

ROLE CARD ORGANIZATION

** = Go Global (Forest)

Data Recorder:

Set up Study Area & Take Measurements:

Swather (only for forest studies)** & Tree Gauger & Flagger

Location by Triangulation (only for forest studies)**

Tree DBH & Identification

Crown Width Larger Trees

Height/Crown Depth & Compass Bearing

Tree Health & Status:

Status and Stance

Tree Health Check

Crown Status (only when trees are fully leafed out)

Supporting Materials:

Tan Table/Height Calculation

Locating Trees - GPS

Mappers

Carbon Storage

Measuring Younger Trees:

Root Collar Diameter

Small Trees Height or DBH

Crown Width Young Trees

Watch **training videos** on how to measure trees at www.acer-acre.ca/resources/training-videos



www.acer-acre.ca

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Task Breakdown

Task Card	Number of Students	Description	Notes
GPS	2 + recorder		
Mapper	2-4	Can do 2 teams - one for perimeter, one for building and features, etc.	Good to have quality check on tree numbers half way through. Check for missing trees and repeated numbers
Swather	1	For doing forest studies only	
Gauger & Status & Stance	1-3		
Diameter	1-2 + recorder		Tape must be levelled and
Tree	1-2 + recorder		Both of these tasks will
Tree Health	2-3 + recorder		require a camera
Locating	3 + recorder	For doing forest studies only	
Crown Width	2-4	May be difficult in closed canopies - try your best	
Height & Compass (working together)	3	This task will take the longest and should be performed last. Most variability with this measurement, so promote double/triple checking	Recommended: Flagging team once finished should help

The tasks are arranged in order and in groupings that work well together. If you have a limited number of students or time, it will be easier to break it up this way.

+ recorder let's you decide whether you'll have individual recorders per task or one for the whole group – you decide. However, ensure that ALL DATA IS Compiled onto one sheet before leaving the field –it's amazing how many mistakes can be found this way.

BLACK TEAM

LOCATING TREES - GPS

Set-up

- Measure yourself with a metre-stick and determine where 1.3 metres is on you.
- Get a clear view of the sky.
- Press POWER button firmly and hold until GPS receiver turns on.
- You will see the satellite page containing the message ACQUIRING SATELLITES – you need at least four dark bars for accuracy.
- The GPS is ready to use.

Instructions – Introductory

1. Marking LOCATION of a tree (WAYPOINT)
 - Go to NW side of first tree and hold device up 1.3 metres
2. Record your location on the spreadsheet.
3. Turn off GPS unit - Hold down POWER button

Instructions – Advanced use with GPS memory

1. Marking LOCATION of a tree (WAYPOINT)
 - Go to NW side of first tree and hold device up 1.3 metres
 - To record your location you can press MARK button on GPS unit regardless of what page you're on – the Mark Waypoint page will appear on GPS unit
 - Use ROCKER button (up arrow) to move cursor to top of page where there is a number (e.g. 001) and press the ENTR button (this is spelling on GPS unit)
 - An onscreen keyboard will appear. Use this to give a unique code to each tree location e.g. WSS01
 - Use ROCKER key to move cursor around keyboard and press ENTR button to confirm the selection
 - After typing your code for the location press OK (in middle of keyboard)
 - Press ROCKER to go to OK button (at bottom of screen)
 - Repeat step 3 for each tree
- TIP: For mistakes press BACK button to erase each character
2. To FIND saved locations
 - Press FIND button on unit
 - Use ROCKER key to highlight the name you saved for your locations
 - Press ENTR button to confirm selection
 - The coordinates will appear
 - You can copy the locations to your record sheet
 3. Turn off GPS unit - Hold down POWER button



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BLACK TEAM

LOCATING TREES - GPS



FIND Key
- Press and release
at any time to view
the Find Page.

PAGE Key
- Press and release to
cycle through the Main
Pages.
- Press when using the

EQUIPMENT

- GPS Receiver, Recorder, measuring tape, clipboard, data entry sheet

PINK TEAM

MAPPERS

In pairs...

To map and measure the property:

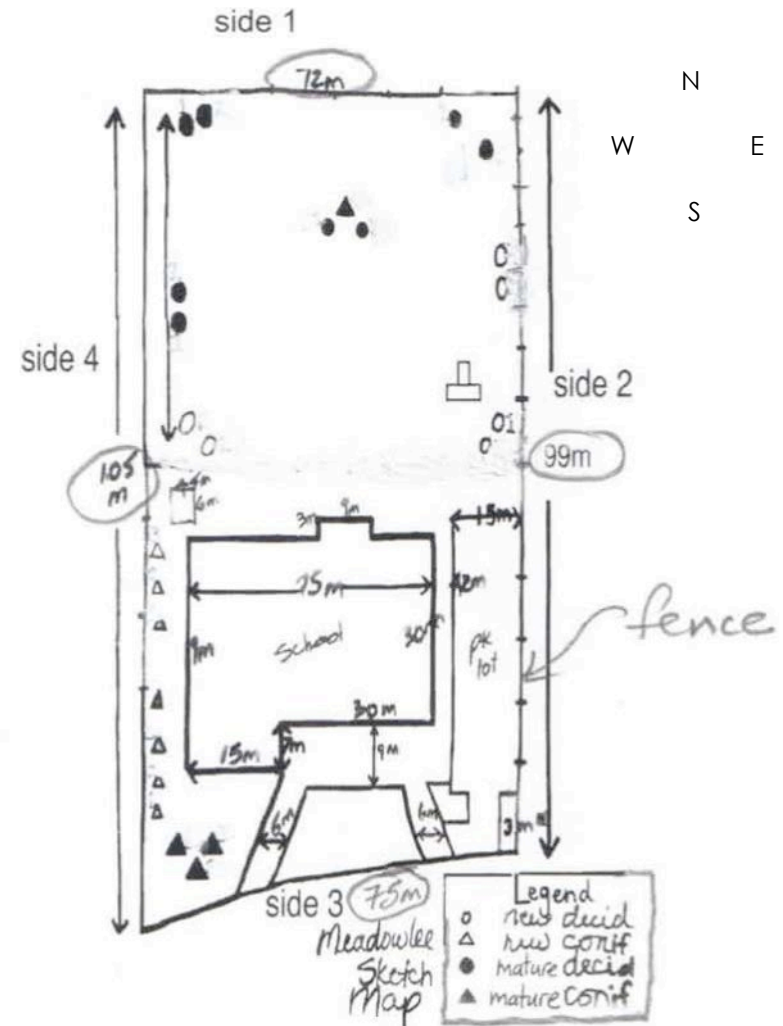
1. Use compass to find north.
2. Mark N on upper right corner of your page.
3. Measure dimensions of property with metric Trundle Wheel or Yellow 30 metre tapes.
4. Tell Mapmaker. e.g. Call out "Length of east side of property 60.70 metres."
5. Help create the scale: calculate how many times measurements of property must be reduced to fit in the grid inside frame of the final map on graph paper.
6. Measure dimensions of features: buildings, streets, driveways, parking lots, playing field, yard and tell the Mapmaker.
7. Include locations of trees and types. See diagram.
8. Complete the Legend.
9. Use N to decide various sides of property and label them.
 - a. Side one (north)
 - b. Side two (east)
 - c. Side three (south)
 - d. Side four (west)
10. ASK GPS EXPERT TO WAY-MARK (get the coordinates) THE 4 CORNERS OF YOUR MAP!

