INTRODUCTION

This self-study course has been designed to familiarize the new Shopsmith Mark V owner with the basic knowledge and woodworking skills necessary to be able to fully appreciate and utilize the SHOPSMITH MARK V HOME WORKSHOP SYSTEM.

The text for this course is Power Tool Woodworking for Everyone by R. J. DeCristoforo. This book will prove invaluable to the Mark V owner both in the utilization of this course and for many more advanced woodworking applications. Also, there are many references in this course to the Shopsmith Mark V Owner's Manual, a copy of which is included with all new Shopsmith Mark V's or can be purchased separately.

WARNING: Read and understand the Shopsmith Mark V Owner's Manual, particularly the Safety Section, before attempting procedures based on the Self Study Course for the Shopsmith Mark V Home Workshop System.

A WORD FROM THE AUTHOR
The work assignments or woodworking operations covered in these lessons represent, step by step, exactly what I have always tried to teach students in working with them face-to-face. Naturally, they are designed to train even the complete novice. Even though you may be a pretty experienced craftsman, I cannot urge you too strongly to perform all of the work assignments. See it through all the way so that you learn all operations on your own Mark V through experience. The reason for this is quite simple. All power tools differ somewhat in their operating characteristics. If you follow this entire course on your new Mark V, you will have mastered all of the basic woodworking operations and, at the same time, will have learned to handle your versatile new woodworking machine with complete facility and safety.

A WORD ABOUT THE AUTHOR
Until his death, Professor Benjamin W. Spaulding was truly the dean of America's woodworking teacher-instructors. When he designed and wrote this woodworking course, he was Professor Emeritus of Industrial Arts at San Jose State College with over 43 years experience in training many thousands of people to be not only just craftsmen but to be teachers of craftsmen.

We are proud to be able to bring you this instruction course written by Professor Spaulding specifically for the Mark V owner. To the best of our knowledge this is the first time an educational program of this magnitude has ever been attempted. Your woodworking lessons, representing a culmination of all of Professor Spaulding's experience, are the most complete and detailed woodworking course in existence. Study them carefully and follow the instructions.
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HOW TO CHECK AND ALIGN YOUR SAW

DESCRIPTION:
Any power tool is designed, in so far as possible, to supply all of the precision and all of the muscle required for the various operations. Therefore, the first thing to do is to "check out" your tool to be sure all important alignments and adjustments are correct. Only in this way can you be sure of performing accurate work.

WARNING: Read and understand the Mark V Owner's Manual, paying particular attention to Safety, General Information and Alignment and Adjustment sections.

In addition, study carefully in your textbook pages 15 through 20. At this time you should try to learn the proper nomenclature of as many as possible of the parts of your Mark V.

OPERATIONS:
1. Check to see that your table surface, with trunnion set at "0" is square to the sanding disc.

2. Check to be sure that the miter gauge slots in which the miter gauge bar slides are parallel to the sanding disc.

3. Check to see that the head of your miter gauge, when set at 90°, is exactly at right angles to the miter gauge slots and/or sanding disc.
LESSON 1
ASSIGNMENT 1

4. Check to see that your rip fence, when locked to the table, is parallel to the miter gauge slots and/or sanding disc.

5. Check to be sure that your extension table is parallel to the saw table and that the fronts of the fence bars line up.

If adjustment is needed for any of these items, refer to the Alignment and Adjustment section of your Owner's Manual.

When all of these points have been checked and any necessary adjustments made, your saw will give you true, accurate cuts. As is true of any piece of machinery, adjustments can slip slightly after many hours of use. It is wise to recheck all of these points after each 24 hours of actual use.
HOW TO RIP LUMBER

DESCRIPTION:
Ripping (the popular contraction of rip sawing) is the sawing of lumber with the grain of the wood. This is normally referred to as the long way of the stock. The function of ripping is to reduce a given piece of stock to the desired width to be used in constructing a project. Ripping is one of the most basic woodworking operations. Normally, lumber is available only in widths that increase in increments of two inches. This dimension is usually the size of the stock before it was dressed smooth. For this reason, it is extremely helpful to the craftsman to be able to reduce the stock to exactly the width desired. This also removes the limitation of designing all projects to fit only the stock widths of lumber.

OPERATIONS:
1. Select a piece of stock 3/4" by 6" and 2' or 3' long. Use soft lumber such as pine.

WARNING: The stock should not be warped. Warped stock will bind and kickback.

3. Lower or raise the table until the saw blade projects 1/4" to 3/8" above the thickness of the stock (in this case 1" to 1-1/8").
4. Adjust the rip fence so that it is very close to 4" from the point of a tooth bent toward the fence.

5. Lock the fence firmly in place.
6. Using the quill feed, move the blade so it is exactly 4" from the fence and lock the blade securely.
7. Start the saw, set the speed dial for sawing and make short trial cut on scrap stock. You need only "nick" the end sufficiently to permit measurement. Turn off machine and let it come to a complete stop and then measure cut.

8. If not correct, readjust blade to exact width.
9. Select the edge of the board that is straight.

Note: A crooked edge may cause binding. Also, do not use a board that is warped or has a wind (twist) in it for this first operation.

10. Start saw.
11. Place edge of board against rip fence standing to left of the line of saw cut.
12. Push forward at uniform speed until the end of the stock you are holding reaches the saw table.
13. Now, place thumb of right hand back of stock with the first and second finger pressing stock down on saw table and the other fingers over the top of the rip fence. The left hand presses stock against fence.
14. When cut reaches 4" from end, remove left hand and finish cut with right hand alone.

15. Allow the cutoff piece to drop off the saw table or onto a support stand or rear table.
16. Stop saw and let it come to a complete stop before removing scrap piece.
17. In ripping short pieces (nothing less than 10" in this first operation) or narrow cuts, the same method is used only it is advisable to use a push stick instead of the right hand to feed the board through and a feather board instead of left hand to hold stock against fence.
18. In ripping long stock, some support should be used to hold the stock the height of the saw table. (See pages 52, 58 and 59 of textbook.)
HOW TO CROSSCUT LUMBER

DESCRIPTION:
Crosscutting lumber is sawing it across the grain at 90° to the edge. Crosscutting is used to obtain square ends and to reduce stock to the required lengths for construction of the project.

Both the accuracy of the 90° cut and the accuracy of the finished length are extremely important. The simplest of all joints, the butt joint (which you will learn about later) must have true, square edges in order that the pieces will mate properly and give you a strong joint. In addition, the basic techniques of crosscutting are used in many other more difficult woodworking operations, and it is therefore important to master these techniques completely.

OPERATIONS:
1. Take the piece of stock used in the ripping operation. This should be 3/4" by 4" by 2' or 3'.
2. Adjust the saw table so that the saw protrudes not more than 3/8" above thickness of stock.
3. Place the miter gauge with safety grip and extension in lefthand slot and set at 90°. Make sure it is at right angles to the table slots. Check this using the Alignment and Adjustment section of your Owner's Manual.
4. Place edge of stock against miter gauge extension allowing it to protrude approximately 1" beyond saw blade.
5. Start saw.
6. Place right hand on miter gauge safety grip. (See page 53 of textbook.)
7. Slide miter gauge and stock across saw table, making the cut slowly.
8. Turn off the power and let the saw come to a complete stop.
9. Return the stock and miter gauge to starting position.
10. Remove cutoff scrap piece.
11. Turn stock end for end.
12. Measure from cutoff end 20".
13. Square pencil line across edge of stock at this point.

14. Again place edge of stock against miter gauge and adjust so that the lefthand tooth of saw coincides with pencil line.

15. Start saw.
16. Proceed as in Operations 8, 9 and 10.
17. Remember to always let saw come to complete stop before removing scrap end.
LESSON 1
ASSIGNMENT 4

HOW TO CROSSCUT STOCK TO EQUAL LENGTHS

DESCRIPTION:
Crosscutting stock to equal lengths involves setting the saw so that repetitive equal cuts may be made without further adjustment. This can be done in several ways, the simplest of which involves using a clearance block on the rip fence to locate the workpiece and prevent pinch between blade and fence. (See pages 55 and 56 of textbook.)

USE:
Crosscutting of stock to equal lengths is used in the construction of a vast number of projects requiring several identical-length parts. The simplest example would be the shelves in a bookcase where all shelves must be the same length. In addition, the rails of tables and chairs, the legs and almost all of the parts of stools and benches, the side members of all cabinets, and hundreds of other items benefit from the use of this technique.

OPERATIONS:
1. Adjust saw blade to proper height.
2. Rip out a piece of stock 3/4" by 3" by 30".
3. Plan on cutting four pieces 5-1/2" long.
4. Put rip fence in place.
5. Take a piece of scrap stock 3/4" by 2-1/2" by 3". This is called a clearance block.
6. Clamp it on the rip fence with a C-clamp so that the block is 1" behind last tooth of saw blade, or bolt it to the fence through the hole provided for this purpose. (See page 56 of textbook.)
7. Measure 6-1/4" from rip fence to inner point of saw blade tooth.
8. Put miter gauge in place.
9. With a piece of scrap stock at least 16" long, make a cut by holding stock against miter gauge and butted against the clearance block.
10. Turn off saw and let it come to a complete stop.
11. Measure for accuracy of 5-1/2" block.
12. If correct, proceed to cut off 3 pieces in the same manner as cutting scrap stock. Use stock ripped out in Step 1.
13. To cut the fourth piece, measure the length on the remaining piece and square line across edge.

14. Adjust stock so the outer tooth of saw blade coincides with pencil mark with the 5-1/2" length against miter gauge.
15. Make cut.
16. You should now have four pieces 5-1/2" long.

Note: To cut longer pieces of equal length, place the rip fence on the extension table and adjust the headstock of the Mark V for proper distance on the ways and proceed as before.

Also, an extension face on the miter gauge aids the operator in controlling long pieces. (See page 53 of textbook.) And, if long enough, a stop block may be clamped on this extension at desired distances and the stock butted up to it for equal length cutting. A miter gauge stop rod (see page 54 of textbook) performs the same function.
LESSON 1
ASSIGNMENT 5

HOW TO CUT RABBETS

DESCRIPTION:
A rabbet consists of an L-shaped groove in the edge or end of a piece of stock. There are two general types of rabbets—edge and end.

USE:
Rabbets are generally used as a recess in which other pieces of material will fit. Perhaps the classic example would be picture or mirror frames. These have a rabbet all around the inside on the back and the glass is recessed into this rabbet.

In addition, the parts of a tremendous number of projects are fitted together through the use of rabbets in conjunction with other types of cuts. Parts of drawers, boxes, screens, even the sides of cabinets and bookshelves, involve the use of rabbets. In addition, the rabbet is often used in various types of joints. The simplest of these is the rabbet-but joint. (See sketch on page 79 of textbook.)

OPERATIONS:

WARNING: When cutting rabbets, it is necessary to remove the upper saw guard. Whenever you remove the upper saw guard, keep the lower guard in place and work with extreme caution.

1. Prepare a piece of stock 3/4" by 3" by 30".
2. Select and mark one of the flat surfaces. Mark one face for reference.
3. The rabbet to be cut will be 3/8" by 3/8".
4. Adjust the saw blade height to 3/8".
5. Put on rip fence and bring up to 3/8" from outer point of saw blade tooth.

7. Hold stock with flat side on saw table and marked surface up.
8. Make cut holding stock firmly against rip fence with left hand and pushing the stock with the right. Do not return stock past blade but lift up and remove from saw table.

**WARNING:** Keep your right hand away from line of saw cut as the cut is completed.

9. Stop saw and let it come to a complete stop.
10. Adjust rip fence or quill feed to 3/8" from the *inner* point of saw blade tooth to face of fence.
11. Repeat the operation of cutting with marked side against rip fence.
LESSON 1
ASSIGNMENT 5

12. Again, do not pull stock past blade but pick it up and remove it from table.
13. Turn off saw and wait for it to stop, then remove scrap piece.
14. You will now have an edge rabbet cut as shown in sketch.

15. To make 1/2" x 3/4" end rabbet prepare a piece 3/4" by 4" by 12".
16. Put miter gauge in place.
17. Adjust saw blade to 1/2" above table.
18. Bring up rip fence to 3/4" from outer point of saw blade tooth.
19. Hold stock against miter gauge with flat surface down and end of stock against the rip fence.
20. Make cut.
21. Back stock away from rip fence the thickness of the saw blade kerf.
22. Make repeating cuts until all waste stock is removed.

23. You now have an end rabbet 1/2" by 3/4" as shown in sketch.
HOW TO MAKE A TONGUE AND GROOVE JOINT

DESCRIPTION:
This joint consists of a tongue in one piece of stock and a groove in another piece of stock that fit together to form a secure joint. The grooves and the tongue are generally made in the center of the edges of the stock.

USE:
Tongue and groove joints are widely used to join flooring and siding. In addition, they can be used in the construction of drawing boards, table tops, etc., that must be built up out of several boards to achieve the desired width. The same technique can be used to make slides for drawers, sliding window screens and many other items.

OPERATIONS:
1. Prepare 2 pieces of stock 3/4" by 6" by 24".
2. In one we will make a groove 3/8" by 9/16" and a 3/8" by 1/2" tongue in the other. Let us make the tongue first.
3. Adjust the saw blade height to 3/16".
4. Bring up rip fence to 1/2" from outer saw blade tooth point.
5. Make cut by holding stock flat surface down.
6. Turn stock end for end and repeat operation on other side.

7. Adjust saw blade height to 1/2".
8. Set rip fence at 9/16" from inner tooth of saw blade.
9. Holding stock on edge and flat side firmly against rip fence, make cut on both sides.

10. You should now have a tongue 3/8" by 1/2".
11. To make the groove in the other piece, set the saw blade height at slightly over 9/16".

Note: This extra depth will allow space for glue.

12. Bring up rip fence to 9/16" from outer point of saw blade tooth.
14. Turn stock around end for end and make cut from other side.
15. Stop saw and let it come to a complete stop and move rip fence in or feed quill out the distance of a saw blade kerf.
16. Make repeating cuts turning stock end for end each time.

17. Continue until the groove is entirely free of waste stock.
18. You should now have a groove 3/8" by 9/16" and the two pieces should fit snugly together.

Note: Several pieces may be fitted together in this manner by making a groove and a tongue on opposite edges of each member.
LESSON 1
ASSIGNMENT 7

HOW TO MAKE ANGULAR CUTS

DESCRIPTION:
Angular crosscutting is the process of making cuts across the stock at any desired angle. These are commonly called miter cuts, and joints made from them are miter joints.

USE:
This operation is used in the construction of picture frames, screens, door trim, and similar objects that require (or look better with) miter joints.

OPERATIONS:
1. Prepare a piece of stock 3/4" by 2-1/2" by 3'6".
2. Set saw blade not to exceed 1-1/8" above table.

WARNING: Always be sure your saw blade is sharp and your saw guards are in place.

3. Remove rip fence.
4. Set miter gauge at 45° to the right of the 90° on the quadrant and put miter gauge in left slot. (See pages 63 and 64 of textbook.)
5. Place edge of stock against miter gauge, as in crosscutting. Have the stock protruding approximately 1/2" beyond the saw blade.
6. Holding firmly, make cut slowly.
7. Turn off saw, wait for blade to stop and remove scrap piece.
8. With a square test for accuracy. If incorrect, adjust miter gauge and make another cut. You can also check using the cutoff piece.
9. Turn stock over having the opposite edge against miter gauge.
10. Measure 7-1/2" from the inner cutoff corner and square a line across edge.

11. Adjust until marked edge is even with left protruding tooth of saw blade.

12. Turn on power and make cut.
13. Repeat operation until three segments have been cut.
14. For the fourth segment, set miter gauge at 45° with the setting this time to left of 90°.
15. Put miter gauge in right slot.
16. Using one of the cutoff segments as a template, mark off length on the outer edge of remaining stock.
17. Make last cut. You will now have four segments of equal length and they should form a frame when fitted together—7-1/2" square inside and 12-1/2" outside.
18. Rabbets may be cut on the short edge of each segment using Step 4 for cutting rabbets.

Note: To make octagons (eight-sided forms), set miter gauge at 67-1/2°. To make hexagons, set gauge at 60° and proceed in same manner.

Note: In making angular cuts the motion of the blade has a tendency to make the stock creep. The miter gauge safety hold down will hold the stock firmly in place, prevent creeping and keep your hands out of danger.
TEST QUESTIONS ON LESSON 1

MULTIPLE CHOICE: Underscore your choice.
1. To tighten saw blade on arbor, the nut is turned (clockwise) (counterclockwise).
2. In ripping short or narrow pieces (scrap stock) (push stick) should be used.
3. In crosscutting the left hand should be held at least (1") (3") (6") from the line of the saw cut.
4. A piece of stock clamped or bolted to rip fence for cutting equal lengths is called a (stop block) (clearance block).
5. In addition to assuring correct lengths, this block prevents (binding between blade and fence) (creeping of work piece).
6. Combination saw blades are best for (ripping) (crosscutting) (all purpose).
7. In a tongue and groove joint, the groove is made slightly deeper to make room for (sawdust) (glue) (expansion).
8. An angular crosscut of 45° is called a (beveled rip) (miter).
9. In making angular cuts, the motion of the blade tends to make the stock (kickback) (creep).
10. For safety, a beginner should not rip work shorter than (6") (10") (18").
11. The projection of the saw blade above the work piece should be (1-1/4") (1") (1/2").
12. The speed dial of the saw should only be adjusted (before) (after) the saw is turned on.
13. For safety, the operator should always stand (behind) (to one side of) the line of saw cut.
14. In cutting stock to exact marked lengths, the cut itself is made (directly on) (on the waste side of) the pencil line.
15. In most crosscutting a miter gauge is most conveniently used in the (left) (right) hand miter gauge slot.
16. To cut segments for a hexagon, the miter gauge should be set at (67-1/2") (45°) (60°).
17. In cutting an edge rabbet, safe practice requires that the waste be left (between blade and rip fence) (outside the saw blade).
18. After finishing one cut for an edge rabbet, safe practice requires that the stock be (lifted over rip fence) (slid back over blade to starting point).

TRUE OR FALSE: Circle your selection
T F 19. For accurate work, a clearance block must be a particular thickness.
T F 20. In cutting several equal length pieces, the clearance block can be used for even the last segment.
T F 21. The clearance block should be clamped to the rip fence directly in line with the saw arbor.
T F 22. In cutting stock to exact measured length, the saw cut is made in the waste stock.
T F 23. In making a rabbet-but joint, all cuts are at the ends of the stock.
T F 24. Miter gauge slots in the saw table must be parallel to the saw blade.
T F 25. Cutting a tongue for a tongue and groove joint is the same as cutting two rabbets.
T F 26. In cleaning out waste stock in a groove, time is saved by turning the stock end for end.
T F 27. In making multiple cuts, such as used in grooving, it is safe to adjust the rip fence with the saw blade turning.
T F 28. A clearance block is not necessary in cutting an end rabbet because it is not a through cut.
T F 29. A saw should be turned off and the blade stationary when making any major adjustments on the saw table.
T F 30. The rip fence when locked must be parallel to the table slots to prevent binding of the work piece.

If you have difficulty in answering any of these questions, reread the work assignments in Lesson 1 and study the saw chapter in your textbook.
LESSON 2
INTRODUCTION

A MESSAGE FROM BEN SPAULDING

By this time you should have thoroughly studied the table saw chapter of your textbook and your Owner's Manual. In performing the assignments in Lesson 1 you have learned the most basic saw operations and the basic safety rules.

In the balance of these lessons, we will not go into as complete detail as we did in the first lesson. You are expected to follow all safety and operating rules whether they are spelled out or not.

WARNING: Read and understand the Shopsmith Mark V Owner's Manual, particularly the Safety Section, before attempting procedures based on the Self Study course for the Shopsmith Mark V Home Workshop System.

The following phrases will be used frequently. Here is what they mean:

**Prepare a piece of stock**—provide a workpiece of the designated size, having square ends and edges and smooth surfaces. The use of scrap, if straight and true, not warped and free from knots and nails, is encouraged.

**Set miter gauge X° right**—set miter gauge head until the designated number to the right of 90° is opposite the "0" mark, then lock.

**Set miter gauge X° left**—set designated degree number to left of 90° on "0" mark and lock.

**Place miter gauge**—put miter gauge, with head toward you, in designated table slot. If no other setting is specified, the head should be set at 90°.

**Set rip fence X° from blade**—set and lock rip fence approximately the designated distance from blade and use quill feed and lock to bring to exact setting.

**Tilt table X°**—on the saw, the table is always tilted right—that is, the designated degree number to the right of "0" is brought in line with the "0" mark, then locked.

Note: When tilting the saw table, use the quill feed to keep the saw blade centered in the insert slot while tilting.

**Set Depth Dial**—controlled quill feed is extremely useful on the table saw. You merely unlock the depth lock, set dial and relock. When the "0" on the dial reaches the pointer, the quill is stopped.

**Outside tooth of saw blade**—the tip of a saw blade tooth bent (set) toward the pencil mark being used or away from the point measurement (such as rip fence).

**Inside tooth of saw blade**—the tip of a saw blade tooth bent toward the point of measurement (such as rip fence). When using miter gauge the inside tooth is always the tip of tooth bent toward miter gauge.
LESSON 2
ASSIGNMENT 8

HOW TO CROSSCUT TAPERS ON FLAT BOARDS

DESCRIPTION:
Taper cutting is reducing stock by making a continuous straight cut which produces progressive variation in width. Taper cuts in small stock can be made with only miter gauge support.

USE:
Taper cuts in flat boards are used in planter boxes, window boxes, waste baskets, and similar objects that have top and bottoms of unequal size. Long taper cuts requiring the use of a tapered jig are frequently used on table legs and other pedestals. Taper cuts on one side only are often used to form a slanting front to cabinets and shelves.

OPERATIONS:
Let us make a flower box approximately 8-3/4" square at the top and 8" high with tapered sides.

1. Prepare a board (redwood if you have it) 3/4" × 8" × 36".
2. Crosscut stock into 4 pieces 8" long.
3. Set miter gauge at 85° left.

