Tree House Design Project

Architecture

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Overview

Overview: Your Task is to design and build a tree house following proper architecture standards, techniques and codes.

1. **Research:** tree house design.
2. **Location:** Based on your research you will find an appropriate tree location. Take a few pictures of the tree and print them on letter size paper. In your portfolio, document how you chose this tree and why it is the best tree and location.
3. **Brainstorm:** Place a piece of tracing paper over the picture of the tree and sketch several designs for potential tree houses. Make sure to consider your criteria in your sketches. Several views will probably be necessary.
4. **Model Tree:** Select a series of branches and sticks and mount them to the base to create a tree that resembles the one in your picture.
5. **Select the best Idea:** Select which design will work best keeping in mind your research. Create a drawing plan of the Tree house, explain why this is the best design. Include the dimension and locations for the tree, sizes, platform styles, etc.
6. **CAD:** Based off of your plan, create detailed scaled drawings of your tree house design and deck including all components and elements.
7. **Model:** Develop a foam core model of all of the pieces of the tree house. Assemble them temporarily on the tree using tape, clips, etc. Keep it neat.
8. **Revise:** Based off of your model, adjust your CAD plans. Print the plans on the large format printer.
9. **Build:** using appropriate materials processing procedures and based off of your CAD plans, create the tree houses from the materials provided. If you need to add anything special you may have to seek out additional materials.
10. **Finishing touches:** add materials to your tree to resemble the location. This is your chance to make it look realistic.
11. **Test and Evaluate:** In your portfolio, explain how your tree house design came together. Explain if everything worked as planned. Explain what you would do differently if you did it again.
12. **Presentation:** Present your tree house theory to the class.

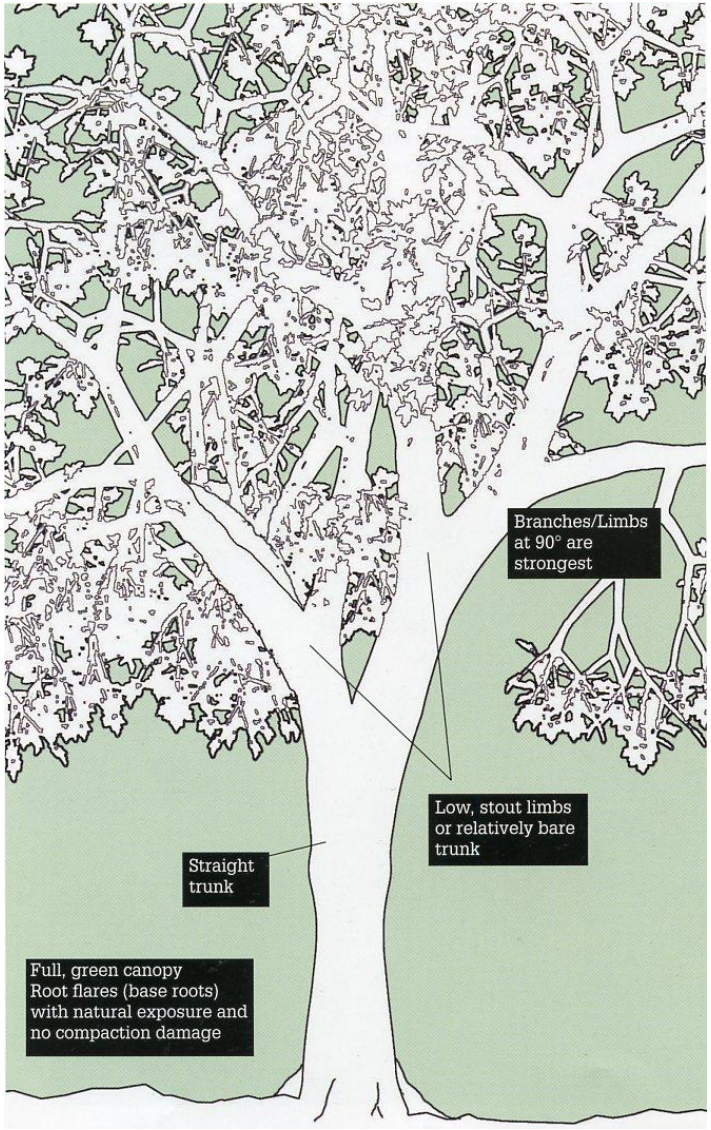
Criteria

- Each Student is responsible for:
- At least 100 sq./ft. of indoor space
- At least 100 sq./ft. of decking
- At least 2 modes of access to their spaces
- At least 1 “Play Thing”