EQUIPMENT

- Compass
- Masking tape
- Metric Trundle wheels or Yellow 30 metre tapes

PINK TEAM

MAPPERS



PINK TEAM

SWATHER

Individually....

Working with Tree Gauger and Flagger of Pink Team

1. Find northwest corner post of quadrat.
2. Face north east corner post with Side #1 rope along your left side.
3. Open metre sticks and begin walking along side #1 rope to set the two-metre swath.
4. Fold metre sticks together to get past a tree.
5. The Tree Gauger behind you will check if small trees are big enough to be flagged – i.e. are they 4 cm DBH?
6. If Gauger gives the OK, then Flagger flags the tree with a number – increasing as team moves along.
7. When first two-metre swath is completed, the pink team members check, with opened metre sticks, where the two-metre swath line is and then begin the second round. This will be second layer in spiral toward middle.
8. Repeat for third spiral (4 metres in from the side ropes) to the middle after again checking this distance using the opened metre sticks.
9. Continue in spiral until all trees have been numbered.

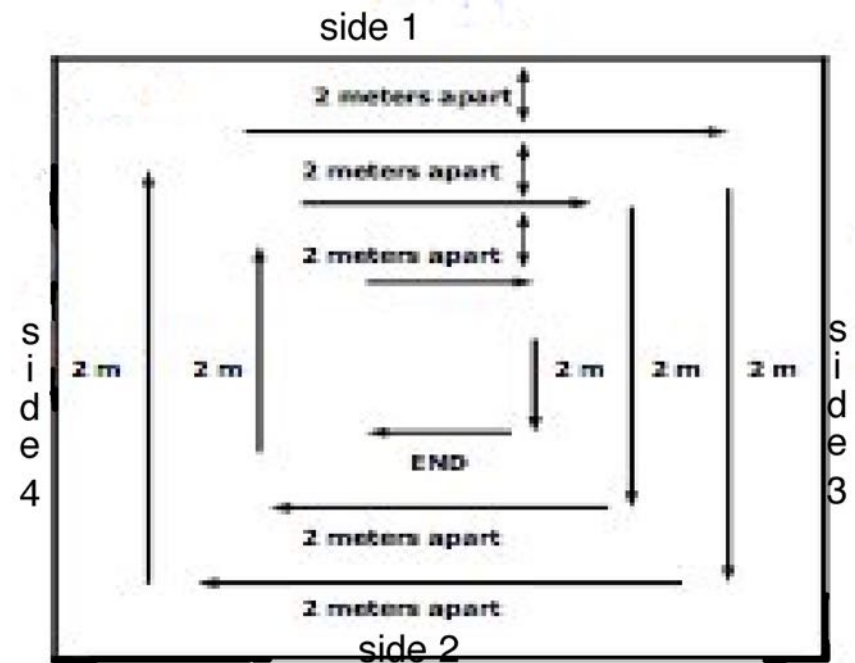
TIP: Tie flagging tape to side ropes to help keep your distance from the side constant as you walk. Aim for the tape on the opposite side rope.

EQUIPMENT

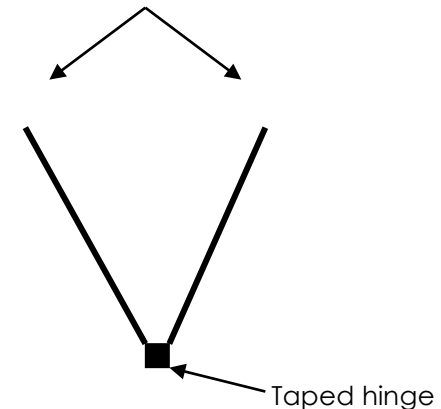
- Swather or hinged metre sticks i.e. two sticks hinged by duct tape so they reach 2 metres when open.

PINK TEAM

SWATHER



Metre sticks



YELLOW TEAM

LOCATING BY TRIANGULATION

In pairs or trio...

For both mature and newly planted trees

AT THE TREES:

1. As first Locator put your back to the tree and FACE the closest side. Post A will be on the right.
2. As the second Locator, hold the zero end of the tape at waist height and at the tree centre.
3. Hold other end of tape, unwinding it as you walk towards post A. Keep the line straight and tight. Adjust tape until it is level from tree to post for accuracy.
4. Read measurement in metres using TWO DECIMAL PLACES, e.g. 5.23m.
5. Repeat step three and four for post B.
6. Tell Recorder the distance - reading Line "a" first. **e.g.** Call out "Tree #6, Line "a" is 16.07 m" **and then** "Tree #6, Line "b" is 4.60 m."

TIP 1: For team of three: one at each post and one at tree

TIP 2: A Line + B Line must equal a minimum of 20m and not be greater than 27m.

