Woodworking Wonders

Level 3

National 4-H Curriculum
BU-06877

Nailing It Together

Woodworking Youth Activity Guide

Name _____

County _____

REVIEWED & RECOMMENDED
National 4-H Curriculum

Notes to the Helper

You're providing a valuable service to young people today who are learning about woodworking through this Woodworking series.

Your Responsibilities

- Assisting youth as they complete the activities in this book
- Directing youth to think through why something happens—or, why it doesn't
- Helping youth choose woodworking projects that are appropriate for their skill level
- Helping youth perform difficult tasks
- Helping youth evaluate the quality of their work
- Emphasizing safety rules for youth

Your enthusiasm and encouragement will mean more to youth than you can imagine. Encourage youth to ask questions and see how they can apply new knowledge not only to woodworking, but also to their lives. With your help, youth can set goals, identify resources, practice communication skills and evaluate their own progress.

Nailing It Together

This book is for youth who are competent with hand tools and have used basic tools such as a hammer, hand saw, brace and bit and sander. It is vital that you be there when youth are first trying out new skills and tools. Safety is emphasized throughout the book. This book also emphasizes the following life skills: planning and organizing, communication, problem solving, making decisions and other vital skills.

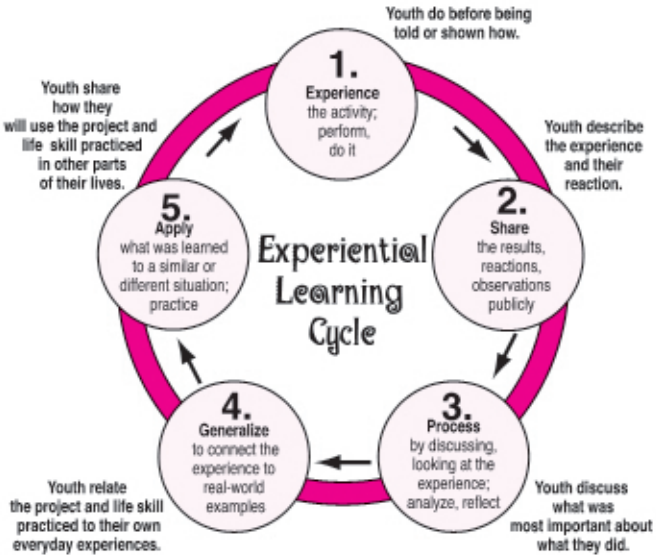
Woodworking Wonders Series

These four books for youth include: *Measuring Up*, for grades 2–4; *Making the Cut*, for grades 4–6; *Nailing It Together*, for grades 6–8; and *Finishing Up*, for grades 9–12.

The *Woodworking Group Helper's Guide* provides additional learning-by-doing activities that can be adapted for youth groups, classrooms or home learning. The guide also provides answers for the youth guide activities.

Each of the books includes a goal and achievement page that youth can use to monitor their progress and to keep a record of the work they have accomplished. It is important that you assist and encourage youth to complete the goal and achievement sections of each book.

Each chapter is filled with activities so that youth can practice what they read. The lessons are short, but the activities may take some time. The Experiential Learning Model is used to construct the curriculum.The idea behind it is to help youth learn by doing. Research has found that experiential learning is one of the best ways to teach skills.



Pfeiffer, J.W., & Jones, J.E., "Reference Guide to Handbooks and Annuals" © 1983 John Wiley & Sons, Inc. Reprinted with permission of John Wiley & Sons, Inc.

With that, we leave you to a task that will be a learning experience for you as well as a pleasure. Thanks for your interest in youth.

Acknowledgements

These publications were reviewed and researched by: Jim Adams, Kansas State University; Curt Peters, University of Arizona; Kevin Jones, University of Arkansas; Bobbie Bower, 4-H volunteer, and Michael Bower, 4-H volunteer and master carpenter, both of North Carolina; Eldon Fisher, Colorado State University; Matt Pangrac, 4-H member, Illinois; and Bobby Rogers, 4-H leader and woodworking business owner, North Carolina.

