Activity: Field Trip to a Forest

This activity is an adaptation of "Field Trip to a Forest" from Focus on Forests.

Objective: to develop an appreciation for the complexity of the forest ecosystem by practicing the skills of observing, recording and collecting during a forest field trip

Materials: 5-meter string or rope; stake (optional); light intensity meter; meter stick; length of flagging tape

Prior Knowledge: The students must have the ability to recognize a number of tree species before beginning this activity. They must have been taught how to take the diameter of a tree at breast height and measure the height of a tree (see below). They must be able to estimate the age of a conifer by counting each year's growth (the number of spaces between the branches on the truck – see below) .

Extension: If the same areas of study are used every year, tree growth and health can be tracked over time.

Activity:

1. Tell students to imagine they have been asked by a class of students in Australia to give them a detailed description of what an Ontario forest is like. Brainstorm a list of questions that would lead to a complete description of the forest. Some example questions include: What kinds of trees are there? Are there more of some kinds of trees than others? Are they all about the same size and age or are

there many different sizes present? What is the soil like? Is the area wet or dry? How much light reaches the forest floor? What plants can you find other than trees? What signs are there of animal life?

2. Take the class to the forest setting that you visited in the previous activity. Have the students work in pairs. One student is designated the reporter. Assign each pair an area of study and try to make the study areas diverse. The area of study will be defined by tying a 5-meter string to a tree or stake in the center of the area and walking in a circle to define an outer border. The students must tie about ten pieces of flagging tape to trees, bushes, or grass to mark the border. The pair walks slowly through the designated area recording qualitative and quantitative observations according to the worksheets provided.

3. The following day, students will use the information gathered to compose a letter to a fictitious Australian student, describing their section of the forest in detail.

4. Letters will be read in small groups. As they listen, each student must make note of similarities and differences between their study area and the area they are hearing about. They can do this in a t-chart. When they have listened to all the letters, they will have a better understanding of the diversity of the area.

Forest Observation Sheet

Names:_____ **Date**: _____

1. Give a general description of the area (what are your first impressions?)
   _____
   _____
2. Is it hilly or flat? _____
   _____
3. Is it wet or dry? _____
4. Is it dense bush or sparse bush? _____
5. What kind of vegetation is found under the trees? _____
   _____
6. a) What is the light intensity reading in the darkest part of your area? _____
   b) What is the light intensity reading in the lightest part of your area? _____
7. Is there any evidence of disease or damage from other sources on the trees? Make note of the type of tree and any other details.

_____

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8. Do you think the forest was established naturally or was it planted by people? How can you tell?

_____

_____

9. What types of trees are found in your area? Fill in the table for each type of tree you find.

Species	Number of individuals	Height of the tallest tree (meters)	Diameter of the tallest tree (centimeters)	Age estimate of the trees (for conifers only)

10. What is the average height of the trees in your area? (Were there many trees around the height of your tallest tree or were most of the trees smaller?)

_____

_____

11. Sit down and take a moment to listen to the sounds of the environment. You can probably hear some of your classmates, but make yourself listen beyond those sounds to the sounds of nature. What can you hear? _____

_____

_____

12. When you have finished, begin to plan your letter. Pick out the main ideas to form paragraphs to make up the body of your letter and plan the order they should be presented in. If you have time, begin writing your first paragraph.

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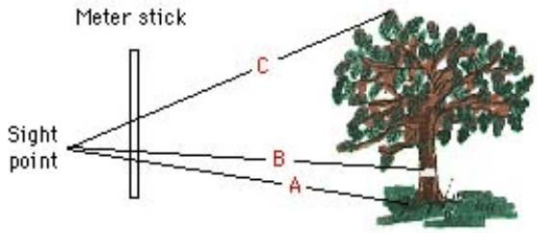
MEASURING TREE HEIGHT
USING A RATIO

INTRODUCTION:
Many times we do studies in the field that require us to record the height of the trees. This is a simple way to measure the height of a tree by using representative lengths on a meter stick and then calculating the ratio from these measurements.

