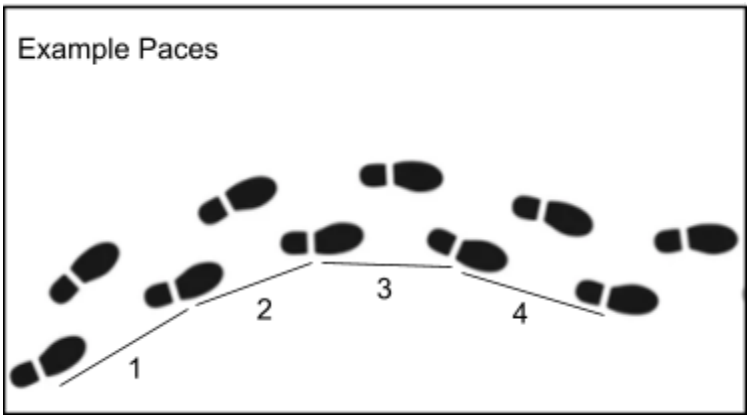
Forestry Kit Worksheet

1. Find your pace



Lay out a 100 ft measuring tape. With your normal stride, walk from one end of the tape to the other counting each pace (every second step). Repeat this 3 times:

_____ _____ _____

Average these pace counts together: _____

Pace length = 100 ft/Average Pace Count = _____ ft

Number of Paces for one chain (66ft) = Pace Length * 66ft = _____ paces

2. Tree Diameter

a. Use the Scale Stick to find Diameter at Breast Height (DBH) for three different trees:

Tree One: _____ in

Tree Two: _____ in

Tree Three: _____ in

b. Use the d-tape to check your Scale Stick DBHs:

Tree One: _____ in

Tree Two: _____ in

Tree Three: _____ in

3. Tree Height

a. Use the Scale Stick to find log height (measured in number of 16ft logs) of the three trees:

Tree One: _____ logs

Tree Two: _____ logs

Tree Three: _____ logs

b. Use the tangent gauge to measure total tree height for the three trees:

Height to eye level (H): _____ feet

Tree One:

Distance to Base of Tree (D) = _____ feet

Height of Tree (D+H) = _____ feet

Tree Two:

Distance to Base of Tree (D) = _____ feet

Height of Tree (D+H) = _____ feet

Tree Three:

Distance to Base of Tree (D) = _____ feet

Height of Tree (D+H) = _____ feet

4. Board Feet

Use the Scale Stick DBH and log height measurements to find board feet for each tree:

Tree One: _____

Tree Two: _____

Tree Three: _____

5. Tree Age

Use the increment borer to age one tree: _____

6. Basal Area

Using the basal area gauge 10 basal area factor (BAF) notch count the number of “in” trees in your plot: _____

Basal area for the plot = number of ‘in’ trees * 10 (from BAF) = _____

Forestry Kit Worksheet Guide for Instructors

It is recommended to review the Forestry Field Skills powerpoint to review instructions and videos that cover specifically how to use the forestry tools used in this activity.

Set up four stations for students to work through:

1. Pace Station:

Materials: measuring tape

How-to: Lay out 100 ft of the measuring tape in a flat area. Have the students walk back and forth along the tape counting their paces. Make sure students are taking normal steps and are counting after every other step (see diagram on worksheet for what equals one pace). They will work through simple math on the sheet to figure out how long their pace is and how many paces it will take them to walk one chain (66 ft) which is a forestry measurement that will be used later to take tree height using the scale stick.

Optional Additional Activities:

- Give students several distances to pace out (20ft, 50ft, 150ft). Check their accuracy using the measuring tape.
- Discuss how walking uphill, downhill, or in difficult terrain might affect their pace.

2. Tree Diameter, Height, and Volume Station:

Materials: Scale Stick, D-tape, Tangent Gauge, measuring tape, optional flagging and marker to mark and number selected trees

How-to: Either pre-select or have students choose one to three trees to measure (depending on how much time you have). Ideally, trees should be at least 16 feet tall with a diameter greater than 6in to make scale stick volume measurements easier. Before starting, have students take the measuring tape and measure out where 4.5' (Breast Height) is on themselves. This will help them take consistent measurements for diameter at breast height (DBH).