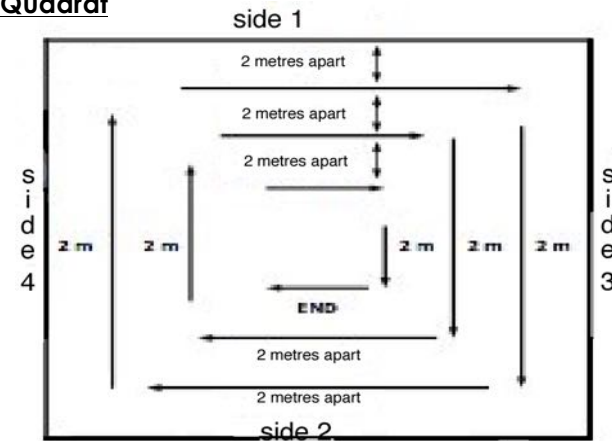
EQUIPMENT

- Two orange 30m tapes
- Recorder, Clipboard

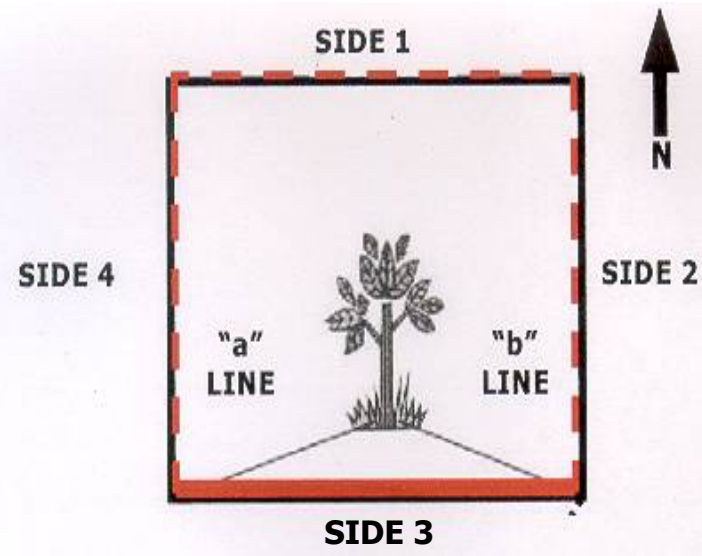
YELLOW TEAM

LOCATING BY TRIANGULATION

One Quadrat



One Quadrat



PINK TEAM

TREE GAUGER AND FLAGGER

Gauge the Tree Size – use this to determine which trees you will number!

Check the diameter of any smaller trees at 1.3m from the ground. **If tree gauge fits easily around the young tree at 1.3 metres, then it is too small to be included; otherwise tell the flagger to mark the tree.**

FLAG the Tree

1. Write the tree # of each tree on the flagging tape with a black marker
2. Tear off enough tape to fit tied around the tree trunk, to show the number of the tree for easy viewing. Tie it loosely around tree.
3. Tell the RECORDER: E.g.: Tree #3 tagged

EQUIPMENT

- Permanent Marker
- Flagging Tape
- Tree Gauger.

PINK TEAM

TREE GAUGER AND FLAGGER

TREE GAUGER



HOW TO NUMBER A TREE



Write the plot #, quadrat #, and tree # on the flagging tape, then attach flag to tree securely

In pairs...

For both mature and newly planted trees:

1. Find a tree that has been flagged.
2. Decide if tree is Deciduous or Coniferous.

TIP: If tree has broad leaves or no leaves at all use DECIDUOUS tree key. If tree has needles or cones use CONIFEROUS key.





















































3. For coniferous trees, see the back of the card.
4. Select description that best fits your tree then.
5. Scan down the page for the paired numbers and locate the new number for you next choice.
6. Select the number that best describes your tree and read each description carefully.
7. Keep following through the key to the new numbers until you find a description that ends with the name of a tree species.
8. Tell recorder the species you have identified and say the tree number e.g. Call out "Tree #6 White spruce."

EQUIPMENT

- Coniferous Tree Key
- Deciduous Tree Key

Key to Conifers of Ontario

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A	Leaves needle-like, not hiding twig		Leaves in bundles		Go to B
			Leaves single		Go to BB
AA	Leaves scale-like, hiding twig		Twigs leaf-covered and flat		White-cedar
			Twigs leaf-covered and rounded		Eastern red cedar
B	Leaves (needles) in bundles		Deciduous; 10-50 needles per bundle		Go to C
			Evergreen; 2-5 needles per bundle		Go to D (pine)
C	Deciduous		Cones 1 cm long		Tamarack (Am. Larch)
			Cones 2-5 cm long		European larch
D	Pine		5 leaves per bundle		White pine
			2 leaves per bundle		Go to E
E	2 leaves per bundle		Leaves under 8 cm long		Go to F
			Leaves about 10 cm long		Red pine
F	Leaves usually under 5 cm long		Leaves 2-8cm; cones curved; mature cones often closed		Jack pine
			Leaves 4-5cm; bluish green and twisted; young bark orange-red; mature cones usually open		Scots pine
BB	Leaves single		Leaves 2-sided (flat)		Go to G
			Leaves 4-sided		Go to CC (spruce)
G	Leaves 2-sided (flat)		Leaves with stalk		Go to H
			Leaves stalkless		Balsam fir
H	Leaves with stalk		A shrub; leaves pointed at tip, yellow-green above and pale green below		Canada yew
			A tree; leaves rounded at tip; many lengths of leaves on same twig		Hemlock
CC	Leaves 4-sided (spruce)		Leaves green		Go to I
			Leaves silvery-blue, sharp and very stiff		Blue spruce
I	Leaves green		Leaves roll easily between fingers; cones 2-5 cm long		Go to J
			Leaves slightly flattened; do not roll easily; cones 10-15cm long		Norway spruce
J	Leaves roll easily; cones 2-5 cm long		Cones 2-4 cm long; twigs with dense short hairs; not common in Southern Ontario		Black spruce
			Cones 4-5 cm long; twigs usually hairless		White spruce

ORANGE TEAM

STATUS AND STANCE

Analyze Status of tree.