Tree House Basics and Design

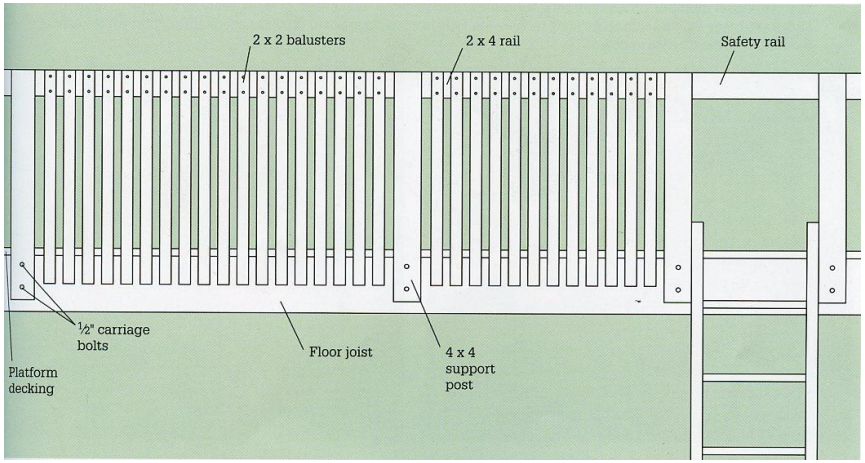
Choosing a Tree

- General Tree Health
- Is it big enough
- Location
- Behavior



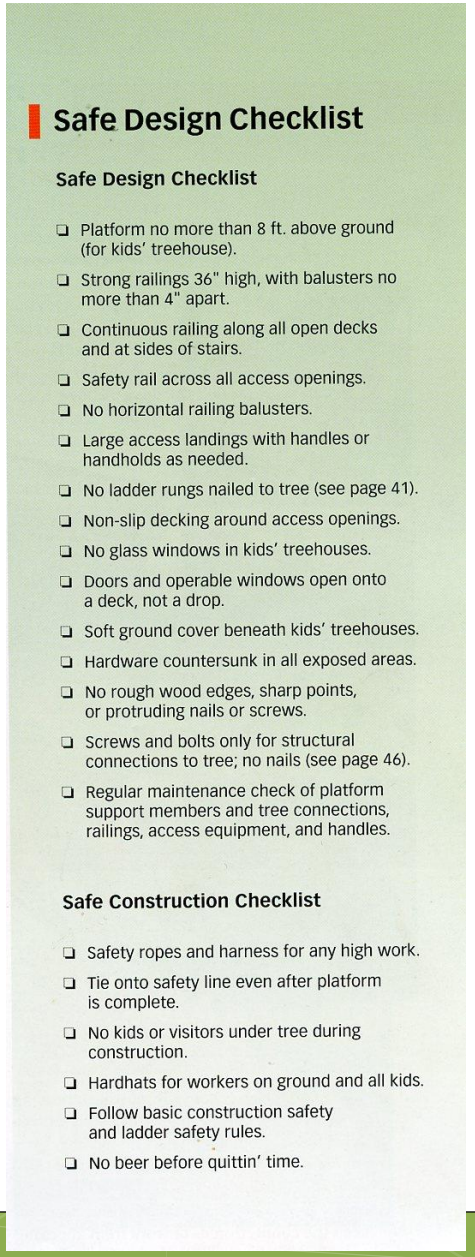
Planning and Design

- Building codes and zoning laws
- Elements of a tree house
- Design Considerations
- Drawing plans
  - Photo of Tree
  - Tracing Paper
  - Sketches
  - CAD
- Lumber and hardware



Tree House Safety

- Safe tree house design
- Working safely
  - Safe design checklist



Safe Design Checklist

Safe Design Checklist

- ❑ Platform no more than 8 ft. above ground (for kids' treehouse).
- ❑ Strong railings 36" high, with balusters no more than 4" apart.
- ❑ Continuous railing along all open decks and at sides of stairs.
- ❑ Safety rail across all access openings.
- ❑ No horizontal railing balusters.
- ❑ Large access landings with handles or handholds as needed.
- ❑ No ladder rungs nailed to tree (see page 41).
- ❑ Non-slip decking around access openings.
- ❑ No glass windows in kids' treehouses.
- ❑ Doors and operable windows open onto a deck, not a drop.
- ❑ Soft ground cover beneath kids' treehouses.
- ❑ Hardware countersunk in all exposed areas.
- ❑ No rough wood edges, sharp points, or protruding nails or screws.
- ❑ Screws and bolts only for structural connections to tree; no nails (see page 46).
- ❑ Regular maintenance check of platform support members and tree connections, railings, access equipment, and handles.

Safe Construction Checklist

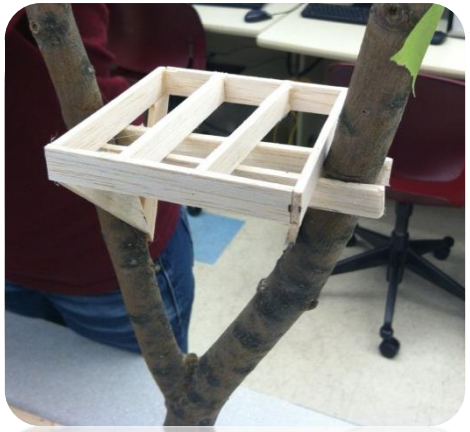
- ❑ Safety ropes and harness for any high work.
- ❑ Tie onto safety line even after platform is complete.
- ❑ No kids or visitors under tree during construction.
- ❑ Hardhats for workers on ground and all kids.
- ❑ Follow basic construction safety and ladder safety rules.
- ❑ No beer before quittin' time.

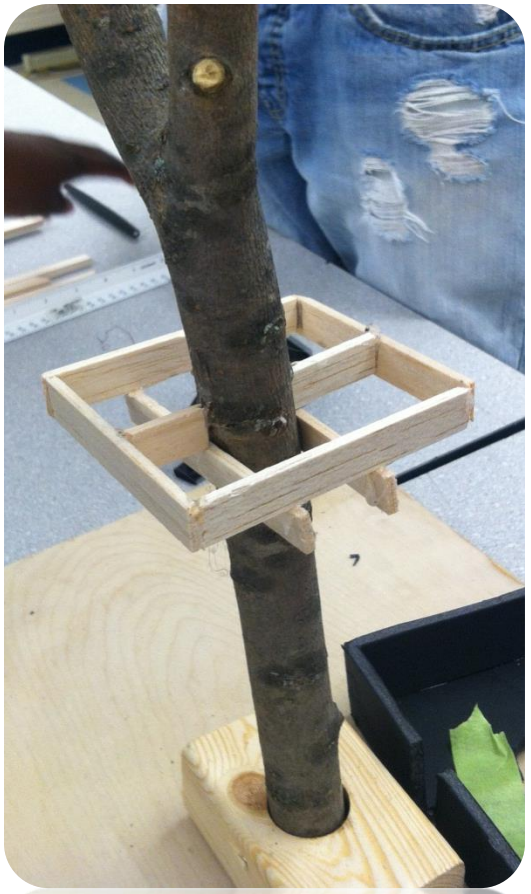
Tree House Techniques

- Building Platforms
  - Platform basics
  - Platform anchoring techniques
  - Installing Decking

