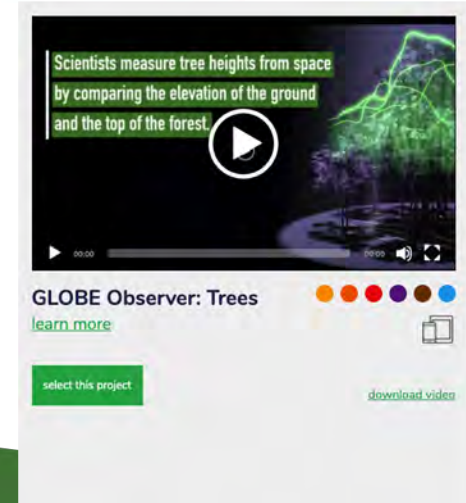




&



GLOBE  
Observer



GLOBE  
Trees

Girl Scouts and GLOBE Observer



The [Global Learning and Observations to Benefit the Environment \(GLOBE\) Program](#) is an international science and education program that provides students and the public worldwide with the opportunity to participate in data collection and the scientific process and contribute meaningfully to our understanding of the Earth system and global environment.



The [GLOBE Observer](#) app is a GLOBE's data entry tool that allows an international network of citizen scientists to work together to learn more about our shared environment and changing climate. *GLOBE Observer* currently accepts observations of Clouds, Mosquito Habitats, Land Cover and Trees.

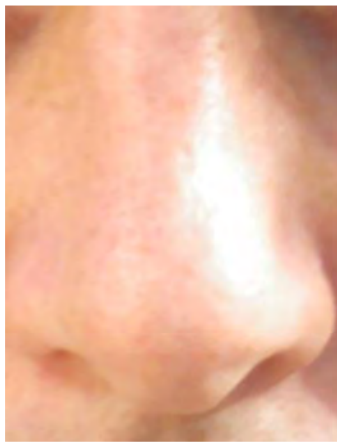
# GLOBE Trees

## NASA GLOBE and Girl Scouts

### GLOBE Observer Trees Tool: Think Like a Citizen Scientist



Hear



Smell



Touch



See



Taste

GLOBE **Trees**

What's an Observation?



Zoomed out



Zoomed in



View up



View above

## Observations:

- ☐ What you notice?
  - ☐ Needles or leaves?
  - ☐ Time of year?
  - ☐ Height?
  - ☐ Colors, shapes or patterns?
  - ☐ What do you think makes your tree unique or special?
- ☐ What was different about the tree from a distance and “zoomed in”?
- ☐ Did you see any insects, plants, animals, lichen or fungi on your tree?

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Zoomed out



Zoomed in



View up



View above

## Observations:

- ☐ What you notice?
  - ☐ Needles or leaves?
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**Press Pause while you make your observations and discuss.**

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# What does a Scientist Do?

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Press Pause while you discuss.

# What does a Scientist Do?



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# What does a Scientist Do?



1. Observe
2. Ask a Question
3. Make a Hypothesis





Tall Tree



Short Tree

## Observations

- ☐ What differences do you notice between these trees?
- ☐ What similarities?