1. Determine whether or not the tree is either
 - (A) ALIVE: lots of buds or leaves
 - (B) DEAD: symptoms include:
 - No leaves or buds!!!
 - Bark peeling excessively, or is absent
 - Excessive insect or animal damage
 - If tree's been uprooted
 - Dry/brittle appearance

Take a photo of the symptom!!!

Tell the RECORDER to write the photo's # on the data sheet!

Analyze Stance of tree.

2. Determine whether the tree is
 - (S) STANDING
 - (L) LEANING *
 - (P) PRONE

Check pictures on the other side of this card.

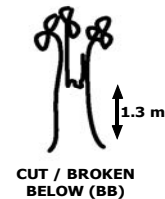
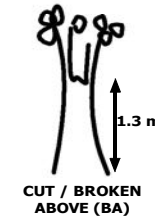
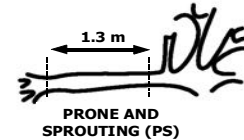
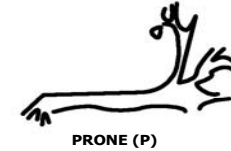
3. Tell the recorder the tree status – don't forget to say the tree number! e.g. Call out "Tree # 6, Alive, Leaning."

EQUIPMENT

- Health check field sheet

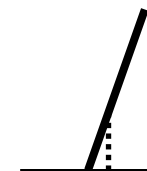
ORANGE TEAM

STATUS AND STANCE



90°

90° 30°



Assess the Health of the Tree:

1. Check to see if the tree shows any damage or defects. (diagrams on back of card)
2. Shout Back to the Recorder all that apply

Prove it!

3. Set Camera to show date on photos
4. Take a photo of the defect or damage
5. Write down the photo number beside the tree # on the data sheet.

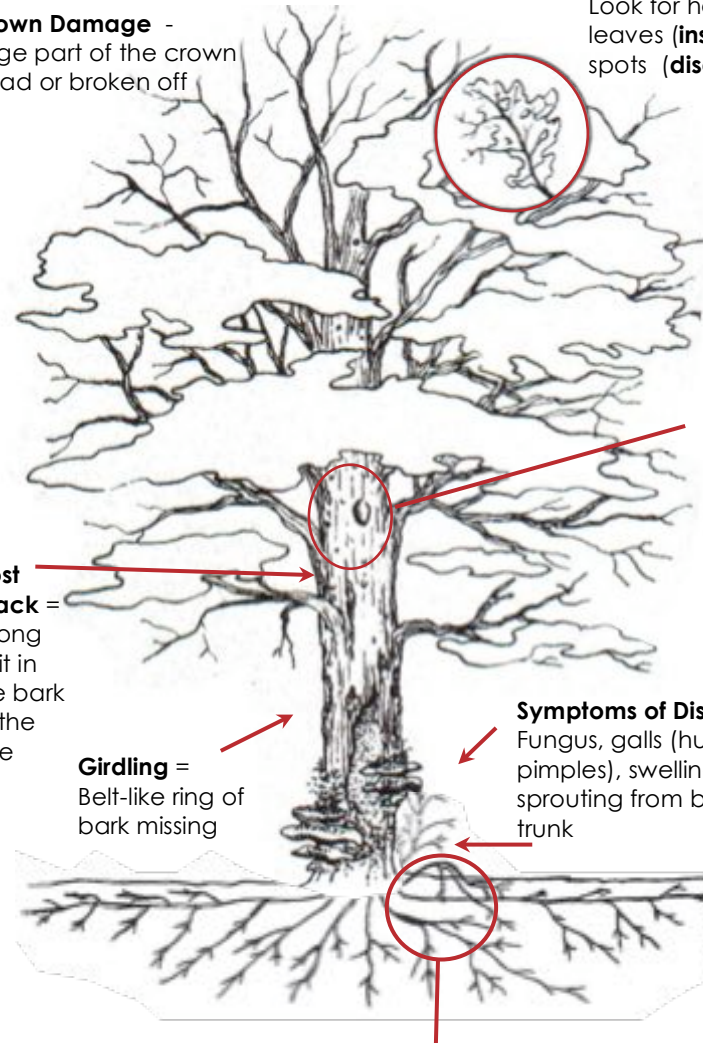
*Bark Damage examples: Partial Girdling, Frost Cracks, Evidence of Deer rubbings, etc.

Health Code!	
Mechanical Damage	
None	NN
Bark Damage*	BD
Significant Top Breakage	TB
Visible Root Damage	RD
Complete Girdling	CG
Defects	
None	NN
Minor Damage/Vandalism	DV
Animal browsing	AB
Insect Infestation	II
Symptoms of disease	SD

Animal browsing = snacked on by animals! Think of the damage beavers do, or deer. Do your tree branches or trunk look like they have been eaten?

Crown Damage - large part of the crown dead or broken off

Look for holes in leaves (**insects**) or spots (**disease**)



Holes indicate **insects** under bark

Frost Crack = a long split in the bark of the tree

Girdling = Belt-like ring of bark missing

Symptoms of Disease: Fungus, galls (huge tree pimples), swellings, sprouting from base of trunk

Root Damage: exposed roots, cracks, certain fungi on roots, inability to hold tree steady in the ground or growing in a circle around tree

Image Adapted from Focus on Forests (1989)

