Section 26.1
Molding & Trim Basics

Section 26.2
Interior Door & Window Details

Section 26.3
Baseboard, Ceiling, & Other Molding

Chapter Objectives
After completing this chapter, you will be able to:

• **Identify** uses for molding and trim other than decoration.
• **Explain** which joints are used for molding and trim and why.
• **Identify** different types of molding and trim.
• **Demonstrate** how to scribe molding and trim to an uneven surface.
• **Demonstrate** how to trim to an uneven surface.
• **Explain** how to cut a coped joint.

Discuss the Photo
Trim Carpentry A trim carpenter is a specialty carpenter who installs many types of interior woodwork. What are some examples of interior woodwork you have seen?

Writing Activity: Job Advertisement
Use the Occupational Outlook Handbook and other resources to investigate the job of finish carpenter. Create a 200-word job advertisement for a finish carpenter. Include information about training, tool use, and basic skills required.
**Before You Read  Preview**

Careful trim carpentry is one characteristic of high-quality building construction. Choose a content vocabulary or academic vocabulary word that is new to you. When you find it in the text, write down the definition.

**Content Vocabulary**

- molding
- trim
- casing
- side casing
- head casing
- reveal
- return
- baseboard
- coping
- crown molding
- springing angle
- backing
- wall standard
- coping
- wall standard

**Academic Vocabulary**

You will find these words in your reading and on your tests. Use the academic vocabulary glossary to look up their definitions if necessary.

- reinforces
- absorbs
- accurate

**Graphic Organizer**

As you read, use a chart like the one shown to organize information about content vocabulary words and their definitions, adding rows as needed.

<table>
<thead>
<tr>
<th>Content Vocabulary</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>molding</td>
<td>narrow lengths of wood shaped to a profile</td>
</tr>
<tr>
<td>trim</td>
<td>a length of wood with square edges that is surfaced on 4 sides (S4S)</td>
</tr>
</tbody>
</table>

Go to glencoe.com for this book’s OLC for a downloadable version of this graphic organizer.

**Academic Standards**

**Mathematics**

- **Data Analysis and Probability:** Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them (NCTM)
- **Number and Operation:** Understand the meaning of operations and how they relate to one another (NCTM)

**Science**

- **Life Science:** Matter, energy, and organization in living systems (NSES)
- **Science and Technology:** Abilities of technological design (NSES)

**Industry Standards**

- Installing Interior Trim

**English Language Arts**

- Read literature to build an understanding of the human experience (NCTE 2)
- Participate as members of literacy communities (NCTE 11)

NCTE  National Council of Teachers of English
NCTM  National Council of Teachers of Mathematics
NSES  National Science Education Standards
Types of Millwork
Why are molding and trim often combined?

Houses are made of many different materials, but no material is used more extensively than wood. In Unit 4, many fundamental principles of wood growth and usage were discussed, including frame construction techniques using lumber. Lumber is one category of wood used in construction. Millwork is another category. In the broadest sense, millwork includes doors and door frames, window frames, stair parts, cabinetry, trim, molding, and any wood product with a finished surface. Unlike lumber, millwork is meant for use where it will be visible once the house is complete.

Installing millwork such as that shown in Figure 26-1 is the job of the trim carpenter. Generally, trim carpentry involves all the woodwork that is installed inside a building, with the exception of wood flooring. This chapter will cover molding and trim.

Figure 26-1 Using Millwork
All Millwork This photo shows several types of millwork, including molding and trim.
Molding and Trim

The term **molding** usually refers to narrow lengths of wood with a shaped profile. The term **trim** refers more often to a length of wood with square edges that is *surfaced on four sides* (S4S). However, the two terms are often used interchangeably. **Trim** is also used as a verb. For example, a builder might *trim out* a window (attach molding and trim to it).

Although they are used decoratively, molding and trim often have practical purposes as well. For example, window molding reinforces the window jambs and conceals the large gap between the jambs and the surrounding framing. Baseboard molding protects the lower portion of a wall from damage when the floors are cleaned. (For this reason, it was once known as *mop board*.)

Molding and trim can be made on site from rough stock. This is sometimes done when unusual patterns and profiles are required. For example, a trim carpenter could plane the surfaces of rough stock to convert an unusual hardwood into trim. Another example would be to use a custom-made router bit to shape the edge of trim stock, then rip the shaped edge off on a table saw to create molding. If large quantities of a unique molding are needed, they can be fabricated at a millwork company. However, most trim and molding is purchased from local sources. Molding and trim can be used individually or combined to form many interesting designs, as shown in Figure 26-2.