Note: This will be 5° off the right angle. If a greater taper is desired the angle should be increased.

4. Place miter gauge in right table slot.
5. Pull miter gauge back until it clears the saw blade.
6. Place edge of stock against it and adjust so that the saw blade will finish cutting at the left bottom corner.
7. Make cut by holding the safety grip of the miter gauge with the left hand. Turn off machine and wait for it to come to complete stop before removing stock from gauge and returning gauge to front of table.
8. Turn stock over end for end and repeat cut on opposite end.
9. Repeat both cuts on remaining 3 pieces.
10. When nailed together as shown the project will resemble sketch on this page.

Note: We will make bottom in later assignment.
LESSON 2
ASSIGNMENT 9

HOW TO MAKE A TAPERING JIG

DESCRIPTION:
This jig consists of two pieces of stock fastened together at one end with a hinge and adjustable at the other to various widths.

USE:
To assist the operator in making tapered cuts on long pieces of stock. If carefully made it will be useful to you for a long time and help you get more pleasure and production from your shop.

OPERATIONS:
1. Prepare 2 pieces of stock 3/4" × 2-1/2" × 29-5/8"
2. Cut one piece 24" long. Save the small piece also.

3. Fasten the ends of the two long pieces together with a 2" by 3" butt hinge.

4. On one edge and one side of the 5-1/2" piece square pencil lines 1/2" apart starting at end A.

5. Locate center of each squared line on the marked side and drill through holes having diameters of a 6 penny common nail. (1/16" or 3/32")
6. Screw the end of the 5-1/2" piece perpendicular to the side of the end of the 24" pieces with end A against 24" piece.

Note: Since hole spacing is 1/2" and adjustable leg of jig is 24" in length, the amount of taper per foot of cut can be readily set. Each hole represents a taper of 1/4" per foot. Example: Set nail or screw in 4th hole away from 29-1/2" leg of jig for a taper of 1" per foot. Set 24" leg against nail and fasten into end of 24" through 5th hole using nail or screw.
LESSON 2
ASSIGNMENT 10

HOW TO RIP LONG TAPERS ON FLAT BOARDS

DESCRIPTION:
Taper cutting on long boards requires the use of a jig because long stock will not fit the miter gauge. In addition, it is basically a rip cut.

USE:
Taper cuts are made in long stock (up to 24") for tall flower boxes, stools and cabinets. They are frequently needed for table legs and other supports. Tapers on one side only will give a slanting front to cabinets.

OPERATIONS:
1. Prepare 4 pieces of stock 3/4" × 8" × 16". (Redwood if you have it.)
2. There must be a specific amount of taper on each edge. In this case let us use 1/2" taper per foot.
3. Adjust saw blade to 1" height. Mount extension table on right.
4. Remove miter gauge and put rip fence on extension table.
5. Place tapering jig constructed in Operation 8 against rip fence.

Note: To make tapering jig slide easily apply paste wax to sides and bottom.

6. Slide headstock, carriage and main table to right until main table is only about 1" from extension table. Be sure both tables line up across top surfaces.
7. Set jig with nail in No. 2 hole and rest inner edge of 24" side against nail.
8. Nail in place with a 6 penny nail using next (No. 3) hole. (Or use #6 × 1-1/4" round head screw.)

Note: The nail need not be driven all the way in.
9. Place stock against the side of the jig and the protruding block.
10. Adjust rip fence and jig (using quill feed for final adjustment) so that the saw blade will start cutting on the front left corner.

Note: This is accomplished with both the jig and stock pulled forward until the front left corner is even with the inner tooth of the saw blade. A front table extension will be a great help.

11. Now with the right hand, grasp the jig where the short block is fastened to the long piece. (See page 62 of textbook.)
12. Start saw and make cut slowly, moving jig and stock simultaneously, being sure the stock is against the block and the jig at all times.
13. Continue on through after the cut is made, lifting up and clear, first the stock and then the jig.
14. Make similar cut on remaining pieces of stock.
15. Set jig as before with nail in No. 4 hole, then fasten.

16. Turn stock over and cut tapers in opposite edges of the 4 pieces of stock.
17. Nail together. You now have a tall planter box. Assemble exactly as you did the small planter in Assignment 8.

Note: We will make bottom in later assignment.
LESSON 2
ASSIGNMENT 11

HOW TO CUT BEVELS

DESCRIPTION:
Beveling is cutting the complete edge or end of stock at any angle less than 90° to the surface of the stock. Cross bevels are called cross miters when cut at 45°.

USE:
Bevels are cut on the ends of stock when fitting two pieces together as in the corner of a deep picture frame. Edge bevels are used extensively in cabinets and multi-sided objects. Bevel joints (45°) are made in veneer plywood to show only the veneer on the outside surface, since a butt joint would show the edge of the stock. On long stock, end bevels are generally made using the miter gauge, rip bevels using the rip fence. On small pieces of stock either method may be used.

OPERATIONS:
Let’s make bottoms for the two planter boxes you made in the previous two assignments. Since the sides of the planters taper, the edges of the bottom must be beveled to fit properly.

First, make the bottom of the small planter, using the miter gauge. If you made yours carefully, using stock 3/4” thick, these dimensions will fit.

1. Prepare a board 3/4” × 5-15/16” × 5-15/16” (redwood, if you have it.)
2. Lock table carriage and headstock at extreme right end of tubes.
3. Tilt saw table 5° to right of “0”.
4. Adjust saw blade to 1-1/4” height.
5. Put miter gauge (set at 90°) in right slot.
6. Place edge of stock against miter gauge face and align bottom right front corner with inside tooth of blade.

WARNING: Whenever the table is tilted, always check to be sure the miter gauge clears blade before turning on power.

7. Hold stock firmly in place, turn on saw and make cut.

WARNING: Turn off machine and let it come to a complete stop. Do not return stock to starting point. Remove stock, then return empty miter gauge. Bevel cuts, like all crosscut operations, are made easier and safer with the miter gauge safety grip.
LESSON 2
ASSIGNMENT 11

8. Turn stock counter clockwise to next edge and repeat Steps 6 and 7. Repeat until all four edges are beveled.
9. Push bottom, smaller face down, through the top of the planter. It should fit smoothly and snug at the bottom. Fasten with small 8 penny nails through sides into edges of bottom. Drill a few holes in the bottom for water drainage.

![Nails and Drainage holes](image)

Now let us make a bottom for the tall planter. Again, use redwood if you have it.

10. Prepare a piece of stock 3/4" × 6-1/8" × 6-1/8".
11. Reset table to 3° to right of "0".
12. Set saw blade height at 1".
13. Place rip fence at extreme right side of table.
14. With rule flat on table, adjust quill feed until inner tooth of blade is 6" from fence.

![Blade and Fence](image)

Note: Saw guard removed for clarity.

15. Turn on saw and make cut, using rip technique from Lesson 1. **Do not return stock, but lift over to right of fence.**
16. Turn stock 90° and repeat cut. Do this on remaining sides.
17. Install bottom in tall planter, just as you did in the small one.

Note: Both of these bevels were quite slight. Naturally, a steeper angle to the table would give a more pronounced bevel but the operations are the same.
LESSON 2
ASSIGNMENT 12

HOW TO CUT CHAMFERS

DESCRIPTION:
Chamfers differ from bevels in that, while bevels cut the entire end or edge at any angle less than 90°, chamfers cut off only the top corners. Most chamfers are at 45°.

USE:
Chamfers are frequently used in the construction of some types of projects. They are commonly used on table tops, stools, boxes, and cabinets to "ease" the sharp edge or for decoration. They are also used on square legs to give them a more graceful shape.

OPERATIONS:
1. Set saw table at "0". Prepare a board 3/4" × 8" × 8".
2. Lock headstock and carriage at extreme right of table. Tilt saw table to 45°, feeding out on quill while tilting.
3. Mark off on edge of board the desired width of chamfer. In this case let it be 1/4".

4. Put miter gauge in right table slot.

Note: Saw guard removed for clarity.
5. Adjust so that inside saw blade tooth is even with pencil mark on edge of stock, with marked edges of stock down.
6. Make cuts on all four edges.

Note: Saw guard removed for clarity.

WARNING: Turn off machine and let it come to a complete stop. Do not return stock after each cut, but remove from miter gauge and return empty gauge.
LESSON 2
ASSIGNMENT 13

HOW TO MAKE COMPOUND ANGULAR CUTS

DESCRIPTION:
Compound angular cuts are made by cutting stock with the saw table tilted and an edge of the stock against the miter gauge face set at an angle less than 90°.

USE:
Compound angular cuts are used in picture frames, shadow boxes, planter boxes, mirror frames, and similar objects having flared sides.

OPERATIONS:
Let us make a picture frame 10" × 10" on the outside.

1. Prepare 4 pieces of stock 3/4" × 1-3/4" × 11".
2. Tilt saw table 30° right with headstock and table at right.
3. Set miter gauge 54-3/4" (left) and place in right table slot.

Note: For work angles other than 45° see pages 68 and 69 of textbook.

4. Place stock with edge against miter gauge.
5. Adjust saw blade height to 1-1/4".
6. Adjust stock so that the cut will start a short distance from end nearest you. A miter gauge safety grip will avoid "creep".

Note: Saw guard removed for clarity.
7. Make cut very carefully and slowly.
8. Repeat on one end of remaining pieces. **Turn off saw.**
9. Measure 10" from cut off tip on all 4 pieces.

10. Turn stock over and end for end. Place the short side against miter gauge holding stock with safety grip.
11. Adjust stock so that saw will start cutting at pencil mark on lower corner of stock. See sketch on previous page.

Note: This adjustment must be done **very** accurately otherwise the frame will not be square.

12. Start saw and make cut.
13. Make similar cuts on other 3 pieces.

Note: Save the parts to the frame. In another assignment we will learn to spline them together.
LESSON 2
ASSIGNMENT 14

HOW TO MAKE TWO COMMON WOODWORKING JOINTS

I. DADO AND RABBET JOINT

DESCRIPTION:
A dado and rabbet joint is usually made with two pieces of equal thickness and width. A tongue in the end of one piece, formed by a rabbet having depth and width equal to one half stock thickness, exactly fits into a dado cut in the second piece. The outside edge of the dado is one half stock thickness from the end of the stock.

USE:
Dado and rabbet joints are extensively used in cabinetmaking. When cut for a snug fit and adequately glued, the joint is strong. Use for drawer and box corners is common.

OPERATIONS:

WARNING: When cutting dados and rabbets, it is necessary to remove the upper guard. Whenever you remove the upper saw guard, keep the lower guard in place and work with extreme caution.

1. Prepare a piece of stock 3/4" x 3" x 10".
2. Crosscut stock into two pieces of equal length.
3. Mark pieces “A” and “B”.

Note: Since standard 1" stock does not always measure exactly 3/4", cutting the dado and rabbet to 3/8" measurements will not necessarily be 1/2 the stock thickness. However, it will make a completely satisfactory joint.

4. Butt the end of “B” across end of “A” to form a right angle and square a line on edge of “A” indicating exact width of stock.
5. Mark a second line on edge of “A” exactly 3/8" away.
6. Set saw blade height at 3/8" and lock carriage with blade close to left edge of table slot.
7. Set fence so the outer saw blade tooth is on line farthest from fence.
8. Advance quill feed until inner saw blade tooth is exactly on other line. Lock quill.

9. Set depth dial at "0" and lock.
10. Release quill lock, retract quill and relock.
11. Set miter gauge in left hand slot, place workpiece "A" against it, butted against fence.

12. Turn on saw and make cut, removing stock at end of cut and returning miter gauge.
13. Advance quill 1/8" and repeat cut, continuing until depth stop is reached.

14. You now have a dado 3/8" x 3/8".
15. Set fence 3/8" from inner saw blade tooth.
16. Advance quill until outer saw blade tooth is 3/8" from fence and lock quill.
17. Place stock "B" against miter gauge with end butted against fence.
18. Turn on saw and make cut.

19. Unlock quill, retract and rellock.
20. Place stock on end against fence, cut end down with the saw kerf toward blade.

21. Turn on saw and make cut, holding firmly down on table and against fence.
22. You now have an end rabbet leaving a tongue \( \frac{3}{8}'' \times \frac{3}{8}'' \). Assemble joint.

II. NOTCH JOINT

DESCRIPTION:
Two pieces of stock may be assembled in a notch joint by cutting dados across the edges which have depth equal to one half the width of the stock.

USE:
Notch joints are used in making dividers for silver or similar drawers, partitions of book shelves and cabinets. They provide a ready means of cross bracing in box and furniture construction of all types.

OPERATIONS:

WARNING: When cutting notches, it is necessary to remove the upper saw guard. Whenever you remove the upper guard, keep the lower guard in place and work with extreme caution.

1. Prepare a piece of stock \( \frac{3}{4}'' \times \frac{3}{2}'' \times 16'' \).
2. Crosscut stock into pieces of equal length.
3. Measure 3-9/16'' from end of one piece and mark a square line at this point on the 3'' face.
4. Stand other piece on end, with one edge exactly on line, and mark the thickness of stock.

5. Now measure to exactly the center of 3'' face (in this case 1-1/2'') and mark.
6. Use this mark to set saw blade height. See below.
7. Set rip fence so outer tooth of blade is on mark farthest from fence. (The marks made in Step 4.)

8. Place miter gauge in left slot and put both pieces on edge against it and butted against fence. Have marked face of stock toward blade.
9. Hold pieces firmly together against miter gauge and make cut.
10. Still holding both pieces firmly together, remove from miter gauge and return gauge.
11. Reposition the two pieces so that the edge of blade toward the fence cuts exactly on the other mark.

12. Hold pieces together, remove from miter gauge and return gauge.
13. Keep repeating cuts, each time sliding both pieces toward fence the width of a saw blade cut, until all waste is removed.
14. You now have two slots or cross dadoes. Assemble the pieces.
LESSON 2 TEST

TEST QUESTIONS ON LESSON 2

TRUE OR FALSE: Circle your selection.

1. In cutting tapers on wide flat boards the smaller angle number will produce a greater slant.
   T F

2. In assembling the project in Assignment 8 each side overlaps the two adjacent.
   T F

3. The tapering jig remains stationary when cutting a long taper.
   T F

4. The tapering jig and stock are returned to original position after making a cut.
   T F

5. Chamfers are usually cut at 45°.
   T F

6. In cutting a chamfer the cut is started at the lower corner of the stock.
   T F

7. The stock is turned over for the second cut in compound angle cutting.
   T F

8. In cutting a 45° bevel the table is tilted at 60°.
   T F

9. The stock should not be returned to the starting position in making a bevel cut.
   T F

10. In making a tapering jig the hinge is fastened between the two boards.
    T F

11. It is safe practice to use the miter gauge in reverse position when crosscutting wide boards.
    T F

12. When cutting a cross miter in the right end of wide stock the left hand should grasp the head of the miter gauge.
    T F

13. In fitting two bevel cuts together at right angles the angle of each must be 45°.
    T F

14. It is not necessary to center the saw blade in the insert slot when the saw table is tilted from 0° to 45°.
    T F

15. The miter gauge safety grip reduces the chance of error when cutting compound angles.
    T F

16. The rip fence must always be to the right of the saw blade when used as a support for cutting bevels and chamfers.
    T F

17. The correct setting of saw table and miter gauge for commonly used work angles can be found in the textbook.
    T F

18. Oil is applied to the bottom and side of the tapering jig to make it slide easily.
    T F

19. When cutting compound miters the miter gauge must always be used in the right table slot.
    T F

20. In cutting long tapers with the tapering jig the stock is held down on the table with your left hand.
    T F

    T F

MULTIPLE CHOICE: Underscore your choice.

22. In cutting tapers on wide board angle on the miter gauge produces the smallest taper (70°) (60°) (85°).
    T F

23. In cutting tapers with a tapering jig the operator stands to the (left of) (right of) (behind) the line of cut.
    T F

24. The angle in the tapering jig remains (the same) (is increased) (is decreased) in making the second cut.
    T F

25. Underscore the sketch of a bevel.

26. The angular cut on the edge of a board to enhance its appearance is the (bevel) (chamfer).
    T F

27. In cutting compound angles the table angle is (less) (greater) than the miter gauge setting.
    T F

28. In cutting compound angles on a four sided figure, the work angle in Assignment 13 is (60°) (45°) (15°).
    T F

29. In making the second cut in sawing tapers on wide boards the stock is (turned end for end) (turned over) (kept in same position).
    T F
LESSON 3
INTRODUCTION

A MESSAGE FROM BEN SPAULDING

You have now progressed through two lessons and fourteen work assignments, and you are to be congratulated on your progress. Lesson 3, while it still gives full step-by-step instructions, has assignments that require more careful settings and more precise workmanship.

Always remember that your Mark V is only as accurate as the settings you make. A few minutes extra time spent in checking your settings can save much wasted time and material. Whenever you are in doubt, make a test cut on scrap the same size as your workpiece and check your dimensions.

There are many fixtures and accessories that will make your work easier and more accurate—some you can build and some you may buy. An auxiliary fence (page 81 of textbook) about 6" high is helpful whenever sawing stock on end. The tenoning jig (page 84 of textbook) will be very helpful. Retractable casters give your Mark V mobility and a front table extension and miter gauge extension will increase the capacity.

The miter gauge safety grip is a must, both as a safety measure and for its unique work-holding ability. It will simplify and increase the precision of every miter gauge operation and make you a better craftsman.
DESCRIPTION:
Two matching surfaces held together by a spline form a spline joint. The spline, usually a strip of hardwood, fits snugly into a slot which is formed by grooves or channels cut in the matching surfaces. Spline joints are named in accordance with pattern: “blind”; “corner”; and “through exposed”.

USE:
Splines are used primarily to provide strength and rigid assembly in mitered and other types of joints. They are used in well made picture frames, railings, facings of tables, cabinets and furniture.

OPERATIONS:

WARNING: When cutting splines, it is necessary to remove the upper guard. Whenever the upper guard is removed, keep the lower guard in place and work with extreme caution.

Let us fasten together the frame made in Assignment 7, Lesson 1. Lay the frame in assembled position with the best side up. Now mark the corners with a pencil as shown below.
1. Adjust saw blade for 3/8" depth of cut.
2. Set rip fence so cut will be approximately in the center of 3/4" stock. (3/8" to center of blade.)
3. Be sure there is at least 1/8" of table insert between blade and fence for work support. Use quill feed if necessary.

4. Clamp feather board at about 60° to left side of saw table and adjust until center of curved end is about 1/4" from blade and in center of blade. See sketch below or use the feather board supplied in your safety kit. (See page 74 of textbook.)
5. Hold mitered end of stock marked "1A" on table with pointed corner toward you.
6. Press stock down with right hand and against fence with left hand. Use extreme care.

7. Make cut slowly.
8. Repeat on the other three ends marked "A".
9. Place mitered end of stock marked "1B" on table with pointed end away from you.

Note: This assures the back side of all pieces will be against fence and spline grooves will therefore line up properly.

10. Hold as on previous cuts and feed slowly.
11. Repeat on other three ends marked "B".
NOW CUT THE SPLINES TO FIT THE GROOVES.

12. Prepare a piece of stock 3/4" x 4" wide x 6" long.
13. Set saw blade height at 7/8".
14. Make a short test cut in a small piece of scrap and measure width of kerf carefully. (It is usually 1/8")
15. Set rip fence the full width of this saw kerf away from inside tooth. Use quill feed for final adjustment.

Note: Splines must be a snug fit in grooves, so be sure of this setting. Grain of splines must be at 90° to grooves.

16. Stand stock on end; press down with right hand and hold side against fence with left.

17. Make cut slowly. (See page 78 of textbook.)
18. Turn stock around and make second cut on same end, but on opposite face.
19. Turn stock on other end and repeat same two cuts.
20. Mark off 3/4" from each end of block and cut off.
You now have four splines to fit your grooves. Assemble frame with glue and splines; when glue has dried, sand off projecting ends of splines.

Note: To spline the compound mitered frame made in Lesson 2, Assignment 13 follow the same directions with these exceptions:

1. Saw Table must be tilted at exactly the same angle used in cutting the compound miters. (30°)
2. Pieces are held flat against fence with beveled edge resting on table. Be sure there is table support for this edge.

3. Saw blade height must be sufficient to actually cut 3/8" deep in workpiece. This will be more than 3/8" projection.
LESSON 3
ASSIGNMENT 16

HOW TO MAKE END LAP JOINTS

DESCRIPTION:
Two pieces of stock of equal thickness can be joined in an end lap after removing half the thickness at one end of each from an area equal to the width of the mating piece. This is really nothing but two fitted end rabbets.

USE:
End lap joints permit flush surfaces with minimum effort and expense. They are used in door and cabinet frames, stretchers, screens and braces, and simple furniture.

OPERATIONS:

WARNING: When cutting lap joints, it is necessary to remove the upper saw guard. Whenever the upper guard is removed, keep the lower guard in place and work with extreme caution.

1. Prepare (2) pieces of stock $3/4" \times 1\frac{3}{4}" \times 16"$.
2. Set the saw blade height to 3/8" (1/2 stock thickness).
3. Place miter gauge in left table slot.
4. Place rip fence 1-3/4" to right of outside saw blade tooth.
5. Place edge of stock against face of miter gauge and end against rip fence.
6. Make crosscut on both pieces.
7. Adjust saw blade height to 1-3/4".
8. Set rip fence 3/8" to right of inside tooth.
9. Remove miter gauge.
10. Grasp the top of the stock with the right hand, crosscut surface toward saw blade, and press end flush on saw table.
11. Grasp the stock with the left hand just above the rip fence and press firmly against the fence.
12. Stand to left of line of saw blade.
13. Push stock slowly with both hands, while maintaining stock perpendicular.
14. After the cut is made, raise the stock up from table.
15. Repeat the cut on the other piece of stock.
16. Fit the two members together as shown on sketch on next page.