Writer and editor: Denice McConnell, Pennsylvania

Design and Production: Northern Design Group, Minnesota

Technical Plans: Bobby Rogers and Michael Bower

Original Design Team: Roger Tormoehlen, Extension 4-H Youth Specialist, Purdue University, and Cherie Hofmann. An earlier version of the series was done by Ronald Hawthorne, volunteer; Art Redinger, Extension Educator, 4-H; Dick Reel, Extension Educator, 4-H; Katherine Rust, volunteer; and Thomas Thurston, volunteer, all from Indiana, Purdue University.

Warning: Some web sites which are included in these materials as a convenience for users are not managed by National 4-H Curriculum or other land-grant universities, therefore responsibility for contents cannot be taken by National 4-H Curriculum or the universities. Given the dynamic nature of the Web, some sites may no longer exist or may have had content changes.

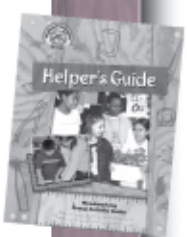
For more on woodworking, look for these other guides in this set

Measuring Up

Making the Cut

Finishing Up

Helper's Guide



Woodworking Wonders

Level 3

Nailing It Together

Table of Contents

Welcome to Nailing it Together!

More than likely, you've finished the first two books of the *Woodworking Wonders* series, *Measuring Up* and *Making the Cut.* You're probably in the 6th, 7th or 8th grade and you're ready for advanced information about woods, tools and careers. *Nailing It Together* is your next challenge.

You will learn more about woodworking careers, veneers, hinges, joints and using tools. The projects you make will take you further into the woodworking field. Plans for special projects are in the appendix.

So, fill out *My Plans* and your *Achievement Program* on the next two pages and get ready for more adventures in woodworking.

How This Book Works

Woodworking is a valuable skill. You can make a career of it or you can apply woodworking knowledge to hobbies and household repairs. To get the most out of this book, it would be a good idea for you to know how it is organized.

Each chapter features a short lesson on woodworking skills. Then the fun starts! After reading about a skill, you get to practice it through the activities. With each lesson or activity you'll see:

About Woodworking: *this will be a skill you learn from the activity*

About Yourself: *this will be how you might apply the skill to your life*

Activities
Activities are usually a lot of fun because they let you learn by doing things yourself. You're required to do seven activities each year to complete the Achievement Record.

Clovers Mean Safety
You'll find tips about safety when you see clovers. Being safe will keep you and others from being hurt. Safety skills are just as important as learning how to use tools.

Toolbox
This will tell you what tools and supplies you'll need to complete the lesson activity.

Talk it Over
Questions at the end of activities will help you think through what you've learned and how it applies to your life.

More Challenges
These are ways to learn more about the woodworking skill or how you can apply what you've learned to you and your community. More Challenges are optional, but you'll want to do some of them!

Interesting Facts
Occasionally you'll see tidbits of information that will expand the lesson's information.

My Plans

First Things First. Check these off as you complete them.

- ☐ Select your woodworking project helper, if you don't already have one.
- ☐ Complete the four steps of My Plan on this page.
- ☐ Do at least four woodworking leadership experiences each year you use this book.
- ☐ Complete seven activities for each year you use this book. The activities are listed in the Achievement Plan on the next page.

Name:_____

My project helper is:_____

Phone:_____ **E-Mail:**_____

1. Project Goals

I plan to make these woodworking projects while I use this book:

_____

_____

I plan to complete the *Nailing It Together Achievement Program* by _____.
(date)

2. Leadership Experiences

Experiences	Plan to do	Date
Give a woodworking demonstration.		
Assist with a county judging activity.		
Set up a woodworking promotional display.		
Promote the woodworking project to a civic group.		
Help conduct a woodworking workshop or project meeting.		
Recruit a friend to be part of the woodworking group.		
Help someone complete a woodworking project.		
Organize a community service project involving woodworking.		
Other activities:		

3. Project Highlights

Record and date the most fun things you learn. Include what you make, repair, paint or refinish.

4. Project Review

When you've completed what you planned, arrange a project review with your parent or woodworking helper. You'll need to have this page complete as well as the Achievement Program and the Talk It Over sections of this book.

Nailing It Together
Achievement Program

☐ Do at least seven of the required activities each year you use this book, or 21 within three years.

☐ Select and do any of the More Challenges in *Nailing It Together* or make up your own activities. Record the page and number of each one you complete. If you choose some of your own, write them down.

☐ Have your woodworking helper initial the activities as you complete them.