Standard molding patterns and shapes are readily available. Likewise, standard sizes of trim can be purchased. Typical molding profiles are shown in Figure 26-3 on pages 752–753.

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**Figure 26-2 Using Molding and Trim**

**Design Flexibility** Various types of moldings can be used separately, as in A, or they can be combined with trim. For example, the assembly of molding and trim in B would be called a **built-up baseboard**.
Many Shapes  These moldings are shown in cross section, called a molding profile. The profiles shown here are among the most common. The actual dimensions listed here are only a sample of what is available. Moldings come in many sizes.

Figure 26-3  Typical Molding Profiles
Planning for Molding and Trim  Installation of molding and trim is one of the last steps in construction, but planning needs to start early. Orders for materials should be placed at least six to eight weeks in advance. Everyone on the building team (such as the contractor, finish carpenters, and so on) should have drawings and specifications at the earliest possible stage. Any changes need to be communicated because they will affect the final installation as well as the budget.

Materials  Most molding and trim used in residential construction are made of solid wood, but other materials are becoming quite common.

Solid Wood  Most products are made of pine, hemlock, poplar, or fir. Hardwoods such as oak and maple are common, and other hardwoods are available by special order.

Finger-Jointed Stock  Some manufacturers make molding and trim from short lengths of solid wood that have been finger-jointed and glued together. This utilizes wood that would otherwise be wasted. Finger-jointed wood is considered paint-grade product. This means that it is suitable for finished use if it will be painted, but not if it will be stained. Paint conceals the finger joints.

Veneered Stock  Good quality wood is increasingly difficult to find, so molding and trim is sometimes made from a base material that is then covered with wood veneer, as shown in Figure 26-4. The base material could be

![Figure 26-4 Veneered Stock](image_url)

Efficient Wood Use  This window casing consists of wood veneer applied to a base stock.
finger-jointed solid wood, a composite material, or a synthetic material. The veneer can be prefinished or finished on site.

**Synthetic Stock** Some manufacturers produce trim made from synthetic materials such as polyurethane that are much lighter than wood. However, synthetic stock can be cut and nailed with standard woodworking tools, and it is decay resistant. This makes it especially useful for exterior use. The molding shown in Figure 26-5 is one example. These products come with a primer coat because they are always painted. Always consult the manufacturer’s literature for joinery details. Some types of joints used for wood molding are not suitable for use on synthetics. Also, special adhesives may be required.

The cost of interior trim varies a great deal with wood species and styles. For example, pine used for door and window frames may cost half as much as some hardwood trims. The choice of materials is therefore based on where the trim is located and how it will be finished. For example, oak crown molding with a stain finish might be specified for a living room and dining room. Simple cove moldings made of pine might be specified for bedrooms. They would also be painted. Paint-grade molding can often be purchased in lower grades because painting will cover minor imperfections of color and figure. Such details are covered in the building plans and specifications.

The moisture content of wood determines how stable it will be once installed. The recommended moisture content for interior wood trim varies from 6 to 11 percent, depending on climate. The averages for various parts of the contiguous United States are shown in Figure 26-6. In Canada the recommended moisture contents for the four major geographical areas are: Vancouver, 11 percent; Saskatoon, 7 percent; Ottawa, 8 percent; Halifax, 9 percent.

**Finishes**

Interior molding and trim may be painted, stained, or given a clear finish such as varnish or polyurethane. In some cases, the wood is stained before it is coated with a clear finish. The type of finish desired often determines the species of wood to be used.

Woodwork to be painted should be smooth, close-grained, and free from pitch streaks. Two woods having these qualities in a high degree include northern white pine and yellow poplar. When the finish is to be clear, or natural, the wood should have a pleasing grain and uniform color. Woods with these qualities include ash, birch, cherry, maple, oak, and walnut.

**Curved Trim and Molding**

Most trim and molding is used in straight lengths. However, there are times when the installation of curved stock is necessary. For example, a room with curved walls will require baseboard that follows that curve.
Window trim around the top of a *Palladian window* also must be curved, as shown in Figure 26-7. (A Palladian window is a tall window with a curved top, flanked on each side by a shorter, rectangular window.) In some cases, such as with curved-head windows, the window manufacturer will supply curved trim. However, it is also possible to create curved trim.

**Direction of Curve** In some cases, a piece of straight, solid-softwood stock can be forced into a gentle curve. However, the thicker the stock, the less likely this method will succeed. Excessive bending will cause the wood to snap or crack. Also, bending is only possible across the thickness of the wood, not across its width.

**Recall** What does baseboard molding protect against?

**Making Curved Stock** Curved molding and trim can be made in various ways. Some methods are shown in Figure 26-8 on page 756. The method chosen depends on what material will be used, the degree of curve...
Bendable Four methods for creating curved molding or trim using solid wood.