Note: On stock wider than the maximum depth of cut, omit steps 7 through 12. Substitute a series of crosscuts similar to Step 5 above. The stock is moved away from the fence a distance equal to the width of the kerf for each cut.
HOW TO MAKE A HALF LAP MITER JOINT

DESCRIPTION:
A half lap miter joint is a combination of a lap and miter joint. It is made, as in the half lap, by cutting away one half the thickness at the end of the two pieces to be joined. However, the area from which the material is removed is one half that required for the lap joint, being triangular instead of rectangular. Again, adjacent surfaces lie in the same plane when assembled.

USE:
Half lap miter joints are used where more strength and better appearance are required than is provided by the half lap. Glued together and allowed to set in clamps, the half lap miter joint is very strong and need not show any fastening. It is an excellent joint for many types of frames.

OPERATIONS:

WARNING: When cutting half lap joints, it is necessary to remove the upper saw guard. Whenever the upper saw guard is removed, keep the lower guard in place and work with extreme caution.

2. Place miter gauge in left table slot.
3. Adjust height of saw blade to 3/8". (1/2 stock thickness)
4. Place rip fence 1-3/4" to right of outside saw blade tooth.
5. Mark stock “A” and “B”.
6. Make cut across stock “A” with end against rip fence and edge against face of miter gauge.
7. Leave saw blade height the same.
8. Remove fence.
9. Set miter gauge at 45° right and place in right table slot.
10. Take stock "B", make 45° cut starting with inside saw blade tooth even with the left lower corner of stock.
11. Move stock left the width of saw blade kerf and repeat cut.
12. Make successive cuts until all waste stock is removed.

Move stock to right width of saw kerf after each cut

Note: saw guard removed for clarity.

14. Set rip fence 3/8" to right of inside saw blade tooth.
15. Again take stock "A".
16. Grasp top of stock with right hand, press end flush on table and crosscut surface away from fence.
17. Press stock against rip fence using left hand.
18. Make cut slowly keeping stock perpendicular and firmly against rip fence at all times.
19. Lift up when cut is complete.

Note: Again, as in making the half lap joint, on stock too wide for the height of the saw blade, the surplus stock will have to be removed on stock “A” by making successive saw kerfs as was done on “B”.

20. Remove fence.
21. Adjust saw blade to 1” height.
22. Set miter gauge 45° left and place in left table slot.
23. Place stock “A” with uncut surface on table and make 45° cut through lower corner of joint end, starting with inside saw blade tooth even with right lower corner of stock.

Note: Saw guard removed for clarity
24. Fit "A" and "B" together as shown in sketch below.
LESSON 3  
ASSIGNMENT 18

HOW TO MAKE TENONS FOR MORTISE AND TENON JOINTS

DESCRIPTION:
A tenon is an integral projection on the end of a piece of stock, usually called the "rail". This projection is made to fit into a cavity in another piece of stock. The second piece of stock is called the "leg", and the cavity the "mortise". (See page 83 of textbook.)

There are several types of mortise and tenon joints such as blind, haunched, open, stub, keyed, barefaced, and pinned. Sizes of tenons are determined by the stock on which cut. A good rule is: "Make thickness of the tenon one half thickness of stock and tenon length equal to stock thickness plus 1/4 inch."

USE:
Mortise and tenon joints are used in leg and rail construction for well-made tables, chairs, and benches. They permit strength and durability to be combined with excellent external appearance.

OPERATIONS:

WARNING: When cutting tenons, it is necessary to remove the upper saw guard. Whenever the upper guard is removed, keep the lower guard in place and work with extreme caution.

1. Prepare a piece of stock 3/4" x 3" x 12".

Note: This size stock requires a tenon 3/8" thick, 1" long with 1/2" shoulder on one edge.
2. Adjust saw blade to 1" height.
3. Move rip fence 9/16" to right of inside saw blade tooth.
4. Grasp top of stock with right hand and press end of stock down on table.
5. Press side of stock against rip fence with left hand.
6. Make cut slowly lifting up after completion.
7. Repeat on other side. These are the "cheek" cuts.

8. Set miter gauge in left table slot.
10. Place clearance block 1" to right of outside saw blade tooth.
11. Make cuts on both sides of stock with edge against miter gauge face and end against clearance block.

Note: These are called the "shoulder" cuts. Steps 2 through 11 could be done with repetitive shoulder cuts, moving the stock one saw blade kerf each time. However, this would be much slower and gives a rougher tenon.
LESSON 3
ASSIGNMENT 18

12. Adjust saw blade to 1/2" height.
13. Make cut across one end using clearance block.
14. Move stock one kerf width to left and repeat cut.

15. Continue cuts until top edge of tenon is formed.
16. The tenon should now look as sketched below:

Note: Save this tenon as in future lessons we will make a mortise to fit it.
HOW TO MAKE TENON FOR HAUNCHED MORTISE AND TENON JOINT

(Part I)

DESCRIPTION:
A haunched mortise and tenon joint is designed to receive the corner of an inserted panel. First a groove is cut in one piece of stock and then a mortise is cut in the groove. The width of the mortise is the same as that of the groove. A tenon with the corner notched out is cut in the second piece of stock. The haunch will fill the end of the groove previously cut.

USE:
Haunched mortise and tenon joints are used in the construction of panel doors, paneled cabinets, bulletin boards, folding screens and similar framing.

OPERATIONS:
1. Prepare two pieces of stock 3/4" × 2" × 16" and mark "A".
2. Take stock "A" for the tenon.
3. Place rip fence 9/16" to right of inside saw blade tooth.
4. Adjust saw blade height to 1".
5. Make cheek cuts as in cutting tenon (Steps 3 through 7 of Assignment 18).
6. Place miter gauge in left table slot.
7. Adjust saw blade height to 3/16". Mount clearance block on fence.
8. Place fence so clearance block is 1" to right of outside saw blade tooth.
9. Make shoulder cuts on both sides of stock "A".
10. Remove block. Place rip fence 5/8" from outside saw blade tooth.
11. Adjust saw blade height to 3/4".
12. Make shoulder cut on one edge of stock.

13. With a knife chip off the end of tenon down to the shoulder cut, or remove stock with repetitive saw cuts.

14. This will leave a haunch 3/8" long and 3/8" thick to fill the end of the groove we will now cut.
15. Make the setup above for grooving. (See Steps 11 through 17 of Lesson 1, Assignment 6).

Groove THIS edge of Stock “A”

16. Make groove 3/8” wide and 3/8” deep on edge of stock “A”.
17. Make similar groove on stock “B”.

Note: PART II—Construction of the mortise, will be described in Lesson 6 of this course. Save the haunched tenon (A) and the grooved stock (B) in order to complete construction of the finished joint.
TEST QUESTIONS ON LESSON 3

TRUE OR FALSE: Circle your selection.

T F 1. Feather boards are used for the sole purpose of holding the stock against the ripping fence.
T F 2. The grain of a spline runs in opposite direction to the groove.
T F 3. Both members of a half lap joint must be the same width.
T F 4. When removing the surplus material in a half lap miter joint, the same method can be used on each member.
T F 5. In making the half lap miter joint, the miter cut is made across the entire width of both members.
T F 6. The saw blade height remains the same when cutting all shoulder cuts on the tenon.
T F 7. The haunch on a haunched mortise and tenon joint is the same thickness as the groove.
T F 8. The groove in stock "B" forms a part of the mortise in a haunched mortise and tenon joint.
T F 9. Part of the tenon is removed in cutting the groove on stock "A" of the haunched mortise and tenon.
T F 10. There is a top shoulder cut on the haunched mortise and tenon joint.
T F 11. The spring action in a feather board is affected by the angle between the edge of the board and the saw table.
T F 12. The grooves for the spline are cut perpendicular to the mitered surfaces.
T F 13. One quarter the thickness of the stock is removed from one end of each of the two pieces in a half lap joint.
T F 14. When the stock to be joined in a half lap joint is not as wide as the maximum depth of cut the excess stock is usually removed by making successive crosscuts.
T F 15. Tenons are made to fit snugly into mortises.
T F 16. If the rail is 3/4" thick the tenon should be 1-1/8" long.
T F 17. The stock is held against the face of the miter gauge and the rip fence when making cheek cuts.
T F 18. The vertical cuts for forming the cheeks on the tenon are made before the crosscuts.
T F 19. The purpose of the haunch on a haunched mortise and tenon joint is to increase the strength of the joint.
T F 20. It is good practice to make the thickness of the tenon equal to 1/2 the thickness of the stock.

MULTIPLE CHOICE: Underscore your choice.

1. Splines should fit in the grooves (fairly loose) (very tight) (just snug).
2. Half lap miter joints are used because (they are stronger) (better outward appearance) (easier to make).
3. In making the spline joint in Assignment 15 a (blind) (corner) (through exposed) spline is used.
4. There is only one (are two) ways of sawing off the surplus material on stock "A" in a half lap miter joint.
5. The thickness of a tenon is determined by (the width of the rail) (the thickness of the rail) (the length of the rail).
6. In cutting the shoulders on a tenon the waste stock is (between the saw and ripping fence) (drops off on table to left of saw).
7. In making the vertical cuts on a tenon, you should stand (to left) (to right) (directly behind) the line of saw cut.
8. In cutting the cheek cut on the haunched mortise and tenon joint, the saw is set at (3/16") (9/16") (1/2") from the ripping fence.
9. Mortise and tenon joints are used most in (furniture) (picture frames).
10. The tenon made in Assignment 18 is for a (blind) (through) (keyed) mortise and tenon joint.
HOW TO CUT DADOES

WARNING: When cutting dadoes, it is necessary to remove the upper saw guard. Whenever you remove the upper saw guard, keep the lower guard in place and work with extreme caution.

DESCRIPTION:
A dado is a rectangular groove cut across the grain of stock into which the edge or end of other stock fits. Common types, named in accordance with design are: "plain"; "dovetail"; "blind"; and "corner".

USE:
Dadoes are used extensively in building bookshelves, benches, garden furniture, tables, wall brackets, drawers, cabinets, etc. when a simple, straight line pattern is followed. In such cases, use of a dado permits rapid construction, quick assembly and adequate strength.

OPERATIONS:

WARNING: When cutting dadoes, it is necessary to remove the upper saw guard. Whenever the upper guard is removed, keep the lower guard in place and work with extreme caution.

1. Prepare a piece of stock 3/4" × 6" × 14".
2. Square a line across one edge 5" from one end.
3. Square another line 3/4" away.
LESSON 4
ASSIGNMENT 20

5. Separate carriage and headstock until saw blade just clears left side of table insert. Lock carriage.

6. Place unmarked edge of stock against miter gauge and butt end against fence.
7. Position stock by moving fence until squared line farthest from fence is even with outside tooth of saw blade. Lock fence.

8. Extend quill until saw blade just clears right side of table insert and lock quill.
9. Set depth dial at "0" and lock.
12. Advance stock slowly by pushing miter gauge while oscillating the quill rapidly within the limits permitted by the stop setting of the depth dial.

WARNING: Hold stock very firmly in position with the right hand and oscillate the quill with the left. Use of the safety grip very greatly assists this operation. Stop motor and return miter gauge and stock.

13. Advance quill to stop and lock.
14. Move fence to position stock until squared line nearest the fence is opposite inside saw blade tooth. Lock fence.

Note: Saw guard removed for clarity.
15. Repeat Steps 10, 11, and 12. The stock should now appear as follows:
HOW TO CUT A STOP DADO

DESCRIPTION:
A "stop dado", also called a "blind dado" and a "gain", is a dado cut less than the full width of the stock. A corner is cut out of the stock to be fitted equal in length to section not dadoed.

USE:
Stop dadoes are used when the details of the joint should not be evident when viewed from one edge.

Note: A dado can, of course, be stopped short of both edges in which case the details of the joint can not be seen from either edge.

OPERATIONS:

WARNING: When cutting stop dadoes, it is necessary to remove the upper saw guard. Whenever the upper guard is removed, keep the lower guard in place and work with extreme caution.

Prepare a piece of stock 3/4" × 6" × 14" or use stock prepared for Assignment 20.

1. Square lines 3/4" apart across one edge and 5" from end. Adjust saw blade to 3/8" height.
2. Fasten a stop block of scrap stock on the rear of the table opposite the miter gauge using a C-clamp. Adjust the scrap block to stop a cross cut 1/2" short of the full width of the stock.
3. Cut stop dado, to the extent permitted by stop block, following exactly the procedure used in Assignment 20.
4. Square up the end of the dado with a hand chisel.

5. Cut a notch $3/8'' \times 1/2''$ in the edge of a small piece of stock having the same thickness and width as the stock dadoed.

6. The two pieces should fit together snugly.
HOW TO CUT A COVE MOLDING

DESCRIPTION:
Moldings are pieces of stock which have been shaped by cuts that, in cross section, are straight, concave, convex, angular, or circular. Such stock is then used for decoration purposes. The cuts can be made with the circular saw, the jointer, molding cutters, or a combination of cuts by these tools.

OPERATIONS:

WARNING: When cutting molding, it is necessary to remove the upper saw guard. Whenever the upper guard is removed, keep the lower guard in place and work with extreme caution.

Let us cut a mold which is a combination of a straight and a concave cut, as sketched:
1. Prepare one piece of stock $3/4'' \times 5'' \times 12''$ and another $3/4'' \times 2'' \times 20''$.
2. Outline the cross section of the mold on one end of the 5'' wide stock and mark one side of the same piece "S" as indicated in sketch.

3. Lock rip fence 1'' from outside tooth of saw blade.
4. Set saw blade to 1/8'' height.
5. Place 12'' stock on table, edge to be molded against fence, and marked side up. Make rip cut.

6. Set saw blade to 1'' height.
7. Lock rip fence 5/8'' from inside tooth of saw blade.
8. Place edge of stock to be molded on table, hold marked side against fence and make rip cut.
9. The stock is now cut by rabbet $1/8'' \times 1''$. 

Mark this face "S"

Draw outline here

Marked face

Fence

Stock

1/8''

1/8''

1/8'' × 1''

rabbet

Drawing of cove
10. Set saw blade to 5/8" height.
11. Clamp guide stick (stock 3/4" x 2" x 20") on table to left of saw blade angled from the front center towards back left corner.

Note: See illustration on page 100 of textbook.

12. Place stock on table with marked side up and uncut edge against the guide stick. Adjust position of stock by moving guide stick until the top of the arc indicating the convex cut is even with maximum depth of cut and the other end of the arc is even with the tip of a saw blade tooth positioned 1/8" above table.

Note: The correct positioning of stock and guide strip will require considerable trial and error. It is easiest to do by sighting flat across table top in line with the cut edge of the stock. You can then line up the outside of the blade with the mark on the end of the stock.
13. Clamp feather board to table to hold stock against strip. Set saw blade to 1/8" height.
14. Make cut holding stock against guide strip and feeding slowly.

WARNING: Stand to left of line of cut and keep hands close to guide strip.

15. Lift stock from table upon completion of cut. Raise saw blade 1/16" and make similar cut. Repeat until cove cut reaches the scribed arc.

Note: A sharp "combination" or "rip" saw blade should be used for this operation.

You will notice that the cove cut is not an exact arc. Hand sanding will correct, if desired.

The use of the Mark V Dado, or 6" Dado Assembly, will permit cutting the cove in fewer passes.
HOW TO CUT SAW KERFS FOR BENDING

DESCRIPTION:
Pieces of stock may be bent by crosscutting equally spaced kerfs in the portion of the stock to be bent. The spacing and depth of the kerfs depends upon the amount of bend and the flexibility of the stock.

Note: See illustrations on page 97 textbook.

USE:
Bending stock by means of kerf cuts is a quick, practical method of constructing garden arbors, edges for drum tables and stools, or other projects requiring arched, curved or bent integral parts.

OPERATIONS:

WARNING: When cutting saw kerfs for bending, it is necessary to remove the upper saw guard. Whenever the upper guard is removed, keep the lower guard in place and work with extreme caution.

1. Prepare a piece of stock 3/4" × 1-3/4" × 18".
2. Install miter gauge extension.

Note: If you do not have a miter gauge extension, construct one using piece of stock 3/4" × 2-1/2" × 18". Fasten to miter gauge with flat headed stove bolts. Counter sink or counter bore bolt holes.
3. Set saw blade to 5/8" height.

Note: See method of determining kerf spacing shown in sketch at top left of page 98 of textbook.

5. Place miter gauge in left table slot and make cross cut through extension.

Note: Let us decide that 3/8" will be the "kerf spacing".

6. 3/8" to the right of this cut, drive a 6 penny finishing nail 1/2" from bottom edge.
7. Cut off nail 1/2" from surface of extension. (See sketch)

8. Place stock on table, edge against miter gauge extension and end touching nail.
10. Move stock to right placing kerf over nail in extension and repeat cut.

11. Continue until kerfs are made the full length of stock.
12. The stock may now be readily bent.

Note: Dampening the outside surface of stock reduces the probability of cracking.
HOW TO CUT 4' X 8' SHEETS OF BUILDING MATERIAL

Note: In view of the cost of the stock required, completion of this assignment during Lesson 4 is optional. If deferred, it is recommended that these instructions be referred to at the time the cut is made.

DESCRIPTION:
Much building material suitable for power tool woodworking is sold in 4' x 8' sheets 1/8" to 3/4" thick. An initial cut on such sheets, bisecting the length, requires a power saw with a full 48" rip capacity. Any other rip or cross cut requires less capacity.

USE:
In view of the weight of a sheet thicker than 1/4", a roller stand will assist during initial cuts.

OPERATIONS:

WARNING: Do not rip large sheets of plywood or similar materials by yourself. Use a rear support table and get at least one helper. For heavy sheets, get two helpers.

1. Select a 4' x 8' sheet of stock.
2. Lock headstock and carriage at the extreme right end of ways.
3. Raise table just clear of saw blade teeth and lock.
4. Mount extension table at left end of ways, set to same height as saw table, and lock.
5. Lock rip fence on extension table 47-15/16" from inside saw blade tooth.
LESSON 4
ASSIGNMENT 24

Note: Lock rip fence at extreme left edge of extension table. Extend quill to obtain desired distance and lock.

6. Place "run-off support" for each half sheet.
7. Make several practice passes, keeping left edge of plywood firmly against rip fence during complete pass.

8. Set saw blade 1/2" above top of stock.
9. Lock extension table to same height as saw table and be sure runoff supports are at this same height.
10. Start motor and make rip cut. Feed slowly and keep stock very firmly against rip fence. Avoid any tendency to "wobble" the stock.
HOW TO RESAW LUMBER

DESCRIPTION:
Resawing is ripping stock to produce two or more pieces with the same length and width as the original.

USE:
Resawing provides one or more pieces of thinner stock from a single piece of material on hand.

OPERATIONS:
1. Prepare a piece of stock 3/4" x exactly 4" x 24". Let us resaw this stock to 3/8" thickness.
2. Set saw blade to 1-15/16" height. This will leave 1/8" of uncut wood in the center for work support.

Note: Use rip saw blade, if available.

3. Lock rip fence 3/8" from inside saw blade tooth.

WARNING: Do not attempt to resaw stock that is warped or has a “wind”. Under such conditions there is danger of a kickback.

4. Place a 1-5/8" thick scrap block between table and feather board, and clamp so that feather board will hold stock against fence just ahead of blade.
5. Place edge of stock on table and make rip cut while keeping side of stock firmly against fence. Feed slowly.
6. When cut is complete, remove stock from table by lifting up and over the rip fence.
7. Turn stock end for end and repeat Step 5. Be sure that same side is kept against rip fence.
8. The stock now should appear as follows:

![Resawed Wood](image)

9. Break the 1/8" strip of stock in the center with your hand by pulling the halves apart, and sand resawed surface of 5/8" section.

![Sanding Ridge](image)

Note: Depth of cut which leaves an unsawed center section prevents danger of contact between revolving saw blade and loose outside piece.
HOW TO USE THE MOLDING HEAD  
(OPTIONAL ASSIGNMENT)

DESCRIPTION:
A molding head is designed for mounting on the table saw in place of the saw blade. Then operated with a set of three identical knives installed, a mold can be quickly cut in the surface or edge of stock.

USE:
Molds required in the surfaces or edges of stock which exceed the capacity of the shaper usually can be cut with the molder. The molds may be decorative, such as the “four-bead” mold or functional like the “tongue” cutter. Selection of knives can be made from a wide assortment available at your dealer.

OPERATIONS:

WARNING: When using the molding accessory, it is necessary to remove the upper saw guard. Whenever the upper guard is removed, keep the lower guard in place and work with extreme caution.

1. Prepare one piece of stock 3/4” × 6” × 18”, and another 3/4” thick having width and length equal to one side of the rip fence.
2. Mount molding head with a set of knives (use a surface decorating pattern such as “four-bead”) installed.
3. Mount molding insert and adjust table height for 1/8” depth of cut.
4. Turn molding head by hand to be sure the knives clear the insert.
5. Lock fence 3” to the right of inside edge of knives.
6. Place 6” wide stock on table, edge against rip fence, and make pass.
Note: Placing stock so that knives will cut with the grain rather than against, produces a smoother cut.

7. Stop motor. Increase depth of cut 1/8” and repeat Step 6. Repeat until desired depth of cut is reached.

Note: This is the technique for all molding cuts in the center face of the stock. Dimensions will vary, but not the operations.

8. Make a facing for the rip fence. (See description and illustration on page 94 of textbook.)

Note: To make semi-circular cut-out: Use “blank” cutter knives. Mount facing on the left side of rip fence. Position fence to place outside half of facing thickness over knives. Lower table very slowly. Turn off machine and raise table. Shift facing to right side of fence, un-cut side out. Position fence and complete cut-out.

9. Mount edge molding knives (such as “Ogee”, or “Cove”, or “Quarter Round”).
10. Mount facing on left side of fence.
11. Position rip fence to place the outside surface of facing in line with the inside edge of knives.
13. Place stock on table, edge against miter gauge and butt end against facing.

14. Make cross-grain cut.

Note: Use very slight depth of cut on each pass to prevent chattering. Lower table only 1/16” between passes until desired depth of cut is reached.

Note: This is how all end molding is done. Always mold across ends before molding edges. The edge cuts will then remove splinters left by the end cuts.

15. Raise table for 1/8” depth of cut.
16. Place face of stock down on table with edge against rip fence.
17. Make passes, lowering table 1/8” each time, until desired depth is reached.

