a forest in North Central Florida.
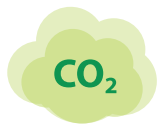
CO$_2$ **Carbon in Pines** (2 of 2)

Complete the calculations below, where d = diameter; h = height; GW = green weight; and DW = dry weight.

1. Green Weight (GW) = 0.0577 x d^2 × h   GW = _____ kg/tree

2. Dry Weight (DW) = GW × 0.5   DW = _____ kg/tree

3. Carbon (C) = DW × 0.5   Carbon content = _____ kg C/tree

4. Total carbon content of plot = carbon content per tree × 10 trees

   Total carbon content of plot = _____ kg C in 1/40th hectare plot

5. Total carbon content of 1 hectare = total carbon in plot × 40

   Total carbon in 1 hectare = _____ kg C/hectare

This final number illustrates the total carbon stored in one hectare of pine plantation where the students took measurements. However, this is not the same as the amount of carbon that the trees sequestered in one year of growth. Carbon sequestration is the net intake of carbon by the tree over a period of time. In this case, the forest where students sampled is 25 years old. Assume that trees sequestered carbon at the same rate during each year it lived, and use the equation below to determine what rate carbon is sequestered by the forest annually.

Total carbon in 1 hectare ÷ 25 years = Carbon sequestration rate

6. Carbon sequestration rate = _____ kg C/ hectare /year