Tall Tree



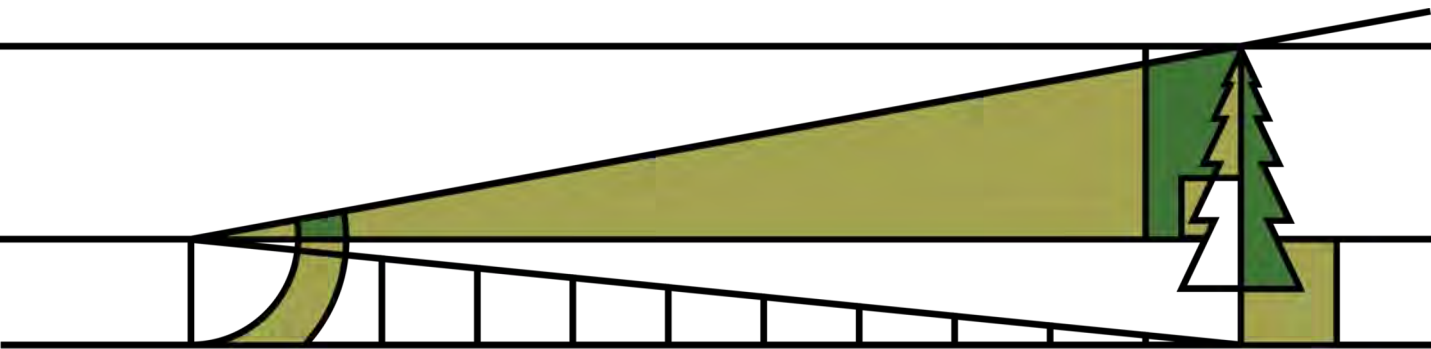
**Press Pause while  
you discuss.**



Short Tree

## Observations

- ☐ What differences do you notice between these trees?
- ☐ What similarities?



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## Formulate a Question

Can tree height tell you which tree is older?

# Can tree height tell you which tree is older?

1. Yes.
2. No.



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## Make a Hypothesis

Answer your question based on observations



# Can tree height tell you which tree is older?

1. Yes.
2. No.



Press Pause while  
you discuss.



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## Make a Hypothesis

Answer your question based on observations

# Can tree height tell you which tree is older?

1. Yes.
2. No.



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## Make a Hypothesis

Answer your question based on observations

I needed more information.

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**Was our hypothesis correct?**

Can tree height tell you which tree is older?



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How can you tell how old a tree is?

Tree rings. Trees gain rings every year.



# How do scientists know if their hypothesis is correct?

Collect and Analyze Data



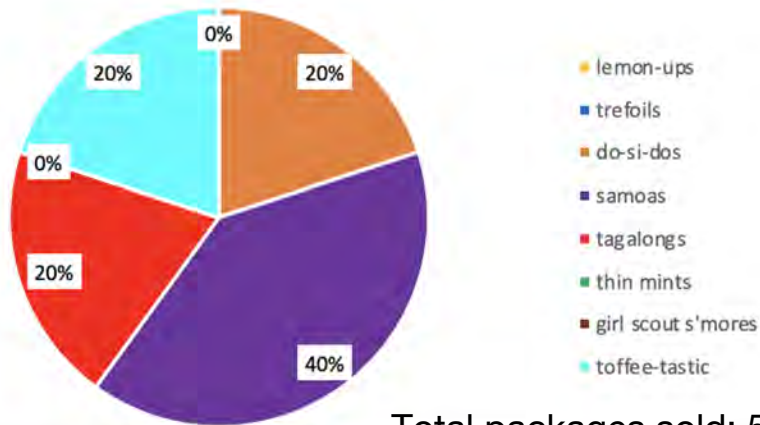
# Collect and Analyze Data

## Girl Scout Cookie Sales



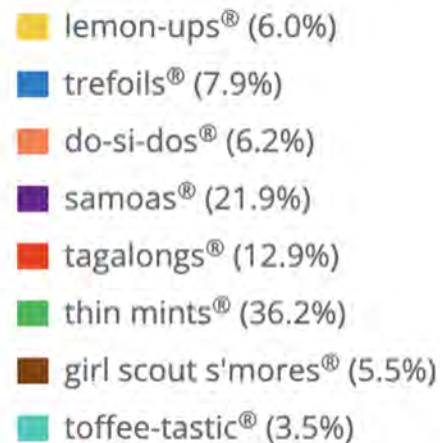
### Single Sale

Single Family



Total packages sold: 5

### Troop Sales



Total packages sold: 1,559



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Tree Height Data  
<https://vis.globe.gov/trees>



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**GLOBE Observer: Tree Height**

<https://youtu.be/pMV9COMYtSg>





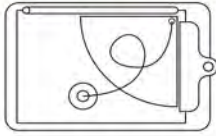
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# GLOBE Observer Trees Tool

[https://youtu.be/\\_pE26h4xlui](https://youtu.be/_pE26h4xlui)

# The Hand-Held Clinometer for Measuring Tree Height

## Build a Clinometer



1. Pull a knotted string through the circle in the upper right corner.
2. Attach a weight to the bottom of the string.
3. Tape your straw to the top of the page.
4. Clip to a clipboard or hold against a hard surface.