Note: This is how most edge molds are made. You can also mold edges with face of stock against fence and edge down on table. However, when doing this, it is imperative that you have work support for part of the edge throughout the entire pass.
TEST QUESTIONS ON LESSON 4

TRUE OR FALSE: Circle your selection.
T  F  1. When cutting dadoes with the saw, waste material can be removed by oscillating the quill.
T  F  2. The depth of a dado is determined by the thickness of the inserted stock.
T  F  3. A chisel is used to complete the groove in a stop dado.
T  F  4. The same operation is used to remove the surplus stock in a stop dado as in a regular dado.
T  F  5. The arc cut on a mold with the saw is a perfect semicircle.
T  F  6. The guide strip used in cutting the cove was parallel to the saw blade.
T  F  7. The spacing of the saw kerfs in bending stock is determined by trial and error.
T  F  8. In cutting a large sheet of plywood, bisecting the length requires more rip capacity than subsequent cuts.
T  F  9. The same surface should be against the ripping fence when making both rip cuts in resawing.
T  F 10. A rectangular groove cut with the grain is called a dado.
T  F 11. A "stop dado" gives more strength in a joint than a full dado.
T  F 12. The use of a "stop block" when cutting dadoes will control the length of the dado.
T  F 13. A cove mold can not be cut with a Magna Dado.
T  F 14. Correct spacing of kerfs when cutting stock for bending, depends upon accurate measurement with a steel rule.
T  F 15. Nothing but care by the operator will prevent properly cut stock from cracking as it is bent.
T  F 16. A helper who is assisting during the ripping of large stock should help guide the cut.
T  F 17. A crosscut saw blade, if available, should be used when resawing.
T  F 18. If resawing of warped stock is attempted, a kick back may result.
T  F 19. When resawing, use a depth of cut slightly more than half the width of stock.

MULTIPLE CHOICE: Underscore your choice.
20. Dadoes are cut in stock (across the grain) (on the end) (on the edge).
21. In fitting shelves in a bookcase, you cut (a rabbet) (a tongue and groove) (a dado).
22. The depth of each successive cut in sawing a cove is increased (1/16") (5/16") (1/4").
23. The cove is cut (before) (after) the rabbet cut.
24. The saw kerfs are cut to within (1/16") (1/4") (1/8") of the finish side in bending.
25. The standard width of plywood is (3") (4") (6").
26. The section of a 4' x 8' sheet of plywood not being cut off may be held up (by the extension table) (with C-clamps on the table) (by a floor rest).
27. In resawing a 4' board, the saw blade should be set (3") (2-1/16") (1-15/16") above the table.
HOW TO DRILL PILOT HOLES IN SOFTWOOD

DESCRIPTION:
A "pilot hole" or "lead hole" for a wood screw is a straight hole having a diameter equal to that of the root of the screw, and depth equal to half the length of threaded portion.

The pilot hole is drilled at the angle required for the driven screw.

USE:
A "pilot hole" is drilled so that the screw can be driven with ease at the angle required. In addition, there is less probability of damage to the stock and to the screw head.

OPERATIONS:
Let us drill four pilot holes for 1-1/4" - #10 wood screws.

1. Prepare two pieces of stock 3/4" × 2" × 7-1/2".
2. Set Mark V in Vertical Drill Press position. (See page 125 of textbook.)
3. Scribe a longitudinal center line on the side of one piece. Intersect this line with four equally spaced squared lines. Make punch marks at the four intersections.
LESSON 5
ASSIGNMENT 27

4. Secure correct drill bit in the chuck and lock table 3” below drill point.

WARNING: NEVER leave the key in the chuck. Remove the key immediately after securing the drill bit.

Note: Exact drill bit size is listed in table on page 132 of textbook.

5. Place unmarked stock on table, edge butted against rip fence.
6. Place second piece of stock, scribed side up, on top of first piece.
7. Position stock by moving rip fence to place right hand punch mark directly under drill bit point. Lock fence.

Note: You can also use table raiser to move table and fence forward or back to align the marks with the drill bit.

8. Extend quill until drill bit point enters punch mark. Lock quill.
9. Set depth gauge at 1” mark and lock.
10. Release quill
11. Start motor and turn speed dial to "K".

Note: See "Operational Speeds" chart on page 130 of textbook.

12. Slowly feed drill bit, keeping stock in the fixed position, until checked by stop.
13. Drill pilot holes at the remaining three punch marks. This is the manner in which all pilot holes are drilled, since the screw shank can form its own hole in soft wood. On a carefully finished job you should counternail for flat head screws. (See next Assignment.)
LESSON 5
ASSIGNMENT 28

HOW TO DRILL HOLES FOR SCREWS IN HARDWOOD

DESCRIPTION:
Screws may be readily set into hardwood by drilling a pilot hole having a diameter equal to that of the root of the screw and a clearance hole equal to that of the shank or gauge of the screw.

Countersink

Shank Hole

Pilot Hole

Note: Correct drill bit size is listed in table on page 132 of textbook.

Screw holes in hardwoods are countersunk (sketch above) to bring screw head flush with surface when the screw is driven. The screw head can be covered with a wood plug, when screw is driven, if the hole is counterbored (sketch below).

Counterbore

Clearance Hole

Pilot Hole

Dimensions of holes for accommodating screw heads vary with the type of screw used: Common types are shown below:

Oval Head

Flat Head

Round Head

All three heads are either slotted or recessed.
USE:
Screw holes are drilled in hardwood so that the screws can be readily driven at the correct angle to hold the material with maximum strength. In addition, drilled holes reduce the probability of damage to the screws and to the material joined.

OPERATIONS:
1. Prepare two pieces of hardwood 3/4" × 3" × 7-1/2".
2. Make four punch marks 1-1/2" apart in the surface of one piece, and on a line 3/8" from one edge.

![Diagram of hardwood with drill marks and measurements]

Note: Let us drill for 1-1/2" - #8 round head screws and without countersink or counterbore.

3. Secure correct drill bit in the chuck and lock table 3" below drill point.
4. Using scrap stock under the hardwood, drill four clearance holes completely through stock. Follow procedure specified in Operations 5 through 12 of Assignment 27.
5. Position drilled stock on the edge of the other piece of hardwood as indicated in following sketch.

![Diagram of hardwood with marks and instructions]

6. Feed a punch through the drilled holes and mark the centers of pilot holes on edge of hardwood.

Note: Be sure to keep all edges of both pieces of hardwood in exact alignment while marking centers. Use a punch which almost fills the drilled holes.
7. Secure an 11/16 inch drill bit in chuck. (See table on page 132 of textbook. Also refer to Note following Sketch 3, Assignment 29.)
8. Place stock on edge against rip fence and position right hand hole under drill bit point.
9. Drill the four pilot or lead holes following procedure specified in Operations 5 through 12 of Assignment 27 except set depth gauge for 3/8”.
10. Place the two pieces in proper alignment, insert screws and drive.

Note: If the screws bind, coat the threads with paraffin or soap.
HOW TO COUNTERBORE FOR SCREWS

DESCRIPTION:
Counterboring is increasing the diameter of part of a hole. When the clearance hole for a wood screw is counterbored to receive the screw head, it is necessary to increase the depth of the clearance and pilot holes an amount equal to the length of the counterbore. The size of the counterbore is made large enough to accommodate the entire head of the screw below the surface of the stock. Counterboring may be done before clearance and pilot holes are drilled. However, since counterbores usually have removable pilots, such drilling may be done last.

USE:
Counterboring of screw holes is used: a) to allow the root of the screw to enter the stock to be joined when the thickness of the stock counterbored is greater than the length of the screw. b) to cover the screw head with a wood plug. The plug may be required for concealment, protection, or decoration.

OPERATIONS:
Let us counterbore 1" deep for 1-1/2" - #10 flat head screw.

1. Prepare a piece of stock 3/4" × 1-3/4" × 7-1/2".
2. Scribe a longitudinal center line on one edge of stock. Intersect this line with four equally spaced squared lines. Make punch marks at the four intersections.
LESSON 5
ASSIGNMENT 29

4. Place side of stock against fence and position right hand punch mark under point of drill bit.
5. Drill four holes 1" deep.

Note: When setting depth dial with a twist drill mounted in chuck, be sure that lead point of drill bit is embedded in punch mark and lips of drill bit are touching surface of stock. The limit of travel of the flutes determines the bottom of the hole.

6. Replace drill bit with one of size 3/32".
7. Place scrap under stock to be drilled.
8. Drill four lead holes in the center of the counterbores to a depth of 1".
HOW TO DRILL ANGULAR HOLES

DESCRIPTION:
Let us drill straight holes in flat stock having parallel center lines that form sharp angles with one side and extend through the adjacent edge.

USE:
Screw holes of this type may be used when joining table and cabinet tops to the rails or sides. They may be used whenever the edge of stock is joined to a flat surface without the use of brace, bracket, dado, ledge, etc.

OPERATIONS:
Let us drill four 3/16" diameter holes.

Method 1

1. Prepare a piece of stock 3/4" × 5" × 15".
2. Scribe a longitudinal on one side 1-1/4" from one edge. Intersect this line with four squared lines 3" apart. Make punch marks at the four intersections.
4. Drill 3/8" holes 1/4" deep, angled 90° to the surface, centered at punch marks.
5. Replace drill bit with 3/16" size.
6. Tilt table to 20° mark and lock.

7. Place fence on lower half of table and cover upper side of fence with a piece of scrap.
8. Position lower wall of right hand hole under point of drill bit by adjusting position of fence and stock.
9. Drill through the lower edge of stock. The hole should come out approximately in the center of the lower edge.
10. Drill similar holes at the other three punch marks.

Holes Could be Counterbored Like This by Starting with a Larger Drill Bit
Method 2

1. Prepare a piece of stock 3/4" × 1-3/4" × 8".

Note: This stock will be used as a "Leveling Block".

2. Perform Operations 1, 2, 5, 6 and 7 of Method 1.
3. Set edge of leveling block on scrap and side flat against stock to be drilled. Slide block until it is centered over the squared line through the right hand punch mark.

4. Position the fence, block, and stock so that the drill bit point will enter the top edge of the block close to the surface of the stock and aligned with the right hand punch mark.
5. Drill similar holes at the other three punch marks using the same leveling block.
HOW TO DRILL HOLES AT COMPOUND ANGLES

DESCRIPTION:
When a hole is drilled in the underside of a table top at a compound angle, the center line of the hole will tilt in two directions from the perpendicular. (See page 136 of textbook.)

USE:
Holes drilled at compound angles are used for fitting legs in tables, chairs, stools and benches. Fasteners, such as screws, dowels, and pegs applied at compound angles, are extensively used in cabinet work.

OPERATIONS:
Let us drill four holes which allow legs to tilt at equal compound angles. (20°)

1. Prepare one piece of stock 3/4" x 12" x 12", and another 3/4" x 3" x 12".
2. Make four punch marks at the intersections of lines drawn 2" from each edge of 12" square.
3. Set table at 70°.
4. Set miter gauge 45° to left of 90 and place in right hand table slot.
5. Secure a 3/4" spur bit in chuck.
6. Loosely clamp the 3" wide stock diagonally across the lower right corner of the table.
7. Place 12" square stock on table, marked side up, and bottom edges butted against miter gauge and clamped stock.
8. Determine the depth to set on dial by holding one edge of square stock against bit extended to table surface. Set depth gauge dial at "0" when the spur of bit is just short of bottom surface and lock.

![Diagram of bit and stock]


Note: Larger stock can be positioned for compound angle drilling by using miter gauge and angle stock as guides on the upper half of table. In such case, it is advisable to clamp stock to table. The same type of drilling, in large stock, can also be readily done with Mark V set in Horizontal Boring position.

10. Drill holes at four punch marks. Insert short sections of 3/4" dowel, if available.
HOW TO MAKE A DOWEL JOINT ON A TABLE LEG

DESCRIPTION:
A dowel joint is made by drilling matched holes in fitted surfaces so that one dowel can be accommodated in each pair of holes. When joining legs and rails, the dowel size is governed by the size of the stock used. A good rule is "dowel diameter equal to one-half rail thickness". The length of the dowel should be "twice rail thickness plus one-half inch".

USE:
Dowel joints are used extensively in cabinet making. Use permits quick and accurate assembly of furniture and strength in the completed project. In addition, they require less material than many other types of joints.

OPERATIONS:
1. Prepare two pieces of stock: 3/4" × 3-1/2" × 12", and 1-3/4" × 1-3/4" × 12".
2. On one end of 3-1/2" wide stock, scribe longitudinal center line. Intersect with squared lines 3/4" from both ends of center line. Punch mark the two intersections.
LEsson 5

ASSIGNMENT 32

Note: It is customary to locate rail close to outside surface of leg.

5. Set left edge of table under end of drill bit, lock carriage and headstock.
6. Butt side of leg against fence, punch marks facing headstock and marked end towards back of table.
7. Adjust table, fence, and stock to place one punch mark in line with spur point of drill bit and 1" away. Lock table and fence.

9. Set depth dial at 1-1/16".

Note: Extra length of hole, compared to dowel, provides room for glue that will be forced to bottom of hole by dowel.

11. Start motor and set speed dial at “P”.
12. Drill hole.
13. Reposition stock and drill second hole.
14. Place miter gauge, set at 90°, in left table slot.
15. Place rail on table, punch marks toward headstock, edge against miter gauge and end butted against fence.

16. Drill holes as specified in Operations 7 through 12 above.
17. If 3/8" birch doweling is available, prepare two 2" dowels.
19. Set Mark V as 12" Disc Sander. Chamfer off ends of both dowels by "hand holding" ends against front edge of revolving disc. Support dowels on table and roll to bevel edge.
LESSON 5
ASSIGNMENT 33

HOW TO DRILL HOLES FOR DOWELED TABLE TOP

DESCRIPTION:
If holes drilled in the squared edges of stock match similar holes in other stock the pieces can be assembled and held together to form a table top. The number, diameter, and length of the dowels should be suited to the thickness of the stock.

USE:
The construction of a table top from a single piece of stock may be inadvisable because:
  a) Material not readily available.
  b) Cost is prohibitive.
  c) Possibility of warping.
  d) Laminated appearance is desirable.
A top, built up by doweling, overcomes these objections.

OPERATIONS:
1. Prepare two pieces of stock, 3/4" x 6" x 36".
2. Mark one side of each piece assuming that side has preferred appearance.

Note: In actual construction such selection insures the best possible appearance of the material and requires minimum sanding to produce an even surface.

3. Clamp stock together, marked surfaces out, and all edges matching.
4. Square three lines across long edges: at center and four inches from each end. See below.
5. Set Mark V in Horizontal Boring position.
7. Unclamp and place one piece of stock on table, marked side down, unmarked edge butted against fence.
8. Adjust position of fence, stock, and table to place spur of drill bit approximately level with center of stock and aligned with one of the squared lines.

Note: When following this method, it is not necessary to drill in the exact center of each edge. Variation in stock thickness causes unevenness of the under side of the top only. The marked sides, facing the table, will always be flush.

9. Drill 1-1/16" holes in the edges of both pieces at the scribe marks in accordance with procedure specified in Assignment 32.
10. If 3/8" doweling is available, prepare three 2" dowels.
11. Assemble stock with dowels.
LESSON 5
TEST

TEST QUESTIONS ON LESSON 5

TRUE OR FALSE: Circle your selection.
T F 1. In drilling holes for screws the clearance hole is made slightly smaller than the shank of the screw.
T F 2. The pilot hole should have a larger diameter than the clearance hole.
T F 3. An oval head screw requires a deeper countersink than a flat head screw of the same gauge.
T F 4. When counterboring is required, the clearance hole must be drilled first.
T F 5. The depth of the counterbore is governed by the length of the screw and the thickness of the stock.
T F 6. A leg fitted in a table top at a compound angle forms a single angle with the perpendicular.
T F 7. A leveling block is used for checking the accuracy of the drill table.
T F 8. When drilling dowel holes in stock for a table top it is necessary to find the exact center line of the edge being drilled.
T F 9. The diameters of the shank and root of a wood screw are equal.
T F 10. The diameter of the pilot hole for a wood screw is made equal to the diameter of the body of the screw.
T F 11. The same drill speed should be used for drilling in both soft and hardwood.
T F 12. The same amount of countersinking is required for round and flat head screws of the same size.
T F 13. Both the quill lock and the depth dial lock are often used when setting for depth of hole.
T F 14. Countersinking in softwood is not essential for making screw heads flush with surface.
T F 15. No more than two dowels should be used in each edge of stock used for a doweled table top.
T F 16. The edges of stock used for a doweled table top should be squared.
T F 17. Rails are usually joined to legs in the center of one side of the leg.
T F 18. The depth of hole for a table leg fitted at a compound angle must equal stock thickness.

MULTIPLE CHOICE: Underscore your choice.
1. When fastening two pieces of hardwood together with screws, the hole drilled in the second piece is called the (pilot) (clearance) hole.
2. The clearance hole for a 1-1/2" - #10 screw in softwood should be (3/32") (1/64") (3/16").
3. The (pilot) (clearance) hole is usually drilled first.
4. Countersinking in hardwood is not required for (round head) (flat head) screws.
5. The size of the dowel used to join rail and leg is determined by the (width of the rail) (size of the leg) (thickness of the rail).
6. Stock is matched and clamped together when locating dowel holes for a table top in order to be sure that the holes will be (opposite) (equal distances from the edges) (equal distances from the ends).
HOW TO MAKE A MORTISE

DESCRIPTION:
A mortise is a cavity cut in one piece of stock into which a tenon, cut in another piece of stock, is fitted. Mortises are named according to shape; round end or square end, and through or blind.

USE:
The mortise, as used in a wood joint, supports the tenon.

OPERATIONS:
Let us cut a blind mortise to fit the tenon made in Assignment 18 of Lesson 3.

1. Prepare a piece of stock 1-5/8" × 1-5/8" × 12".
2. On one side, scribe three lines at distance from one edge, as follows: 5/8", 13/16", and 1". Intersect these lines with two squared lines 1/2" and 3" from one end. Make punch marks on centerline 3/16" in from each end mark and then 3/8" apart in between.
5. Place stock on table, punch marks up, and a side butted against fence.
6. Adjust table, stock, and fence to position right hand punch mark under drill bit point.
7. Drill hole 1" deep.
8. Reposition stock and drill similar hole centered on left hand punch mark.
9. Drill similar holes successively, centered at punch marks, moving stock 3/8" to the left after each hole is drilled. Feed slowly.

Note: Cuts are made at both ends of a mortise before removing waste stock from the center in order to give maximum accuracy to the drill bit (or chisel) while cutting, particularly at the two ends. This helps to make a mortise with sides cut at the correct angle.

10. Remove waste stock on sides with hand chisel.

Note: Round end mortise can be changed to square mortise by squaring the ends with hand chisel. Round end mortises can be made exactly this same way with a router bit. The stock can be carefully slid along fence to permit router to remove waste (Operation 10). Do not attempt this with a drill bit. If desired, the two narrow sides of the tenon may be filed round to fit in a round end mortise.
11. Assemble mortise as shown below.
LESSON 6
ASSIGNMENT 35

HOW TO CUT A MORTISE FOR A HAUCHED TENON

Note: Use of mortising chisel in this assignment is optional. Mortise may be drilled as in Assignment 34 and squared with a hand chisel.

DESCRIPTION:
Let us cut a mortise that will support the tenon made in Assignment 19 (Lesson 3 of this course).

Note: For description of mortising attachment, hold-down, chisel, and bit, see page 141 of textbook.

USE:
A square mortise within a groove is used to support the square haunched tenon.

OPERATIONS:
1. Take stock B from Assignment 19 (3/4" × 2" × 16").
2. Square lines across grooved edge 3/4" and 2" from end.
4. Mount mortising attachment, 3/8" mortising bit and 3/8" mortising chisel. (See page 141 of textbook.)
5. Place stock on table, grooved edge up, and one side butted against fence.
6. Mount hold-down attachment.
7. Extend quill until tip of mortising bit is just even with the top of the stock. (NOT the bottom of the groove.)

8. Lock quill. Set depth dial for 1-1/16". Release quill lock. This will give a total depth of groove plus mortise of 1-1/16". The tenon made in Assignment 19 is 1" long. The extra depth is for clearance and glue.
9. Position stock as shown below for cut No. 1. Adjust location of stock along fence to align chisel with pencil mark. Feed table in or out to align chisel sides with sides of groove.
10. Reposition stock as shown below by sliding along fence. Make cut No. 2.

11. Slide stock along fence almost 3/8" and make cut No. 3. Repeat until cuts 1 and 2 are connected by mortise. Stock should now look like this.

12. Assemble haunched tenon from Assignment 19 in tenon as shown in sketch in Lesson 3.

Note: If you are using a drill or router bit instead of a mortising chisel you can follow all operations just as given. Line up drill very carefully. After Operation 11, you will have to square up the mortise with a 3/8" hand chisel.
HOW TO DRILL LONG HOLES

DESCRIPTION:
The average length of standard wood drills is about equal to the distance the average quill can be extended. This distance is approximately four inches. Deeper holes are long holes.

USE:
Long holes are drilled in lamp bases, posts or columns for supporting electrical fixtures, and to contain wire or conduit. Hollow shafts and cylinders of small diameter are made by drilling long holes. The clearance and pilot holes for deeply set screws frequently require long hole drilling procedure.

OPERATIONS:
1. Prepare a piece of stock 1-3/4" x 1-3/4" x 12".
2. Draw diagonals in both ends and punch marks at intersections.
3. Set Mark V in Horizontal Boring position.

Note: Long holes (over 4" deep) can be drilled with a standard wood drill bit if the stock is less than 8" long and can be drilled from both ends on a common center line. For this assignment, if an extension drill bit is not available, shorten stock to 7-1/2" and follow procedure outlined as applicable.

5. Place miter gauge in left table slot and fence on right side of table.
6. Butt side of stock against miter gauge and end against fence.
7. Position punch mark on left end in line with, and close to, point of drill by adjusting table, miter gauge, and fence. When positioned, lock carriage, headstock and fence. Lock miter gauge bar in slot.
LESSON 6
ASSIGNMENT 36

8. Start motor and set speed dial at "P".
9. Feed drill bit slowly while holding stock firmly against miter gauge and fence. (Accuracy may be further assured by clamping stock to miter gauge or table.)