MATERIALS:
Meter stick
Ribbon or cord (to wrap around tree)

PROCEDURE:
1. Measure from the ground, up the tree trunk to a height of 2.0 meters (you can use a shorter height if necessary). Tie the ribbon or cord around the tree trunk at this height.
2. Move away from the tree to a distance that allows the entire tree, from the base to the top, to fit within the meter stick when held out in front of you (see diagram below).



3. Count the number of centimeters the tree covers (from **A** to **C** on the drawing) and the number of centimeters from the ground to the ribbon (from **A** to **B** on the drawing). Record these lengths.

A to C: Centimeters representing tree = _____ cm
A to B: Centimeters representing 2.0 meter mark = _____ cm

CALCULATIONS:

4. To calculate the tree height we simply find the ratio of the two heights by dividing the larger number (tree) by the smaller number (ribbon). The answer (ratio) is how many times taller the tree is than the ribbon. We simply multiply that answer by the ribbon height and we have the height of the tree.
The complete formula is:

$$\frac{\text{Representative tree height (cm)}}{\text{Representative ribbon height (cm)}} \times 2.0 \text{ meters}$$

For example if the tree covers 80 centimeters on the meter stick and the ribbon height covers 8 centimeters, then the estimated height of the tree is 20 meters.

$$\frac{80 \text{ cm}}{8 \text{ cm}} \times 2.0 \text{ meters} = 20 \text{ meters}$$

These instructions were taken from:
http://www.geocities.com/CapeCanaveral/Hall/1410/lab-Env-06.html

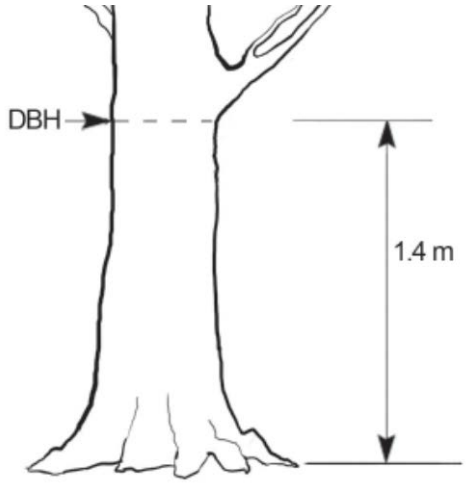
Different Ways to Measure Tree Trunk Diameter at Breast Height

(http://www.richmondhill.ca/documents/tree_bylaw_factsheet_4.pdf)

Use a measuring tape to measure the circumference of the tree 1.4 m above the ground.

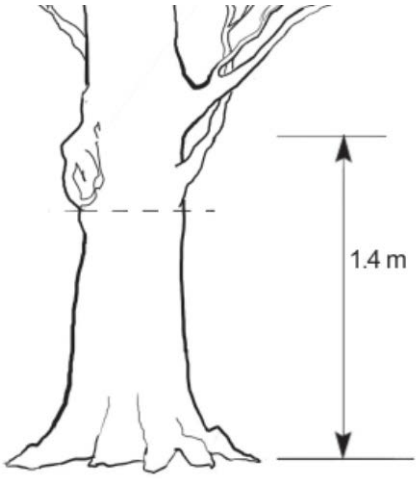
A. A tree with a single straight trunk

Simply measure a straight line 140 cm (1.4 m) from the ground up along the trunk.



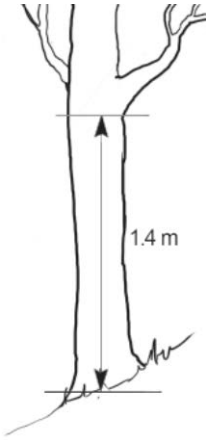
B. A tree with branches or bumps

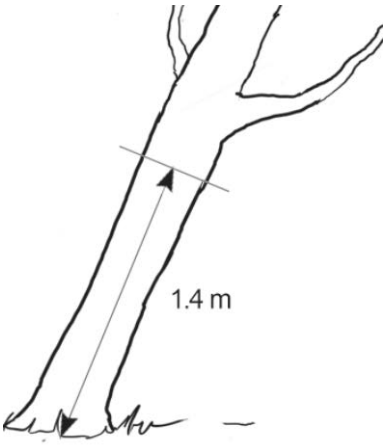
If the tree's branches or bumps interfere with the DBH (Diameter at Breast Height) measurement, take the measurement *below* the branch or bump.