- **Laminated**
  - Thin layers glued together

- **Kerfed**
  - Saw kerfs across one face, then bend stock

- **Solid**
  - Waste

- **Segmented**
  - Finished curve cut from segmented curve
  - Angled segments
necessary, and how the material will be finished. Here are the basic methods:

Laminating  Thin layers of wood can be glued together in curved forms. When the glue dries, the layered assembly will retain the shape of the forms.

Kerfing  A shallow saw cut is called a kerf. When one side of a piece of wood is repeatedly kerfed, the wood will be weakened enough to bend. The spacing and depth of kerfs will affect how much of a bend is possible.

Solid Stock  A curved piece can be cut from a single piece of solid wood. However, this method has limited use, because the starting stock must be wide enough to contain the entire curve. Also, much of the wood will be wasted.

Segmental Stock  Instead of cutting one large curved piece, many smaller pieces can be cut from straight stock and then glued together end to end. This creates a large, angular piece in the approximate shape of the curve desired. This piece is then cut or shaped to create the final curved stock. This method wastes much less wood than the solid stock method.

Steam Bending  Subjecting wood to hot steam relaxes wood fibers and enables the wood to bend somewhat. This method is labor intensive because the wood to be bent must be contained in a custom-built steambox.

Use of Synthetics  Molding and trim made of flexible polymers can be bent into a wide range of curved shapes. These products can be painted or stained.

Cold Bending  The wood is soaked in water and then bent. This is only possible with thin strips of wood. Also, the bend is not permanent, so the bent wood must be contained in some sort of frame.

Chemical Bending  Certain chemicals will make wood more pliable. This method should only be used by professionals.

After You Read: Self-Check

1. Define trim carpentry.
2. What is the meaning of the abbreviation S4S?
3. What advantages does synthetic trim have compared to solid wood?
4. What qualities are desired in wood that is to be painted?

Academic Integration: Science

5. Create a Diagram  Refer to Figure 26-2 on page 751 and Figure 26-3B on pages 752–753. Using any of these molding profiles and any dimension of trim, design a built-up baseboard. Make a sketch of your design using CAD software if possible. Describe your design and how it might be installed in a bulleted or one-paragraph summary.

Go to glencoe.com for this book’s OLC to check your answers.
Basic Skills

What tools do you think are most important to a trim carpenter?

The molding or trim around a window or door is called the casing. When installing casing in a room, door and window frames are usually trimmed first because baseboard and some other moldings must fit against them.

Preparing the Room

Before any molding or trim can be installed, the interior wall covering must be complete (except for paint). Cabinets, built-in bookcases, rough fireplace mantels and similar features should be in place.

The finish floor may or may not be in place at this stage. If it is, precautions should be taken to protect it from damage. If it is not, spacers can be used to approximate the thickness of the finished flooring. The subfloor should be scraped clean and be free of any irregularities. Lightly mark the location of all wall studs on the floor or lower portion of the wall. The marks will be covered later by trim.

Basic Joinery

The two most common corner joints that are used for casing are the butt joint and the miter joint. They are shown in Figure 26-9. The joints connect side casings with the head casing. A side casing is a vertical piece at the side of a door or window. A head casing is the horizontal piece at the top of a door or window.

Butt Joint A butt joint is a quick and easy joint to make. It is made using cuts made at 90° across the face of the stock. Casing that is made primarily of trim stock often uses this joint.

Miter Joint Casing with a shaped surface is mitered at a 45° angle. Mitering ensures that the shape will be continuous from side casings to head casing. As the wood dries, a mitered joint may open slightly at its outer edge. Nailing across the joint after pre-drilling the hole and gluing the joint help to hold the joint together.

Many trim carpenters use compressed-wood biscuits to hold trim joinery together. This technique can be used on butt joints or mitered joints. A biscuit joiner (see Chapter 6,

Figure 26-9 Casing Joints

Joining Casing A. Casing with a molded shape must have a mitered joint at the corner. B. Square-edged casing may be joined with a miter joint or a butt joint. In both cases, the casing is nailed to the wall and the joints may be reinforced by nailing at the locations shown by arrows.
Section 6.4) is used to cut a shallow groove in the ends of both pieces. A compressed biscuit is inserted into the groove and glued in place to reinforce the joint, as shown in Figure 26-10. When the pieces are brought together, the biscuit absorbs moisture from the glue and expands slightly, forming a tight joint. Biscuits are available in three standard sizes, as shown in Table 26-1.

