

Production Technology

The Step Stool Project—A

Name _____

Page			Safety	Design & Planning
2-3	Safety quiz: Router	<input type="checkbox"/> Ready to mark	____ redo	____ passed
4	Simple Fractions I	<input type="checkbox"/> Ready to mark		____/10
5	Mixed Fractions I	<input type="checkbox"/> Ready to mark		____/10
6	Missing Measurements I	<input type="checkbox"/> Ready to mark		____/10
7	Basic Isometric Drawing I	<input type="checkbox"/> Ready to mark		____/10
8	Fully assembled step stool			
9	Steps and support slats			
10	Left side assembly			
11	Right side assembly			
12	Materials requisition	<input type="checkbox"/> Ready to mark		____/10

back What do I do next?

Marks criteria for finished project

____/10 Measurement
 ____/10 Quality of joinery
 ____/10 Quality of finish

	Safety & clean up	Current mark
Week one	____%	____%
Week two	____%	____%
Week three	____%	____%
Week four	____%	____%
Week five	____%	____%
Week six	____%	____%

Router information



**complete
your
training**



**wear
safety
glasses**



**wear
hearing
protection**



**get
a
spotter**

Operate only with instructor's permission and after you have received instruction.

Remove any jewelry, eliminate loose clothing, and confine long hair. Make sure all guards are in place and operating correctly. Always use proper eye and hearing protection.

Check your bit frequently to ensure safe operation. Be careful the bit could be hot! Make all bit changes and adjustments with the power supply to the router disconnected. When changing a bit in a router, before beginning operations. Be sure the bit is inserted a minimum of 15mm (5/8") and the collet chuck is tight and secure. Rotate the spindle completely by hand to ensure bit is seated

Make sure the work piece is securely fastened and the travel area of the router is free of any obstructions. When routing edges using a pilot guide you route in an counter- clockwise direction.

All materials should be inspected for defects such as warps, knots and foreign objects. Make a trial cut in a similar piece of stock first. Remember this rule of thumb: harder the material the slower the speed

Make sure the switch is in the off position before plugging into the power source.

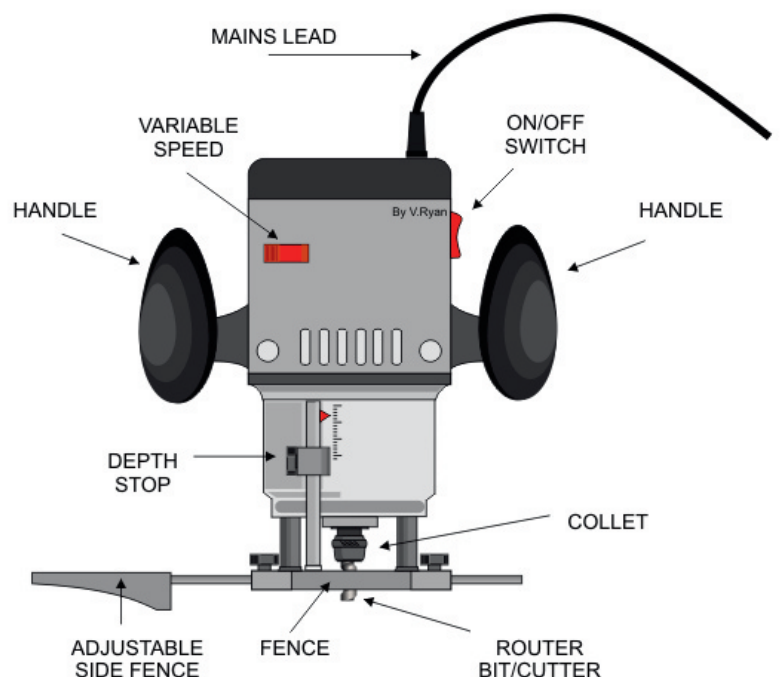
Carefully hold the router firmly with both hands and apply constant cutting pressure. Do not force or jam the cutting bit into the work piece. Guide the router slowly through the stock and let the machine do its work.

When finished, move the cutter away from the stock, turn off the router and wait for it to come to a complete stop before laying the tool down.

Unplug the router before cleanup.

Safe Operation of a Router Table:

- Move workpiece from right to left.
- Feed at steady rate without stopping.
- To avoid rough and chipped surfaces make several passes for deep cuts.
- Use push sticks to keep your fingers away from the bit.
- Never position the workpiece between the fence and the bit.



Router Safety Quiz

Name:

Check the box next to the most correct answer

- 1 When should permission be obtained from your instructor to operate the router?**
 - ☐ always
 - ☐ never
 - ☐ sometimes
 - ☐ when the stock to be routed is large
- 2 Which are included in the proper dress for operating a router?**
 - ☐ no jewelry
 - ☐ no loose clothing
 - ☐ confine long hair
 - ☐ all of the above
- 3 When must Personal Protective Equipment (PPE) must be worn to operate the router?**
 - ☐ sometimes
 - ☐ never
 - ☐ always
 - ☐ all of the above
- 4 What must you do when changing the bit or performing any other maintenance on the router?**
 - ☐ turn off the machine
 - ☐ turn off the machine and disconnect the machine from the power source
 - ☐ it doesn't matter because the bits are small anyway
 - ☐ keep the safety guard in place
- 5 What should you do after changing the bit on the router? Check all that apply.**
 - ☐ rotate the spindle completely by hand before turning on the machine
 - ☐ be sure the switch is in the off position before inserting the plug into the outlet
 - ☐ ensure that the collet chuck is tight and secure
 - ☐ remove the wrench from the collet before inserting the plug into the outlet
- 6 What is considered safe practice when cutting stock on the router?**
 - ☐ start on your piece of stock right away
 - ☐ hold onto the router firmly with both hands
 - ☐ use only one hand so you can hold the stock with the other
 - ☐ none of the above
- 7 What should you do when cutting stock on the router?**
 - ☐ turn the machine on and off several times to get rid of the offcuts
 - ☐ feed the stock into the blade to slow down the motor
 - ☐ guide the router slowly through the stock and let the machine do its work
 - ☐ place your stock on the table with the outline down towards the table so that you will not cut off the line
- 8 Which of the following are safe practises when cutting stock on the router? Check all that apply.**
 - ☐ make sure the work piece is clamped securely to the table
 - ☐ when routing edges using a pilot guide, you rout in an counter-clockwise direction
 - ☐ make sure the cutting area under the work piece is free of any obstruction
 - ☐ use an old dull bit
- 9 What rule should you use when choosing the correct speed for cutting stock on the router?**
 - ☐ the harder the material the slower the speed
 - ☐ the harder the material the faster the speed
 - ☐ the softer the material the slower the speed
 - ☐ doesn't matter because the stock will be held tightly to the table
- 10 What should you do when finished routing?**
 - ☐ lay the router down on the workbench
 - ☐ move the router away from your stock and wait it to completely stop before laying it on the workbench
 - ☐ continue to hold the cutter firmly against the work piece until it stops
 - ☐ leave the switch in the locked-on position

$$\frac{1}{2} + \frac{1}{2} =$$

$$\frac{1}{4} + \frac{1}{4} =$$

$$\frac{1}{8} + \frac{1}{8} = \frac{1}{4}$$

$$\frac{14}{16} + \frac{1}{16} = \frac{15}{16}$$

$$\frac{2}{2} + \frac{1}{2} =$$

$$\frac{2}{4} + \frac{1}{4} =$$

$$\frac{5}{8} + \frac{2}{8} =$$

$$\frac{11}{16} + \frac{3}{16} =$$

$$\frac{2}{2} - \frac{1}{2} =$$

$$\frac{2}{4} - \frac{1}{4} =$$

$$\frac{7}{8} - \frac{5}{8} =$$

$$\frac{13}{16} - \frac{9}{16} =$$

$$\frac{3}{2} - \frac{1}{2} =$$

$$\frac{3}{4} - \frac{1}{4} =$$

$$\frac{3}{8} - \frac{1}{8} =$$

$$\frac{15}{16} - \frac{7}{16} =$$

$$\frac{2}{4} + \frac{2}{4} =$$

$$\frac{1}{8} + \frac{3}{8} =$$

$$\frac{3}{16} + \frac{5}{16} =$$

$$\frac{5}{8} + \frac{3}{8} =$$

$$\frac{1}{16} + \frac{3}{16} =$$

$$\frac{7}{16} - \frac{3}{16} =$$

$$\frac{1}{2} + \frac{1}{4} =$$

$$\frac{1}{4} + \frac{1}{8} =$$

$$\frac{1}{8} + \frac{1}{16} = \frac{3}{16}$$

$$\frac{3}{16} + \frac{1}{2} = \frac{11}{16}$$

$$\frac{2}{4} + \frac{1}{2} =$$

$$\frac{2}{4} + \frac{1}{8} =$$

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$$\frac{1}{2} + \frac{3}{16} =$$

$$\frac{2}{4} - \frac{1}{2} =$$

$$\frac{2}{8} - \frac{1}{4} =$$

$$\frac{7}{8} - \frac{5}{16} =$$

$$\frac{13}{16} - \frac{1}{8} =$$

$$\frac{3}{4} - \frac{1}{2} =$$

$$\frac{3}{8} - \frac{1}{4} =$$

$$\frac{5}{8} - \frac{1}{16} =$$

$$\frac{15}{16} - \frac{1}{2} =$$

$$\frac{2}{4} + \frac{2}{8} =$$

$$\frac{1}{16} + \frac{3}{8} =$$

$$\frac{3}{16} + \frac{1}{4} =$$

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$$\frac{5}{16} - \frac{1}{8} =$$

