Tape Measure

The Tape Measure is the first tool the students will learn. This is a critical competence that impacts their success in the entire program.

1. Begin with the Green Carpentry Math Book, Worksheet M3-1, Pages 11-12
   - Introduces the student on how to read a tape measure
   - One exercise in inches
   - One exercise in feet and inches
2. Apply knowledge in a hands-on measuring exercise.
   • Students physically measure various items in the classroom and shop.

   **Tape Measure Exercise**

   Measure the items listed below. Give the width, length, and height.

<table>
<thead>
<tr>
<th>Item to Measure</th>
<th>Width</th>
<th>Length / Depth</th>
<th>Height / Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher's Desk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom Table Top</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birdhouse</td>
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<td></td>
<td></td>
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<tr>
<td>Bookcase</td>
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<td></td>
<td></td>
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<tr>
<td>TV</td>
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</tr>
</tbody>
</table>

3. Upon completion of this exercise,
   the instructor should demonstrate how to measure difficult items.
   • Height of a door opening. Put tape end on floor and measure up
     (Most new to the tape measure try to hook the tape on top
     of the door and read dimension at the floor)
   • Curved items, just measure in a straight plane across item.
   • Long items, such as a chalk board, get a helper to hold one end.

4. Continue weekly tape measure exercises to keep students in practice.
   • See Tape Measure Exercises 2 through 6.
   • Note that half of Tape Measure Exercise 3 is a hands-on exercise
     o Students actually measure pieces of wood and record the
       thickness, width and length of the sample pieces.

5. Measuring will continue throughout shop exercises and projects.
6. Help students learn the tape measure and math together
   - See enclosed worksheet

   - On the chalkboard, list several fractions to add up for a total sum
     - Mark each fraction in a continuous line on the tape measure
     - Check answer by adding fractions mathematically
       - For example, \( \frac{1}{4}'' + \frac{1}{2}'' + 1 \frac{3}{8}'' = \) 

   - Exercise/Game reinforces tape measure and math skills
Tape Measure Exercise

Measure the items listed below. Give the width, length, and height.

<table>
<thead>
<tr>
<th>Item to Measure</th>
<th>Width</th>
<th>Length / Depth</th>
<th>Height / Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher's Desk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom Table Top</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Birdhouse</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bookcase</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Dry Erase Board on Wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCR/DVD Player</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom Door</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sawhorse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Ring Binder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piece of 2 X 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piece of OSB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House in Shop window opening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light on Classroom Door</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom Door Opening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bubbler</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work Benches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-Opening File Cabinet</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Read the indicated measures on the ruler below. It measures lengths up to 6" to the nearest 16th inch. Hints: All measures are reduced to lowest terms.

A. ______  B. ______  C. ______  D. ______
E. ______  F. ______  G. ______  H. ______
I. ______  J. ______  K. ______  L. ______

Refer to the ruler below. Read these measures in feet and inches to the nearest 16th of an inch.

N. ________  O. ________  P. ________
Q. ________  R. ________  S. ________
T. ________  U. ________  V. ________
W. ________  X. ________  Y. ________
Read the indicated measures on the ruler below. It measures lengths up to 6" to the nearest 16th inch. Hints: All measures are reduced to lowest terms.

A. ____  B. ____  C. ____  D. ____
E. ____  F. ____  G. ____  H. ____
I. ____  J. ____  K. ____  L. ____
M. ____  N. ____  O. ____  P. ____
Q. ____  R. ____

Measure actual size of wood samples. Read your tape measure and state answer in feet and inches to the nearest 16th of an inch, if over 12".

Measure this sheet of paper for S. ____

S = x x

T = x x
U = x x
V = x x
W = x x
X = x x
Y = x x
Problem Exercises #4

Read the indicated measures on the ruler below. It measures lengths up to 6" to the nearest 16th inch. HINT: All measures are reduced to lowest terms.

A. _____   B. _____   C. _____   D. _____
E. _____   F. _____   G. _____   H. _____
I. _____   J. _____   K. _____   L. _____
M. _____

Refer to the ruler below. Read these measures in feet and inches to the nearest 16th of an inch.