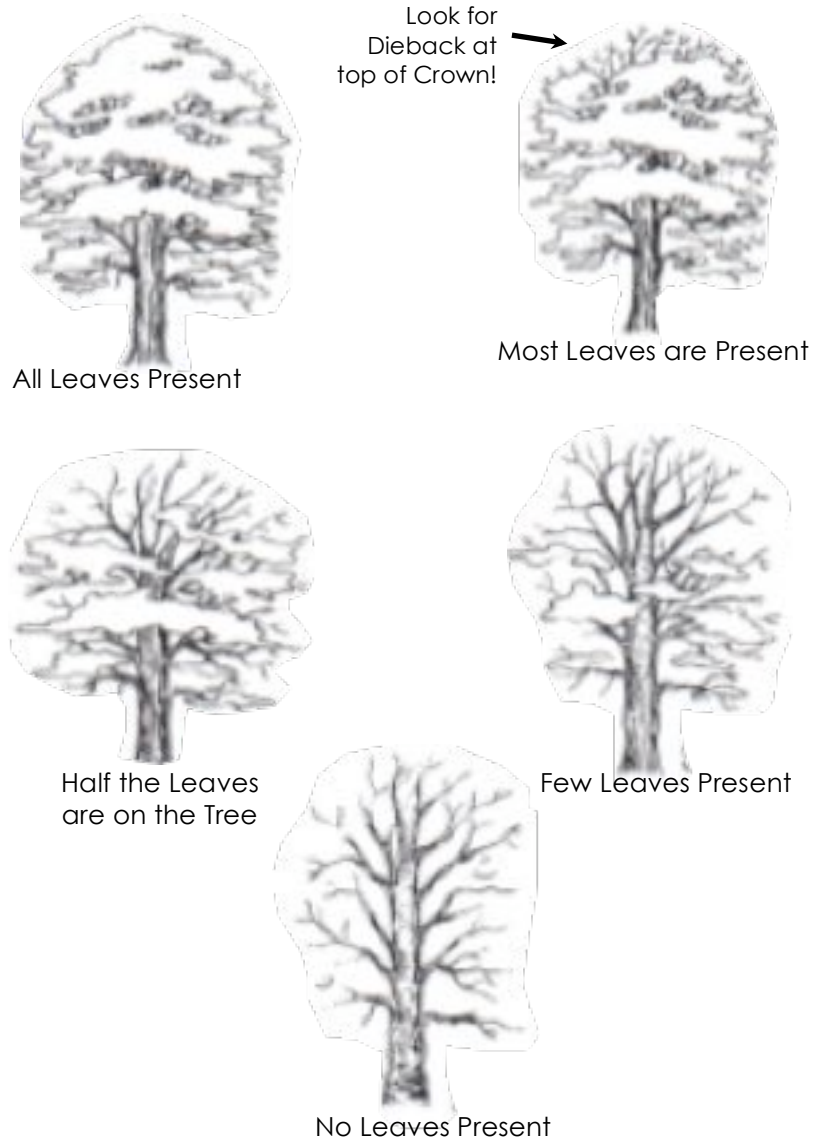
*Only perform this in Summer & Early Fall, when all the leaves are out!

Assess the Status of the Tree's Crown (leaves):

1. Stand back from the tree so it is easy to see the whole crown (20m is best).
2. Determine the percentage of leaves growing on the tree (see diagrams)
3. Tell the Record the Foliage Status. Don't forget to say the tree # (e.g.: call out "Tree #6, All leaves present!")
4. Hypothesize if water shortage, salt damage, frozen/compacted roots or disease has affected your tree

EQUIPMENT

- Health Check Data Sheet
- A good pair of eyes!

TREE CROWN/FOLIAGE DIAGNOSIS

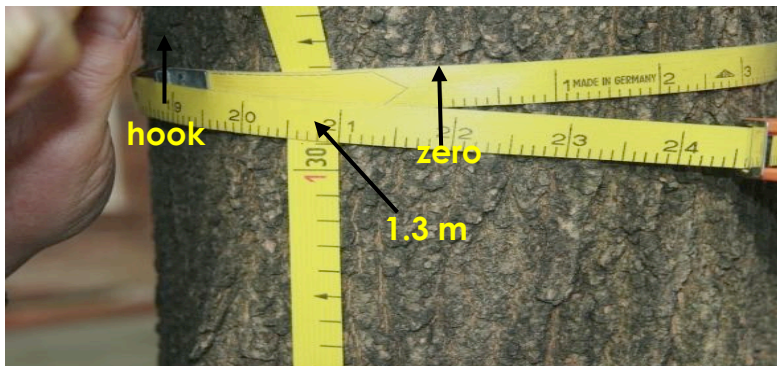
Images Adapted from Focus on Forests (1989)

ORANGE TEAM

TREE DBH

For mature trees over 4 centimetres DBH:

1. Find a tree that has been numbered.
2. Use the distance side of the ORANGE diameter tape with RED numbers to measure 1.3 m UP the trunk. For trees with multiple trunks, use tallest trunk of tree for measurements.
TIP: Put the tape on the SHORTEST side of the tree.
3. Use the diameter side of the ORANGE diameter tape.
TIP: It is the side without red numbers and says "DIAMETER" near zero metres.
4. Put hook into tree at 1.3 m to your left and wrap it around the tree and read diameter at the 0 mark.
5. Have another team member make sure it is level and untwisted.
6. Read diameter at the zero mark in centimetres to two decimals.
7. Tell the recorder the DBH and tree number. e.g. Call out "Tree #6, diameter is 8.60 cm"



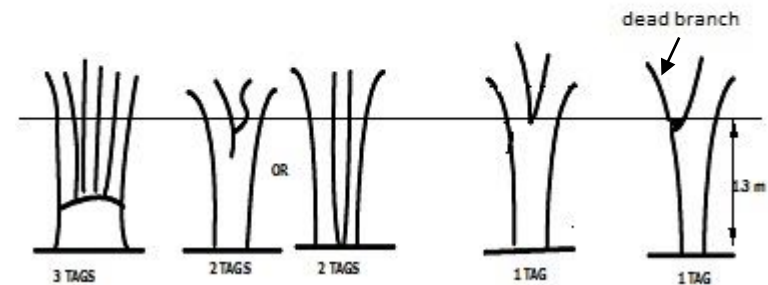
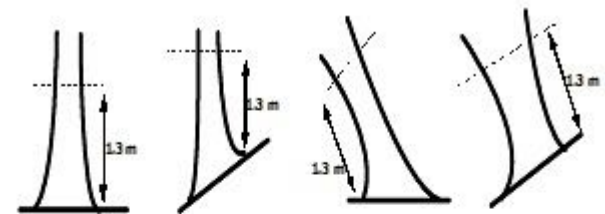
ORANGE TEAM

TREE DBH

To determine:

- a) Where to measure DBH
- b) How many tags should be used
- c) How to attach the tag. See the tag protocol.