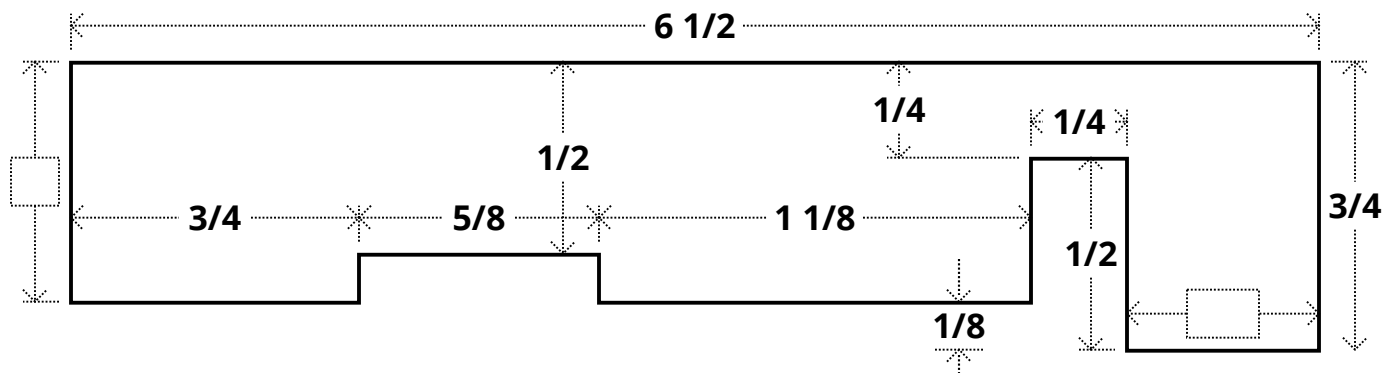
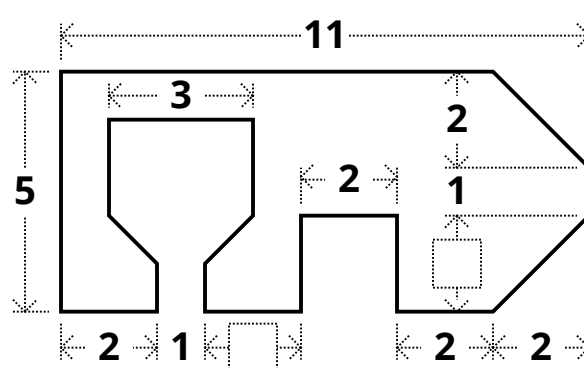
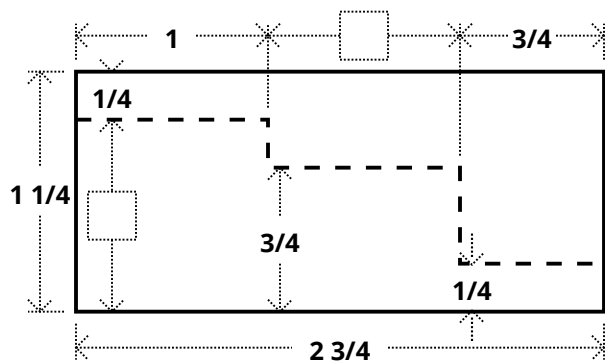
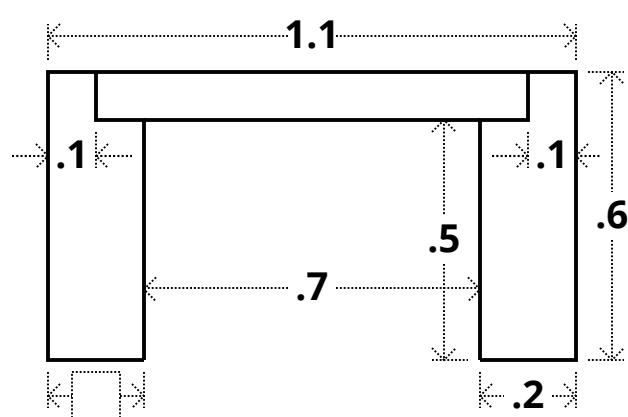
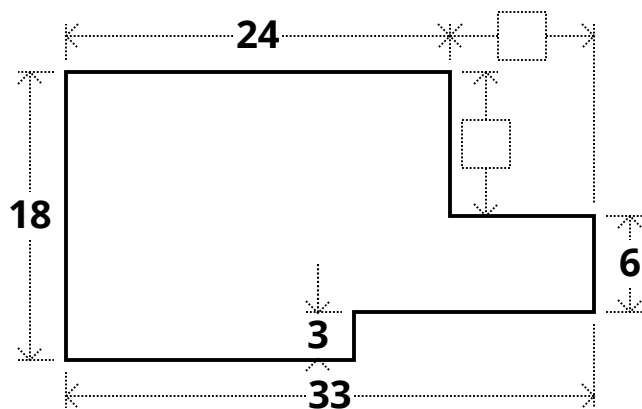
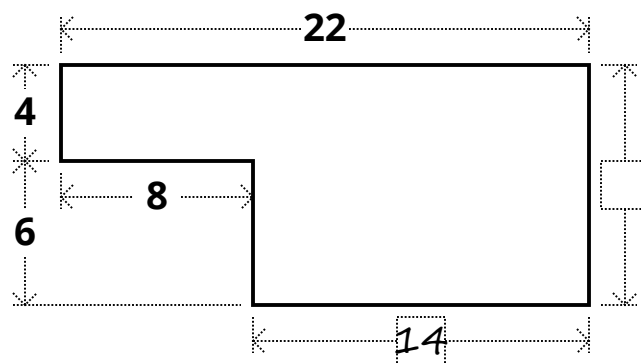
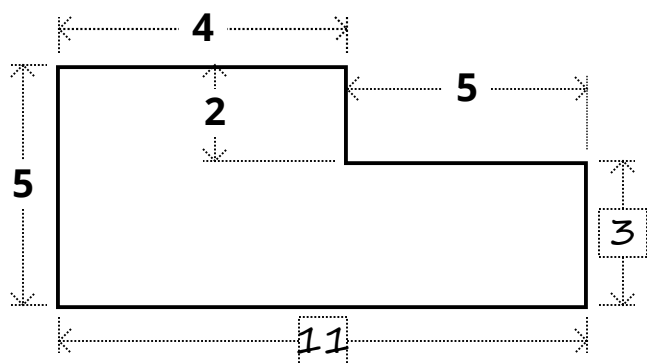
Missing Measurements I

Please add the missing measurements to the boxes.