### Making a Miter Cut

Because two pieces of trim are often joined to form a 90° corner, the angle for most miter cuts is 45°. Use a miter saw to ensure accuracy when making these and other cuts (see Section 5.3).

If angles other than 90° or 45° are required, you must calculate them. To do this, divide 180 by the number of sides. Then subtract that answer from 90. The result will be the number of degrees for each miter cut. For example, to make cuts for a five-sided figure, you would make the following calculations:

\[
180° \div 5 = 36° \\
90° - 36° = 54°
\]

### Door Casing

**What is a reveal?**

The most commonly used casings for interior doors vary in width from 2¼” to 3½”. Thicknesses vary from ½” to ¾”. Two of the more common patterns are shown in Figure 26-11.

### Installation

Casings are nailed to the door jamb and to the framing around it, allowing about a ¾” reveal on the face of the jamb, as shown in Figure 26-12 on page 760. A reveal is a small offset between a piece of trim and the surface it is applied to. The small step this creates adds visual interest.
It also allows the trim carpenter to adjust the fit of the casing if the door is not perfectly square.

Nails are located in pairs and spaced about 16" apart around the opening. To nail into the framing, use either 6d or 7d finish nails, depending on the thickness of the casing, as shown in Figure 26-12, arrow 1. To fasten the thinner edge of the casing to the jamb, use 3d, 4d, or 5d finishing nails, as shown in Figure 26-12, arrow 2. With hardwood, the holes should be pre-drilled to prevent the wood from splitting. It is the trim carpenter’s responsibility to countersink the nail heads. It is typically the painter’s responsibility to fill them.

**Door Rosettes**

Mitering is commonly used for joining molding at corners. However, molding can also be installed using *rosettes*, a type of plinth block. These add a decorative element to the room. They eliminate the need to miter the molding. They also conceal differences in thickness between baseboard and door casing as shown in Figure 26-13.

**Window Casing & Shutters**

*What is picture framing a window?*

Casing for windows should be of the same pattern as that selected for the door. Windows may also require a stool and an apron, as shown in Figure 26-14. The *stool* is a horizontal member that laps the window sill and extends beyond the casing. An *apron* serves as a finish member below the stool.

Window trim is commonly applied in two different ways: with a stool and apron (Figure 26-14A) or with only casing, as shown in Figure 26-14B.

**The Window Stool**

The stool is normally the first piece of window trim to be installed. It is notched so that it fits between the jambs and butts against the lower sash. Refer to Figure 26-15, which is a section view.

**Summarize** Why are holes pre-drilled when using hardwood?
The upper drawing shows the stool in place. The lower drawing shows it laid out and cut, ready for installation.

Note the three distances labeled A, B, and C. Distance A, the overall length of the stool, is equal to the distance between the outer edges of the side casings, plus the amount that each end of the stool extends beyond the casing’s outer edges. Distance B is equal to the width of the finished opening. Distance C is equal to the horizontal distance measured along the face of the jamb between its edge and the inside face of the lower sash. An allowance of about $\frac{1}{32}$" should be deducted for clearance between the sash and the stool. A notch is then cut at each corner of the stool along the layout lines.

The stool is toenailed at the ends with 8d finish nails so that the casing at the sides will cover the nailheads. With hardwood,
pre-drilling is required to prevent splitting. The stool should also be nailed at the center to the sill and to the apron when it is installed. Toenailing may be substituted for face-nailing to the sill (see Figure 26-14A).

The Casing

Apply the casing after installing the stool. Nail it as described for the door casing. Other types of windows, such as awning, hopper, or casement, are trimmed much like a double-hung window. Casings of the same type are used for all.

When just casing (and no stool or apron) is used to finish the bottom of a window, all four lengths are mitered (see Figure 26-14B on page 761). This is called picture framing a window, because the four pieces form a continuous frame around it. The four pieces can be nailed in place one by one. An alternative is to lay the pieces face down on a clean, smooth surface and fasten them together from the back with corrugated fasteners. The assembled casing, much like a picture frame, can then be nailed as a unit to the window jambs and studs.

The Apron

Cut the apron to a length equal to the distance between the outer edges of the side casings. To avoid exposing endgrain at the ends of the apron, cut and nail a return in place, as shown in Figure 26-16. A return is a piece that continues the profile of trim or molding around the corner. Trim carpenters refer to this technique as returning the apron to the wall. Attach the apron to the rough sill with 8d finish nails, then glue the return into place at each end and hold it in place temporarily with painter’s tape.

Interior Shutters

Movable interior shutters were popular in Western architecture from about 1700 to the early part of the nineteenth century. They were used in the great mansions of New Orleans and in many other fine homes of America. Shutters such as those in Figure 26-17 are once again popular. They are found most often in homes with traditional or country-style interiors.