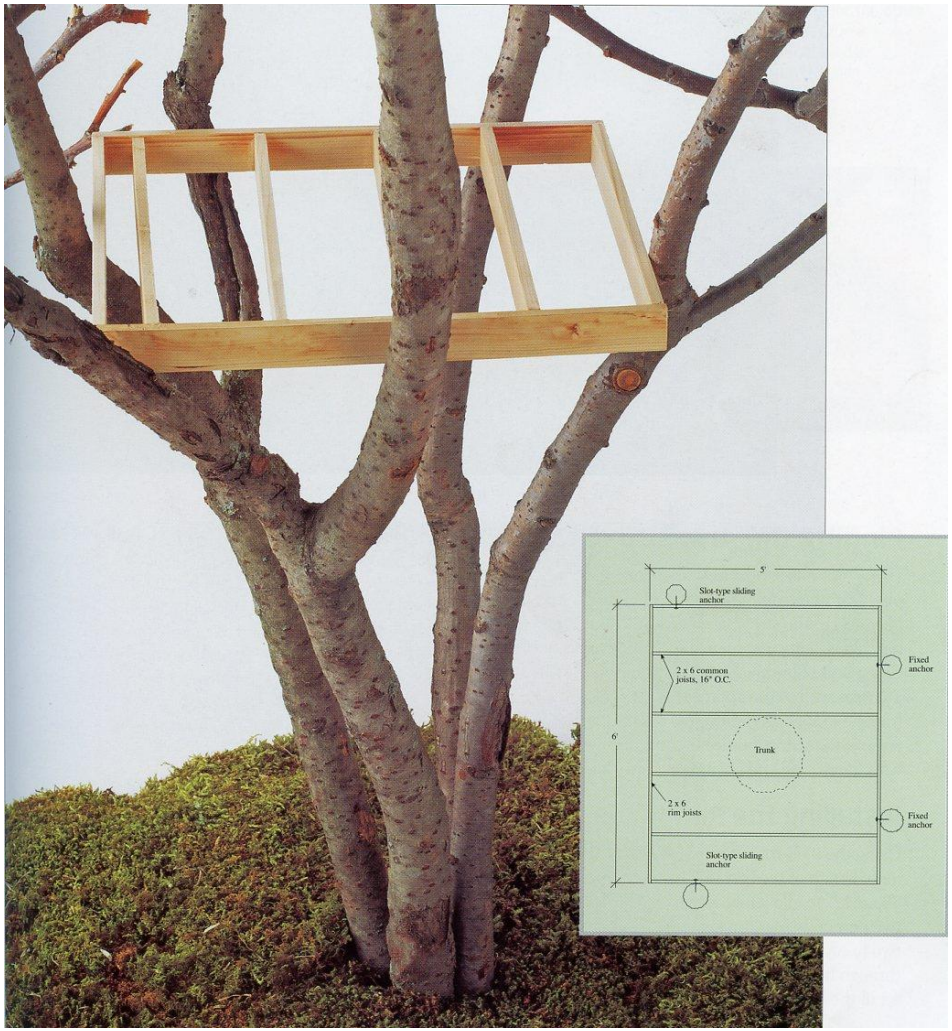
Platform Designs

- Single Tree: Platform Nestled in Branches
- Single Tree: Trunk as center post
- Two Trees: Platform Spanning between trunks
- Three Trees: Platform Spanning between trunks
- Two Trees and two support posts