### What is a clinometer?

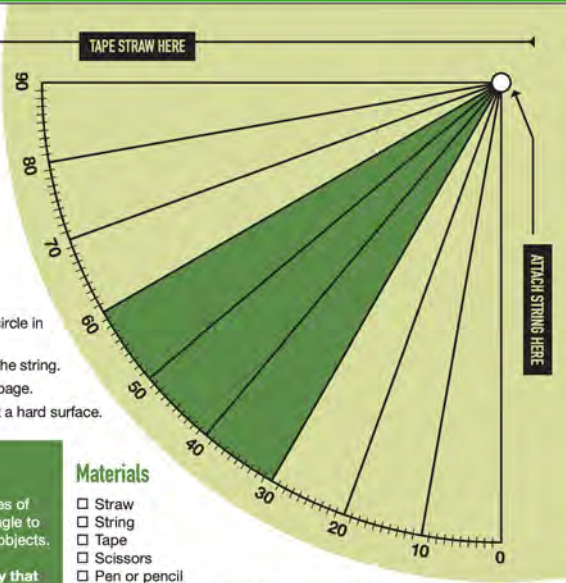
A clinometer is a tool for measuring angles of slope or elevation. You will need this angle to calculate the height of trees and other objects.

Measuring tree height is just one way that scientists study the health of forests. Give it a try using this paper clinometer.

### Materials

- ☐ Straw
- ☐ String
- ☐ Tape
- ☐ Scissors
- ☐ Pen or pencil
- ☐ Hard surface (clipboard, book, cardboard)
- ☐ Weight (beads, paper clip, metal washer)

observer.globe.gov



## Calculate the Height of a Tree

1. Find a tree on level ground that is at least 15 ft (5 m) tall. Stand where you can clearly see the base and the top.
2. Look at the top of the tree through the drinking straw.
3. Use the clinometer to measure the angle at which you are looking at the tree. It helps to have a friend tell you where the string crosses the arc.
4. Measure the distance to the tree using a tape measure or your pace length.



You can also measure trees with the GLOBE Observer app - no tape measure or clinometer required!



### What is a tangent?

The tangent (tan) of an angle is a trigonometric function used to calculate the legs of a right triangle. When measuring a straight tree on level ground, the tree trunk and ground form a right triangle.

If your calculator doesn't have the tan function, find a tree that can be viewed from a 45 degree angle when looking at the top. The tangent of 45 is 1, so the height of the tree above your eye height is equal to the distance from the tree.