Name: _____

Score: _____

/10



Basic Isometric Drawing I and II

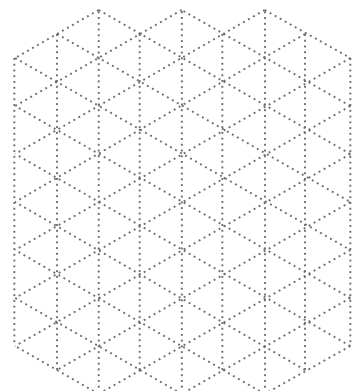
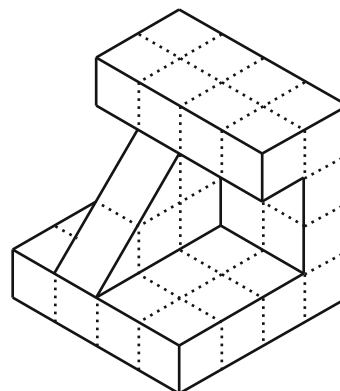
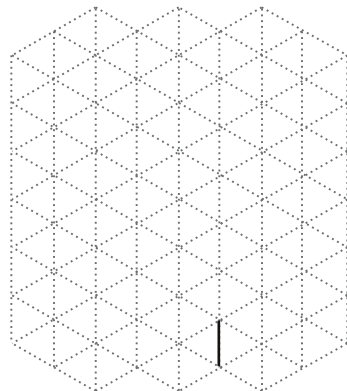
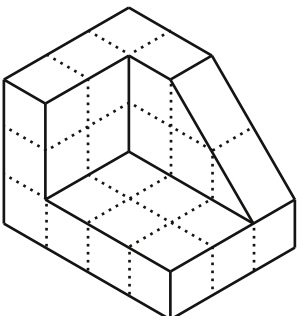
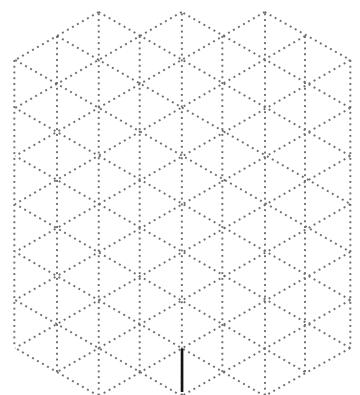
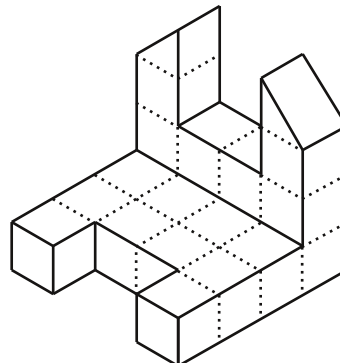
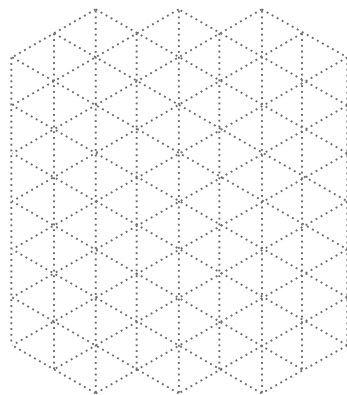
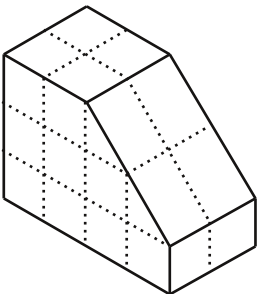
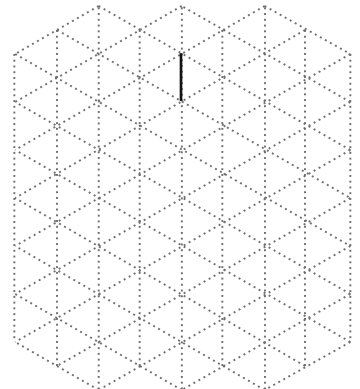
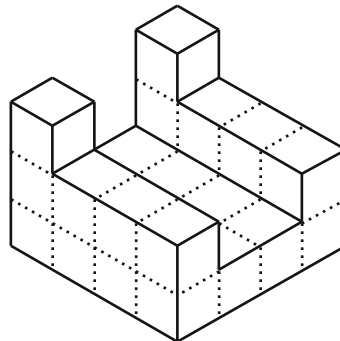
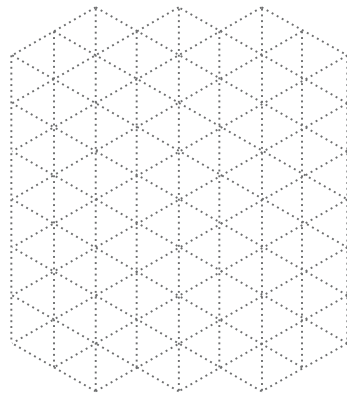
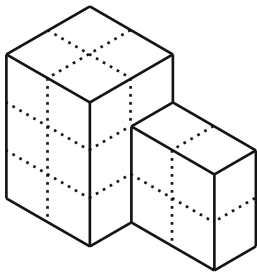
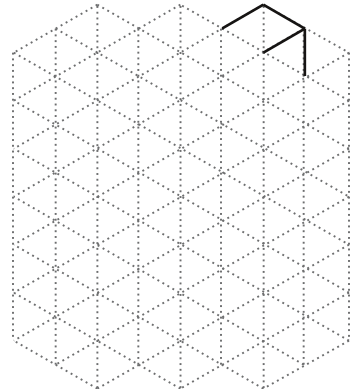
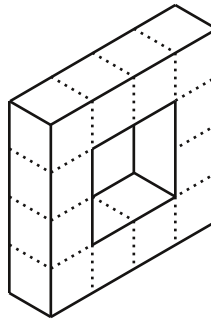
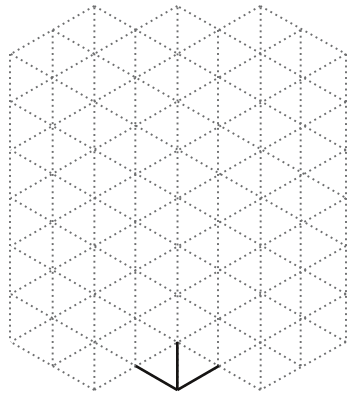
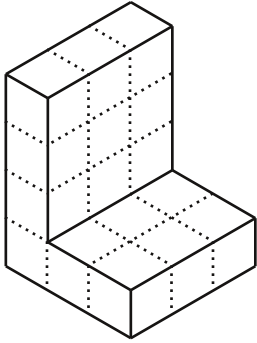
Please redraw the shapes. Use the dotted lines to assist and guide you.