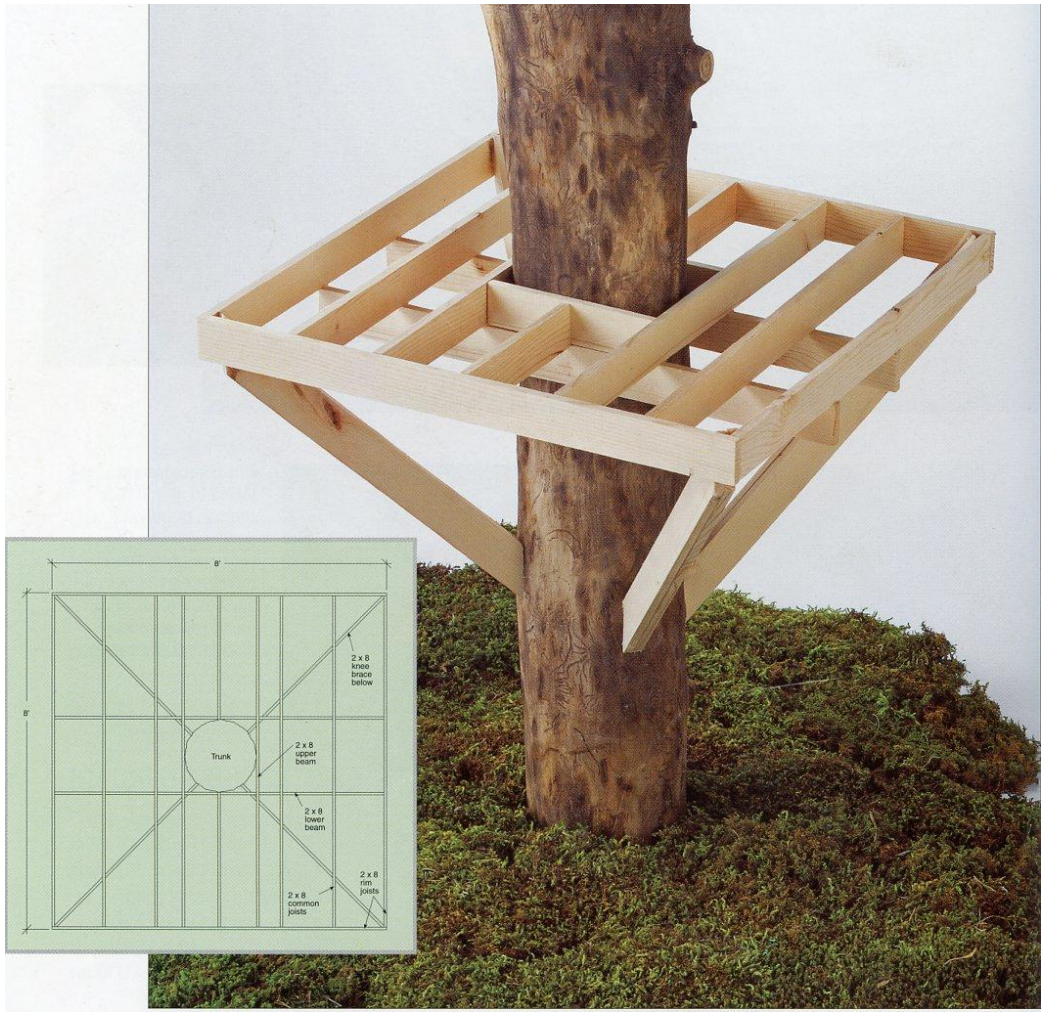




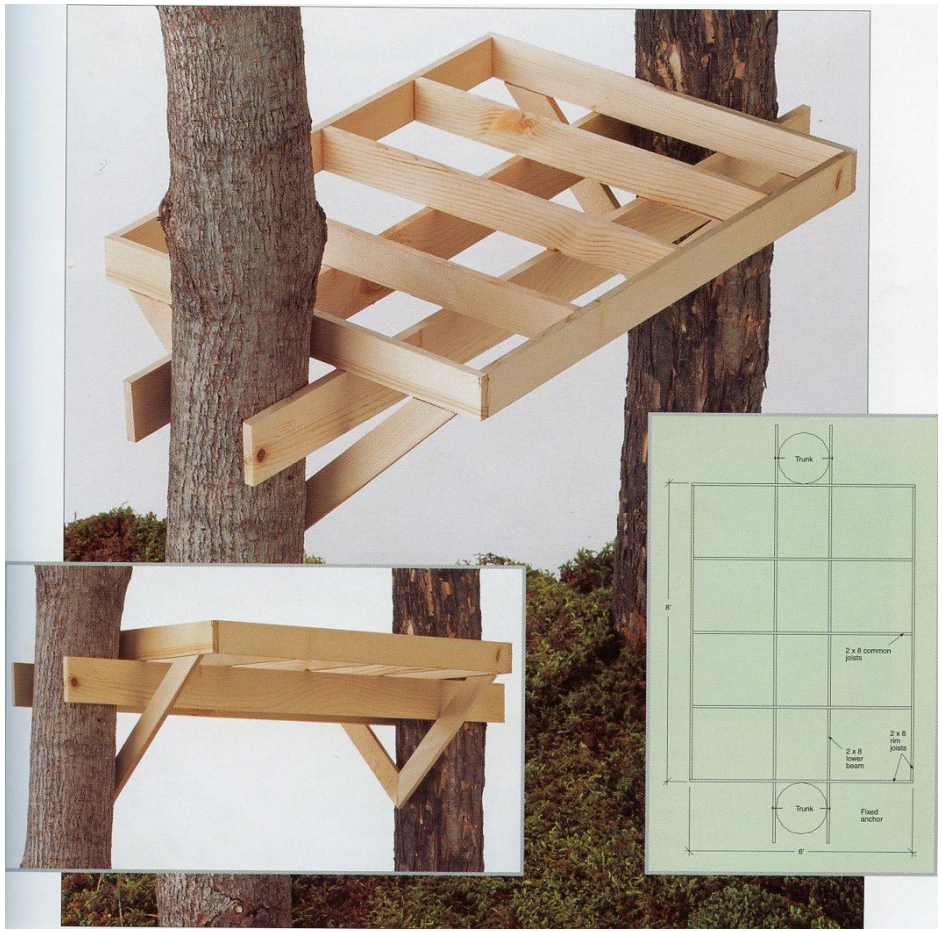
Single Tree: Platform Nestled in Branches