Figure 26-16 Mitered Return
Best Quality The ends of the apron should be mitered to continue the profile of the apron and conceal its end grain.

Figure 26-17 Window Shutters
Improved Privacy Louvered shutters may be used throughout a home instead of curtains.
To determine the size of the shutters to be installed in a window, measure the width of the opening between the side jambs. Measure its height from the top of the sill to the inside surface of the top jamb. Various methods can then be used to install the shutter, as shown in Figure 26-18.

![Figure 26-18 Shutter Hinge Details](image)

**Two Mounting Methods** If the edge of the window casing is thin, as in A, the shutter can be attached to a hinge strip secured to the window jamb. If the edge of the casing is thick, as in B, the hinge can be attached directly to it.

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**After You Read: Self-Check**

1. What two basic cuts are used when installing door and window casing?
2. What is a reveal and why is it important?
3. How do you picture frame a window?
4. To what length should the apron be cut?

**Academic Integration: Mathematics**

5. **Miter Cuts** A carpenter is installing the trim around a window that is a regular hexagon. What is the angle of the miter cuts the carpenter should make?

   **Math Concept** A regular hexagon is a geometric figure with six sides. All the interior angles of a hexagon are congruent.

   **Step 1:** Divide 180° by the number of sides.
   **Step 2:** Subtract the result from 90°.

   Go to [glencoe.com](http://glencoe.com) for this book’s OLC to check your answers.
Baseboard

What trades might need to know the type of baseboard planned for a house?

After the window and door casings are complete, the trim carpenter installs the other moldings in a room. These include flat moldings, such as baseboard or chair rail, and sprung moldings, such as crown molding. Sprung moldings are moldings that project out from the wall surface.

Baseboard, or base molding, is a board or molding used against the bottom of walls to cover their joint with the floor. It serves as a transition between the wall surface and the floor. It also covers the gaps that often occur at this location. It can be added after all the doors are trimmed and the cabinets are in place. It can be installed after the finish flooring and should be installed before any carpeting.

One-piece baseboard consists of a single piece of stock that varies in size from $\frac{7}{16}” \times 2\frac{3}{4}”$ to $\frac{1}{2}” \times 3\frac{3}{4}”$ or wider. It is the most common type of baseboard. A small molding called a base shoe is sometimes added to conceal the joint between the bottom of the baseboard and the floor. The shoe is nailed into the baseboard, not into the flooring. This prevents the shoe from being moved out of position as the flooring shrinks or expands.

When carpeting is to be installed, the baseboard is installed first, using temporary spacers to lift it slightly above the subfloor, as shown in Figure 26-19. A consultation with the carpet installer can determine how much clearance is needed. The edges of the carpet are then tucked beneath the baseboard. When wall-to-wall carpeting is used, the shoe is usually omitted, and in some cases, the entire baseboard is omitted.

Baseboard may have several parts. For example, two-piece baseboard consists of

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**Builder’s Tip**

**TRIMMING BASEBOARD** To get a good fit, it is often necessary to cut a tiny amount off the end of a piece of baseboard. To do this, lower the miter saw until the blade’s teeth are at table height. Hold the baseboard against the fence with your fingers well away from the blade. Then slide the molding under the blade guard until one end touches the teeth of the blade. DO NOT TURN THE SAW ON YET. Push the molding against the saw teeth slightly. This will nudge the blade slightly out of position. Now raise the saw blade, but without moving the molding. Turn on the saw and make the cut. A small fraction of wood will be removed. Test fit the cut. Repeat the process if necessary.

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**Figure 26-19 One-Piece Baseboard** Planning Ahead. Temporary spacers should be used to create a uniform space under baseboard in a room that will have wall-to-wall carpeting.
a base topped with molding, as shown in Figure 26-20. When the wall covering is not straight and true, the base cap conforms more closely to the variations than a single wider baseboard would. Three-piece baseboard is shown in Figure 26-3 on pages 752–753.

Square-edged baseboards should be installed with a butt joint at inside corners and a miter joint at outside corners. Profilèd baseboards should also be mitered at outside corners, but they should be *coped* (shaped to fit each other) at inside corners (see Figure 26-20). A coped joint looks similar to a mitered joint when complete, but it is a better joint to use in these locations. It forms a good joint even if walls are not perfectly square or plumb at the corners. Also, if the wood shrinks over time, a coped joint will not open up as visibly as a mitered joint will.