Name: _____

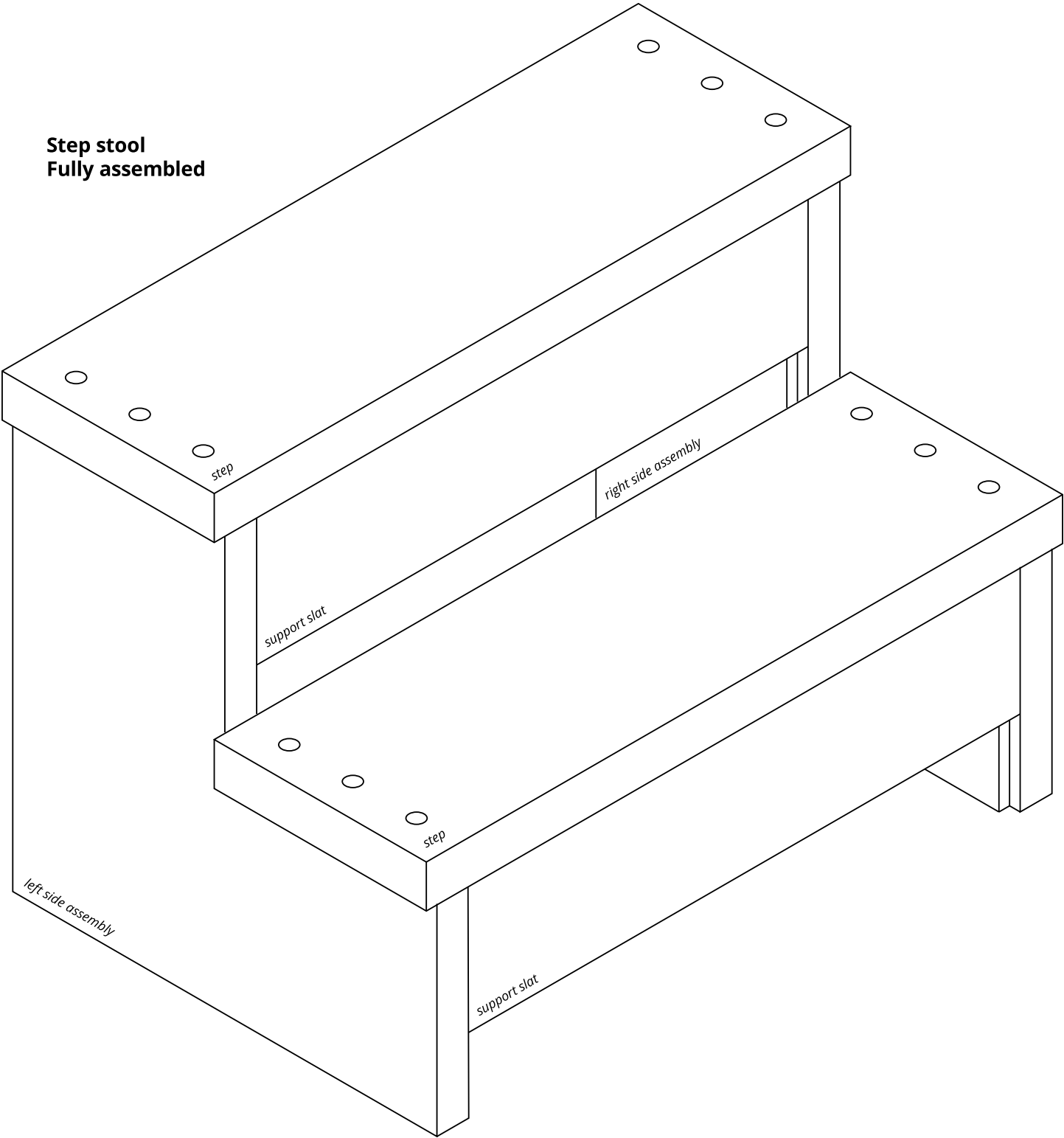
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