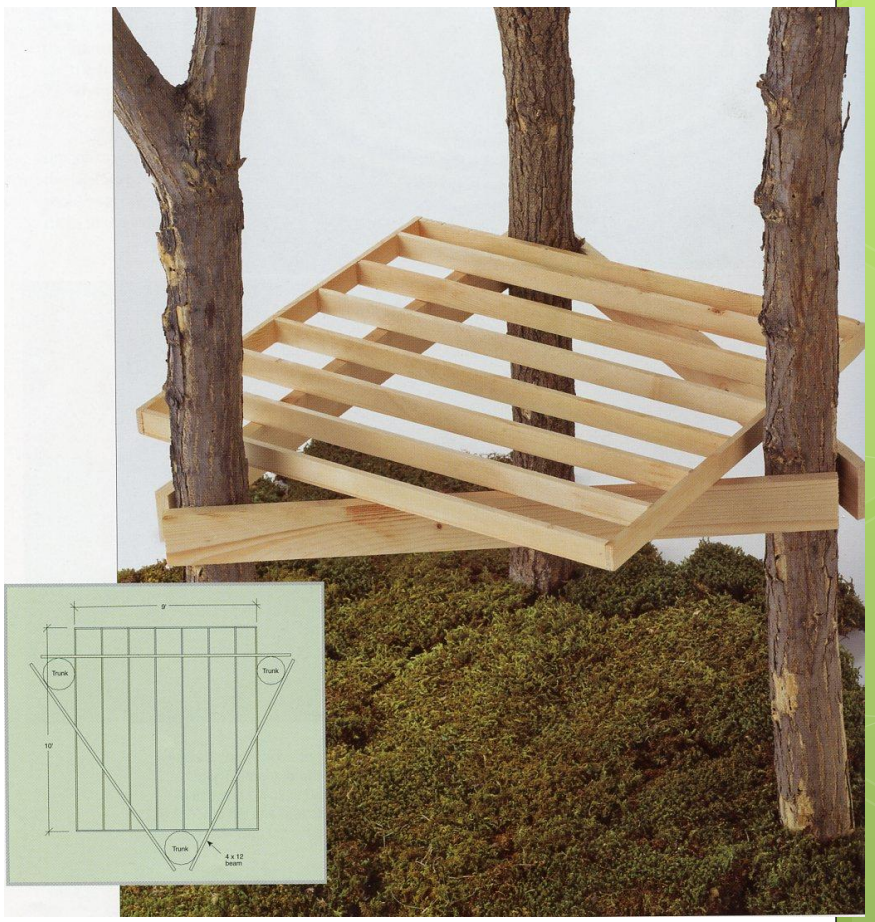
Single Tree: Trunk as center post



Two Trees: Platform Spanning between trunks



Three Trees: Platform Spanning between trunks



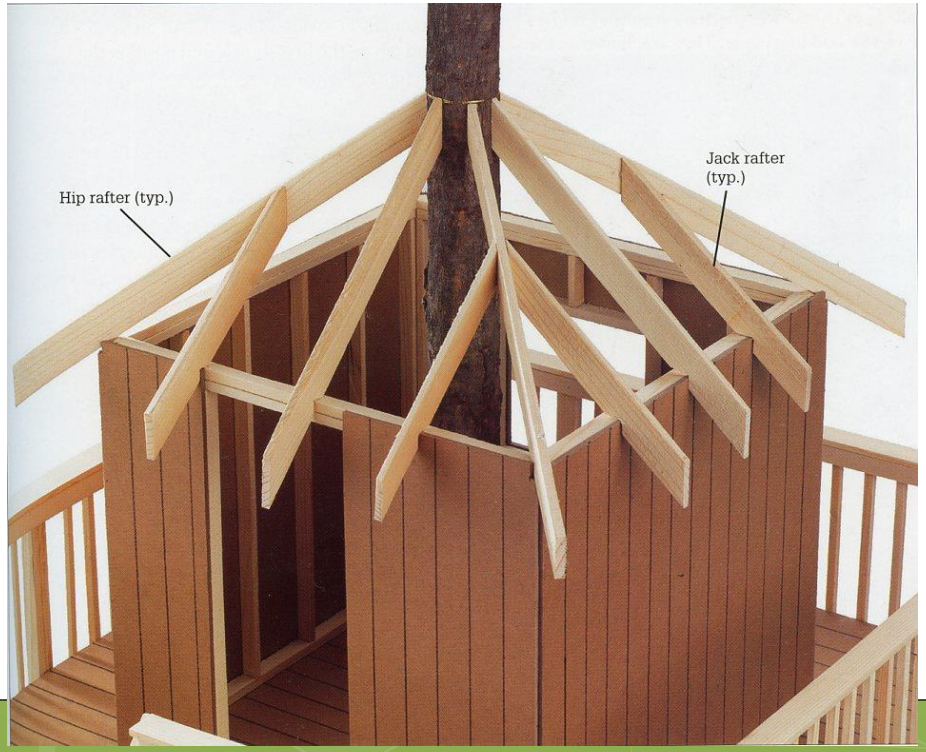
Two Trees and two support posts

Walls, Windows, Doors

- Framing Walls
- Siding and Trim
- Installing Walls
- Making Windows and Doors
- Building Railings

Building Roofs

- Framing the roof
- Sheathing and Roofing



Accessories

Ladders, Trap Doors, & Other Modes of Access

- Building Ladders
- Trap Doors
- Fireman's Pole

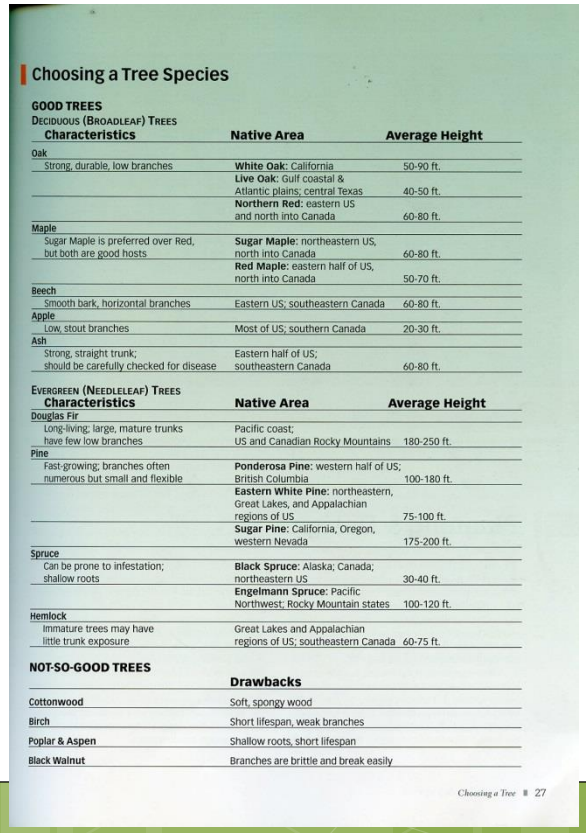
Swings and Play Things

- Swings and Slides
- Climbing Features
- Pulleys and Accessories
- Zip Lines

Student Process

Research

- Students use the information just provided to them as well as outside sources to develop a design for their tree house.