Note: Forcing the drill bit will cause the point to follow the grain of the wood and creep from the centerline. Brad-point drill bits are less likely to follow the grain. Retract the drill bit frequently in order to bring out the chips.

10. When maximum quill extension is reached, retract quill and stop motor.
12. Repeat Operation 9 until full capacity of the drill bit has been used.

Note: If the extension drill bit is longer than 12" and the required drilling is completed from the left end, insert scrap between the right end and fence.

13. If drilling cannot be completed from one end, turn stock end for end and drill until holes meet. Leave settings of miter gauge and fence unchanged.
HOW TO DRILL HOLES FOR DOWELS IN MITERED CORNERS

DESCRIPTION:
A doweled miter joint is made from two pieces of similar stock by drilling matched dowel holes at an angle of 90° to the surfaces of the miter cuts.

USE:
Doweled miter joints are used in door frames, built-up panels, frames having simple mitered corners, and in furniture. It is a joint that provides additional gluing surface and increased resistance to bending and breaking stresses.

OPERATIONS:
Let us make a four-sided frame having doweled, simple mitered corners.

1. Prepare four pieces of stock 3/4" × 2-1/2" × 12".
2. Make 45° miter cuts at both ends of each piece leaving outside edges 11-1/2".
3. Scribe longitudinal center lines on each miter cut. Square lines 7/8" from both ends of the center lines and punch mark the intersections.

4. Set Mark V in Horizontal Boring position.
6. Set miter gauge at 45° to right of 90°. Place in left table slot and in reverse position.
7. Place one piece of stock on table, long end butted against face of miter gauge, and mitered end even with edge of table.
8. Position the back punch mark in line with point of drill bit, and close to it, by adjusting table, miter gauge and carriage. Lock miter gauge to table.
10. Clamp a scrap block on fence which prevents stock moving away from face of miter gauge.
11. Holding stock firmly against miter gauge, drill one hole in each end of all four pieces to a depth of 1-1/16”.
12. Adjust miter gauge and scrap block to position forward punch marks in line with drill point. Drill remaining 8 holes to the same depth.
13. Prepare eight 3/8” diameter dowels 2” long.
14. Assemble frame as indicated in following sketch.

Note: Dowel holes were centered exactly, instead of approximately, in this assignment. By so doing, less adjustment of the stock and its supports is required. However, if one face of all four pieces of stock is marked, and this marked face is always kept down on the table, holes need not be centered and joints will be flush.
HOW TO DRILL HOLES FOR A PEGGED JOINT

DESCRIPTION:
Two pieces of stock, butted, and held together by a dowel form a pegged joint.

USE:
Dowels or pegs provide strength in butt joints and are extensively used in box corners, drawers, and cabinet corners, pegged joints, in which rounded dowel ends extend slightly above the outside surface, are used in "Colonial" maple furniture.

OPERATIONS:
1. Prepare two pieces of stock 3/4" x 5" x 10", and four 3/8" dowels 2" long.
2. Square a line across the side of one piece 3/8" from one end. Make four equally spaced punch marks on this line.
3. Set Mark V in Horizontal Boring position.
5. Set miter gauge in left slot and fence on right side of table.
6. Place edge of unmarked stock against miter gauge, left end one inch inside left edge of table, and right end butted against fence.
7. Hold marked stock perpendicular to table, punch marks opposite drill bit and backed against end of stock on the table. Match edges of stock.
8. While keeping edges of stock matched, position back punch mark in line with drill point by adjusting table height and miter gauge.
9. Remove stock and lock miter gauge to table. Replace stock.
11. Drill similar holes centered on remaining punch marks, positioning stock by moving miter gauge.
HOW TO USE ROUTER FOR CUTTING A STOP RABBET

DESCRIPTION:
A stop rabbet is a rabbet which does not extend to both ends of the edge in which it is cut.

USE:
A stop rabbet is used in a joint to conceal construction detail when viewed externally.

OPERATIONS:
Let us cut a stop rabbet 3/8" × 3/8" on one edge which stops 3" from each end.

1. Prepare a piece of stock 3/4" × 3" × 12".
2. Set Mark V in Horizontal Boring position.
3. Mount router chuck with 3/8" router bit secured in place.
4. Mark one side of stock. Scribe a longitudinal on one edge, 3/16" from the marked side. Square two lines across the longitudinal, 3-3/16" from each end. Make punch marks at the two intersections.
5. Remove miter gauge. Place fence on left side of table.
6. Place stock on table, marked side down and unmarked edge butted against fence.
7. Position left edge of stock flush to the left of table edge by moving fence. Lock fence.
8. Position back punch mark in line with axis of router bit and close to the end of bit by adjusting table, stock, and carriage.

9. Hold stock firmly in place and cut hole 3/8" deep centered on back punch mark.

Note: Use maximum speed setting for router operation. Keep hands well clear of area into which router bit is cutting.

10. Move stock forward and cut similar hole centered on front punch mark.
13. Slide stock towards front of table until bit is centered in back hole. Stop motor. Stock now looks like this:

15. Make a third pass, completing the stop rabbet.
16. Square ends of rabbet with hand chisel if desired.
HOW TO DRILL HOLES IN METAL

DESCRIPTION:
Holes may be drilled in aluminum, copper, brass and other non-ferrous metals using any bits, other than auger bits, ordinarily used in wood. When drilling in metal the drill bit must be accurately centered, the quill fed slowly, and the spindle speed kept low. Holes drilled in steel and other ferrous metals require use of "high speed" drill bits to avoid very rapid dulling.

USE:
Drilling holes in metal is occasionally required when mounting trim, attaching wood to metal, altering or adding screw holes to metal fixtures, and similar projects which are within the capacity of woodworking power tools.

OPERATIONS:
Let us drill two small holes in strap iron.

1. Select a piece of strap iron 1/4" \times 1" \times 12".
2. Using a metal scribe, scratch awl, or nail, draw a longitudinal center line on one side. Square lines 3" from each end. Drive shallow holes with a centering punch at the two intersections. (See illustration on page 149 of textbook.)

4. Secure 1/8" high speed drill bit in chuck.
5. Remove miter gauge. Butt the edge of a piece of scrap stock (size not less than iron stock) against fence.
6. Place strap iron, punch marks up, on scrap and butt against fence.
7. Position right punch mark in line with, and close to, point of drill bit by adjusting carriage, fence, and stock.
8. Set depth dial to stop quill feed before bit reaches table. Start motor and set speed dial to "K".
9. Feed drill bit slowly, using constant pressure on quill feed handle, until drill bit enters scrap stock.
10. Reposition stock and drill through hole centered in left punch mark.
Note: a) Feed pressure and drill speed of primary importance when drilling metal. Whenever the drill bit stops cutting but continues to turn in contact with metal, "spot hardening" of the stock and damage to the drill bit will result. Application of cutting oil while drilling is advisable.
b) As the turning drill bit point leaves the metal and enters the scrap wood it tends to twist the metal stock. Hold all stock firmly against the fence at this stage of the operation. Metal stock less than 7" long should be clamped to table prior to drilling.
HOW TO DRILL HOLES IN GLASS

DESCRIPTION:
Grinding glass with the notched end of a soft metal tube is a quicker way of making a hole than power drilling using a twist drill bit. Rotating the notched end of a metal tube in contact with the glass lubricated by a mixture of oil and emery powder, will produce a clean through hole.

USE:
Screw or bolt holes in mirrors; holes in glass lamp stands for wires or fasteners; cuts in glass ornaments; attaching hinges or fixtures to glass doors; are examples of projects requiring holes drilled through glass.

OPERATIONS:
Let us drill a small diameter hole in a piece of glass (plate glass approximately 1/4" thick, if available).

1. Cut off a straight 6" length of 1/4" or 3/16" copper or brass tubing. Cut 4 notches 1/8" deep in one end using a hacksaw.

2. Select a piece of glass having about 10 sq. in. area and at least one straight edge 4" or 5" long.
3. Select spot in which to drill. If you wish to mark it, coat the area with white water color or thin paint.
5. Place glass in center of table, painted side up, and edge butted against fence. Beneath glass have a smooth piece of plywood or similar stock.
6. Build a ring of putty on the glass around the center mark. Make the inside diameter of the ring about 3/8".
7. Secure tube in chuck. Position center mark on glass under axis of tube by adjusting fence, glass, and table. Use masking or adhesive tape to hold glass in place.
8. Cover exposed surface inside ring with mixture of oil and emery powder.
9. Start motor and set speed dial at “A”.
10. Feed drill bit with light pressure. Retract tube frequently to allow mixture to flow into cut.

Note: When drilling glass of irregular shape, such as bottles, construct a cradle that will hold work in a fixed position until hole is completed.
TEST QUESTIONS ON LESSON 6

TRUE OR FALSE: Circle your selection.

T  F  1. Mortise should have tapering sides to make a tight fit with the tenon.
T  F  2. When forming a round end mortise, holes should be drilled one after the other starting at one end.
T  F  3. The approximate distance the quill of a drill press can be extended is 4 inches.
T  F  4. All corners of a frame having doweled miter joints are assembled at the same time.
T  F  5. The holes in a doweled miter joint are drilled at an angle of 90° to the mitered surfaces.
T  F  6. Holes for dowels in a pegged joint are bored in each piece separately.
T  F  7. A stop rabbet is used to give additional strength in a joint.
T  F  8. Holes in soft metal can be drilled with a drill ordinarily used in wood.
T  F  9. Cutting holes in glass is best done with a twist drill bit.
T  F  10. Constant, firm pressure should be kept on quill extension handle when drilling glass.
T  F  11. When the holes forming a mortise have been drilled, the slot may be cleaned out by moving the work back and forth while the drill bit is turning.
HOW TO GET READY FOR SANDING

DESCRIPTION:
The choice between setting Mark V for disc sanding or drum sanding should be governed by the size and shape of the workpiece. Positioning the table and headstock should be suited to the size of material and the sanding angle required. The grit of the disc or sleeve used should be carefully related to density of the material and stage of completion of the sanding operation. The coarser the grit the faster it cuts and the rougher the finished surface. Fine grit gives a very smooth surface but cuts more slowly and clogs more easily.
USE:
The correct selection of sanding method, tool adjustment, and abrasive is necessary for good results from sanding.

OPERATIONS:
1. Provide 12” disc; one medium grit sanding disc (Optional: drum sander; drum sander sleeve; additional coarse sanding disc.)
2. Mount abrasive paper to sanding disc.
3. Optional: a) Apply abrasive paper (coarse) to additional sanding disc. b) Mount disc on headstock auxiliary spindle. c) Mount extension table at left end of tubes.

4. Optional: a) Remove and replace sanding sleeve of 2-1/4” drum sander. b) Replace sanding disc on auxiliary spindle with drum sander.
HOW TO SAND CROSSCUTS

DESCRIPTION:
The surface of stock exposed by a saw cut across the grain can be smoothed by sanding. Such smoothing can be readily done on surfaces up to 1” × 10” areas using Mark V set in Disc Sander position.

![Diagram of sanding process]

Note: If support table is positioned so that down-turning side of paper is used, maximum width accommodated will be less than 6”. If table is raised to use cross-moving section, stock 10” wide and 1” thick can be sanded. Wider stock is sanded by using miter gauge and sliding work across disc.

USE:
Sanding crosset surfaces is done to prepare stock for joining. It is also done to produce a “finished” surface.

OPERATIONS:
1. Prepare a piece of stock 3/4” × 2-1/2” × 10”.
3. Set Mark V in Disc Sander position.
4. Place miter gauge in left table slot.
5. Set fence on right side of table.
6. Place stock on table, edge against miter gauge and end butted against fence.
7. Position left end of stock 1” beyond left edge of table in line with the center of the down turning side of sanding disc by adjusting fence, miter gauge, and table. Lock carriage.
8. Position headstock to place sanding disc 1” away from left end of stock. Lock headstock.
9. Hold stock firmly down on table and against miter gauge.
10. Start motor and feed disc into stock.
11. When stock is smooth, turn end for end and repeat sanding.

Note:  a) The use of miter gauge safety grip, when performing this and similar operations which require quill control by the left hand greatly simplifies performance and contributes to accuracy.  b) While sanding, slide stock back and forth between rim and center of disc by moving miter gauge.  This movement spreads the wood dust over the paper which tends to prevent burning of the stock due to a "loaded band".
LESSON 7
ASSIGNMENT 44

HOW TO SAND TO EXACT LENGTH

DESCRIPTION:
Since saw cuts across the grain of stock leave relatively rough surfaces, several pieces cannot readily be cut to exactly equal lengths. A quicker and more reliable method is to “duplicate sand”.

USE:
The production of two or more parts having exactly the same dimensions is required for the majority of home furnishings. Chairs, tables, benches, and stools each need legs and rails of identical size. Desks, cabinets and drawers include many parts that must match each other exactly.

OPERATIONS:
1. Prepare two pieces of stock 3/4" × 3" × 12-1/4".
2. Set miter gauge in left slot and fence on right side of table.
3. Place one piece of stock on table, edge against miter gauge and end butted against fence.
4. Position left end of stock one inch beyond table edge and in line with center of down-turning side of disc by adjusting table, miter gauge and fence. Lock miter gauge to table. Lock carriage.
5. Position sanding disc one inch from stock by moving headstock. Lock headstock.
6. Place sanding disc in contact with stock by extending quill. Lock quill.
8. Start motor and set speed at "Disc Sand".
9. Hold stock firmly in position and feed sanding disc into stock until movement of quill is stopped by depth gauge. Return quill.
10. Replace stock with second piece and repeat Operation 9 above. Remove stock from table.
11. Release depth gauge lock. Advance quill until surface of paper is exactly 12" from fence. Lock quill.

Note: Exact positioning of disc is facilitated by adjusting quill lock so that quill can be moved by lever action but will not respond to return spring tension.

12. Lock depth gauge at "0" mark. Release quill.
13. Repeat Operation 9 above on the unsanded ends of both pieces of stock.

Note: a) "Duplicate sanding" of longer stock is accomplished using procedure outlined above except that fence is positioned on extension table mounted at right end of tubes.

b) The use of stop rods mounted in the miter gauge may be substituted for the fence when duplicate sanding short lengths.
HOW TO DUPLICATE SHORT STOCK

DESCRIPTION:
Duplicate sanding is required for many parts too short to be positioned with the miter gauge.

USE:
Small hardwood pieces having a precise geometric shape and size are used as inlay. Hardwood squares, usually 2” square (or less) are used in chess and checker boards. Jewel boxes, miniature cabinets and similar projects are assembled from parts having measurements that can be achieved only by precise “duplicate sanding”.

OPERATIONS:
1. Prepare two hardwood pieces 1/2” (or less) thick × 2-1/4” × 2-1/4”.
2. Number the edges of each piece (clockwise) “1”, “2”, “3”, “4”.
3. Position edge of table two inches below top of sanding disc and three inches from it.
4. Set fence on left side of table.
5. Place one square of stock on table with edge “3” butted against fence.
6. Position edge “1” of square opposite center of “down” side of disc and 3/8” beyond edge of table by adjusting position of the stock and fence. Lock fence and carriage.
7. Position headstock to place sanding disc 1” from stock. Lock headstock.
10. Butt a thin form block or strip (metal or wood) into the 90° angle formed by fence and edge “4”. Clamp form block to table.
Note: The left edge of the form block must not extend beyond edge of table.

11. Hold stock firmly in place and sand edge “1” to depth stop.
12. Place edge “2” towards disc and repeat Operation 11.
13. Replace first square with second and repeat Operations 11 and 12.
15. Position sanding disc exactly 2” from fence. Set depth dial on “0” mark and lock. Release quill.
16. Sand edges "3" and "4" of both squares.

17. The two squares should now measure exactly 2" each side and all edges should meet at 90° angles.
LESSON 7
ASSIGNMENT 46

HOW TO SAND TO EXACT WIDTH

DESCRIPTION:
Stock can be reduced to specified width and the edges given smooth straight surfaces using Mark V in Disc Sander position.

USE:
Reducing stock to widths that lie within close tolerances can be easily done with the disc sander. This tool also puts a better edge on plywood than possible with the saw or jointer.

OPERATIONS:
1. Prepare a piece of stock (softwood or plywood) 3/4" × 5-1/4" × 14".
2. Set fence on left side of table. Do not lock fence.
3. Off-set fence slightly by screwing in Allen set screw located on right side of fence base. Lock fence approximately 4" from left edge of table. Lock carriage.
4. Position sanding disc 2" from left edge of table by adjusting headstock. Lock headstock.
5. Extend quill until the distance between rim of sanding disc on the down-turning side and the fence, measured in line forming 90° with surface of disc, is 5-1/8". Lock quill. Set depth gauge at 1/8" mark and lock.
6. Start motor. Feed stock through from the back between fence and disc keeping surface flat on table and edge butted against fence. See below.

7. Release quill lock. Advance quill to depth stop and re-lock.
8. Turn stock over and repeat Operation 6 above. Stock should now measure exactly 5" wide.

Note: The edges of stock wider than the table can be sanded by offsetting the fence when mounted on the extension table. The main table is used for stock support.
HOW TO SAND ROUND CORNERS

DESCRIPTION:
The outside corners and edges of stock sized by a table saw are square, simple angled, or compound angled. All outside corners and edges can be rounded on a disc sander.

USE:
Stock is finished with rounded corners for decoration, protection of persons or material, and to permit joining or fitting with other parts.

OPERATIONS:
1. Prepare two pieces of stock, each 3/4" x 3" x 12".
2. Scribe 8 arcs having 1" radii, across the corners at both ends of both pieces. See below.
3. Set miter gauge 45° right and place in left table slot.
4. Position left edge of table 2” from sanding disc. Lock headstock and carriage.
5. Place stock flat on table with one edge butted against face of miter gauge.
6. Position corner of stock 1” from center of down turning side of sanding disc.

![Diagram of sanding disc and miter gauge](image)

7. Turn on motor. Hold stock firmly in place. Feed sanding disc into stock until paper is tangent with arc.
8. Turn stock and repeat Operation 7 above on all corners.
9. Replace stock with second piece and repeat Operations 7 and 8 above.

Note: These corners could be cut off on the saw if you prefer. However, sanding them off in this assignment will give you more practice and better “feel” for the action of the sanding disc.

10. Complete sanding free-hand to the scribed arcs on all four corners by placing the straight sanded edge against the disc and swinging the stock left and right. (See page 274 of textbook.)

![Diagram of pivot work to round corner](image)
11. Match the two completed pieces to detect any irregularities in the sanded areas.
12. If not an exact match you can carefully free-hand sand each piece until they match. You can also hold both pieces firmly together and carefully sand until all corners match.
HOW TO SAND STOCK TO A CIRCLE

DESCRIPTION:
Stock can be made in a true disc using only the circular saw for straight cuts and the disc sander. Naturally the bandsaw or jigsaw can cut a true circle requiring only enough sanding to smooth the edge.

USE:
Circular stock is used for ornaments, rings, washers, bases, frames, wheels, table tops, and other uses without number.

OPERATIONS:
Let us make an 8-inch diameter disc.

1. Prepare a piece of stock 3/4" x 10" square.
2. Locate center by drawing diagonals. Scribe a circle using 4-3/4" radius.
3. Using table saw reduce stock to 8-sided figure having sides not quite tangent to circle. See below.
4. Set Mark V in Disc Sander position.
5. Plug screw hole at end of miter gauge with section of doweling or circular stock. Drill 1/64" hole through center of plug. Insert 3/4" brad in drilled hole, point up. Drill 1/64" hole 1/2" deep in center of bottom of stock.

6. Place miter gauge backward in left table slot.
7. Set stock with hole over brad point. Position brad in line with center of down turning side of sanding disc by adjusting miter gauge and table height.
10. Start motor. While holding stock firmly on brad and table, feed disc into one point of stock.
11. When 1/8" is sanded off point, lock quill.
12. Slowly turn stock clockwise.
13. When all points are even, advance quill 1/8" and repeat Operation 12 above.
14. Repeat Operation 13 until scribed circumference is reached.

Note: Avoid excessive overlap of stock beyond left edge of table. Straight sanded edges require stock flush on table while sanding.

Note: For circles having diameter less than 7", use 1/2" scrap stock with length of one side slightly larger than diameter of circle. Clamp square stock to table with one corner matched to left front corner of table. Locate brad point in scrap stock to properly position stock to be sanded.

The miter gauge used in right table slot will accommodate larger stock. Circles of still larger diameter can be turned by centering stock on cup center inserted in hole on top of fence and with fence mounted on extension table. Height of extension table is adjusted to position stock to be sanded. Height of main table is adjusted to support stock while sanding. (See page 274 of textbook.)
TEST QUESTIONS ON LESSON 7

TRUE OR FALSE: Circle your selection.

1. #1/2 grit abrasive paper is finer than 2/0 grit.   T   F
2. When mounting abrasive paper with bonding type adhesive adjustment of the paper may be made after initial placement on the cast aluminum disc.   T   F
3. Small bubbles under abrasive paper will cause defects in the sanded wood surface.   T   F
4. Dried, bonding adhesive must be dampened with a liquid cleaner to remove.   T   F
5. Two sanding discs can be operated on Mark V headstock at the same time.   T   F
6. The surface of stock exposed by crosscutting with a sharp hollow ground blade can not be made smoother by sanding.   T   F
7. When setting Mark V for sanding stock to length, the finished length is determined by locking the "quill-lock" so that the distance between paper and fence equals desired length.   T   F
8. "Burning" the sanded area is caused by "loading" the paper.   T   F
9. When sanding to width with the Disc Sander, the stock is fed from the front of the table.   T   F
10. The fence is "offset" with C-clamps.   T   F
11. The length of stock that can be sanded to width using the "off-set" fence is limited to 16".   T   F
12. When sanding circles using the Disc Sander the stock is turned "clockwise".   T   F
13. The amount stock overlaps the edge of the table when sanding circles is unimportant.   T   F
14. When sanding large diameter circles, the stock is centered and supported by the cup center mounted in the fence.   T   F
15. Scrap stock, clamped to the table, can be used in sanding small diameter circles.   T   F
16. When sanding circles the quill is fed slowly and continuously into the stock until the scribed circumference is reached.   T   F
17. Maximum speed for the disc sander is about 2300 rpm.   T   F
18. The cast aluminum disc can be heated to a higher temperature with hot water than by friction between disc and softwood.   T   F
19. When rounding corners at the end of square cuts, the stock is kept flat on the table.   T   F
20. The quill is locked when hand sanding round corners.   T   F

MULTIPLE CHOICE: Underscore your choice.