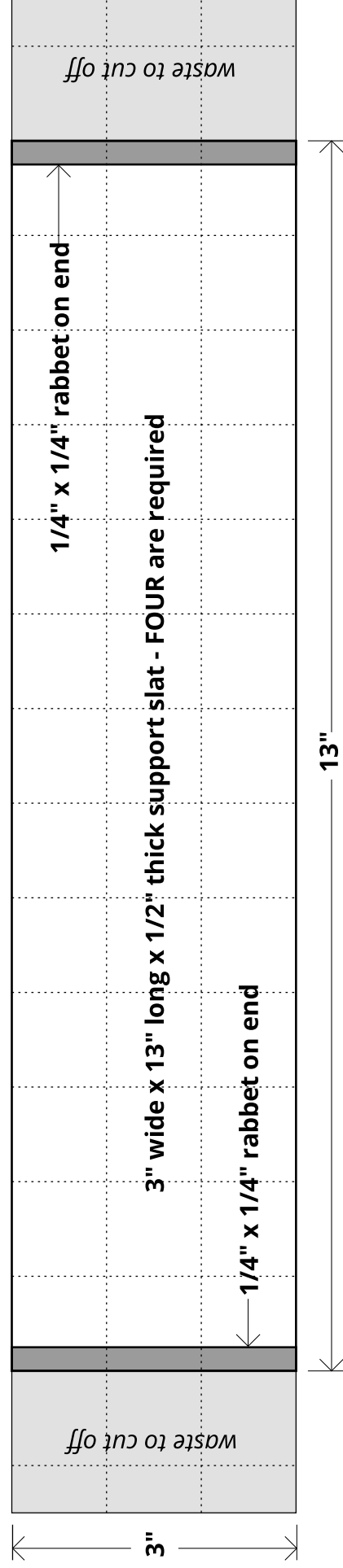
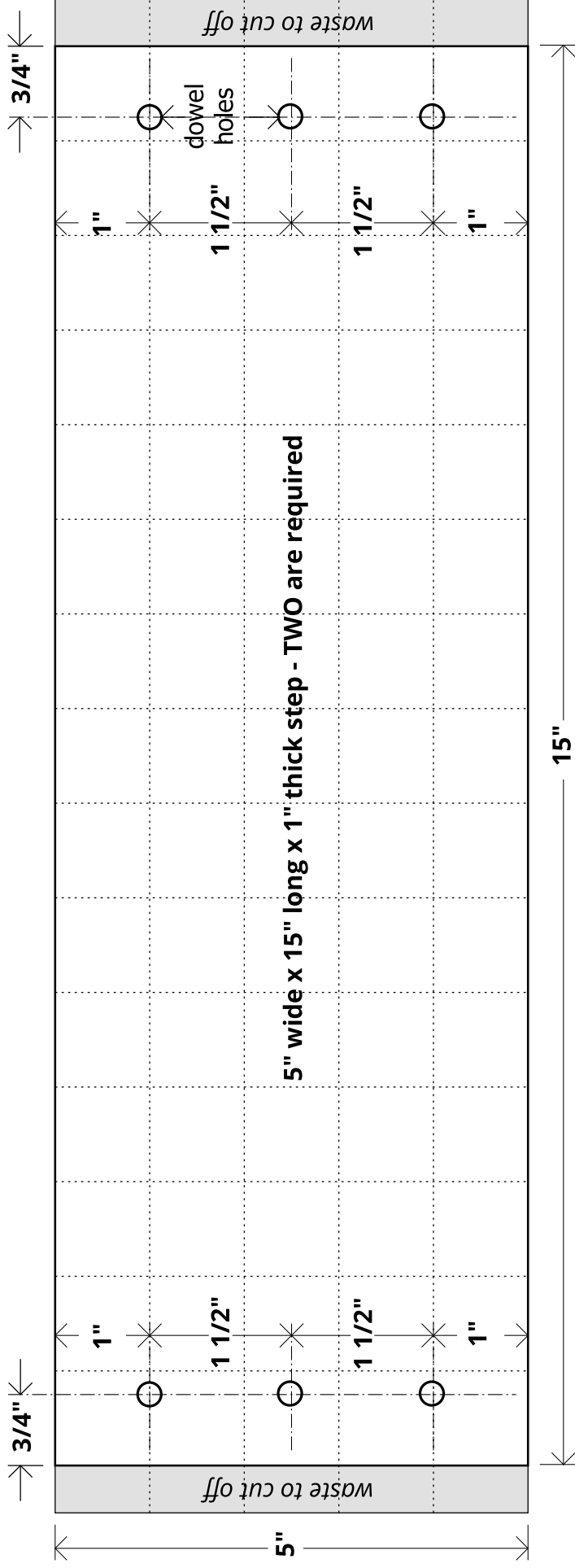
___/7