Choosing a Tree Species

GOOD TREES

Deciduous (Broadleaf) Trees

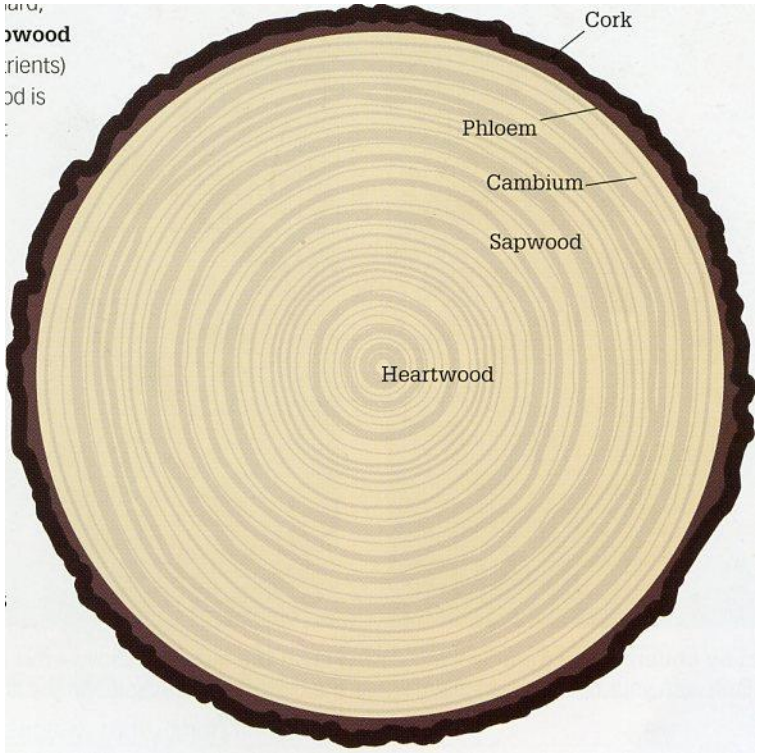
Characteristics	Native Area	Average Height
Oak		
Strong, durable, low branches	**White Oak:** California	50-90 ft.
	Live Oak: Gulf coastal & Atlantic plains; central Texas	40-50 ft.
	Northern Red: eastern US and north into Canada	60-80 ft.
Maple		
Sugar Maple is preferred over Red, but both are good hosts	**Sugar Maple:** northeastern US, north into Canada	60-80 ft.
	Red Maple: eastern half of US, north into Canada	50-70 ft.
Beech		
Smooth bark, horizontal branches	Eastern US; southeastern Canada	60-80 ft.
Apple		
Low, stout branches	Most of US; southern Canada	20-30 ft.
Ash		
Strong, straight trunk; should be carefully checked for disease	Eastern half of US; southeastern Canada	60-80 ft.

Evergreen (Needleleaf) Trees

Characteristics	Native Area	Average Height
Douglas Fir		
Long-living; large, mature trunks have few low branches	Pacific coast; US and Canadian Rocky Mountains	180-250 ft.
Pine		
Fast-growing; branches often numerous but small and flexible	**Ponderosa Pine:** western half of US; British Columbia	100-180 ft.
	Eastern White Pine: northeastern, Great Lakes, and Appalachian regions of US	75-100 ft.
	Sugar Pine: California, Oregon, western Nevada	175-200 ft.
Spruce		
Can be prone to infestation; shallow roots	**Black Spruce:** Alaska; Canada; northeastern US	30-40 ft.
	Engelmann Spruce: Pacific Northwest; Rocky Mountain states	100-120 ft.
Hemlock		
Immature trees may have little trunk exposure	Great Lakes and Appalachian regions of US; southeastern Canada	60-75 ft.