Baseboard cut to fit between walls should always be cut a little long. The stock can then be bowed slightly and sprung into place. This ensures a tight fit. When more than one length of baseboard is needed along a wall, the pieces are joined over a wall stud with a mitered lap joint. The angle of the miter is typically 45°, as shown in Figure 26-21. The baseboard is secured to each stud with two 8d finishing nails. The bottom nail should be close enough to the floorline to be covered by the base shoe molding.

**Fitting a Joint**

Though a length of baseboard can be measured precisely to fit into place on a wall, trim carpenters usually find it quicker and more *accurate* to mark a length of baseboard in place. The technique is to cut a board about an inch or two longer than necessary, then hold it in place for marking. This technique works particularly well when fitting baseboard against door casing. The trim carpenter saying is, “If you don’t measure, you can’t measure wrong.” A similar technique is to
hold a small piece of plywood scrap, sometimes called a preacher, against the edge of the door casing, as shown in Figure 26-22. This is very useful if casing is not perfectly plumb. When walls are out of plumb, two lengths of square-edge baseboard that intersect at an inside corner will not fit together properly. One or both of the boards may have to be scribed and trimmed to fit. Scribing is a marking process that allows a piece of wood to be precisely fit against a surface that is irregular or not square. The process is shown in Figure 26-23 in the Step-by-Step Application.

**Mitering a Joint**

Outside corners on baseboard are frequently mitered. The cut is made across the thickness of the material instead of across the width. The process is shown in Figure 26-24.

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**Step-by-Step Application**

**Scribing a Joint** Variations of this technique can be used wherever one material must fit tightly against an irregular surface.

**Step 1** Install the first length of baseboard.

**Step 2** Set the second piece in position on the floor. Place the end to be joined against or near the face of the piece already installed.

**Step 3** Using a compass, draw a line parallel to the face of the installed piece on the face of the piece to be joined, as in Figure 26-23. Be careful to hold the legs of the compass horizontally and at right angles to the baseboard being scribed. This will ensure a parallel line. If a compass is not available, the same results can be achieved by supporting a pencil flat on a scrap of wood and using them to draw the line.

**Step 4** Cut the scribed piece along the line using a coping saw or a jigsaw fitted with a fine-tooth blade.

**Step 5** Test the fit. Recut as needed, or use a woodfile or sandpaper to fine-tune the fit.

Go to glencoe.com for this book’s OLC for additional step-by-step procedures, applications, and certification practice.
1. Set a piece of baseboard against the wall, as in Figure 26-24A. Mark a layout line on the floor along the edge of the piece.
2. Repeat the process on the adjoining wall.
3. Hold the first piece to be mitered in place. Mark it where it intersects the layout line (Figure 26-24B).

4. Set the miter saw to a 45° bevel angle and cut just outside the layout line.
5. Repeat Step 3 and cut the second piece at a 45° bevel angle.
6. Test fit the pieces and trim them as needed. The completed corner is shown in Figure 26-24C.

**Coping a Joint**

Inside corner joints between trim members are usually made by cutting the end of one member to fit against the face of the other. This shaping process is called **coping** and is shown in Figure 26-25. Coped joints are used in a variety of situations, but they are quite common when installing baseboard. This is because a coped joint will not open up after the baseboard is nailed in place. It is also less likely to show a gap if the baseboard shrinks after installation.

To prepare a coped joint, start by installing the first length of baseboard. This baseboard has a square cut on one end and is butted to the wall surface. Once this piece is nailed to the wall, the intersecting piece can be prepared. The end of this piece will be coped as shown in Figure 26-26 on page 768.
1. Use a miter saw to miter the end at 45°. Refer to A in Figure 26-26.

2. Rest the coping saw blade against the edge of the miter cut. Hold the saw at 90° to the back of the molding and begin your cut. Then cut the molding along the inside edge left by the miter cut. As you cut, direct the saw slightly inward, away from the molding to be joined. This is known as back-cutting. Refer to B and C in Figure 26-26.

3. The end profile of the coped member should match the face of the intersecting molding. Refer to D in Figure 26-26. Fine-tune the fit as necessary for a tight joint.

Coping Strategy  Baseboard is often coped at one end and butted into a wall or a door casing at the other end. The coped cut should be made first. There are two reasons for doing this:

1. It allows for recuts. A coped cut is more difficult than a square cut. A novice may have to cut it a second time to ensure a tight fit, and leaving the baseboard long allows for this.

2. Trimming is easier. When installing the coped baseboard, it is often necessary to trim a small amount off one end so that the baseboard will fit perfectly. It is faster and easier to trim a little off a square cut than off a coped cut.