NOTE: Tags will be attached at 1.3m.



DBH can be used to estimate amount of carbon absorbed by the tree. Go to [CARBON STORAGE](#) page to learn how.

BLUE TEAM

COMPASS BEARING

Individually as Compass Bearer, **work with Blue Team** for **height**.

For Measuring Height of mature trees only:

1. As Compass bearer, stay at the tree, place a light coloured object at the base of the tree, and guide the other BLUE team members in a straight line away from the tree.
2. Place string of compass around neck. Hold compass flat at your stomach and have the string end pointing towards the clinometer.
3. Turn the housing so that the red end of the needle is inside the black hollow arrow ("The house").
4. Read the compass bearing at the mark below the string to the nearest degree. This is the "degrees from north" or Bearing.
5. Tell the recorder – Don't forget to say the tree number! e.g. Call out "Tree #6, 27 degrees." This bearing will allow the next measurement to be taken at the same spot.

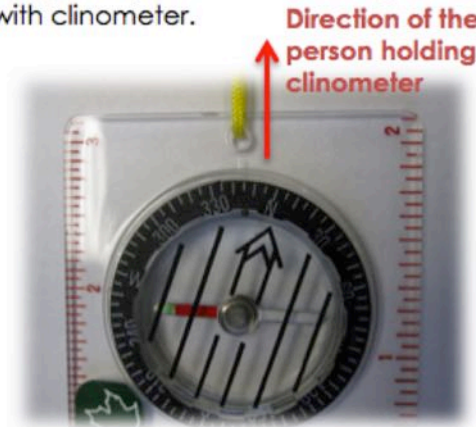
EQUIPMENT

- Compass

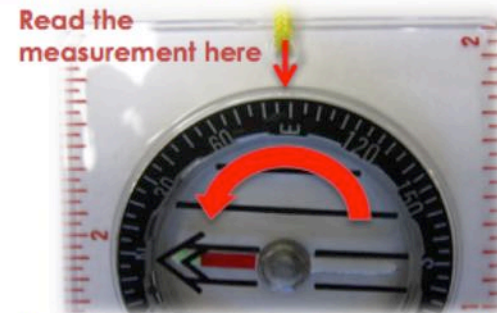
BLUE TEAM

COMPASS BEARING

1. Hold FLAT against you and POINT string hole TOWARDS the person with clinometer.



2. Turn the house (black circle) to fit the RED magnetic needle inside the BLACK arrow outline.



3. Once the black outline and the red needle are aligned, read the degrees from north at mark below the string. Note that "E" represents 90°, "S" represents 180°, "W" represents 270°, and "N" represents both 0° and 360°.
4. Record Compass Bearing for that tree. In the example above, it's "88°".

BLUE TEAM

HEIGHT/CROWN DEPTH

NOTE: All height measurements are taken at 20 METRES from the tree so **EYE to TREE DISTANCE is always 20 METRES.**

1. Find the best line of sight to tree top from 20 metres.
2. Hold blue CLINOMETER by the handle, and line your vision through clinometer with the tip of top branch, using the diamond shape inside the eyepiece.
3. Read the angle indicated in the viewfinder (Note that when you are pointing upward you get a positive angle and vice versa.)
4. Redo this until you get two same readings. Then tell the recorder. e.g. Call out "Tree #6, upper angle plus 27 degrees".
5. Repeat steps 4 - 6 for LOWER ANGLE – point clinometer at base of tree where the trunk meets the ground. e.g. Call out "Tree #6, lower angle minus 3 degrees".
6. Repeat steps 4 - 6 for CROWN DEPTH- point clinometer at the first big branch from the ground. e.g. Call out "Tree #6, First Branch angle plus 5 degrees".

TIP: Ask COMPASS BEARER to put a light-coloured object (e.g. sneakers or data sheets) at the tree base.

EQUIPMENT

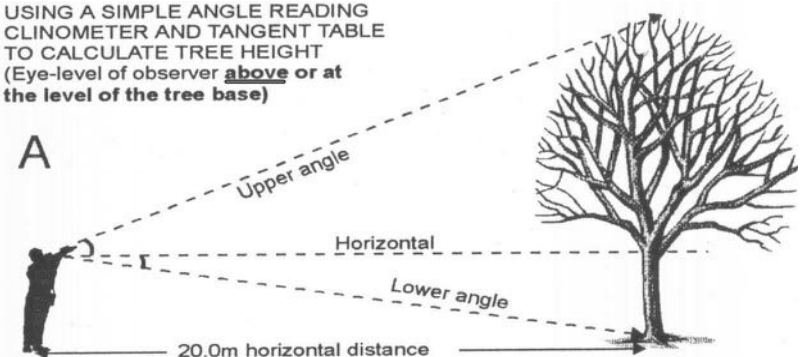
- Clinometer, 30 meter tapes

IN POSITION FOR UPPER ANGLE

- ⇒ CLUE:
- Always repeat readings until two are the same angle.
 - Make sure you can clearly see where the tree meets the ground before reading the LOWER ANGLE.



USING A SIMPLE ANGLE READING CLINOMETER AND TANGENT TABLE TO CALCULATE TREE HEIGHT (Eye-level of observer **above** or at the level of the tree base)



BLUE TEAM

HEIGHT CALCULATION (USING TRIGONOMETRY)

Height Calculation:

Let upper angle be θ_u .
Let lower angle be θ_l .

Then height of the tree is
 $[20 \times \tan(\theta_u)] - [20 \times \tan(\theta_l)]$

Example: A tree has upper angle of 45° and lower angle of -7° , then

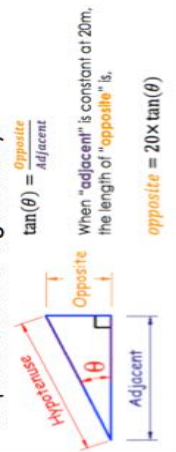
$$20 \times \tan(45^\circ) - 20 \times \tan(-7^\circ)$$

$$= 20 - [-2.46]$$

$$= 22.46$$

Therefore the height of the tree is
22.46m.