Required Activities

Activities	Date Completed	Helper's Initials
Chapter 1 – Careers in Woodworking		
Looking at Resources		
Woodworking Careers		
Chapter 2 – Making Connections		
Getting to Know Fasteners		
Which Clamp Would You Use?		
A Drum Roll for Dowels		
Compare Strengths		
A Dado Joining		
Chapter 3 – Finishing Flourish		
Which Stain is Best?		
Chapter 4 – Making a Mark		
Drawing Angles		
Measuring Angles		
Enlarging Patterns		
Using a Plane		
Smoothing Planes		
Chapter 5 – Is it Wood?		
Build a Laminated Cutting Board		
The Difference in Plywood		

More Challenges
Optional Activities

Activity	Page #	Date Completed	Helper's Initials

Write your own activity here.

Date_____Helper's Initials_____

Write your own activity here.

Date_____Helper's Initials_____

Write your own activity here.

Date_____Helper's Initials_____

After you finish the Achievement Program, your helper will fill out the certificate in this book. Framing your certificate will be an accomplishment! You have lots of fun ahead of you. Let's get started on *Woodworking Wonders.*

Woodworking Wonders

Level 3

Nailing It Together

Achievement Program Certificate

I certify that

_____

has successfully completed the requirements of the Nailing It Together Achievement Program.

Helper _____

Date _____

Picture of my woodworking project and me

Careers in Woodworking

This chapter will open the doors to careers in woodworking. You'll find that many fields of study can be applied to woodworking from engineering to carpentry. So if you're interested in wood in any form, you may find a career for you in this chapter.

What's the Latest?

You've learned quite a few skills since beginning the Woodworking Wonders series. All the skills are useful to you now and as you mature. You may decide that woodworking will be a life-long hobby for you, or that it will just come in handy. However, you may like it so much that you're considering a career in woodworking. In this chapter you'll discover some places to learn more about woodworking and probably pick up some skills and tips along the way. Learning how to learn new ideas is a valuable skill to you and to future employers.

What's new? What are the latest woodworking tools? What are the latest techniques and projects? One way to keep up to date is to read one of the monthly woodworking magazines or a recent woodworking book. Finding resources that help make working with wood more fun and interesting is a good way to practice the skill of finding information.

About Woodworking: Woodworking careers

About Yourself: Learning to learn

Looking at Resources

Pencil, this book, resources

For this activity, you'll research and compile a list of references to use now and in the future. You'll need to buy a woodworking magazine, borrow an up-to-date book from the library or from a friend. Another good resource is the World Wide Web. Record the information and ideas you discover. You'll need a separate copy of the chart below for each of your references. When you finish, share what you discover with other people interested in woodworking. Keep your lists for future use.

Resources and Research

Name of magazine, book or web site:

Date published:

New tools you discover:

Woodworking project ideas:

Tricks of the trade you learn:

Other resources you discover:

Other interesting information:

Careers You Can Choose

The wood and forest industry offers a wide variety of career opportunities. More than two million people are employed in forestry, lumbering, millwork, furniture manufacturing, wood construction and distribution of forest products. Opportunities are unlimited if you are entering one of the skilled or semi-skilled woodworking craft trades. Learning the techniques needed for the skilled woodworking trades usually requires beginning at the bottom and working your way up. You begin work as a helper or an apprentice to a master craftsman. Here are some career options you can consider.

Cabinetmaker: These are skilled wood craftsmen who have specialized in the art of cabinetry. They construct and repair articles such as store fixtures, office equipment, cabinets and furniture. He or she must be able to work from drawings or blueprints; must be able to choose and match materials for color, texture and size; and must be able to operate various woodworking machines to cut and shape parts.

Skilled Carpenter: This is a building trade worker who must be able to do all jobs related to wood-building construction. He or she might install heavy timbers, and do maintenance work. Skilled carpenters are needed in shipbuilding or mining. Skills include being able to read and interpret plans, lay out foundations, construct framework and do finish trim work.

Pattern Maker: Must be able to interpret pattern drawings. He or she should be able to design patterns and should understand shrinkage and warping.

Millman: May repair furniture, set up and adjust equipment, or work as a maintenance cabinetmaker.