### Which measurement system do you prefer?

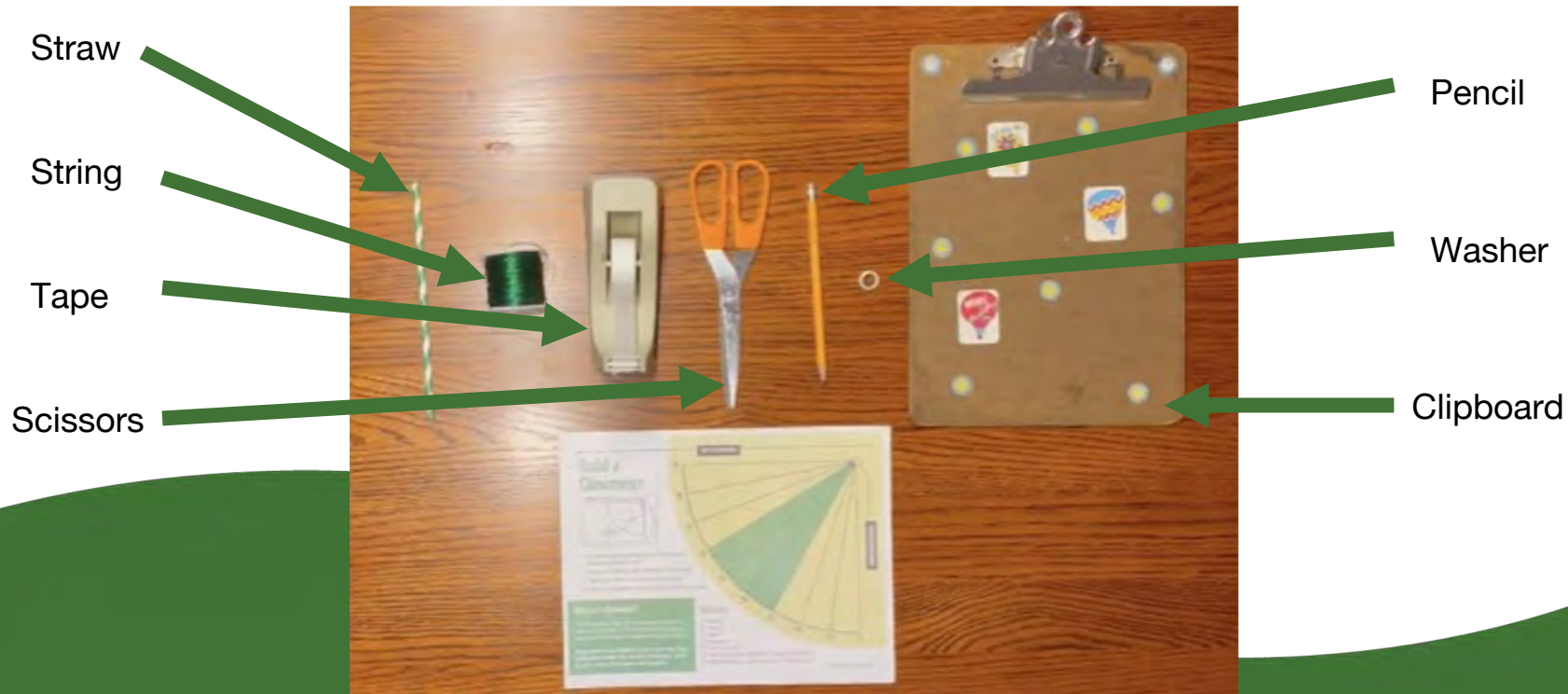
Imperial (Feet and Inches) or Metric (Meters and Centimeters)

Circle or highlight the units you plan on using. Remember, you can use either system, but it's important to only use one.

|   |                                   |   |  |
|---|-----------------------------------|---|--|
| <p>Your Height</p> <p><input type="text"/> in. <input type="text"/> cm</p>        | <p>- 4 in. =</p> <p>- 10 cm =</p> | <p>Eye Height</p> <p><input type="text"/> in. <input type="text"/> cm</p> | <p>This is an estimate. You can also measure your eye height with the tape measure.</p>  |
| <p>Distance from Tree</p> <p><input type="text"/> in. <input type="text"/> cm</p> | <p>x tan</p>                      | <p>Clinometer Angle</p> <p><input type="text"/></p>                       | <p>=</p> <p>Vertical Leg</p> <p><input type="text"/> in. <input type="text"/> cm</p>     |
| <p>Vertical Leg</p> <p><input type="text"/> in. <input type="text"/> cm</p>       | <p>+</p>                          | <p>Eye Height</p> <p><input type="text"/> in. <input type="text"/> cm</p> | <p>=</p> <p>Tree Height</p> <p><input type="text"/> in. <input type="text"/> cm</p>      |
| <p>Tree Height</p> <p><input type="text"/> in. <input type="text"/> cm</p>        | <p>÷ 12 =</p> <p>÷ 10 =</p>       | <p>Tree Height</p> <p><input type="text"/> ft <input type="text"/> m</p>  | <p>You can use the same process to measure anything taller than you on level ground.</p> |

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**Clinometer:** an instrument used for measuring the angle of elevation of slopes. A clinometer can be used to measure the heights of trees, poles, towers, and buildings.  
<https://go.usa.gov/xtE7w>