N. ________   O. ________   P. ________
Q. ________   R. ________   S. ________
T. ________   U. ________   V. ________
W. ________   X. ________   Y. ________
Read the indicated measures on the ruler below. It measures lengths up to 6" to the nearest 16th inch. Hints: All measures are reduced to lowest terms.

A. _____  B. _____  C. _____  D. _____
E. _____  F. _____  G. _____  H. _____
I. _____  J. _____  K. _____  L. _____
M. _____

Refer to the ruler below. Read these measures in feet and inches to the nearest 16th of an inch.

N. _____  O. _____  P. _____
Q. _____  R. _____  S. _____
T. _____  U. _____  V. _____
W. _____  X. _____  Y. _____
Problem Exercises

Read the indicated measures on the ruler below. It measures lengths up to $6''$ to the nearest 16th inch. All measures are reduced to lowest terms.

A. __________  B. __________  C. __________  D. __________
E. __________  F. __________  G. __________  H. __________
I. __________  J. __________  K. __________  L. __________
M. __________

Refer to the ruler below. Read these measures in feet and inches to the nearest 16th of an inch.

N. __________  O. __________  P. __________
Q. __________  R. __________  S. __________
T. __________  U. __________  V. __________
W. __________  X. __________  Y. __________
Chapter 4  Hand Tools - Shop Instruction

Cover chapter 4 in the textbook, 
Carpentry & Building Construction, Pages 106-125

“Discuss the Photo”
Encourage students to actively look at job site

Students use critical thinking to identify conditions

Content Vocabulary
List of important terms for chapter
Students learn unfamiliar words
Students see spelling of new words
Students discover what is important

Identify hand tools.
Focus on hand tools used for the sawhorse project

Describe and demonstrate what and how they are used

Builder’s Tip Boxes
Important tool or procedure tips

Job Safety Boxes
Tips for safety

Tools
Pass actual tool around in classroom
Safety Guidebook
Cover Pages 71-76
5-1 Hand Tools - General shop safety
  Check for damaged tools
  Proper use of hand tools
5-2 Sawing Tools - General safe saw handling
5-3 Edge-Cutting and Shaping Tools
5-4 Assembly, Fastening, and Disassembly Tools

Instructor Resource Guide, Pages 107-108
  Ideas to focus on
  Match Safety Guidebook pages to chapters in text
  Answers to textbook questions

Insight: Hand Tool chapter
Concentrate on the hand tools used to make the sawhorse
  Tape Measure
  Combination Square
  Framing Square - to draw a line at a 90-degree angle
  Framing Square - to draw a line at an angle
  T-bevel
  Handsaw
  Chisel
  Hammer

Demonstrate use of tools and proper name of each tool
Allow students to practice on scrap 2x4s before beginning sawhorse
(Saves money and material)
PaCT Project Goals

- Apply Skills
- Read Blueprints
- Learn Tools
- Build Confidence
Sawhorse Project

1. Introduce blueprint
   - Analyze dimensions on print
   - Examine different views of sawhorse
2. Explain detailed worksheet to build sawhorse
   - How to read and accomplish each step
   - Demonstrate each step to show how to use each tool properly
   - Include written instructions worksheet
     - Helps guide those students who are new to reading a blueprint
3. Discuss Sawhorse Evaluation Sheet at the end of this section
   - Talk about achievements and competencies gained by building a sawhorse
   - Clarify the criteria used to evaluate student success
4. Discuss Wood as a Building Material, Chapter 12, Pages 316-333
   - Processing Lumber
- Moisture Content
- Seasoning/Drying wood
- Nominal and actual dimensions
  - Reference Size Table, page 1030
- Lumber Grades
  - Grade Stamp
- Lumber Defects
  - Warp
    - Bow, Crown, and Cup
  - Strength or Appearance
    - Knots, Wane, Split, and Check
- Protecting Wood, Chapter 12.2
  - Decay
  - Insects
  - Preservative Treatments
5. Incorporate math skills
   - Create a Materials List with prices. Reference cut list at end of section
   - Multiply quantities on Materials List to match number of students
   - List all tools needed for project
     - Reviews tool names
   - Add up prices for a total sum of the project costs
   - Students learn a little about how to run a business
6. Discuss Hand Tools, Chapter 4, Pages 106-125
   - Learn hand tools
     - Identify tools used for sawhorse project
     - Define hammer types (finish vs. framing)
   - Describe what they are used for
   - Demonstrate how they are used
   - Identify hand tool safety
7. Discuss 5-3 Edge-Cutting and Shaping Tools (chisel) and 5-4 Assembly, Fastening, and Disassembly Tools in the yellow Safety Guidebook
8. Discuss Nails & Connectors, Chapter 14.2, Pages 384-386
   • Identify nail features
     o Nail length
     o Head style
     o Shank style
     o Coatings
   • Review nailing detail for framing, page 386
     o Demonstrate why students need to know information