Millwright: Must be able to repair, condition and sharpen saws and knives used on equipment for cutting lumber. He or she must be able to understand the concepts of angle, pitch and set as they relate to cutting. Also, this career requires that you must be able to measure and cut accurately.

Model Maker: Must have exacting skills and knowledge of the woodworking trades.

Lumberjack: Must be physically fit and know how to top tall trees.

Pulpwood and Paper Industry: Highly technical fields for process engineers, product development engineers, process control chemist, technical service engineer, quality control supervisor or a product supervisor. Usually requires a college degree in engineering, science or math.

Heavy Equipment Operator: Must be able to work heavy machinery in the forest or at plant and building sites.

Scaler: Measure logs to determine the board-foot volume that can be obtained.

Machine Operator: Operates the controls of the machinery in a sawmill or factory.

Grader: Must have knowledge of lumber in various tree species and must be able to make quick decisions to mark the grade, thickness and width of the material.

Upholsterer: Applies fabric to finished furniture.

Wood Finisher: Applies the finish to a sanded surface.

Forestry Science Technician: Carries out practical work and helps with research in forest management, conservation, wood processing and the uses of wood. There are many specialized areas such as soil science, wood protection, tissue culture and forest health.

Forester: Can work with various groups to manage forests for continued production of trees and wildlife. This person makes decisions that help keep nature in balance and protects resources. Usually requires a college degree.

Architect: Uses wood products among others to design buildings and private homes. Requires a college degree.

Exhibit Designer: Constructs and designs exhibits for trade shows, museums or for large corporations, etc.

Movie Set Designer or Decorator: Constructs sets for movies and television.

Vocational Education Teacher: Teaches woodworking skills in a vocational setting.

Woodworking Careers

Select a career involving wood and woodworking and research it. You can use the list in this activity, or you may think of a career not on the list that interests you more. If possible, interview someone in the career you choose. In the space below, describe what you learned about the career from your research and your interview. You may want to list potential income, educational requirements or other experience needed to do the job.

Talk it Over

Share it

Which resource did you find most helpful to learn about woodworking projects that interest you?

What interests you in woodworking careers?

Process it

In learning about your career choice, was research or the interview most helpful and why?

Why are you interested in the career you selected?

Generalize it

What do you want from a career?

How does the possible career you are considering match the skills you have right now?

What more do you need to learn to work in your career choice?

Apply it

How will you obtain the skills necessary to be successful in the career you are considering?

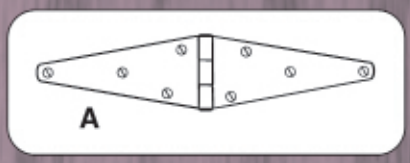
More Challenges

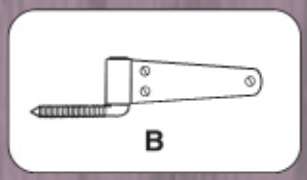
1. Contact your newspaper to see if they publish stories by youth. If they do, write an article for the newspaper on the skills you are learning and the projects you are making as you go through the Woodworking Wonders series. If your newspaper doesn't use youth-written stories, see if you can publish your story in your church bulletin or school newspaper.
2. Write and give a presentation to your class or to your youth group about woodworking careers.
3. Check out web sites related to woodworking careers. Make a list of useful resources for your helper or your woodworking friends. You can expand your list to include cool woodworking sites in general.

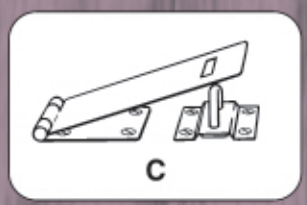
Chapter 2

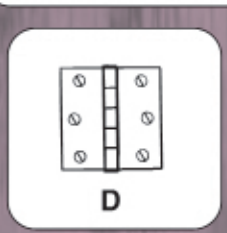
Making Connections

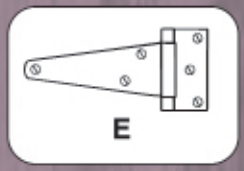
Wood joinery can be an art in itself. In this chapter you'll learn about hinges, expand your knowledge about clamps and learn how to make a dowel joint. Dowel joints will allow you to make more advanced projects. Read on!