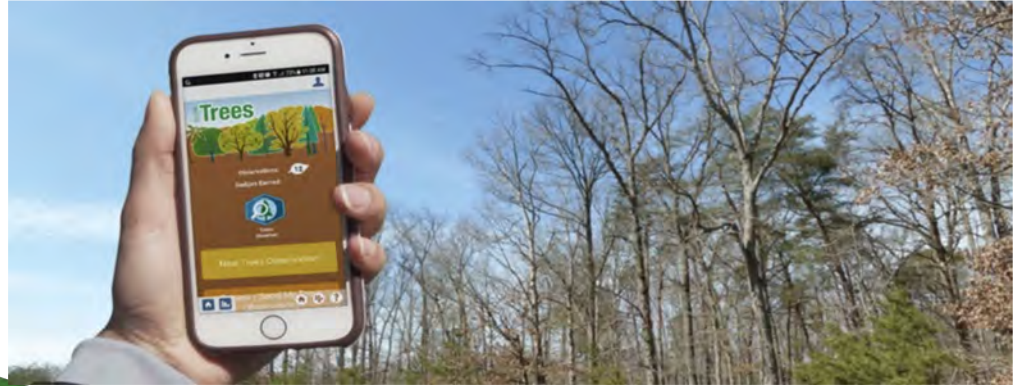


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## Build a Clinometer

<https://youtu.be/AdcU4O1Hwh0>

# Compare the App and a Clinometer



<https://youtu.be/Ky6KhGLw1AU>

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One way to maximize accuracy of the the GLOBE tree height data is to take tree height observations with a hand-held clinometer and the GLOBE Observer Trees tool, then compare the measurements and repeat!





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**How to use the app to measure tree height**

<https://youtu.be/ZaUxc-Aal4Y>



## Welcome, Girl Scouts!

This is the sign up page for Troop Leaders/Volunteers. If you're a Girl Scout, you'll need to wait for an email from your troop leader to get started.

### Sign Up For A SciStarter Account

email

email

How should we refer to you on the site?

username

password

re-enter password

zipcode or postal code

☒ Sign up for our newsletter

☒ By signing up, I agree to SciStarter's Terms of Use.

### Log In With A SciStarter Account

email

password

[Forgot your password?](#)

log in

# GLOBE Trees

## Register your Troop on SciStarter

<https://scistarter.com/girlscouts/volunteer/landing>

Add Troop Details

Select Project

Confirm Settings

### Confirm Your Project!

Make sure your selections are correct or change them with the links below.

#### PROJECT

You've Selected

**GLOBE OBSERVER: TREES**

[select a different project](#)



You've selected a citizen science project for the Journey.

Now, it's time to invite your troop to join this Journey!

Confirm your email address to receive the invitation you can easily forward to them. It will include a unique link to connect them with your Troop's Journey and the project your girls selected.

Send To:

[send to a different address](#)

**confirm & send me the invitation**

[back to previous step](#)

# GLOBE Trees

## Choose GLOBE Observer: Trees

## Get the App



GLOBE Observer, the app of [The GLOBE Program](#), invites you to make environmental observations that complement NASA satellite observations to help scientists studying Earth and the global environment. Those in the [120+ GLOBE countries](#) can download and use the app.

[Lee esta página en español.](#)

GLOBE **Trees** Download the App



# Take Action

## What can you do?



- ☐ Plant a tree and track its growth
- ☐ Create a program to teach other Girl Scouts about a trees
- ☐ Start a hiking group and take tree height observations
- ☐ On a road trip take tree height observations of trees at your stops along the way.
- ☐ Take tree height and land cover observations from the same place in different seasons, then compare the changes to the tree height from year to year and look for differences between the images.
- ☐ Create a GLOBE team for your troop, council, or service unit ([www.globe.gov/globe-community/globe-teams](http://www.globe.gov/globe-community/globe-teams)) and take observations.

GLOBE **Trees**





@TheGLOBEProgram



@GLOBEProgram



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Questions? Share your projects.

- ❑ [GLOBE Observer app link](#) or download from the App Store or Google Play.
- ❑ [GLOBE Visualization System](#) to see other citizen science data from GLOBE observers around the world. You can look for trees pictures or check out data from the other GLOBE tools.
- ❑ [NASA Worldview](#) to explore current and past satellite data (yes, you can view data as early as today in near real time.)
- ❑ [Girl Scout Tree Promise](#)
- ❑ Video about [how to take a tree height observation](#)
- ❑ [GLOBE Teams](#)

**GLOBE**  
**Trees**

**Links for more information**  
**Thanks!**