Crisp, clean, well-drawn lines
Correct line length & placement
Total = ___/10

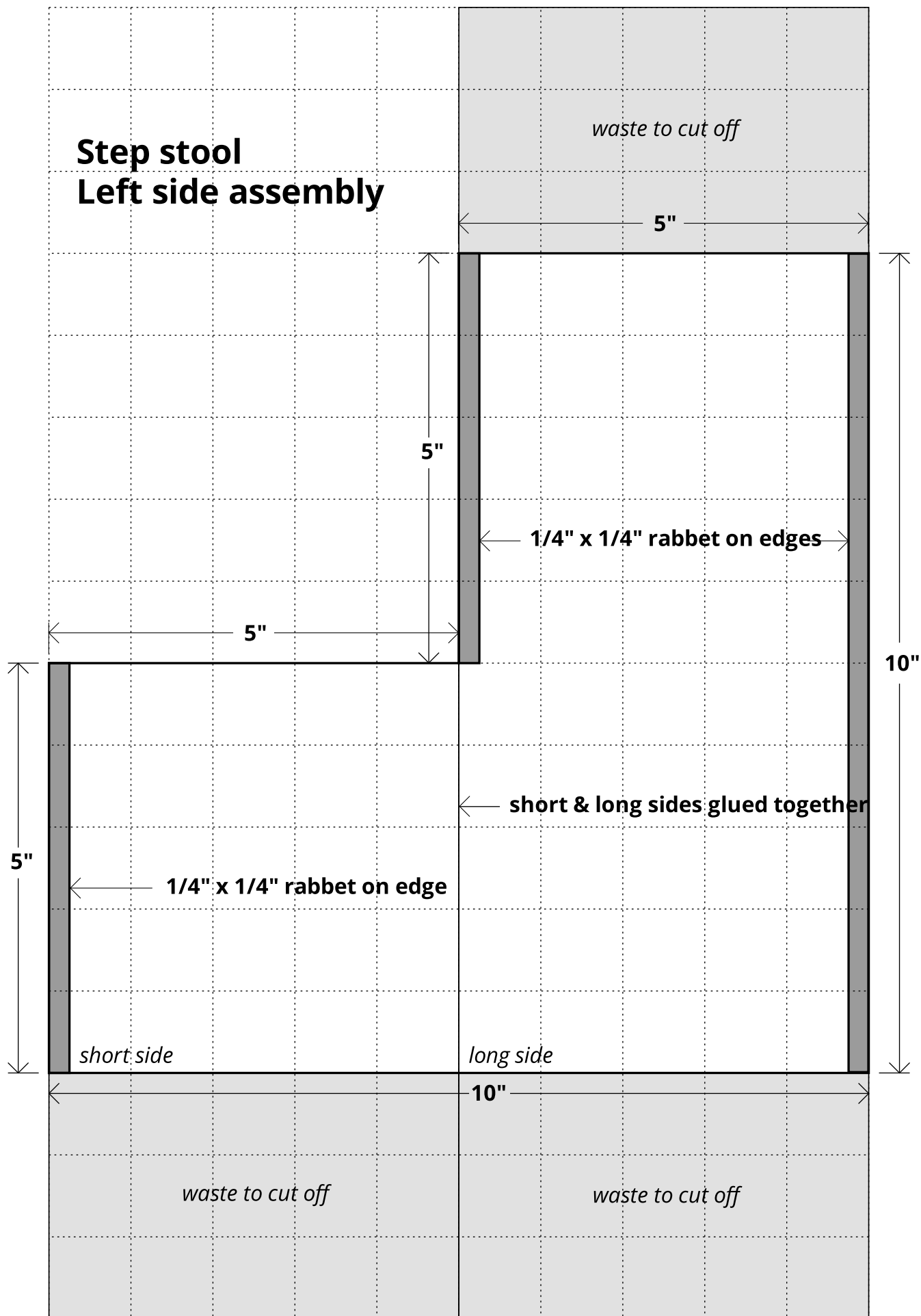


Step stool
Fully assembled

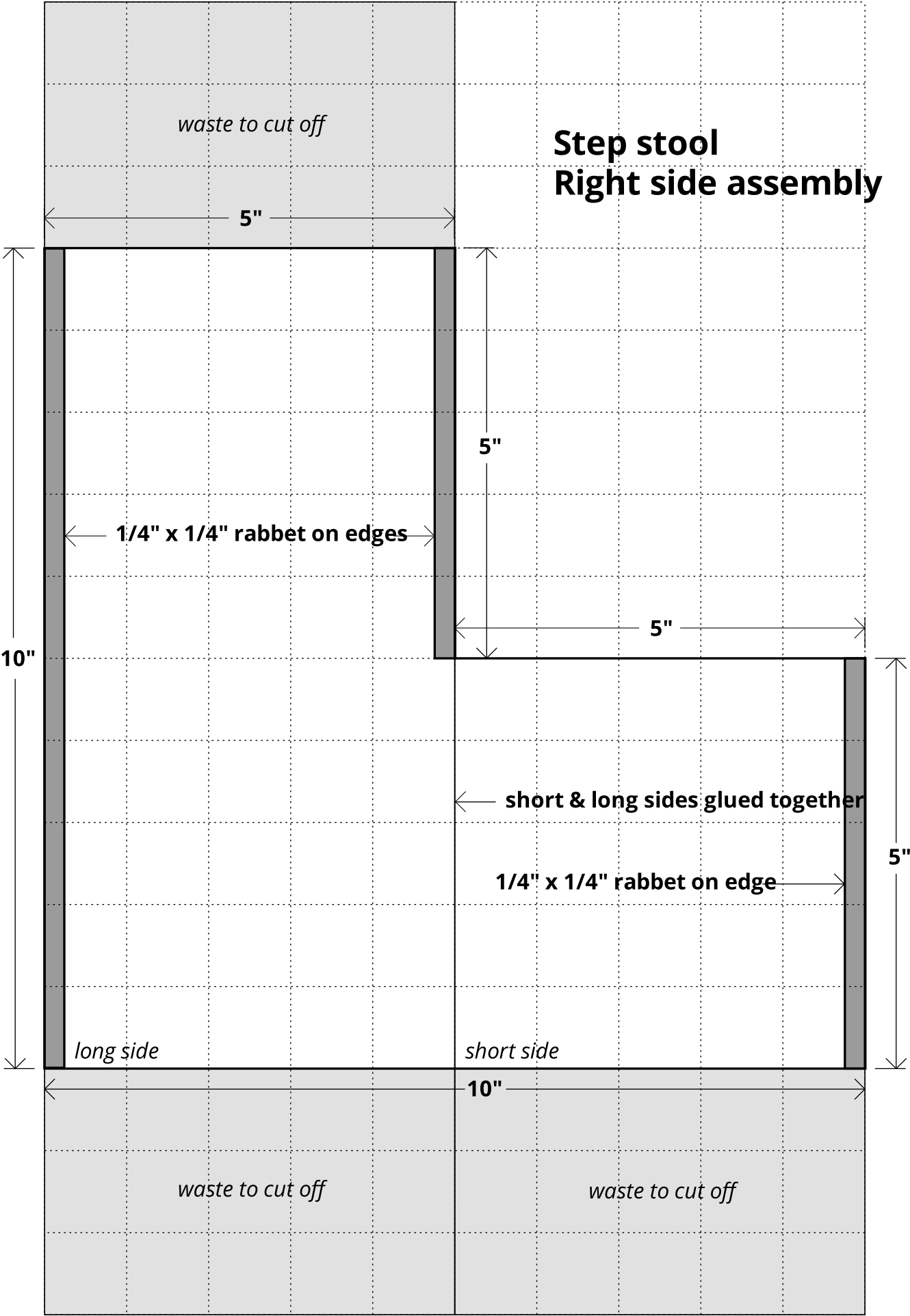




Step stool Left side assembly



**Step stool
Right side assembly**



Cut list and material requisition**Score: __/10****Material Requisition - Maximum \$11.00**

	number needed		cost per item		cost per material
2x6 - 16" long	<input type="text"/>	x	\$1.05	=	<input type="text"/>
resawn 2x4 - 16" long	<input type="text"/>	x	\$0.33	=	<input type="text"/>
1/4" dowel	<input type="text"/>	x	\$0.03	=	<input type="text"/>
wood working glue	<input type="text"/>	x	\$0.25	=	<input type="text"/>
40 grit sandpaper	<input type="text"/>	x	\$0.22	=	<input type="text"/>
60 grit sandpaper	<input type="text"/>	x	\$0.22	=	<input type="text"/>
100 grit sandpaper	<input type="text"/>	x	\$0.22	=	<input type="text"/>
150 grit sandpaper	<input type="text"/>	x	\$0.22	=	<input type="text"/>
220 grit sandpaper	<input type="text"/>	x	\$0.22	=	<input type="text"/>
N95 dust mask	<input type="text"/>	x	\$1.73	=	<input type="text"/>
foam brush	<input type="text"/>	x	\$0.24	=	<input type="text"/>
pair of gloves	<input type="text"/>	x	\$0.03	=	<input type="text"/>
varnish	<input type="text"/>	x	\$0.82	=	<input type="text"/>
total cost =					<input type="text"/>

What do I do next?

Name _____

1. Grab some knowledge

- ☐ Complete all your worksheets about safety, drawing, layout, and math with fractions.
Then get your lumber: ☐ one 8' piece of 2x6 lumber for the **sides** and **steps**
☐ four 16" long pieces of resawn 2x4s for **support slats**

2. Cut up your 2x6 into rough lengths on the mitre saw. You will cut it into 6 pieces roughly 16" long.

- ☐ 2 pieces 16" long for the **steps**.
- ☐ 2 pieces 16" long for the **long sides**.
- ☐ 1 piece 16" long for the **short sides** (it will be cut in half later).
- ☐ 1 piece 16" long to **give back** to your teacher
- ☐ Write the part name and your name on each piece of wood. For example: "*long side 2 — Trenae*"

2. Mill your lumber to thickness and width

- ☐ Use the jointer to make one face and both sides flat on every piece of wood
- ☐ Use the planer to make all three **support slats** 1/2" thick.
- ☐ Use the planer to make the **steps** to 1" thick. Do not plane the sides yet!