1. Sanding on the disc sander should be done on the (down-turning side) (upturning side).
2. The rip fence is off-set by turning (the Allen set screw in fence base) (the two hex nuts under fence) (the through rod in fence).
3. The first cut when rounding corners is made (tangent to) (across) (inside) the scribed circle.
4. Abrasive paper with a grit of 3/0 is (fine) (medium) (coarse).
5. In sanding a circle the stock is centered so that the edge is (slightly beyond) (tangent with) (short of) the left edge of the table.
HOW TO SAND CHAMFERS

DESCRIPTION:
Chamfers consist of beveled edges on exposed surfaces. To be fully effective, the chamfers should have smooth flat surfaces and sharp edges. This can be accomplished better with the Disc Sander than with the saw.

USE:
The upper surfaces of much furniture have edges and corners relieved by chamfering. These include table and bench tops, fence posts, rails, and balusters.

OPERATIONS:
Let us sand 1/2" chamfers at one end of a piece of stock.

1. Prepare a piece of stock 1/2" × 1-1/2" × 12".
2. Square lines on the 4 sides 1/2" from one end.
3. Set miter gauge at 45° right and place in left table slot.
4. Place stock on table, marked end toward sanding disc and edge butted against miter gauge.
5. Position the edge to be sanded one inch beyond edge of table and in line with down turning side of disc by adjusting stock, miter gauge, and table. Lock carriage.

7. Holding stock firmly against surface of table and face of miter gauge, feed disc into stock. Sand to scribed line.
8. Repeat Operation 7 on the remaining three edges.
Note: Use of miter gauge stop rods and miter gauge safety grip greatly facilitate firm positioning of stock while sanding.

9. Draw diagonals on surface at the other end of stock. Lightly punch mark the intersection.

10. Using the procedure outlined above, sand the four edges to the punch mark. Stock should now look like this.
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ASSIGNMENT 50

HOW TO SAND BEVELS

DESCRIPTION:
Bevels are like chamfers but the entire edge is slanted and they are used for decorative and structural purposes and must be smooth with sharp edges. Short bevels can be sanded using the procedure outlined for chamfers except for miter gauge and table settings. Long bevels can best be sanded using the fence in off-set position.

USE:
Bevels are extensively used in joints, particularly the corners of chests and frames made of veneered hardwood.

OPERATIONS:
Let us bevel one end and one edge of a piece of stock.

1. Prepare a piece of stock 3/4" × 4" × 16".
2. Lock carriage at the right end of tubes. Set table at 45° and lock.
3. Set miter gauge at 90° and place in left table slot.
4. Position end of stock 1" beyond left edge of table and hold stock firmly down on table and against miter gauge.

Note: Position stock to overlap table an amount that leaves the abrasive paper just clear of table edge when bevel is completed. The undercut table edge permits close positioning of disc. Sanding with small overlap prevents chattering of work piece and resulting roughness or inaccuracies in sanded surfaces.
5. Feed sander into stock until bevel is formed.
6. Remove miter gauge and place fence on table near left edge. Offset fence by turning set screw in base. Tighten fence.
7. Place stock on table with one edge butted against fence and beveled end towards back edge of table.
8. Position left, front, lower corner of stock 1-1/2" beyond table edge and in line with the center of the down turning side of the disc and 1" inside the rim of disc.

10. Advance quill until paper is in contact with stock. Lock quill.
11. Slide stock to rear until slightly separated from paper.
12. Start motor and feed stock from the rear holding it flat on table and against fence.
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ASSIGNMENT 50

14. Repeat Operation 13 above until bevel is formed.

Note: Miter or bevel cuts made on the table saw which do not conform to planned dimensions can be brought to desired size and shape using procedure outlined in this assignment.

Note: Check that any such re-alignment of the surfaces will not reduce stock below usable length or width.
HOW TO SAND OUTSIDE CURVES

DESCRIPTION:
"Outside", or convex, curves can be sanded to finished form using the sander providing the work piece can be turned or adjusted to bring the full length of the curve into contact with the abrasive.

USE:
Common convex curves requiring sanding are found in oval or round tables and bench tops; arms, legs, and backs of chairs; parts of tables, desks, cabinets, lamps, and wood ornaments.

OPERATIONS:
Let us sand the edge of an oval table top.

1. Prepare a piece of stock $3/4" \times 11" \times 30"$.
2. Scribe an oval on one side.

Note: Use of an oval paper pattern centered on the side helps assure accuracy.

3. Cut stock to approximate shape (about 1/8" from the outline) using a scroll or keyhole saw. If available, a jigsaw or bandsaw quickly reduces stock to a size and shape which requires minimum sanding. If necessary, you can use the table saw to remove most waste stock. See sketch below.
4. Commence sanding at a point which will permit convenient handling of stock on table. Sand to line, then advance and rotate stock as necessary.

Note: The outside surface of narrow curved stock can be sanded using a guide stick clamped to table. (See page 272 of textbook.)

The useful life of abrasive discs can be greatly extended by keeping the paper free of embedded sanded particles. Such cleaning reduces "burning" of disc and of the surface being sanded. It can be done with a cleaning stick.
HOW TO SAND INSIDE CURVES

DESCRIPTION:
Curved flat surfaces which form the inside of rings, cylinders, or and part of a ring or cylinder form "inside" or concave curves. Such surfaces can be sanded with a Drum Sander.

USE:
Inside, or concave, curves are sanded to provide a finished appearance. Or, they are sanded to fit when joined with other parts. Concave curves are often used in scrollwork, contoured legs for furniture and similar decorative projects.

OPERATIONS:
Completion of this assignment requires:
a) Drum sander and sanding sleeve.
b) Shaper insert.
Let us sand the inside curve of a bracket.

1. Prepare a piece of stock 3/4" x 7" x 12".
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2. Outline a shelf bracket on one side of stock. Use this design if you wish.

3. Rough cut to shape using keyhole saw, jigsaw, or bandsaw.
5. Position lower edge of drum below surface of table by extending drum into opening in shaper insert.
6. While maintaining firm contact between stock and table surfaces, sand inside curve to scribed line.

Now let us sand the inside curve of a Cabriole Leg. (simplified)

1. Prepare a piece of stock 1-1/2" x 1-1/2" x 12"
2. Scribe simple concave curves on one side. Use this design if you wish.

3. Rough cut to shape.
4. Set Mark V in Horizontal Boring position.
5. Set table perpendicular to tubes. Position lower edge of sanding drum into hole in shaper insert by adjusting table height and carriage. Lock carriage.

6. While maintaining firm contact between stock and table surface, sand inside curve to scribed line.

Note: A full cabriole leg is curved on all sides and therefore must be sanded free hand. This requires care and steady handling. Study your textbook, page 283.
HOW TO SURFACE SAND FLAT STOCK

DESCRIPTION:
Surface sanding can be accomplished by passing flat stock between table and drum sander. The work should be fed against the direction of rotation of the drum. The clearance between table and abrasive paper should be adjusted to permit only a very small cut on each pass.

USE:
Stock is surface sanded as a finishing process and to reduce a number of pieces of stock to exact equal thickness. It can be used to prepare stock for inlay work.

OPERATIONS:
Completion of this assignment requires drum sander and sanding sleeve.

Let us sand one side of 5" wide stock.

1. Prepare one piece of stock 3/4" × 5" × 18" and another 1/2" × 2" × 20".
2. Set Mark V in Horizontal Drill position. Mount drum sander on spindle.
3. Extend quill 4" and lock.
4. Place stock flat on table. Clamp 1/2" stock to right side of table, parallel with slots, and 1/2" inside right edge of sanding drum.
5. Adjust table height to bring upper surface of stock into light contact with abrasive sleeve. Lock table. Remove stock.
6. Start motor. Feed stock, **against the grain**, from the rear of the table, and with edge butted to clamped strip, between sleeve and table.
7. Retract quill 3". Repeat Operation 6 above.

9. Adjust table height to bring upper surface of 1/2" stock into contact with abrasive sleeve. Lock table. Remove stock.
10. Start motor. Feed stock, **against the grain**, from the rear of table, between drum and table.
11. Turn stock over. Lay a strip of smooth wrapping paper 3" × 20" on table under sanding drum.

12. Repeat Operation 10 above, passing stock on top of paper.
Note: The thickness of the cut in this operation equals thickness of paper. Insertion of additional strips of paper permits finer adjustments of cut thickness than is possible by adjusting table height.

Note: The Drum Sander has many other uses and is a very versatile tool. Study your textbook pages 279 through 284.
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ASSIGNMENT 54

HOW TO SAND WITH PATTERN

DESCRIPTION:
Stock can be sanded to match a pattern by feeding it against the Disc Sander while held in contact with the pattern. A metal guide strip, attached to a temporary wood table superimposed on the permanent work table serves as a stop and guide which develops a match between processed stock and pattern.

USE:
Pattern sanding, using the Disc Sander, can be used for quantity production of a part which has a perimeter formed by straight lines, convex curves, or a combination of the two.

OPERATIONS:
Let us sand stock to conform to a small oval pattern.

1. Prepare stock as follows:
   a) For temporary table—1 piece 3/4" × 10" × 18".
   b) For pattern—1 piece 3/4" × 8" × 12".
   c) For finished ovals—2 pieces 3/4" × 8" × 12".
   d) For guide—1 metal strip 1/4" × 1" × 4".
2. Drill screw holes in metal strip and attach to edge of temporary table as shown on sketch below.
3. Scribe oval on side of pattern stock. Draw the oval with dimensions that are 3/4" less than required in the finished product. For this operation make long axis of pattern 10-1/4" and short axis 6-1/4".

4. Rough cut pattern using keyhole saw, jigsaw, or bandsaw. Finish with Disc Sander.

5. Drive one 1" brad through the center of each quadrant of the pattern. Center the pattern on side of one piece of stock and press together embedding brad points. Rough cut the stock 1/2" outside edge of pattern.

6. Clamp temporary table to main table. Position outside surface of metal guide strip outside the edge of main table, in line with center of down turning side of sanding disc, and 1/8" from it. Lock carriage and headstock.
7. Turn on motor. Feed pattern and stock into sanding disc until pattern butts against guide strip. Maintain contact between pattern and strip while turning stock counter-clockwise through 360°.

8. Pattern sand the second piece of stock.
9. Check accuracy of work by matching the two finished ovals.
SOME TRICKS IN SANDING

If much stock has to be removed, use a coarse grit first and follow with fine grit. This will minimize wear and burning of the fine grit paper. Always use a light feed pressure when sanding and do not turn the sander too fast. Excessive pressure or speed cause burning and quickly wear out the paper. Several light passes are always better than one heavy pass. A belt sander is much better for surfacing operations and will give a flat smooth surface with ease.

Special contoured "sanding drums" can be made of wood for sanding moldings, after you have studied lathe operations. Turn a disc as thick as the desired molding and 7" in diameter. Contour the rim of the disc in the reverse of the desired molding, so that it exactly fits the molding.
Coat the edge with glue and roll it in abrasive grit. This can be purchased at most hardware stores. This special “drum sander” is used just as you do the regular drum, feeding the work between table and drum against the direction of rotation.
TEST QUESTIONS ON LESSON 8

TRUE OR FALSE: Circle your selection.

1. Chamfers should be cut with hollow ground saws to give them a smooth, finished appearance.  T F
2. It is common practice to bevel cut the top of fence posts.  T F
3. Stock can be properly positioned with one hand by using miter gauge safety grip.  T F
4. A square post can be pointed at one end by beveling the four edges at that end.  T F
5. The left edge of Mark V table is undercut to permit close positioning of sanding disc.  T F
6. The table is always tilted to 45° when beveling.  T F
7. A guide stick assists when sanding curved stock to width.  T F
8. Long bevels can be sanded with the disc sander when the rip fence is off-set.  T F
9. Curved stock in Assignment 51 is concave.  T F
10. A concave curve can be sanded on the Disc Sander.  T F
11. Burning of abrasive paper can be reduced by cleaning the paper with a brush.  T F
12. Edge sanding with the drum sander should be done with Mark V in the Vertical Drill Press position.  T F
13. When surface sanding flat stock using Drum Sander, stock is fed from the front of table.  T F
14. Wrapping paper is used to catch the sawdust when sanding thin narrow strips with the drum sander.  T F
15. Stock should be fed with the grain when surface sanding with the drum sander.  T F
16. The metal guide strip used for pattern sanding is clamped to the main table.  T F
17. When pattern sanding, the stock and pattern are held in contact with brads.  T F
18. Stock is rotated clockwise when pattern sanding with the Disc Sander.  T F
19. Excessive speed of the drum sander will cause burning due to pitch drawn from the wood.  T F
20. When edge sanding using the Disc Sander, stock should be passed with the grain.  T F

MULTIPLE CHOICE: Underscore your choice.

21. Concave curves should be sanded with (Disc Sander) (Drum Sander) (Belt Sander).  
22. When edge sanding inside curves, the end of the drum sander should be (above) (below) (even with) the surface of the table.  
23. When pattern sanding, the stock should be rough cut to a size that is (greater than) (equals) (less than) the size of the pattern.  
24. When beveling the end of long stock, the carriage is usually set at the (right end) (center) (left end) of the tubes.  
25. When surface sanding wide stock with the disc sander, the quill is first set (fully retracted) (extended one inch) (extended four inches).
HOW TO CENTER STOCK ON THE LATHE

DESCRIPTION:
Stock is turned on a lathe by rotating it between centers positioned at each end of its horizontal axis. The Cup Center merely supports the stock. The Drive Center both supports and rotates the stock.

USE:
Centering of the stock is used to:
  a. Prevent excessive vibration when rotated.
  b. Permit the drive center to transmit positive and continuing torque to the stock.
  c. Prevent tearing or burning of the stock while turning.
  d. Reduce amount of turning required to make stock circular.

OPERATIONS:
Let us center and mount a piece of stock in the lathe.

Note: (See page 193 of textbook.)

1. Prepare a piece of stock 2\" × 2\" × 12\".

Note: Dry, straight grain, redwood or pine (or any medium-soft wood) is recommended.

2. Scribe diagonals on each end. Punch mark the intersections.
3. Using wood mallet (or scrap stock) hammer drive center into one end of stock until the center will stand, unsupported. Spurs must penetrate at least 1/16\" into stock.

Note: When mounting HARDWOOD, drill 1/8\" diameter holes, 1/4\" deep at the punch marks. Cut grooves 1/8\" deep on the diagonals at one end using a backsaw.
LESSON 9
ASSIGNMENT 55

4. Set Mark V in Lathe position with tool rest arm inclined to the right.
5. Set and lock headstock to provide 1/4" between centers.
6. Set end of stock marked with punch hole only, in point of cup center. Extend point and spurs of drive center into hole and spur marks on left end of stock. Force quill extension lever to firmly seat both centers. Centers must penetrate at least 1/16" into both ends of stock. Lock quill.

**WARNING:** The spurs of the drive center and the cup of the cup center must penetrate into the wood AT LEAST 1/16" in order to mount the stock securely on the lathe. Do not use a drive center or cup center if the point is damaged. The workpiece could be thrown from the machine.

7. Turn stock to position two edges in the horizontal plane.
8. Set tool rest slightly above level of front edge of stock and 1/4" from it. Lock tool rest arm and tool rest. (See illustration top page 185 of textbook.)

**WARNING:** Position the tool rest 1/4" from the workpiece. This will narrow the pinch point. Before turning on the machine, rotate the stock by hand to make sure it clears the tool rest.

Note: Study your Owner's Manual and your textbook (Lathe Chapter) very carefully. Lathe operation, while basically simple, is quite different from other woodworking methods and requires study and care.

Stock Mounted for Turning
HOW TO ROUGH TURN

DESCRIPTION:
When turning wood on a lathe, square cut stock mounted between centers is first reduced to circular cross section. This initial operation is rough turning. It is usually done with a 3/4" gouge.

USE:
The stock is reduced to circular cross section in order to permit uniform cutting of the whole circumference of the stock at any point selected throughout its length.

OPERATIONS:
Let us reduce the stock mounted between centers in Assignment 55 to a cylinder having 1-3/4" diameter.

1. Study use of gouge, page 188 of textbook.
2. If speed dial is not set at SLOW, remove stock, start motor and set speed. Remount stock. Start motor. If vibration is not excessive, advance speed to C. See textbook page 193.
3. Set right end of tool rest just beyond right end of stock.
4. Advance gouge into stock until it takes a small "bite". Slowly slide gouge back and forth on tool rest. Turn the left edge of gouge up (to about 11 o'clock position) when moving chisel to the right. At the start of the left movement, rotate the gouge counter clockwise until the right edge is up (to about 1 o'clock position).
5. Slowly advance the gouge into the work, continuing to “slide” it, until the stock is round.

Note: The section of the stock that has been cut may appear smooth while rotating yet prove only partially round when stopped. Roundness can be checked by resting **back** of chisel on top of turning stock. If not round, chisel will “bounce”.

Chisel will “Bounce” if Stock not Round

6. When first section of stock is rounded, slide carriage to the left and repeat Operation 5 above. Continue until full length of stock is rough turned to a diameter of 1-3/4”.

Note: Stock can be rough turned with a 3/4” gouge by feeding the cutting edge into the stock in a horizontal position and then sliding the chisel right and left on the tool rest. The rotation described above uses more of the cutting edge which lengthens the interval between required sharpenings.
LESSON 9
ASSIGNMENT 57

HOW TO TURN TO SIZE

DESCRIPTION:
Square cut stock which has been rough turned can be further reduced to a cylinder of specific diameter by continuing cutting with a 3/4" gouge. A smoother surface can be produced by making the final cut with a skew.

USE:
Stock is shaped to a specific size prior to further turning to form the sections of the completed part which have the largest diameter.

OPERATIONS:
Let us further reduce the stock rough turned in Assignment 56 to a cylinder having a diameter of 1-1/2" and a smooth surface.

1. Re-adjust tool rest to 1/4" from stock. Reduce the diameter of the stock by taking progressively smaller cuts with the 3/4" gouge.
2. Check the diameter using outside calipers.
3. As the finished diameter is approached, increase the amount the gouge is rotated to provide the shearing cut shown on page 188 of textbook.

Note: The shearing cut produces smoother surface than possible when the cutting edge is presented horizontally.
4. Stop cutting with gouge when the diameter is 1-9/16".
5. Reduce stock to 1-1/2" diameter using a skew.

Note: Use the skew in position which gives scraping action. (See pages 187 and 189 of textbook.)
6. Position tool rest at right end of stock and with edge midway between center and top of stock.
7. Make a light shearing cut between 3" and 1" from the right end of stock. (See illustrations pages 187 and 189 of textbook.)

Note: Do not permit point of skew to penetrate the stock. Remove wood with the center of the cutting edge. Depress the handle to decrease depth of cut. Raise handle to increase cut.
HOW TO MAKE PARTING CUTS

DESCRIPTION:
Cuts made into the turning stock, which cut or part the grain of the wood, are parting cuts. The parting tool has a narrow cutting edge and is usually used in a scraping action.

USE:
Parting cuts are made to: cut off stock to length; form shoulders; cut V's; clean or square the ends of stock; partition stock prior to turning beads. (See text page 190 and illustration page 191 of textbook.)

OPERATIONS:
Let us make the cuts listed under "USE" above.

1. Mount the cylinder turned in Assignment 57 between lathe centers, and turn on motor.
2. Position tool rest at left end of stock and align the edge level with center line of stock 1/4" from stock.
3. Cut a shoulder 1/2" deep at the left end of stock having width equal to twice that of the cutting edge of the tool.

4. Cut a "V", to the right of the shoulder, having a depth of 1/2".
5. Make two *partitioning cuts*, to the right of the "V", each having a depth of 1/2".

![Diagram of partitioning cuts]

6. **Cut off** the left end of stock by placing parting tool in right hand partitioning cut and feed cutting edge into stock. Then cut off with skew. See textbook, page 197.

![Diagram of cutting off stock]

**Note:** Save the uncut stock for use in next assignment. Use a center finder and punch mark the center of the cut off end. Reseat the drive center.

![Diagram of recentering and reseating drive center]
HOW TO MAKE CONCAVE CUTS

DESCRIPTION:
A concave cut forms an arc in stock similar to the curved interior of a ball. Such cuts can be formed in cylindrical stock turning between centers using a gouge or a round nose tool.

USE:
Concave cuts are made principally for decorative purposes. When required for joining, their contour must correspond to the matching convex surface. Concave cuts can be quarter or half circles having radii less than that of the stock being turned. Also, they can be arcs with a longitudinal axis of any length up to that of the stock itself.

OPERATIONS:
Let us make the cuts listed under "USE" above.

1. Mount the cylinder saved in Assignment 58 between centers and turn on motor.
2. Position tool rest at left end of stock and align the edge level with center line of stock.
3. Scribe a line 1" from left end by touching rotating stock with pencil point.
4. Part the stock at pencil line to a depth of 1/2".
5. Using a small gouge in horizontal position, cut quarter circle cove at left edge of parting cut.
6. Scribe a line 2" from left end.
7. Part the stock at pencil line to a depth of 1/2".

9. Scribe lines 3", 3-3/4", and 4-1/2" from left end.
10. Part stock to a depth of 1/2" at the 3-3/4" mark.
11. Using the round nose tool cut an arc 1/2" deep at center extending between the 3" and 4-1/2" marks.