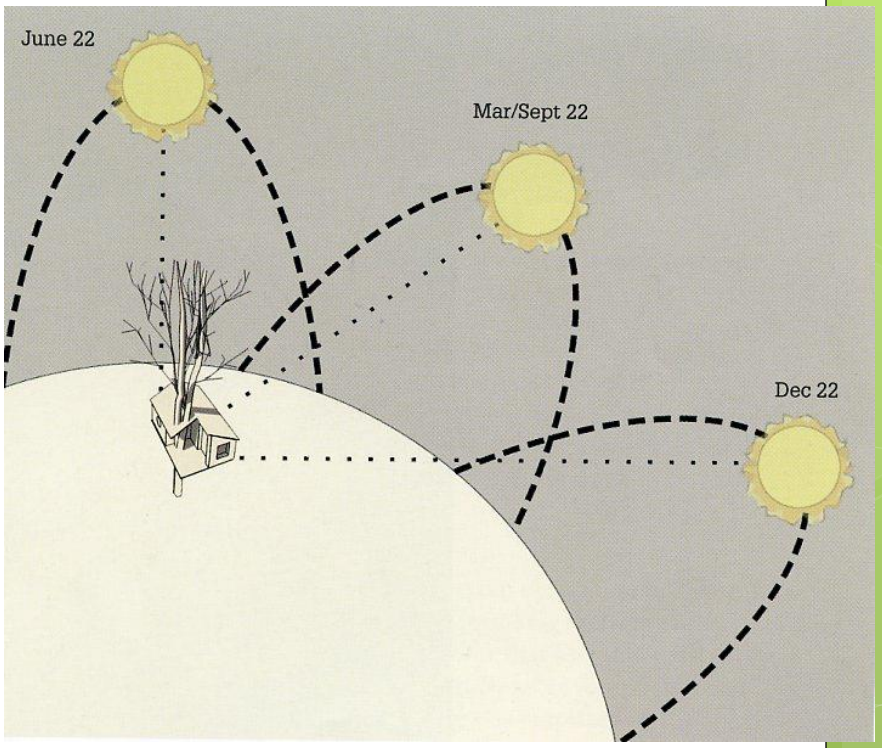
NOT-SO-GOOD TREES

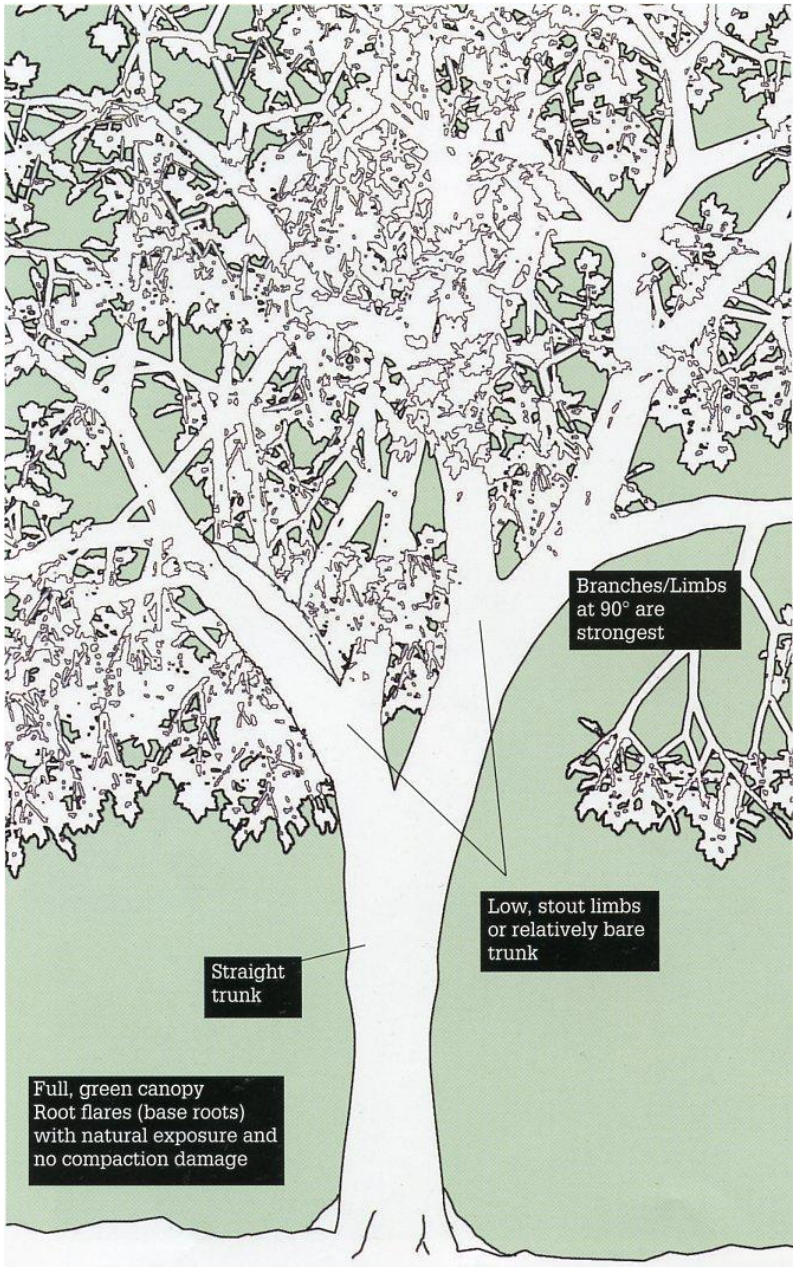
	Drawbacks
Cottonwood	Soft, spongy wood
Birch	Short lifespan, weak branches
Poplar & Aspen	Shallow roots, short lifespan
Black Walnut	Branches are brittle and break easily

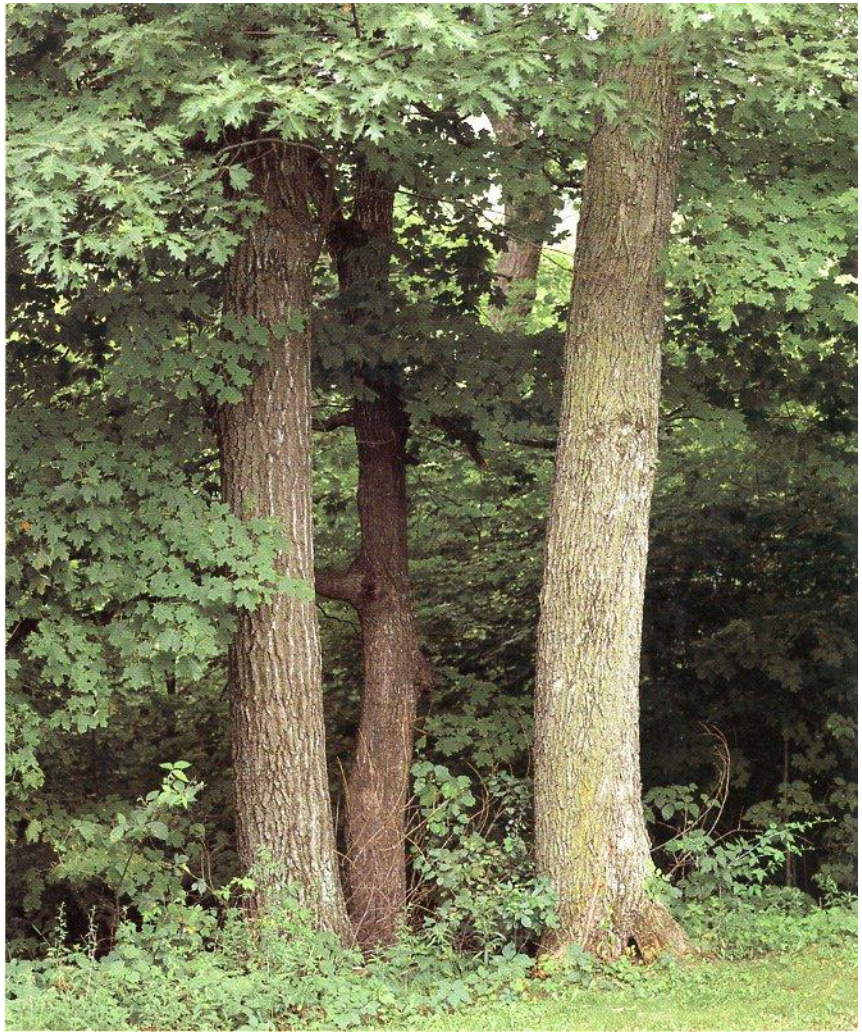


Location

- Students have a homework assignment of finding an appropriate location for their tree house. They need to take a few pictures of their location and bring them in. They then need to explain why this location is best suited for a tree house and prepare a picture to later trace over.




Branches/Limbs at 90° are strongest
Low, stout limbs or relatively bare trunk
Straight trunk
Full, green canopy
Root flares (base roots) with natural exposure and no compaction damage



Brainstorm

- Students will take the photograph of the tree that they chose and utilize their research on tree house design and develop a series of brainstormed sketches on tracing paper of the potential designs.