- ☐ Use the table saw to rip the wood for the **support slats** to 3" wide
- ☐ Use the table saw to rip the wood for the **steps and sides** to 5" wide

3. Make the sides

- ☐ Use a mitre saw to cut the 16" long **short side** into two pieces that are 8" long each.
- ☐ Glue each **short side piece** to a **long side piece** to make the **side assemblies**:
 - make sure that it forms an **L** shape with the two pieces lining up at the bottom
 - make sure that jointed side of both the long and short sides are facing the same way
 - use clamps, make sure the pieces line up well, and let dry overnight
- ☐ Use the planer to plane both side assemblies to 1" thick.
 - start with the jointed side down, get the top clean, and then flip it over
 - these are wider parts, so use quarter turns instead of half turns
- ☐ Lay out the cut and router lines on your side assemblies
- ☐ Use a mitre saw to cut the top and bottom off each side assembly. It should end up 10" high.
- ☐ Use a router with a rabbet bit to cut the rabbets that will hold the support slats

4. Shape the steps and support slats

- ☐ Use the mitre saw to cut the **support slats** to 13" long
- ☐ Use the mitre saw to cut the **steps** to 15" long
- ☐ Use a router with a rabbet bit to cut the rabbets on each end of the **support slats**

5. Assemble the step stool

- ☐ Put all the pieces together without glue to make sure everything fits
- ☐ Put paper down on the workbench and glue together the **side assemblies** and **support slats**
- ☐ Clamp it up tightly with strap clamps. Check that all the corners line up well and are 90 degrees.
- ☐ Now you can add glue to the sides and support slats and attach the **steps** with clamps
- ☐ When the glue is dry, you can lay out the drill holes
- ☐ Use a drill or drill press to drill 1/4" or 3/8" holes through the **steps** into the sides
- ☐ Glue dowels into each drill hole to reinforce the joint. Cut the dowel tops off when dry.

6. Sand to smoothness

- ☐ Use the stationary sander to quickly smooth your joints. Fill if needed. Let the wood filler dry.
- ☐ Use a palm sander to sand from 40 -> 60 -> 100 -> 150 grit.

7. Finish

- ☐ Use paint or water-based polyurethane to finish your project. Wait at least 30 mins between coats.
- ☐ Sand with 220 grit sandpaper after the second and each following coat.
- ☐ Apply 3-7 coats for the best quality.