Note: Save stock for use in next assignment.
HOW TO MAKE CONVEX CUTS

DESCRIPTION:
A convex cut forms an arc in stock similar to the curved exterior of a ball. Such cuts can be formed in cylindrical stock turning between centers using a skew.

USE:
Convex cuts, like concave, are used principally for decoration. In practice, the majority of curved patterns include both types.

OPERATIONS: Let us make three convex cuts in cylindrical stock.

1. Mount stock used in Assignment 59 between centers and turn on motor.
2. Position tool rest at right end of stock and align the edge level with center line of stock.
3. Scribe lines 1", 2", 2-1/2", and 4" from right end. See next page.
4. Part the stock at pencil lines to a depth of 1/2".
5. Using the skew, cut a bead between the two parting cuts nearest the right end of stock.

(Study method of cutting a bead given in text and illustrated on page 195 of textbook.)
6. Starting with the gouge and following with the skew, cut a convex curve between the two remaining parting cuts.
HOW TO ROUND OFF SQUARE CORNERS

DESCRIPTION:
Patterns which combine flat and curved surfaces usually blend the two where they meet by rounding the square corners. The corners formed by cutting the edges of square stock turning between centers can be rounded with a skew.

USE:
Rounding the square corners at the point where the flat surfaces become curved is done primarily for decorative purposes. Such rounding serves the additional purpose of making the pattern more durable by avoiding chipping.

OPERATIONS:
Let us round the corners on a section of square stock.

1. Prepare a piece of stock 1-1/2" × 1-1/2" × 14".
3. Place edge of skew on the tool rest, heel up and cutting edge vertical. The “heel” is the shortest edge.
4. At a point about 4" from the left end, feed the cutting edge into the stock to a depth of 1/4". (Approximately equals the width of bevel on skew.)
5. Place skew on tool rest with heel down, cutting edge vertical and about 3/4" to the left of center line of "V" cuts.

6. Incline cutting edge 45° to the left. Hold blade of skew in firm contact with tool rest using the left hand. With the right hand, lower handle of skew and swing the end to the right.

7. Force the cutting edge, heel leading, down and to the right. Edge follows path shown above.

Note: The cut is made in one pass. Tool motion is the same as that used for cutting the right side of a bead.

Note: Save stock for use in next assignment.
HOW TO TAPER

DESCRIPTION:
A taper is cut in cylindrical stock turning between centers by reducing the diameter progressively between any two points on the axis of the stock.

USE:
Tapers are cut primarily for decoration. They are very frequently cut in the legs of tables and chairs of modern design.

OPERATIONS:
1. Mount the stock used in Assignment 62 between centers.
2. With a gouge, rough turn to a cylinder between right end and center line of "V" cut.
3. Size the cylinder to 1-1/4" diameter. The stock should now appear as follows:
4. Portion the surface of stock by scribing lines at the points indicated in sketch below.

5. Dismount stock. Offset dead center by rotating 90° to the right. Raise tailstock to bring dead center to same height as drive center. Remount stock, square end to the left.

6. Cut taper in section A.

7. Sand surface of taper.

Note: Hand holding abrasive disc mounted on disc sander quickly produces a smooth surface.

8. Part stock to a depth of 1/2" between A and E; D and C; and B and C.

9. Turn curves as follows:
   - Portion B - 1/4 circle, convex
   - Portion C - full bead
   - Portion D - Concave
   - Portion E - Convex

10. The stock should now appear as follows:
TEST QUESTIONS ON LESSON NO. 9

TRUE OR FALSE: Circle your selection.

T  F  1. The cup center rotates with the stock.
T  F  2. Centering the stock prevents excessive vibration when rotated.
T  F  3. The drive center is driven into the stock with a wooden mallet.
T  F  4. The tool rest can be slid parallel with the work which saves time and trouble.
T  F  5. It is not advisable to rotate the stock by hand before initial turning by power.
T  F  6. Rough turning of square stock should be commenced using slow speed.
T  F  7. In making the first cut for roughing down stock, the cuts should be light.
T  F  8. When rough turning, the smoothness of the surface should be checked by placing hand on turning stock.
T  F  9. The surface of cylindrical stock can be smoothed with a skew.
T  F  10. When rough turning, the gouge is rotated to increase the rate of waste removal.
T  F  11. Outside calipers can be used to determine the diameter of circular stock.
T  F  12. When using a gouge, scraping action will result in a smoother cut than shearing action.
T  F  13. The blade of the skew should be approximately horizontal and the center of the cutting edge used, when a shearing cut is made.
T  F  14. The parting tool is seldom used in a scraping action.
T  F  15. Concave cuts are usually made with a skew.
T  F  16. The center of a concave cut in cylindrical stock is nearer the longitudinal axis of the stock than the ends.
T  F  17. A bead is formed by making two convex cuts.
T  F  18. Rounding corners with a skew requires special handling of that chisel not used for any other cut.
T  F  19. When preparing to round the corners of square stock, the skew should be placed on the tool rest with the heel of the cutting edge down.
T  F  20. The amount of taper cut in stock can be regulated with the eccentric in the tail stock.

MULTIPLE CHOICE: Underscore your choice.

1. Stock is tightened between centers by (pushing hard on the head stock) (extending the quill) (driving stock into dead center).
2. The dead center is held in place by (set screw) (lock nut) (friction).
3. Normally, the top edge of the tool rest should be (even with) (well above) (well below) the axis of the stock.
4. To determine the diameter of a cylinder use (outside calipers) (steel square) (inside calipers).
5. The parting tool is usually used to (cut) (scrape) (shear).
HOW TO TURN A SHALLOW BOWL

DESCRIPTION:
Short stock, which has large cross-sectional area, can be turned by securing it directly to a faceplate which is, in turn, mounted on the main spindle. Since the cup center is not required for this operation, the tail stock may be removed. Positioning the headstock and the carriage at the right end of the tubes, permits free access to all surfaces of the stock being turned.

USE:
Faceplate turning is used to make bowls, trays, lamp bases, boxes and similar pieces having design or length not suited to turning between centers.

OPERATIONS:
Let us turn a shallow bowl.

1. Prepare a piece of stock 1-1/4" x 7" x 7".

Note: Use of clear white sugar pine is recommended. A more satisfactory bowl can be made from hardwood. However, more turning and more precise processing will be required. In addition, keep chisels sharp.

WARNING: When turning glued up stock, make sure glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.

2. Draw diagonals on one side of stock. Scribe a circle having 3-1/8" radius centered at the intersection of the diagonals.
3. Make 45° miter cuts tangent to the circumference at the four corners.
4. Center a 6-inch faceplate in the scribed circle. Punch mark the centers of the three outside screw holes. Secure faceplate to stock by driving 1-1/4"—#10 flat head wood screws at the punch marks.
5. Adjust speed setting to "SLOW". Remove tail stock. Position carriage and headstock at right end of tubes.
6. Mount faceplate, with stock attached, on main spindle. Adjust tool rest parallel to face of stock, edge no more than 1/4" from it, and right end slightly beyond the center.
7. Take a light cutoff surface using the round nose chisel. Start cut at the center and slide chisel to the left. Stop motor.

8. Scribe a circle having 6-1/2" diameter by resting pencil on tool rest with point touching the stock 3-1/4" from the center and then turning stock through 360°.

9. Turn on motor. Position parting tool with right end of cutting edge tangent to circle and feed into stock until waste wood is removed.

Note: Splintering the stock can be prevented by substituting the skew for the parting tool just before the cut is completed.

10. Cut out a cross-section pattern conforming with finished inside dimensions, using cardboard or soft sheet metal. Use this design if you wish.

Note: 1/2" Squares
11. Scribe a circle around center of stock having a diameter 5-1/2".

12. Using the round nose, shape the inside of bowl. Make successive cuts from the circumference of the 5-1/2" circle to the center.

Note: Keep cutting edges sharp using rubber bonded wheel (if available) or hand stone. Make frequent checks of shape using pattern. Cutting deeper than 5/8" will result in damage due to contacting 5/8" wood screws. Final cuts should be very light to avoid scuffing the stock.

13. Round off all corners.
Note: Use the skew to cut convex curves at the inner and outer edges of the top of the bowl. Make initial cuts at bottom outside corner with round nose. Make finishing cuts with the skew.


Note: Uneven pressure on abrasive paper, or "loading of the paper", may distort shape and balance of the bowl.

15. Screw holes in bottom can be filled with plastic wood or the base of bowl can be covered with felt.
LESSON 10
ASSIGNMENT 64

HOW TO MAKE A DEEP BOWL

DESCRIPTION:
Stock for a deep bowl can be mounted on the faceplate by gluing. A "mounting block", cut from scrap, is attached to the faceplate with screws. A disc of paper, followed by the stock to be turned is glued to the mounting block. When the turning is completed, separation at the paper is readily effected.

USE:
Faceplate turning with stock secured to a mounting block with glue is used to permit a thinner bottom than possible when screws join stock directly to the faceplate.

OPERATIONS:
Let us turn a deep bowl using mounting block.

1. Prepare a piece of stock 1-3/4" × 9-1/4" × 9-1/4". (see “Note” under Operation 1, Assignment 63).
2. Scribe a 9-1/4" diameter circle on one side and cut stock to octagonal shape as prescribed for shallow bowl. Scribe a 3-3/4" circle about the center.
3. Cut an octagonal mounting block (sides tangent to a 3-3/4" diameter circle) from 3/4" stock.

Note: Rough cutting both stock and mounting block to circular shape, using a jig or bandsaw, facilitates mounting and permits higher initial turning speed.

4. Cut a 3-3/4" diameter disc from brown bag paper or ordinary newspaper.
5. Coat surface of stock inside 3-3/4" circle, both sides of paper disc, and one side of mounting block with glue. Clamp glued surfaces together with C-clamps.

WARNING: Make sure glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.
Note: When clamped, check that all circumferences are matched.

6. Turn deep bowl to desired pattern using procedure outlined for turning shallow bowl. Use this design if you wish.

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NOTE: 1/2" Squares
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7. Remove mounting block using a chisel, hunting knife, or putty knife.
8. Remove surplus glue and paper from bottom of bowl with warm water or by sanding.
HOW TO MAKE BOWL AND COVER

DESCRIPTION:
Stock for the cover of a completed box or bowl can be turned by using the box or bowl as a chuck. A flange, turned on the cover stock to size which makes a tight fit in the base, positions the stock for turning. When the cover is completed, the tight fit can be relieved by sanding.

USE:
Many types of jewel, candy, and powder boxes require covers. Many bowls, including those of large size, are more useful and decorative if made with a well fitting cover.

OPERATIONS:
Let us turn a jewel box with a cover.

1. Prepare a piece of hardwood 2" × 4-1/2" × 4-1/2". Prepare second piece of hardwood 1-1/2" × 4-1/2" × 4-1/2".

Note: Medium hardwood, such as mahogany, is recommended.

2. Attach 2" stock to 3-3/4" faceplate. Turn the base as shown.
3. Before removing the finished box from the faceplate, mark both the outside bottom edge of work and the faceplate so that box can be remounted in the original position.

4. Rough cut and mount the 1-1/2" stock on the faceplate. If cover is to be deep-cut, use mounting block. If not, use short wood screws and subsequently remove screw holes by outside turning.

5. Turn a flange which has an outside diameter equal to the inside diameter of the box.

6. Turn the outside diameter of the cover to equal the outside diameter of the base.
7. Remove the cover from the faceplate and remount the base.
8. Force the flange of cover into the base.

Note: Excessive force will crack base. If necessary, inside diameter of base can be enlarged by sanding. If the initial fit is too loose, wrap a paper shim around flange.

9. Complete turning the cover.
LESSON 10
ASSIGNMENT 66

HOW TO MAKE SANDING DRUMS

DESCRIPTION:
Hardwood stock, 18" long, is turned between centers until a cylinder is formed. A "V" is cut the length of the cylinder and a matching wedge is drilled to receive retaining screws. Abrasive paper is wrapped around the drum and the edges are folded into the "V" cut. The wedge is then secured in the "V" which in turn holds the paper in place. A section 3" long is cut off the cylinder, drilled and recessed to receive a machine bolt. The long drum is mounted between centers for surface sanding wide boards. The short drum is mounted and operated on either the main or auxiliary spindle.

USE:
The 15" drum is used to sand the surfaces of wide stock. The drum, with abrasive sheet attached is turned between centers, and above the main table. A cut is made when the stock is passed through, against the direction of rotation of the drum and in contact with the paper and the table. The 3" drum is used to sand edges and surfaces of flat stock; sand concave and convex curved surfaces; outside and inside edges of circles and cylinders.

OPERATIONS:
1. Prepare a piece of hardwood 3-1/4" x 3-1/4" x 18". (Medium hardwood is recommended.)
2. Scribe diagonals on both ends and drill 1/8" diameter holes to a depth of 3/8" at the intersections. Cut grooves with hacksaw 1/8" deep on the diagonals at one end.
3. Set Mark V in saw position. (Mount hollow ground blade, if available.)
4. Tilt table at 30°. Adjust saw blade height to 7/8". Lock fence 1-3/16" to right of inside saw blade tooth.

Table at 36°
Note: Saw guard removed for clarity.

5. Make rip cut on one side of stock. Turn stock end for end and make second rip cut on same side. Stock should now appear:

6. Set stock on work bench, wedge cut up. Put wedge in groove. Center punch marks on outside surface of wedge, measuring from one end, as follows: 3/4", 2-1/4", 6", 10-1/2", 15". Using V-cut as support, drill 3/16" clearance holes at punch marks.
When holes are drilled, center wedge making ends even with ends of stock and drill pilot holes using 3/32" twist drill. Counter sink clearance holes for 1-1/4" - #9 flat head wood screw. Do not mount wedge.

7. Tilt table to 45°. Lock fence 1-3/4" to right of inside saw blade tooth. Rip cut the four corners of stock.

9. Re-set Mark V in saw position. Cut-off 3” cylinder, measuring from end without hacksaw cuts. (Further check: 3” section will contain two pilot holes.)
10. Set Mark V in Horizontal Boring position. See sketch.
11. Position 3” cylinder for concentric drilling of a through 3/8” hole.

12. In one end of 3” cylinder, cut square recess, 1/2” deep to receive head of a 3/8” - 4-1/2” machine bolt.
13. Insert bolt and set washers and nut.
14. Cut off 3" length of wedge. (Cut off section with two clearance holes.)
15. Cut abrasive paper to length equal to circumference plus twice depth of V-cut. Clamp paper by screwing on wedges.

Note: The length of a standard sheet of abrasive paper should exactly fit both drums.

The completed drums should appear as follows:
TEST QUESTIONS ON LESSON 10

TRUE OR FALSE: Circle your selection.

1. Turning a bowl from hardwood takes longer than when using softwood.  
   T  F

2. Stock is usually mounted between centers when turning a tray.  
   T  F

3. A marking gauge can be used to dimension the perimeter of a faceplate turning.  
   T  F

4. A rubber bonded wheel cannot be operated on Mark V while faceplate turning is in progress.  
   T  F

5. The only method of accurately scribing the circumference of a bowl on stock which is mounted on a faceplate is with dividers.  
   T  F

6. Stock can be cut to form the perimeter of a bowl using a parting tool.  
   T  F

7. Some splintering of the stock is unavoidable when cutting through to the back of stock mounted on a faceplate.  
   T  F

8. Only one side of a pattern is used for marking dimensions and checking profiles when faceplate turning a bowl.  
   T  F

9. When inside turning stock attached directly to the faceplate, depth of cut should be checked carefully to prevent cutting through to the surface of the plate.  
   T  F

10. A turned bowl can be thrown out of round by improper sanding.  
    T  F

11. There is no way of concealing screw holes left in the bottom of a faceplate turning.  
    T  F

12. A mounting block is used to display a finished lamp base.  
    T  F

13. A mounting block is used when turning a shallow bowl because it holds the stock more securely than wood screws.  
    T  F

14. Rough cutting stock to be turned on a faceplate using a bandsaw permits faster initial turning speed than advisable when stock has an octagonal perimeter.  
    T  F

15. When mounting stock for shallow turning, alignment of faceplate perimeter, paper disc, mounting block and stock should be approximate.  
    T  F

16. The base of a small box turned on a faceplate can be used as a chuck to hold stock from which the cover is turned.  
    T  F

17. An excessively tight fit of the cover of a turned box is usually eased with wax.  
    T  F

18. The outside diameter of the flange cut in stock to be used for the cover of a bowl should be equal to the outside diameter of the finished bowl.  
    T  F

19. When making a long sanding drum, a V-cut is made before the stock is turned.  
    T  F

20. When counter boring the short drum, the V-cut should be up when stock is on the table.  
    T  F

MULTIPLE CHOICE: Underscore your choice.

1. The outside diameter of a faceplate turning is usually cut with a (parting tool) (gouge) (round nose).
2. Excessive depth of cut when inside turning stock attached directly to the faceplate will (spoil the pattern) (puncture the bottom) (cause chisel to hit screws).
3. To remove the bowl from the mounting block use (a screwdriver) (hot water) (putty knife).
4. The top of the cover for a jewel box is turned (after the box) (before the flange) (when cover stock is chucked in box).
5. When sanding with the long sanding drum, the stock is fed between drum and table (from the front) (at an angle) (against direction of rotation).
TEST QUESTIONS ON LESSON 1
CORRECTION SHEET

MULTIPLE CHOICE: Underscore your choice.
1. To tighten saw blade on arbor, the nut is turned (clockwise) (counterclockwise). Textbook, page 42
2. In ripping short or narrow pieces a (scrap stock) (push stick) should be used. Lesson 1
3. In crosscutting the left hand should be held at least (1") (3") (6") from the line of the saw cut. Lesson 1
4. A piece of stock clamped or bolted to rip fence for cutting equal lengths is called a (stop block) (clearance block). Both acceptable
5. In addition to assuring correct lengths, this block prevents (binding between blade and fence) (creeping of work piece). Textbook page 56
6. Combination saw blades are best for (ripping) (crosscutting) (all purpose). Textbook, page 45
7. In a tongue and groove joint, the groove is made slightly deeper to make room for (sawdust) (glue) (expansion). Lesson 1
8. An angular crosscut of 45° is called a (beveled rip) (miter). Lesson 1
9. In making angular cuts, the motion of the blade tends to make the stock (kickback) (creep). Textbook, page 64
10. For safety, a beginner should not rip work shorter than (6") (10") (18"). Lesson 1
11. The projection of the saw blade above the work piece should be (1-1/4") (1") (1/2"). Lesson 1
12. The speed dial of the saw should only be adjusted (before) (after) the saw is turned on. Textbook, page 49
13. For safety, the operator should always stand (behind) (to one side of) the line of saw cut. Textbook, page 48
14. In cutting stock to exact marked lengths, the cut itself is made (directly on) (on the waste side of) the pencil line. Lesson 1
15. In most crosscutting a miter gauge is most conveniently used in the (left) (right) hand miter gauge slot. Textbook, page 50
16. To cut segments for a hexagon, the miter gauge should be set at (67-1/2") (45") (60"). Lesson 1
17. In cutting an edge rabbet, safe practice requires that the waste be left (between blade and rip fence) (outside the saw blade). Lesson 1
18. After finishing one cut for an edge rabbet, safe practice requires that the stock be (lifted over rip fence) (slid back over blade to starting point). Lesson 1

TRUE OR FALSE: Circle your selection
T F 19. For accurate work, a clearance block must be a particular thickness. Textbook, page 56
T F 20. In cutting several equal length pieces, the clearance block can be used for even the last segment. Lesson 1
T F 21. The clearance block should be clamped to the rip fence directly in line with the saw arbor. Lesson 1
T F 22. In cutting stock to exact measured length, the saw cut is made in the waste stock. Lesson 1
T F 23. In making a rabbet-butt joint, all cuts are at the ends of the stock. Lesson 1
T F 24. Miter gauge slots in the saw table must be parallel to the sanding disc. Textbook, page 34
T F 25. Cutting a tongue for a tongue and groove joint is the same as cutting two rabbets. Textbook, page 77
T F 26. In cleaning out waste stock in a groove, time is saved by turning the stock end for end. Lesson 1
T F 27. In making multiple cuts, such as used in grooving, it is safe to adjust the rip fence with the saw blade turning. Textbook, page 80
T F 28. A clearance block is not necessary in cutting an end rabbet because it is not a through cut. Lesson 1
T F 29. A saw should be turned off and the blade stationary when making any major adjustments on the saw table. Textbook, page 48
T F 30. The rip fence when locked must be parallel to the table slots to prevent binding of the work piece. Textbook, page 37
LESSON 2
TEST

TEST QUESTIONS ON LESSON 2
CORRECTION SHEET

TRUE OR FALSE: Circle your selection.

T  F  1. In cutting tapers on wide flat boards the smaller angle number will produce a greater slant. Lesson 2
T  F  2. In assembling the project in Assignment 8 each side overlaps the two adjacent. Lesson 2
T  F  3. The tapering jig remains stationary when cutting a long taper. Lesson 2
T  F  4. The tapering jig and stock are returned to original position after making a cut. Lesson 2
T  F  5. Chamfers are usually cut at 45°. Lesson 2
T  F  6. In cutting a chamfer the cut is started at the lower corner of the stock. Lesson 2
T  F  7. The stock is turned over for the second cut in compound angle cutting. Lesson 2
T  F  8. In cutting a 45° bevel the table is tilted at 60°. Textbook, page 69
T  F  9. The stock should not be returned to the starting position in making a bevel cut. Lesson 2
T  F  10. In making a tapering jig the hinge is fastened between the two boards. Lesson 2
T  F  11. It is safe practice to use the miter gauge in reverse position when crosscutting wide boards.
T  F  12. When cutting a cross miter in the right end of wide stock the left hand should grasp the head of the miter gauge. Lesson 2
T  F  13. In fitting two bevel cuts together at right angles the angle of each must be 45°. Textbook, page 67
T  F  14. It is not necessary to center the saw blade in the insert slot when the saw table is tilted from 0° to 45°. See Mark V Owner's Manual
T  F  15. The miter gauge safety grip reduces the chance of error when cutting compound angles. Lesson 2
T  F  16. The rip fence must always be to the right of the saw blade when used as a support for cutting bevels and chamfers. See Mark V Owner's Manual
T  F  17. The correct setting of saw table and miter gauge for commonly used work angles can be found in the textbook. See textbook, page 69
T  F  18. Oil is applied to the bottom and side of the tapering jig to make it slide easily. Lesson 2
T  F  19. When cutting compound miters the miter gauge must always be used in the right table slot. Textbook, page 68
T  F  20. In cutting long tapers with the tapering jig the stock is held down on the table with your left hand. Lesson 2

MULTIPLE CHOICE: Underscore your choice.