A quick review of trigonometry:



Tangent Table

θ ($^\circ$)	$20 \times \tan(\theta)$ (m)	θ ($^\circ$)	$20 \times \tan(\theta)$ (m)	θ ($^\circ$)	$20 \times \tan(\theta)$ (m)	θ ($^\circ$)	$20 \times \tan(\theta)$ (m)
-20	-7.28	-3	-1.05	14	4.99	31	12.02
-19	-6.89	-2	-0.7	15	5.36	32	12.5
-18	-6.5	-1	-0.35	16	5.73	33	12.99
-17	-6.11	0	0	17	6.11	34	13.49
-16	-5.73	1	0.35	18	6.5	35	14
-15	-5.36	2	0.7	19	6.89	36	14.53
-14	-4.99	3	1.05	20	7.28	37	15.07
-13	-4.62	4	1.4	21	7.68	38	15.63
-12	-4.25	5	1.75	22	8.08	39	16.2
-11	-3.89	6	2.1	23	8.49	40	16.78
-10	-3.53	7	2.46	24	8.9	41	17.39
-9	-3.17	8	2.81	25	9.33	42	18.01
-8	-2.81	9	3.17	26	9.75	43	18.65
-7	-2.46	10	3.53	27	10.19	44	19.31
-6	-2.1	11	3.89	28	10.63	45	20
-5	-1.75	12	4.25	29	11.09	46	20.71
-4	-1.4	13	4.62	30	11.55	47	21.45

BLUE TEAM

HEIGHT CALCULATION (USING TRIGONOMETRY)

Example 1:

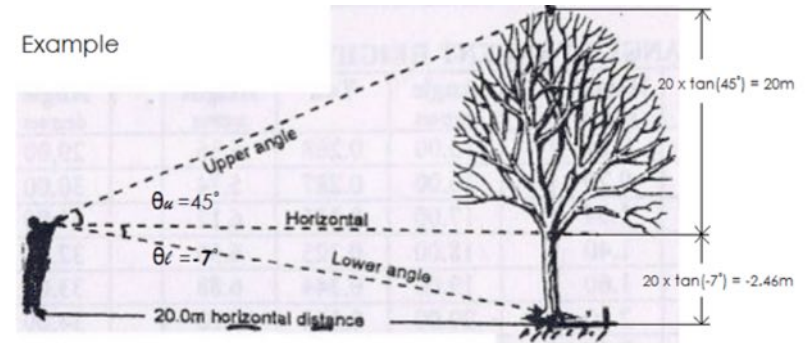
Calculate height of a tree that has upper angle of 45° and lower angle of -7° .

$$[20 \times \tan(45^\circ)] - [20 \times \tan(-7^\circ)]$$

$$= [20] - [-2.46]$$

$$= 22.46$$

Example



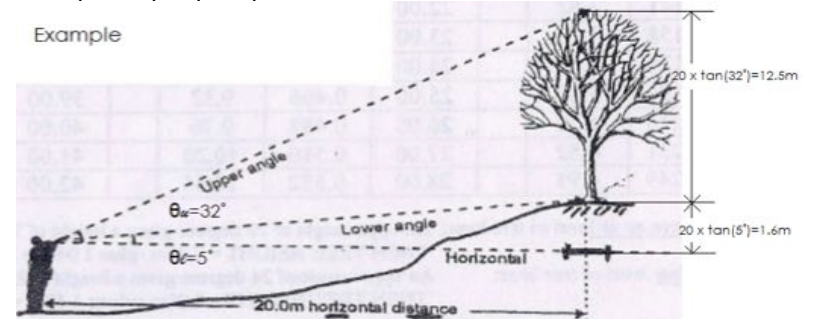
Example 2:

Calculate height of a tree that has upper angle of 32° and lower angle of 5° .

$$[20 \times \tan(32^\circ)] - [20 \times \tan(5^\circ)]$$

$$= [12.5] - [1.6]$$

Example



YELLOW TEAM

CROWN WIDTH (LARGER TREES)

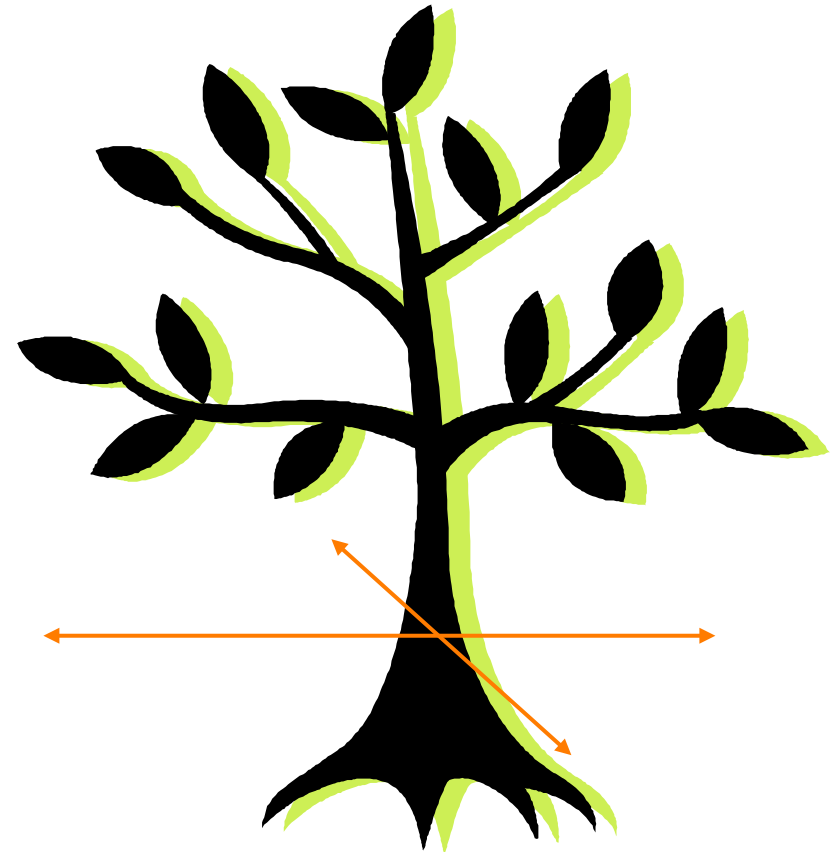
1. Stand UNDER the tree and look UP!
2. With helpers, determine the outer edge of branches and buds.
3. Measure the widest part of leaf cover or crown with the 30 m tape. Find zero on the measuring tape and check to ensure the tape touches the bark of the tree. Then make a 90° angle with your arm, with your fingers pointed towards the edge of the crown and your elbow touching the measuring tape. Read the number on the measuring tape to determine W1.
4. Now stand at the right angle to the first position and repeat measurements to determine W2.
5. Record both crown readings in METRES. e.g. 6.50 m