Hanging Around

You've learned how to connect two or more pieces of lumber using glue, nails and screws. What if you wanted to fasten a door to the front of a cabinet? Would using only glue, nails or screws work? Most likely you'd decide to use some type of special fastener such as a hinge.

A hinge is a piece of hardware that pivots and allows a door or some other object to swing back and forth or up and down. Hinges are classified according to their type and size. Common types of hinges include: butt hinges, strap hinges, T-hinges, screw hook and strap hinges and hasps. Here's an explanation of them:

Butt Hinge: Butt hinges are used to mount doors in a butted position. This means the door and the strip is mounted to form a smooth, or flush, surface.

Strap Hinge: Strap hinges are longer than they are high. Strap hinges are used when the hinge must reach across a long surface such as heavy doors.

T-Hinge: T-hinges are a combination of the butt hinge and the strap hinge. One half looks like a butt hinge and the other half looks like a strap hinge. They are useful when the mounting strip is thin but strong and the door is flimsy (weak) and needs extra support.

Screw Hook and Strap Hinge (Gate Hinge): Two special screw hooks are screwed into a post or doorjamb. The two straps are then mounted in the proper position on the door. The door is then set or mounted on the screw hooks.

Hasps: Hasps are not really hinges but they are made like a hinge and therefore sometimes classified with hinges. They are used to hold doors closed. One part is attached to the door. The hinged part fits over a metal loop attached to the second surface. A pad lock or other device is placed in the loop to hold the door closed.

About Woodworking: Hinges, hasps and flush plates

About Yourself: How to compare alternatives

Getting to Know Fasteners

Pencil, this book, reference materials or a visit to a hardware store

For each type of fastener listed, plus any other you may find, record the intended use, how much it costs and where you found it. You may be able to find examples of many of the fasteners in your home. Write the correct letter in front of the corresponding hinge.

Name	Purpose	Cost	Where Found?
_____ Butt Hinge			
_____ Strap Hinge			
_____ T-Hinge			
_____ Gate Hinge			
_____ Hasp			
_____ Other			

Talk it Over

Share it

What is the most common type of hinge in your home? Where did you find hinges?

How are hinges used?

Process it

How are hinges attached?

What are hinges made of?

How do you decide which type of hinge to use?

Generalize it

What process do you use when analyzing alternatives?

How do you decide which alternative is best?

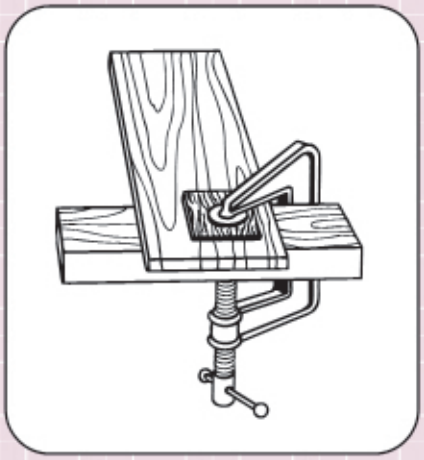
Apply it

What area of your life provides the most alternatives? Why?

More Challenges

1. **Give a presentation about the types of fasteners available and where they might be used. What's the most commonly used hinge? Why?**

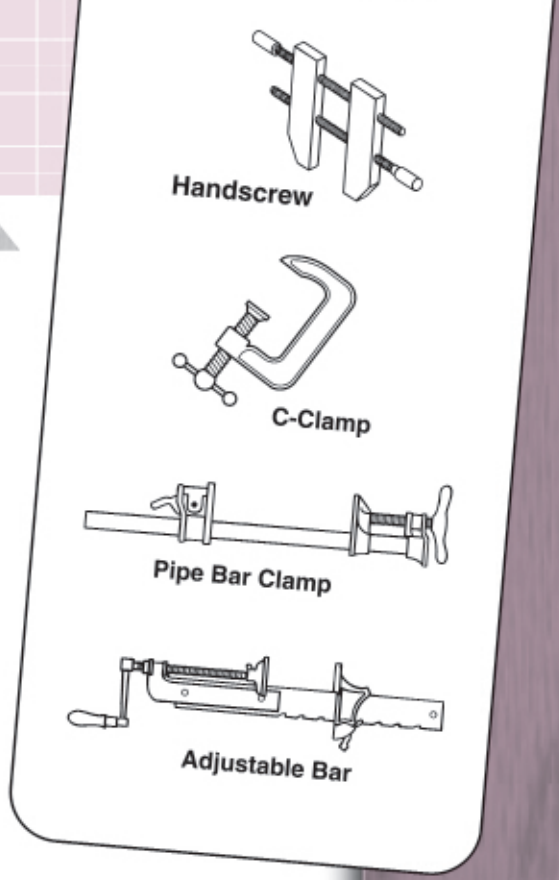
Clamping Techniques



Clamping is important to make projects stay together. Before starting a project, read over the following clamping techniques:

- Get everything ready before you glue anything. This includes the proper clamps adjusted to the correct opening, scrap lumber or stock to prevent damaging wood surfaces, glue and someone to help you.
- Assemble the project dry, that is, without glue or fasteners, as a trial assembly to make certain the joints fit. This will let you adjust your clamps to the proper opening. If you have problems, rework the **joint** or get more clamps.
- Take the project apart, laying the pieces out so they can be easily assembled again. Some glues dry faster than others, so check the amount of time you need to let a project dry by reading the label on the bottle. You must get the project glued and clamped within the drying time. Most glues are only applied to one side.
- Put glue on each joint. Place the joints together. Apply light pressure all the way around until the entire project is assembled. Check for squareness. If not square, release some clamps and reset. Then, tighten all clamps to be firm, but not tight.
- Some woodworkers wipe away excess glue with a wet rag. You must be careful not to get any glue in the wood grain. Another method to deal with excess glue is to allow the glue to dry, then scrape the excess off. This last method produces a stronger joint and there is less chance of rubbing the glue into the grain of the wood.

Here are some types of clamps:



Which Clamp Would You Use?

Following are some situations where a clamp should be used. Write down which clamp you would use and why you selected that clamp. The helper's guide will have the answers and the reasons.

1. You have just placed face **veneer** along the edge of a round table top. Which clamp would you use?

   _____

2. You are about to plane one end edge of some stock. Which clamp do you use to hold the stock on the table?

   _____

3. You just glued together a butt jointed picture frame. Which clamp will you use?

   _____

4. You made a lap jointed picture frame. Which clamp will you use? How many clamps do you need?

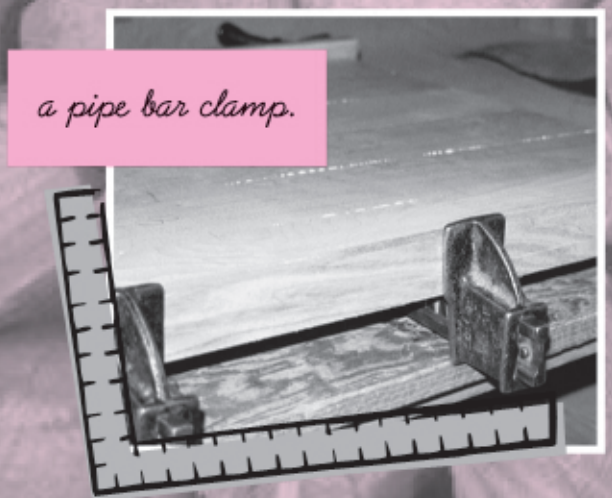
   _____

5. You have just glued together a small mirror frame that is larger at the bottom than at the top. Which clamp do you use?

   _____

Working with a c-clamp.

a handscrew clamp.



a pipe bar clamp.

Talk it Over

Share it

In your experience, why are clamps important to construction techniques?

When and what types of clamps have you used?

What type of clamp do you use most? Why?

Process it

Which clamps will require more practice before you can use them to complete a large woodworking project? Why?

Why are there different types of clamps?

Generalize it

What woodworking problems are now opportunities since you've learned how to use clamps?

Clamps are used to hold things together or provide support. What do you do to provide support for your friends?

Apply it

Where can you use the new skills you've learned about clamps?

What are situations in your life that you can apply principles similar to those used for clamps?

When is it necessary to gain the support of others? Why?

More Challenges

1. **Demonstrate how clamps work and explain when each is used to your class or woodworking group. You may need to borrow clamps for the demonstration.**
2. **Research the history of basic construction techniques, including clamping, and present what you find to your helper or other woodworking enthusiasts. Check out http://encarta.msn.com. Look under woodworking.**