22. In cutting tapers on wide board (70°) (60°) (85°) angle on the miter gauge produces the smallest taper. Lesson 2
23. In cutting tapers with a tapering jig the operator stands to the (left of) (right of) (behind) the line of saw cut. Textbook, page 62
24. The angle in the tapering jig remains (the same) (is increased) (is decreased) in making the second cut. Lesson 2
25. Underscore the sketch of a bevel. Lesson 2
26. The angular cut on the edge of a board to enhance its appearance is the (bevel) (chamfer). Lesson 2
27. In cutting compound angles the table angle is (less) (greater) than the miter gauge setting. Textbook, page 69
28. In cutting compound angles on a four sided figure, the work angle in Assignment 13 is (60°) (45°) (15°). Textbook, page 69
29. In making the second cut in sawing tapers on wide boards the stock is (turned end for end) (turned over) (kept in same position). Lesson 2
TEST QUESTIONS ON LESSON 3
CORRECTION SHEET

TRUE OR FALSE: Circle your selection.

1. Feather boards are used for the sole purpose of holding the stock against the ripping fence. Lesson 3

2. The grain of a spline runs in opposite direction to the groove. Lesson 3

3. Both members of a half-lap joint must be the same width. Lesson 3

4. When removing the surplus material in a half-lap-miter joint, the same method can be used on each member. Lesson 3

5. In making the half-lap-miter joint, the miter cut is made across the entire width of both members. Lesson 3

6. The saw blade height remains the same when cutting all shoulder cuts on the tenon. Lesson 3

7. The haunch on a haunched mortise and tenon joint is the same thickness as the groove. Lesson 3

8. The groove in stock "B" forms a part of the mortise in a haunched mortise and tenon joint. Lesson 3

9. Part of the tenon is removed in cutting the groove on stock "A" of the haunched mortise and tenon. Lesson 3

10. There is a top shoulder cut on the haunched mortise and tenon joint. Lesson 3

11. The spring action in a feather board is affected by the angle between the edge of the board and the saw table. Lesson 3

12. The grooves for the spline are cut perpendicular to the mitered surfaces. Textbook, page 78

13. One quarter the thickness of the stock is removed from one end of each of the two pieces in a half-lap joint. Lesson 3

14. When the stock to be joined in a half-lap joint is not as wide as the maximum depth of saw cut the excess stock is usually removed by making successive crosscuts. Lesson 3

15. Tenons are made to fit snugly into mortises. Textbook, page 83

16. If the rail is 3/4" thick the tenon should be 1-1/8" long. Lesson 3

17. The stock is held against the face of the miter gauge and the rip fence when making cheek cuts. Lesson 3

18. The vertical cuts for forming the cheeks on the tenon are made before the crosscuts. Lesson 3

19. The purpose of the haunch on a haunched mortise and tenon joint is to increase the strength of the joint. Lesson 3

20. It is good practice to make the thickness of the tenon equal to 1/2 the thickness of the stock. Lesson 3

MULTIPLE CHOICE: Underscore your choice.

1. Splines should fit in the grooves (fairly loose) (very tight) (just snug). Lesson 3

2. Half-lap-miter joints are used because (they are stronger) (better outward appearance) (easier to make). Lesson 3

3. In making the spline joint in Assignment 15 a (blind) (corner) (thru exposed) spline is used. Lesson 3

4. There is (only one) (are two) ways of sawing off the surplus material on stock "A" in a half joint. Lesson 3

5. The thickness of a tenon is determined by (the width of the rail) (the thickness of the rail) (the length of the rail). Lesson 3

6. In cutting the shoulders on a tenon the waste stock is (between the saw and ripping fence) (drops off on table to left of saw). Lesson 3

7. In making the vertical cuts on a tenon, you should stand (to left) (to right) (directly behind) the line of saw blade cut. Textbook, page 85

8. In cutting the cheek cut on the haunched-mortise and tenon joint, the saw is set at (3/16") (9/16") (1/2") from the ripping fence. Lesson 3

9. Mortise and tenon joints are used most in (furniture) (picture frames). Lesson 3

10. The tenon made in Assignment 18 is for a (blind) (through) (keyed) mortise and tenon joint. Lesson 3
TEST QUESTIONS ON LESSON 4

CORRECTION SHEET

TRUE OR FALSE: Circle your selection.

1. When cutting dados with the saw, waste material can be removed by oscillating the quill. Lesson 4
   T F

2. The depth of a dado is determined by the thickness of the inserted stock. Generally 1/2 thickness of grooved stock
   T F

3. A chisel is used to complete the groove in a stop dado. Lesson 4
   T F

4. The same operation is used to remove the surplus stock in a stop dado as in a regular dado. Lesson 4
   T F

5. The arc cut on a mold with the saw is a perfect semicircle. Textbook, page 101
   T F

6. The guide strip used in cutting the cove was parallel to the saw blade. Lesson 4
   T F

7. The spacing of the saw kerfs in bending stock is determined by trial and error. Textbook, page 97
   T F

8. In cutting a large sheet of plywood, bisecting the length requires more rip capacity than subsequent cuts. Lesson 4
   T F

9. The same surface should be against the ripping fence when making both rip cuts in resawing. Lesson 4
   T F

10. A rectangular groove cut with the grain is called a dado. Textbook, page 71
    T F

11. A "stop dado" gives more strength in a joint than a full dado. Lesson 4
    T F

12. The use of a "stop block" when cutting dadoes will control the length of the dado. Lesson 4
    T F

13. A cove mold can not be cut with a Magna Dado. Lesson 4
    T F

14. Correct spacing of kerfs when cutting stock for bending, depends upon accurate measurement with a steel rule. Use jig, Assignment 23
    T F

15. Nothing but care by the operator will prevent properly cut stock from cracking as it is bent. Lesson 4
    T F

16. A helper who is assisting during the ripping of long stock should help guide the cut. Textbook, page 58
    T F

17. A crosscut saw blade, if available, should be used when resawing. Lesson 4
    T F

18. If resawing of warped stock is attempted, a kick back may result. Lesson 4
    T F

19. When resawing, use a depth of cut slightly more than half the width of stock. Lesson 4
    T F

MULTIPLE CHOICE: Underscore your choice.

20. Dados are cut in stock (across the grain) (on the end) (on the edge). Lesson 4
    2. In fitting shelves in a bookcase, you cut (a rabbet) (a tongue and groove) (a dado). Lesson 4
    22. The depth of each successive cut in sawing a cove is increased (1/16") (5/16") (1/4"). Lesson 4
    23. The cove is cut (before) (after) the rabbet cut. Lesson 4
    24. The saw kerfs are cut to within (1/16") (1/4") (1/8") of the finish side in bending. Textbook, page 97
    25. The standard width of plywood is (3') (4') (6'). Lesson 4
    26. The section of a 4' x 8' sheet of plywood not being cut off may be held up (by the extension table) (with C-clamps on the table) (by a floor rest). Lesson 4
    27. In resawing a 4" board, the saw should be set (3") (2-1/16") (1-15/16") above the table. Lesson 4
TEST QUESTIONS ON LESSON 5
CORRECTION SHEET

TRUE OR FALSE: Circle your selection.
T  F  1. In drilling holes for screws the clearance hole is made slightly smaller than the shank of the screw. Lesson 5
T  F  2. The pilot hole should have a larger diameter than the clearance hole. Lesson 5
T  F  3. An oval head screw requires a deeper countersink than a flat head screw of the same gauge. Lesson 5
T  F  4. When counterboring is required, the clearance hole must be drilled first. Optional Lesson 5
T  F  5. The depth of the counterbore is governed by the length of the screw and the thickness of the stock. Lesson 5
T  F  6. A leg fitted in a table top at a compound angle forms a single angle with the perpendicular. Lesson 5
T  F  7. A leveling block is used for checking the accuracy of the drill table. Lesson 5
T  F  8. When drilling dowel holes in stock for a table top it is necessary to find the exact center line of the edge being drilled. Lesson 5
T  F  9. The diameters of the shank and root of a wood screw are equal. Lesson 5
T  F  10. The diameter of the pilot hole for a wood screw is made equal to the diameter of the body of the screw. Lesson 5
T  F  11. The same drill speed should be used for drilling in both soft and hardwood. Generally, the harder the material the slower the speed.
T  F  12. The same amount of countersinking is required for round and flat head screws of the same size. Flat head only is countersunk
T  F  13. Both the quill lock and the depth dial lock are often used when setting for depth of hole. Lesson 5
T  F  14. Countersinking in softwood is not essential for making screw heads flush with surface. It is desirable.
T  F  15. No more than two dowels should be used in each edge of stock used for a doweled table top. Lesson 5
T  F  16. The edges of stock used for a doweled table top should be squared. Essential for tight joint
T  F  17. Rails are usually joined to legs in the center of one side of the leg. Lesson 5
T  F  18. The depth of hole for a table leg fitted at a compound angle must equal stock thickness. Lesson 5

MULTIPLE CHOICE: Underscore your choice.
1. When fastening two pieces of hardwood together with screws, the hole drilled in the second piece is called the (pilot) (clearance) hole. Lesson 5
2. The clearance hole for a 1-1/2" - #10 screw in softwood should be (3/32") (1/64") (3/16"). Textbook, page 132
3. The (pilot) (clearance) hole is usually drilled first. Textbook, page 132
4. Countersinking in hardwood is not required for (round head) (flat head) screws. Flat head only requires countersink
5. The size of the dowel used to join rail and leg is determined by the (width of the rail) (size of the leg) (thickness of the rail). Lesson 5
6. Stock is matched and clamped together when locating dowel holes for a table top in order to be sure that the holes will be (opposite) (equal distances from the edges) (equal distances from the ends). Lesson 5
TRUE OR FALSE: Circle your selection.

T  F  1. Mortise should have tapering sides to make a tight fit with the tenon. Sides should be parallel.
T  F  2. When forming a round end mortise, holes should be drilled one after the other starting at one end.
T  F  3. The approximate distance the quill of a drill press can be extended is 4 inches. Lesson 6.
T  F  4. All corners of a frame having doweled miter joints are assembled at the same time. Lesson 6.
T  F  5. The holes in a doweled miter joint are drilled at an angle of 90° to the mitered surfaces. Textbook, page 157.
T  F  6. Holes for dowels in a pegged joint are bored in each piece separately. Textbook, page 158.
T  F  7. A stop rabbet is used to give additional strength in a joint. Lesson 6.
T  F  8. Holes in soft metal can be drilled with a drill bit ordinarily used in wood. Lesson 6.
T  F  9. Cutting holes in glass is best done with a twist drill bit.
T  F  10. Constant, firm pressure should be kept on quill extension handle when drilling glass. Lesson 6.
T  F  11. When the holes forming a mortise have been drilled, the slot may be cleaned out by moving the work back and forth while the drill bit is turning. Can be done but it is not as satisfactory as a router.
TEST QUESTIONS ON LESSON 7
CORRECTION SHEET

TRUE OR FALSE: Circle your selection.
T  F  1. #1/2 grit abrasive paper is finer than 2/0 grit.
T  F  2. When mounting abrasive paper with bonding type adhesive adjustment of the paper may be made after initial placement on the cast aluminum disc. Lesson 7
T  F  3. Small bubbles under abrasive paper will cause defects in the sanded wood surface. Lesson 7
T  F  4. Dried, bonding adhesive must be dampened with a liquid cleaner to remove. Lesson 7
T  F  5. Two sanding discs can be operated on Mark V headstock at the same time. Lesson 7
T  F  6. The surface of stock exposed by crosscutting with a sharp hollow ground blade can not be made smoother by sanding. Assignment 43
T  F  7. When setting Mark V for sanding stock to length, the finished length is determined by locking the "quill-lock" so that the distance between paper and fence equals desired length. Depth Stop - Assignment 44
T  F  8. "Burning" the sanded area is caused by "loading" the paper. Lesson 7
T  F  9. When sanding to width with the disc sander, the stock is fed from the front of the table. Assignment 46
T  F  10. The fence is "offset" with C-clamps. Lesson 7
T  F  11. The length of stock that can be sanded to width using the "off-set" fence is limited to 16". Lesson 7
T  F  12. When sanding circles using the disc sander the stock is turned "clockwise". Lesson 7
T  F  13. The amount stock overlaps the edge of the table when sanding circles is unimportant. Lesson 7
T  F  14. When sanding large diameter circles, the stock is centered and supported by the cup center mounted in the fence. Textbook page 274
T  F  15. Scrap stock, clamped to the table, can be used in sanding small diameter circles. Lesson 7
T  F  16. When sanding circles the quill is fed slowly and continuously into the stock until the scribed circumference is reached. Assignment 49
T  F  17. Maximum speed for the disc sander is about 2300 rpm. (1600 rpm) Textbook, page 266
T  F  18. The cast aluminum disc can be heated to a higher temperature with hot water than by friction between disc and softwood. Lesson 7
T  F  19. When rounding corners at the end of square cuts, the stock is kept flat on the table. Assignment 47
T  F  20. The quill is locked when hand sanding round corners. Not essential but somewhat safer.

MULTIPLE CHOICE: Underscore your choice.
1. Sanding on the disc sander should be done on the (down turning side) (upturning side). Assignment 43
2. The rip fence is off-set by turning (the Allen set screw in fence base) (the two hex nuts under fence) (the through rod in fence). Assignment 46
3. The first cut when rounding corners is made (tangent to) (across) (inside) the scribed circle. Assignment 47
4. Abrasive paper with a grit of 3/0 is (fine) (medium) (coarse).
5. In sanding a circle the stock is centered so that the edge is (slightly beyond) (tangent with) (short of) the left edge of the table. Assignment 48
TEST QUESTIONS ON LESSON 8
CORRECTION SHEET

TRUE OR FALSE: Circle your selection.

T  F  1. Chamfers should be cut with hollow ground saw blades to give them a smooth, finished appearance. Assignment 49
T  F  2. It is common practice to bevel cut the top of fence posts. Assignment 49
T  F  3. Stock can be properly positioned with one hand by using miter gauge safety grip. Lesson 8
T  F  4. A square post can be pointed at one end by beveling the four edges at that end. Assignment 49
T  F  5. The left edge of Mark V table is undercut to permit close positioning of sanding disc. Lesson 8
T  F  6. The table is always tilted to 45° when beveling. Bevels can be any angle.
T  F  7. A guide stick assists when sanding curved stock to width. Textbook, page 272
T  F  8. Long bevels can be sanded with the disc sander when the rip fence is off-set. Lesson 8
T  F  9. Curved stock in Assignment 51 is concave.
T  F  10. A concave curve can be sanded on the disc sander. Assignment 52
T  F  11. Burning of abrasive paper can be reduced by cleaning the paper with a cleaning stick. Lesson 8
T  F  12. Edge sanding with the drum sander should be done with Mark V in the Vertical Drill Press position. Can be done in either position.
T  F  13. When surface sanding flat stock using drum sander, stock is fed from the front of table. Assignment 53
T  F  14. Wrapping paper is used to catch the sawdust when sanding thin narrow strips with the drum sander. Lesson 8
T  F  15. Stock should be fed with the grain when surface sanding with the drum sander. When possible, all sanding is with grain.
T  F  16. The metal guide strip used for pattern sanding is clamped to the main table. Assignment 54
T  F  17. When pattern sanding, the stock and pattern are held in contact with brads. Assignment 54
T  F  18. Stock is rotated clockwise when pattern sanding with the disc sander. Lesson 8
T  F  19. Excessive speed of the drum sander will cause burning due to pitch drawn from the wood. Textbook, page 280
T  F  20. When edge sanding using the Disc Sander, stock should be passed with the grain. Whenever possible, sand with the grain

MULTIPLE CHOICE: Underscore your choice.

21. Concave curves should be sanded with (disc sander) (drum sander) (belt sander). Assignment 52
22. When edge sanding inside curves, the end of the drum sander should be (above) (below) (even with) the surface of the table. Assignment 52
23. When pattern sanding, the stock should be rough cut to a size that is (greater than) (equals) (less than) the size of the pattern. Assignment 54
24. When beveling the end of long stock, the carriage is usually set at the (right end) (center) (left end) of the tubes. Assignment 50
25. When surface sanding wide stock with the disc sander, the quill is first set (fully retracted) (extended one inch) (extended four inches). Not recommended - use drum sander
TEST QUESTIONS ON LESSON 9

CORRECTION SHEET

TRUE OR FALSE: Circle your selection.
T  F  1. The cup center rotates with the stock. Lesson 9
T  F  2. Centering the stock prevents excessive vibration when rotated. Lesson 9
T  F  3. The drive center is driven into the stock with a wooden mallet. Lesson 9
T  F  4. The tool rest can be slid parallel with the work which saves time and trouble. See Owner's Manual
T  F  5. It is not advisable to rotate the stock by hand before initial turning by power. Lesson 9
T  F  6. Rough turning of square stock should be commenced using slow speed. Assignment 56
T  F  7. In making the first cut for roughing down stock, the cuts should be light. Assignment 56
T  F  8. When rough turning, the smoothness of the surface should be checked by placing hand on turning stock. Lesson 9
T  F  9. The surface of cylindrical stock can be smoothed with a skew. Lesson 9
T  F  10. When rough turning, the gouge is rotated to increase the rate of waste removal.
T  F  11. Outside calipers can be used to determine the diameter of circular stock. Textbook, page 195
T  F  12. When using a gouge, scraping action will result in a smoother cut than shearing action. Owner's Manual
T  F  13. The blade of the skew should be approximately horizontal and the center of the cutting edge used, when a shearing cut is made. Textbook, page 189
T  F  14. The parting tool is seldom used in a scraping action. Textbook, page 190
T  F  15. Concave cuts are usually made with a skew. Assignment 59
T  F  16. The center of a concave cut in cylindrical stock is nearer the longitudinal axis of the stock than the ends. Assignment 59
T  F  17. A bead is formed by making two convex cuts. Textbook, page 190
T  F  18. Rounding corners with a skew requires special handling of the chisel not used for any other cut. Lesson 9
T  F  19. When preparing to round the corners of square stock, the skew should be placed on the tool rest with the heel of the cutting edge down. Assignment 61
T  F  20. The amount of taper cut in stock can be regulated with the eccentric in the tail stock.

MULTIPLE CHOICE: Underscore your choice.
1. Stock is tightened between centers by (pushing hard on the head stock) (extending the quill) (driving stock into dead center). Textbook, page 185
2. The dead center is held in place by (set screw) (lock nut) (friction). Textbook, page 184
3. Normally, the top edge of the tool rest should be (even with) (well above) (well below) the axis of the stock. Textbook, page 185
4. To determine the diameter of a cylinder use (outside calipers) (steel square) (inside calipers). Textbook, page 195
5. The parting tool is usually used to (cut) (scrape) (shear). Textbook, page 190
LESSON 10
TEST

TEST QUESTIONS ON LESSON 10
CORRECTION SHEET

TRUE OR FALSE: Circle your selection.

1. Turning a bowl from hardwood takes longer than when using softwood. Assignment 63
2. Stock is usually mounted between centers when turning a tray. Assignment 63
3. A marking gauge can be used to dimension the perimeter of a face plate turning. Textbook, page 179
4. A rubber bonded wheel cannot be operated on Mark V while faceplate turning is in progress. Lesson 10
5. The only method of accurately scribing the circumference of a bowl on stock which is mounted on a face plate is with dividers. Lesson 10
6. Stock can be cut to form the perimeter of a bowl using a parting tool. Lesson 10
7. Some splintering of the stock is unavoidable when cutting through to the back of stock mounted on a face plate. Lesson 10
8. Only one side of a pattern is used for marking dimensions and checking profiles when face plate turning a bowl. Textbook, page 178
9. When inside turning stock attached directly to the face plate, depth of cut should be checked carefully to prevent cutting through to the surface of the plate. Textbook, page 200
10. A turned bowl can be thrown out of round by improper sanding. Lesson 10
11. There is no way of concealing screw holes left in the bottom of a face plate turning. Lesson 10
12. A mounting block is used to display a finished lamp base. Assignment 64
13. A mounting block is used when turning a shallow bowl because it holds the stock more securely than wood screws. Assignment 64
14. Rough cutting stock to be turned on a face plate using a bandsaw permits faster initial turning speed than advisable when stock has an octagonal perimeter. Lesson 10
15. When mounting stock for shallow turning, alignment of face plate perimeter, paper disc, mounting block and stock should be approximate. Used for deep turning
16. The base of a small box turned on a face plate can be used as a chuck to hold stock from which the cover is turned. Assignment 65
17. An excessively tight fit of the cover of a turned box is usually eased with wax. Assignment 65
18. The outside diameter of the flange cut in stock to be used for the cover of a bowl should be equal to the outside diameter of the finished bowl. Assignment 65
19. When making a long sanding drum, a V-cut is made before the stock is turned. Assignment 66
20. When counter boring the short drum, the V-cut should be up when stock is on the table.
Assignment 66

MULTIPLE CHOICE: Underscore your choice.

1. The outside diameter of a face plate turning is usually cut with a (parting tool) (gouge) (round nose). Assignment 63
2. Excessive depth of cut when inside turning stock attached directly to the face plate will (spoil the pattern) (puncture the bottom) (cause chisel to hit screws). Assignment 63
3. To remove the bowl from the mounting block use (a screwdriver) (hot water) (putty knife). Assignment 64
4. The top of the cover for a jewel box is turned (after the box) (before the flange) (when cover stock is chucked in box). Assignment 65
5. When sanding with the long sanding drum, the stock is fed between drum and table (from the front) (at an angle) (against direction of rotation). Assignment 66
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