**How Old Is Your Tree?** *Variation for “How Big Is Your Tree?”*

Have you ever wondered how to find out how **old** your tree is? In this lesson, students will estimate the age of a tree by measuring diameter and using a growth factor table.

Grade level: Middle school

Subjects: Math, social studies, language arts

Resource: [How Old Is Your Tree? Student Page](#_Student_page:_How)

## Part A: Identify your tree

Find a tree you’re interested in learning about. Identify the [species](https://www.dnr.state.mn.us/trees/native-trees.html) using a dichotomous key.

Resource: The [Beginner’s Guide to Minnesota Trees](https://conservancy.umn.edu/bitstream/handle/11299/49816/6593.pdf?sequence=1&isAllowed=y) has an easy-to-use dichotomous key and a basic key on the last pages.

## Part B: Measure your tree and estimate tree age

1. Measure the circumference of the trunk 4.5 feet from the ground.
2. Calculate diameter in inches (D = C/pi)
3. Multiply diameter by the tree's growth factor using the chart below.

Example: A red oak has a diameter of 30 inches. Multiply the diameter (30 inches) by the growth factor for red oak in Minnesota (4.0). The estimated age is **120 years**.

| **Tree species** | **Growth factor** |
| --- | --- |
| Red maple | 4.5 |
| Silver maple | 3.0 |
| Sugar maple | 5.0 |
| River birch | 3.5 |
| White birch | 5.0 |
| Shagbark hickory | 7.5 |
| Green ash | 4.0 |
| Black walnut | 4.5 |
| Black cherry | 5.0 |
| White oak | 5.0 |
| Red oak | 4.0 |
| Pin oak | 3.0 |
| Linden or basswood | 3.0 |
| American elm | 4.0 |
| Ironwood | 7.0 |
| Cottonwood | 2.0 |
| Dogwood | 7.0 |
| Redbud | 7.0 |

[Chart](https://www.purduelandscapereport.org/article/how-old-is-my-tree/) from Purdue University, Indiana

## Part C: Determine the year your tree may have sprouted.

Subtract the tree’s estimated age from the current year.

Example: Subtract 120 from 2020 (current year). The estimated sprouting year is 1900.

## Optional Enrichment: Read and write about your local history.

Students may enjoy learning about what the world was like the year their tree sprouted. Provide local resources for learning about your area’s local history.

Sample elements to include in descriptive writing:

* A *current* description of where the tree is growing.
* Examples might include number and type of nearby buildings, roads, and other vegetation.
* Age of the tree and year it may have sprouted.
* A description of natural conditions the year the tree sprouted.
* A description of human events the year the tree sprouted.
* List additional significant human and natural events that happened over the tree’s lifetime.
	+ Natural examples: wildfires, floods, droughts, etc.
	+ Local examples: date a nearby structure or road was built, year the town was settled, year the school was built, etc.
	+ National examples: year Minnesota became a state, wars, moon landing, presidential administrations, human population numbers, etc.

Resources may include:

* Locally written history books
* Local elders
* Google searches about history of your town, city, neighborhood, or state

Advanced resources:

* [DNR historic air photos](https://www.dnr.state.mn.us/maps/landview/index.html)
* [Minnesota Historical Society](http://search.mnhs.org/)
* [Minnesota Forest History Timeline](https://www.dnr.state.mn.us/forestry/history/timeline.html)

## Optional Enrichment: Verify your tree’s age

To get a precise measurement, consider inviting a forester to take a core sample of the tree with an increment borer. Students can count the tree’s annual rings of growth of the core sample using a hand lens.

## Student page: How Old Is Your Tree?

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Identify your tree.**

Go outside and find a tree that interests you. Collect a leaf and identify the tree using the shortcut guide on pages 17 and 18 of the [Beginner’s Guide to Minnesota Trees](https://conservancy.umn.edu/bitstream/handle/11299/49816/6593.pdf?sequence=1&isAllowed=y). NOTE: The tree species must be one of the varieties listed in the [Minnesota Trees Growth Factor Table](#_Growth_Factor_Table). If the tree you measure is not listed (such as apple), find another tree that is found in the list, such as silver maple. This website may help you: [mndnr.gov/trees/native-trees.html](https://www.dnr.state.mn.us/trees/native-trees.html)

My tree species name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Measure your tree’s circumference.**

To measure circumference in inches, wrap a measuring tape around the trunk of the tree **at 4.5 feet** from the ground. Make sure the tape is level and straight, and not zig-zagging around the tree. The height at which you measure is important. The forestry business uses 4.5 feet as the standard height. The growth tables you will use below are based on this standard.

My tree’s circumference: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Convert the circumference into diameter.**

Circumference measure the distance around an object. Diameter measures the width of an object. Calculate circumference using the formula: **d = C/pi**. Show your work.

My tree’s diameter: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Go to next page!

1. **Use the growth table to estimate the age of your tree.** Multiply diameter by the correct growth factor listed in the table below. Show your work:

My tree’s estimated age \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

### Minnesota Trees Growth Factor Table

| **Tree species** | **Growth factor** |
| --- | --- |
| Red maple | 4.5 |
| Silver maple | 3.0 |
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| River birch | 3.5 |
| White birch | 5.0 |
| Shagbark hickory | 7.5 |
| Green ash | 4.0 |
| Black walnut | 4.5 |
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| White oak | 5.0 |
| Red oak | 4.0 |
| Pin oak | 3.0 |
| Linden or basswood | 3.0 |
| American elm | 4.0 |
| Ironwood | 7.0 |
| Cottonwood | 2.0 |
| Dogwood | 7.0 |
| Redbud | 7.0 |

1. Find the year your tree sprouted. Subtract the estimated age of your tree from the current year.

My tree sprouted in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(year)