1. **Scale stick diameter tips and tricks:** make sure students are holding the stick level and are not moving their head while taking the measurement. Review videos and included scale stick instructions for step-by-step instructions.
2. **D-tape diameter tips and tricks:** make sure students are using the correct side of the tape for diameter measurements. Twisted or sagging tape are the common culprits for in-accurate measurements.
3. **Scale stick height tips and tricks:** Have students pace out one chain from the tree. Number of 16ft logs within the tree is based on merchantable height which is measured from the stump height (6-12 inches above the ground where loggers make their cut to fell a tree) to the point on the tree where the trunk is too small to be profitable (6 inch diameter for sawlogs). Have students look at what a 6in diameter looks like with the d-tape to help them estimate where this is on their trees.
4. **Tangent Gauge tips and tricks:** make sure students have a clear view of the base and top of the tree. It can be more difficult to take an accurate tree height on a slope. Take height along slope contour if slope is considerable.
5. **Scale stick volume tips and tricks**: use the diameter and height taken with the scale stick to estimate the volume of each tree based on the chart on the side of the stick.

Optional Additional Activities:

- Have students identify the species of their selected trees to practice tree ID before taking measurements.

- Discuss how you might handle taking these measurements on unusual trees:
    i. Forked Trees: If forked below 4.5ft - it's two trees! Measure them separately. If forked above 4.5ft - it's one tree.
    ii. Trees that are not round (have a gap or hollow on one side): use your hand to hold out d-tape to where the trunk "should" be for a representative DBH.
    iii. Leaning trees: there are a few methods, find height using pythagorean theorem

3. Tree Age Station

Materials: Increment borer, tree cookies

How-to: Have students look at the tree cookies and count out at least one age to visualize what the core will show. Select several trees for students to take cores from. For the health of the trees, I wouldn't recommend taking more than 2-3 cores from one tree (depending on size). **Important note** - do not twist the increment borer completely through the tree. It will be nearly impossible to remove it!!

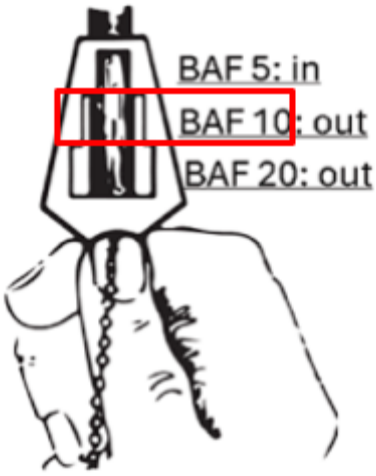
Make sure you or the students select good trees to age:

- The increment borer should reach at least halfway through the trunk to capture the center point.
- I recommend choosing softwood species like pines, spruces, cedars, or firs. Certain trees like aspens have very faint growth rings that are nearly impossible to count. Hardwood trees can be very difficult to bore into (and remove the increment borer from!).

4. Basal Area Station:

Materials: flagging to mark plot center, basal area gauge

How-to: Have students spin a plot, counting the 'in' trees. Make sure students use the same BAF window (10 is recommended, see picture below). It can be helpful to mark the tree you start on with flagging, so you know when to start counting.



Optional Additional Activities:

- Experiment with using a different BAF window on the gauge. Find basal area for the plot to see if it differs from the number calculated using 10 BAF.
- Discuss in what circumstances you might use a smaller and larger BAF.
    i. 5 BAF: more small diameter trees in the stand or a lower density stand. There will be more 'in' trees.
    ii. 10 BAF: considered the standard or general purpose BAF for stands with medium sized trees. It is typically used in southern and Northeastern regions of the US.
    iii. 20 BAF: used in stands with larger diameter trees. It will typically result in fewer trees per plot and is used more commonly in the Western U.S. in larger conifer forests.
    iv. 40 BAF: used for stands with very large diameters.