9. Hands-on exercise
   a. Display nail boxes (see attached nail box labels handout)
   b. Give each student one nail of each type and size to examine
   c. Use wood scraps for students to set nail in as a display
   d. Label each nail
10. Teach students how to make angles with a framing square

11. Teach students to use a handsaw
12. Teach students how to use a chisel!

Daily Feedback Form

Today I learned about using the chisel and getting the angles right. And I really liked learning how to use the chisel.

I need more help with getting the angles straight and smoothing out the area.

13. Discuss Engineered Wood, Chapter 13, Pages 336-35

- Present idea of conserving wood resources
- Explore concept of making stronger and more stable building materials
- Plywood Grade Stamps
  - Wood species
  - Durability
  - Performance rating
• Hands-on class exercise
  o Identify various engineered wood products
  o Plywood, OSB, Particleboard, Fiberboard, MDF

14. Teach students to use a hammer

Daily Feedback Form

Today I learned about how to chisel my 2x4 and to measure my legs for my saw.

I really liked that we had fun today sawing the sawhorse.
Other Competencies Learned:

TEAMWORK

Confidence in themselves and their abilities!
Grant Sawhorse Project - Material

For a pair of horses:

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x6x8-foot Pine #2 Quality Bd</td>
<td>3</td>
<td>$10.41</td>
</tr>
<tr>
<td>2x4x7-foot SPF Construction</td>
<td>1</td>
<td>1.69</td>
</tr>
<tr>
<td>6d Galvanized Nails (190 per box)</td>
<td>50</td>
<td>1.78</td>
</tr>
<tr>
<td>10” x 12” 1/2” CDX Plywood</td>
<td>4</td>
<td>6.59</td>
</tr>
<tr>
<td>Exterior Glue</td>
<td></td>
<td>1.00</td>
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</tbody>
</table>

For 20 Horses:

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x6x8-foot Pine</td>
<td>30</td>
<td>$104.10</td>
</tr>
<tr>
<td>2x4x7-foot</td>
<td>10</td>
<td>16.90</td>
</tr>
<tr>
<td>6d Galvanized Nails</td>
<td>500</td>
<td>7.12</td>
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<tr>
<td>10” x 12” 1/2” CDX Plywood 2-4X8 sheets</td>
<td>40</td>
<td>20.00</td>
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<tr>
<td>Exterior Glue</td>
<td></td>
<td>18.00</td>
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</table>

**Total:** $166.12

Tools Needed:

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape Measure Fat Max 25-foot 237-5157</td>
<td>20</td>
<td>$19.96</td>
</tr>
<tr>
<td>Or Stanley Power Lock 25’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Framing Square w rafter table</td>
<td>20</td>
<td>5.88</td>
</tr>
<tr>
<td>Empire Aluminum 16x24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handsaw Irwin 20” 8T 244-1315</td>
<td>10</td>
<td>10.00</td>
</tr>
<tr>
<td>Sliding T-Bevel Empire 9” plastic</td>
<td>10</td>
<td>3.68</td>
</tr>
<tr>
<td>Combination Square Empire 12”HD</td>
<td>10</td>
<td>7.88</td>
</tr>
<tr>
<td>Finish Hammer 16oz Fat Max Antivibe</td>
<td>10</td>
<td>13.49</td>
</tr>
<tr>
<td>Chisel Set Irwin 4 Marples ¼,½,¾,1”</td>
<td>3</td>
<td>27.98</td>
</tr>
<tr>
<td>Dead Blow Hammer 2LB</td>
<td>10</td>
<td>7.98</td>
</tr>
<tr>
<td>Nipper Master Force 7”</td>
<td>2</td>
<td>10.96</td>
</tr>
<tr>
<td>Quick Grip Clamps Irwin 12”</td>
<td>10</td>
<td>19.87</td>
</tr>
<tr>
<td>Safety Glasses (goggles)</td>
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<tr>
<td>Brooms 24” multi-surface 648-9779</td>
<td>5</td>
<td>12.99</td>
</tr>
<tr>
<td>Dust Pan HD Libman 648-9824</td>
<td>2</td>
<td>10.97</td>
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</tr>
</tbody>
</table>
Steps for Sawhorse Project

1. Determine angle of top and bottom leg cuts. Hold framing square flush to bottom edge on the 24” mark on the blade and at 4” on the tongue. Draw a line along the tongue.

2. Set sliding T-bevel to angle of cut line drawn with framing square.

3. Measure and mark 24 ¾-inches between the top and bottom angle cut lines on all four legs. Layout and cut each one separately for additional practice using the layout tools.

4. To mark edge angle line, align 5 ¾-inch mark on the square tongue and 24” mark on the square blade with bottom edge of the 1x6 leg material. Draw line along tongue down from angle cut line.

5. Mark leg edge angles on all four legs and cut the legs.

6. Cut 2x4 top piece to length (3-feet 6-inches). Double check dimension mark, measure from each end; mark should be in the center of the 7-foot 2x4. Check for warpage. Put crown up. Label it “TOP.” Measure 6-inches from each end and square line across width of piece.

7. Use a framing square to mark leg angle cut lines on both edges of top piece. Draw lines down from two squared lines. Flip Framing Square over to mark the other end. Mark all four legs.

8. Align 1x6 leg with leg cut line on the edge of 2x4. Draw line on opposite side of leg to mark its width.

9. Use a combination square to measure in 3 / 8-inch and draw lines in four places on top surface of top piece.

11. Use glue and nail four legs to top piece use three 6d nails in each leg.

12. Push 10 x 12 plywood end piece against bottom surface of top piece. Trace outside edges of legs. Cut with hand saw.

13. Set sliding T-bevel to an angle that is obtained by combining the 5 ¼-inch and 24” marks on a framing square and draw angled cut lines. Check lines against sawhorse legs before you actually cut plywood.

14. Place sawhorse on flat surface. If it does not wobble, drive home the nails.
<table>
<thead>
<tr>
<th>Tools and Safety</th>
<th>Rating (1-2-3)</th>
<th>Date Accomplished</th>
<th>Instructor Check-off</th>
<th>Student Check-off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape Measure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Framing Square</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Hammer</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hand Saw</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Combination Square</td>
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<td></td>
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<tr>
<td>Sliding T-Bevel</td>
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<tr>
<td>Chisel</td>
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<tr>
<td>Nipper</td>
<td></td>
<td></td>
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<tr>
<td>Lumber and Fasteners</td>
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<tr>
<td>Engineered Wood Products - Plywood</td>
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<tr>
<td>Identify Various Nails</td>
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<tr>
<td>Distinguish 1X and 2X Lumber</td>
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<tr>
<td>Identify actual size vs. nominal size lumber</td>
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</tr>
<tr>
<td>Read a Tape Measure</td>
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<tr>
<td>Identify defects in Lumber</td>
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<tr>
<td>Carpentry Concepts</td>
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<tr>
<td>Layout parts on Lumber material</td>
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<td></td>
</tr>
<tr>
<td>Notching wood to make a joint</td>
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<tr>
<td>Drawing straight lines with a Framing Square</td>
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<tr>
<td>Nail lumber together</td>
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<td></td>
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<tr>
<td>Drawing angle lines with Framing Square</td>
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</tbody>
</table>

1= Mastered skill to teach others  2= Solid skill level  3= Demonstrated basic skill level