Cutting Baseboard Returns

Ideally, the outside edge of the door casing will be thicker than the baseboard. This will prevent the end grain of the baseboard from showing. However, sometimes the baseboard is thicker than the casing. To provide a finished detail in this situation, the baseboard can be returned where it meets the casing. There are two methods for doing this: face mitering and edge mitering. Both are shown in Figure 26-27.
The method shown in 26-27B is similar to the way the ends of a window apron are handled (see Figure 26-16). Glue the small return piece into position and fasten it with brads or small finishing nails. Pre-drill the holes to avoid splitting the wood. When the face of the base shoe projects beyond the face of the door casing, the end of the base shoe can be returned in the same fashion. However, another way to handle this is to cut a reverse miter at a 45° angle, as shown in Figure 26-28. Note that the miter does not go completely through the thickness of the base shoe. Instead, a small stub should be left to fit against the casing for the sake of appearance. This method takes less time than a mitered return but exposes end grain.

**Installing the Baseboard**

Carefully plan the baseboard installation sequence before starting the job. Square cuts fit against wall surfaces. If the walls are unusually irregular, square cuts should be scribed to fit the wall surface (see Figure 26-23 on page 766). Coped cuts fit against adjacent lengths of baseboard. The outline of a room with one door is shown in Figure 26-29. Following are two methods for installing base molding, using square cuts and coped cuts.

**Method 1**

1. Cut and install a piece of molding to go along wall 1. It should have a square cut on each end.

2. Cut and install the molding for wall 2. The end meeting wall 1 should be coped. The other end should be square.

3. Cut and install the molding for wall 3. The end meeting wall 1 should be coped. The other end should be square.

4. Cut and install the molding for wall 4. Cope one end to fit against wall 3. Cut the other end to fit against the door casing.

5. Cut and install the molding for wall 5. Cope the end that meets wall 2. Cut the other end to fit against the door casing.

6. Install the base shoe. The base shoe should be nailed into the baseboard itself, not into the finish floor.

**Knee Protection**
The work of installing baseboard can be made more comfortable with the use of kneepads. These protect a trim carpenter’s knees from injury caused by prolonged contact with hard floors.

Go to [glencoe.com](http://glencoe.com) for this book’s OLC for more on job safety.
Method 2

If you are right-handed, you will find it easiest to work around the room in a counterclockwise direction.

1. Cut the first molding to fit along wall 5 between the door casing and the end wall. Make square cuts on each end.

2. Cope one end of the molding for wall 2 to fit against the molding on wall 5. Square cut the other end.

3. Cope one end of the molding for wall 1 to fit against the molding on wall 2. Square cut the other end.

4. Cope one end of the molding for wall 3 to fit against the molding for wall 1. Square cut the other end.

5. Cope one end of the molding for wall 4 to fit against wall 3. Cut the other end to fit against the door casing.

Ceiling Molding

How is installing ceiling molding similar to installing baseboard?

Ceiling moldings are sometimes used at the junction of wall and ceiling for architectural effect. They are also used to cover any gaps between different materials on the wall and the ceiling, as shown in Figure 26-30.

Ceiling molding is cut and installed in similar fashion to baseboard, using a combination of square cuts and coped cuts. Coped cuts ensure tight joints even if the moisture content of the wood changes slightly. To secure ceiling molding, a finish nail should be driven through it and into the wall plates or studs behind the wall surface. For large moldings, a nail should be driven through the molding into each ceiling joist, if possible.

Crown Molding

Crown molding is a fairly large molding that usually includes both curved and angular surfaces. It calls for special cutting and installation techniques. This is because it is angled away from wall and ceiling...
surfaces, and its back is not in contact with either of them. The angle at which the molding projects away from the wall is called the **springing angle**, as shown in Figure 26-31. The springing angle is typically $38^\circ$ or $45^\circ$. Moldings of this type are sometimes called **sprung** moldings.

**Recall** How is ceiling molding similar to baseboard?

**Installing Backing** It is a good idea to use a solid wood or plywood **backing** behind large moldings. Backing is a long strip of material that is nailed to the wall as support for large moldings. Nailing through molding and into backing is much easier than nailing into framing hidden behind plaster or drywall. This also provides more support for the molding. Pneumatic nailers are widely used to install crown molding because hand-nailing is awkward positions near the ceiling is difficult.

Some carpenters install backing made from 1× or 2× stock, as shown in Figure 26-32 on page 772. Note the angled cuts on the edges of the backing. Another way to install backing is to attach a continuous ¾" thick plywood strip behind the molding. It should be positioned at the same springing angle as the molding. When installing wide moldings against backing, the molding can be attached by nailing or by using trimhead screws. These screws have an unusually small head that can be countersunk below the surface of the molding.