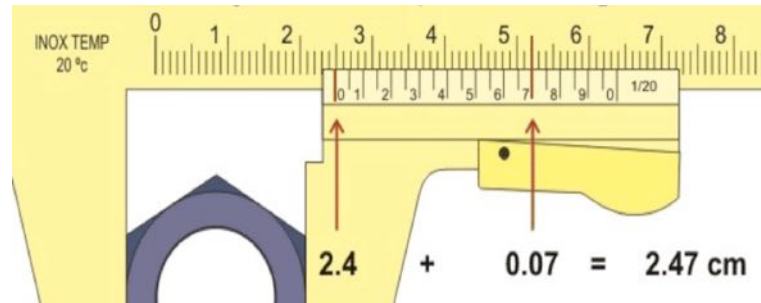
EQUIPMENT

- Two metre tapes (30 m)

YELLOW TEAM

CROWN WIDTH (LARGER TREES)





Test this measurement technique on your finger first to learn how to not hurt the bark of the young stem.

1. Open mouth of Caliper.
2. GENTLY place the jaws around the root collar (where the stem meets the ground).
3. GENTLY slide jaws closed. Not too tight so as to not hurt the bark.
4. Hold the slider firmly.
5. Without scraping the bark, gently remove the Caliper sideways.
6. To read the measurement, find where the 0 on the bottom of the sliding scale lines up with the non-sliding scale. Record measurement on non-sliding scale under column heading RC (mm).

EQUIPMENT

- Graduated Calipers

Root Collar Measurement Young Trees (mm)



WHITE TEAM

SMALL TREES (HEIGHT OR DBH)

IN GROUPS OF 3

Newly planted tree - measure HEIGHT (HT)

1. Measure

A.Tree Height: If tree is less than 1.3m (130cm), Use small tape to measure height of tree from root collar (RC) to base of terminal bud (TB) in cm, and get a number with two decimals. Begin by finding zero on the measuring tape.

B.DBH: If tree is taller than 1.3m (130cm), measure tree diameter at 1.3m (DBH) with calipers and record that measurement with one decimal. Determine the measurement by finding zero on the sliding part and lining it up with the number on the non-sliding part. For trees with multiple trunks, use tallest trunk of tree for measurements. DBH = Diameter at Breast Height.

2. Tell the recorder!

Call out "Tree #6, total height 1.15 cm" and/or "DBH 6.00 mm".

EQUIPMENT

- Graduated Calipers
- 1.5 metre tape

A. Measuring young tree height (when tree is less than 1.3 m)



OR

B. Measuring tree DBH



WHITE TEAM

CROWN WIDTH (YOUNG TREES)

1. Stand close to the young tree so you can stretch the metre tape over the centre of the tree.
2. Find widest part of tree growth – the most space occupied. Remember to measure through centre of tree.
3. Find zero on the measuring tape and measure horizontal distance across tree to outermost buds.
4. Repeat across tree at right angles to first measurement.
5. Record both crown readings in centimetres. e.g. 27.20 cm

EQUIPMENT

- 1.5 metre tape

DECIDUOUS

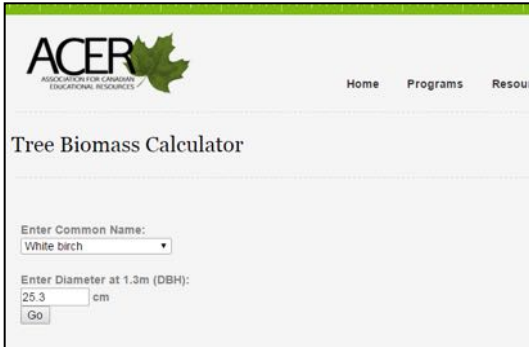


CONIFEROUS



To calculate the quantity of carbon stored in your trees you will need to know the species name and the diameter at 1.3m (DBH) for each one (refer to TREE DIAMETER page for DBH). Follow these instructions:

1. Go to <http://www.acer-acre.ca/treebiomasscal>



The screenshot shows the 'Tree Biomass Calculator' page from the ACER website. The page has a header with the ACER logo and navigation links for 'Home', 'Programs', and 'Resources'. Below the header, the title 'Tree Biomass Calculator' is displayed. The main content area contains two input fields: 'Enter Common Name:' with a dropdown menu showing 'White birch', and 'Enter Diameter at 1.3m (DBH):' with a text input field containing '25.3' and a unit selector set to 'cm'. A 'Go' button is located below the diameter input field.

2. Enter the Common Name and DBH of the tree and click "Go". E.g. White Birch with DBH of 25.3cm has total above-ground dry biomass of 286.91kg. If you can't find your tree in the list, choose either "deciduous" or "coniferous".
3. To estimate the carbon stored in the tree, divide the biomass by 2. e.g. $286.91\text{kg}/2 = 143.46\text{kg}$ Hence this white birch contains 143.46kg of carbon.
4. To estimate the amount of CO₂ absorbed by the tree over the course of its life, multiply carbon stored by 3.7. e.g. $143.46\text{kg} \times 3.7 = 530.80\text{kg}$ of CO₂.
5. Record your calculations.