Create a model tree

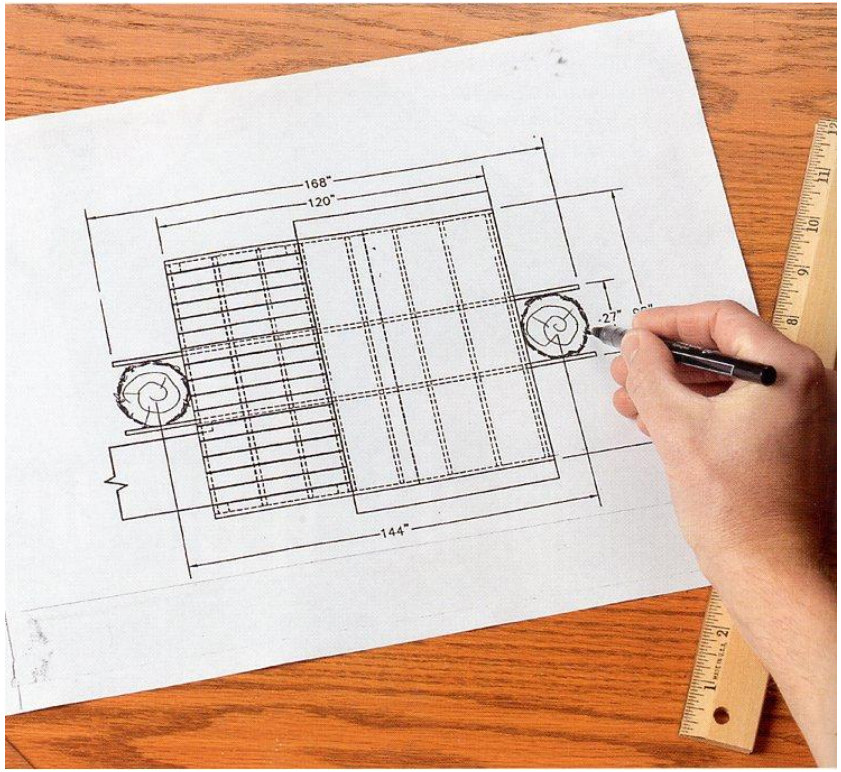
- Student select a series of branches and create a model tree that resembles the real tree location that they chose. They then mount those branches to a plywood base.

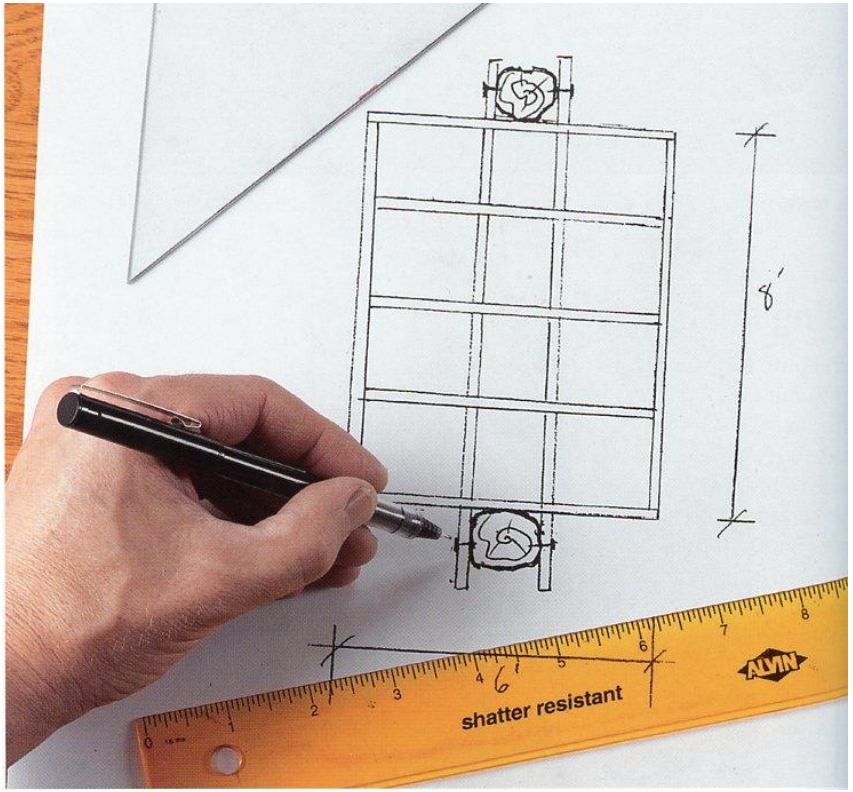
Select the best idea

- Student select which design will work best keeping in mind their research. They create a drawing plan of the tree house and explain why this is the best design. They include the dimension and locations for the tree, sizes, platform styles, etc.

CAD – Computer Aided Design

- Based off of their plan, student create detailed scaled drawings of their tree house design and deck including all components and elements.
- You can use:
- Autodesk REVIT, AutoCAD, Sketchup, etc.
- You can also use traditional drafting techniques.


168"
120"
144"


8'
shatter resistant
ALVIN

Modeling

- Students first develop models of their designs made of foam core.
- This allows them to check their CAD plans and make adjustments to the design specific to the tree.
- Assemble them temporarily on the tree using tape, clips, etc. Keep it neat.

Revise

- Based off the students model, they adjust their CAD plans. They then print the plans on the large format printer.

Build

- Following their architectural plans and using appropriate materials processing procedures, they create the tree houses from the materials provided. If they need to add anything special they may have to seek out additional materials.

Finishing Touches

- Place all finishing touches to the design to make the tree, the houses, and the ground environment look realistic and similar in nature to the actual location of the tree that they chose.

Test and Evaluate

- In their portfolio, they explain how their tree house design came together. They explain if everything worked as planned. They also explain what they would do differently if they did it again.

Presentation

- They present their tree house theory to the classes.

Resources

http://freshome.com/2008/01/08/top-8-most-amazing-tree-houses/

http://www.treehouseguides.com/

http://www.thetreehouseguide.com/building.htm

http://books.google.com/books/about/Black_Decker_The_Complete_Guide_Build_Yo.html?id=mNMXC8iUKqgC