C. A vertically growing tree on a slope or a leaning tree

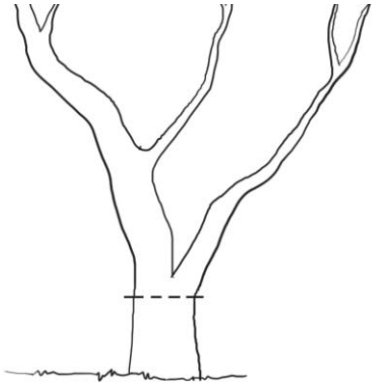
Measure the diameter 140 cm (1.4 m) above the ground at the midpoint of the trunk along the slope.





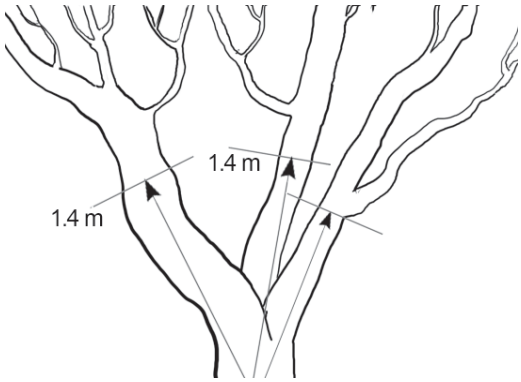
D. A tree that forks below or near 140 cm (1.4 m)

Record the diameter at the narrowest part of the main stem below the fork.



E. A tree that splits into several trunks close to ground level

Following the guidelines above, first measure the DBH of each trunk separately.



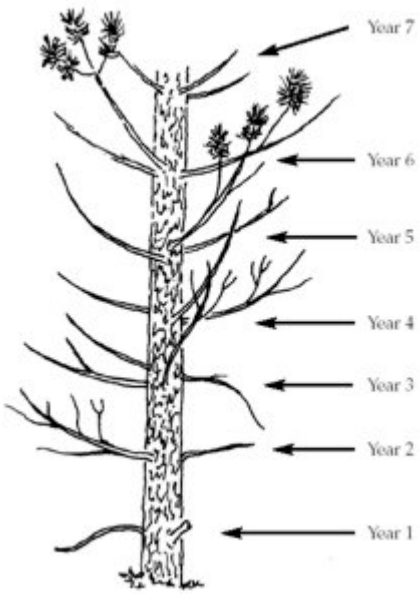
Multiply each of these measurements by itself. Then add up these amounts. Calculate the square root of the total to find the number to record as the DBH for the tree

Aging a Conifer Using Whorls

As a tree grows, it adds a new layer of wood to the outside of the trunk adding to its diameter. Since it adds one layer every year, the layers can be counted to age a tree when a tree is cut down or if a core sample is taken.

In the absence a core sample another method can be used, but only for coniferous trees. This method involves counting the number of spaces between whorls (groups of branches) on the trunk. This method of aging trees is not very accurate, but it does give an opportunity to discuss how a tree grows.

In addition to an increase in diameter, a tree will increase its height by adding new growth to the top. In the spring, buds form at the top of the tree to form horizontal branches while at the same time the leader grows vertically. The following spring, the process repeats itself. Because of this, each year's growth can be seen between each whorl of branches. You can tell how successful each year's growth is by the size of the growth area. The growth areas can be counted to give an estimate of the trees' age. Some trees will have lost all the branches from the whorls near the bottom of the tree as the years have passed. Branch scars can usually be found to indicate the position of the whorl.



Picture source:

http://www.gov.mb.ca/conservation/parks/popular_parks/foresters/02a.jpg