**Built-Up Crown Molding** If a single piece of crown molding does not have the width desired for a wall, crown molding can be combined with other moldings, as shown in Figure 26-33 on page 772. This approach is similar that used to create built-up baseboard (see Figure 26-20 on page 765). Many assemblies are possible, but built-up crown usually requires some sort of backing or blocking. Often this is supplied by trim stock. The stock can be completely hidden, as in Figure 26-33 on page 772, or portions of it can be exposed to form part of the visible profile of the crown. If built-up crown is specified for a room, large detail drawings will be found on the building plans. Trim
cutting crown molding

because of crown molding’s shape, a compound-miter cut is required for a coped joint, instead of a simple miter cut as with baseboard. in a compound-miter cut, a miter and a bevel are cut simultaneously. make a compound-miter cut on crown molding as follows:

step 1 the springing angle of the molding determines the correct saw settings. set a compound-miter saw for the correct miter and bevel angles as indicated in the table.

step 2 place the molding face up and flat on the saw table.

step 3 after the molding is in position, make the compound-miter cut.

step 4 using the cut edge of the molding as a guide, cope the cut using a coping saw, as shown in the figure below. this is the technique shown in figure 26-26b and figure 26-26c on page 768.

step 5 test the fit against a scrap piece of crown molding. fine-tune the fit as necessary with a file until it is tight.

<table>
<thead>
<tr>
<th>type of crown molding</th>
<th>miter angle</th>
<th>bevel (tilt of blade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>cope on right end (top edge of crown against saw fence)</td>
<td>45°</td>
<td>35.3° (right)</td>
</tr>
<tr>
<td></td>
<td>38°</td>
<td>31.6° (right)</td>
</tr>
<tr>
<td>cope on left end (bottom edge of crown against saw fence)</td>
<td>45°</td>
<td>35.3° (right)</td>
</tr>
<tr>
<td></td>
<td>38°</td>
<td>31.6° (right)</td>
</tr>
</tbody>
</table>

* crown molding is flat on the saw table.

go to glencoe.com for this book’s OLC for additional step-by-step procedures, applications, and certification practice.
Both require a miter saw. One method calls for the molding to be positioned against the saw table and saw fence, as if these surfaces represented the ceiling and the wall. The second method, using a compound-miter saw, can be done without holding the crown upright. Instead, all cuts can be made with the molding flat on the saw table.

Other Uses of Molding
Where might built-in shelves be installed?

Moldings are used in many locations and for other purposes, such as for chair rails or shelving trim. An almost unlimited range of effects can be obtained by using or combining moldings and trim.

Chair Rail

Chair rail is a molding that runs horizontally across walls at 3’ to 4’ from the floor, as shown in Figure 26-34. It is often found in dining rooms, where it protects walls from damage caused by the backs of chairs. It may also serve as a transition between two different wall finishes. For example, a wall may be painted below the chair rail and wallpapered above. Chair rail can be installed in the same manner as baseboard. Inside corners may fit together in a coped joint but are sometimes mitered.

Trimming a Clothes Closet

The baseboard in a closet is usually the same as the baseboard used in the adjoining room. Smaller moldings may be used to cover the front edge of closet shelving, especially if the shelf is made of plywood. Wood trim might also be used to support the closet shelf and clothes rod, as shown in Figure 26-35. Such trim, often a piece of 1×3 stock, may be continued around the inside of the closet to provide a solid base for attaching clothes hooks.
Install closet trim as follows:

1. Cut the pieces of the hook strip to fit the closet. As you nail the hook strip into place, use a level to ensure correct position. Finish nails should be driven into the studs, not just into the drywall.

2. Measure 12" from the back wall, and center a closet rod bracket at this point on one side of the closet. These brackets support the closet rod. They are sometimes called rosettes, and may be made of plastic or wood. Screw one bracket into place but leave the other off for now.

3. Cut a closet rod to length. Place one end in the bracket attached in Step 2, and place the other bracket on the loose end of the rod. Slip the assembly into place, level the rod, and attach the second bracket to the hook strip.

4. Cut a shelf to length and set it on top of the hook strip. The shelf is not usually nailed. This allows it to be removed when the closet is painted.

If a closet is not needed for clothes, it can be put to other uses by adding shelving and table space, such as for a small home office. The doors can be closed when necessary to conceal office clutter.
Built-in Shelves

Closets, linen cabinets, and storage cabinets often require built-in shelves. These are adjustable shelves that are made to fit a specific space in the house. Built-in shelves are typically made of plywood, MDF, or particleboard. The front edge can simply be rounded over or it can be covered with a hardwood nosing. Both methods are shown in Figure 26-36. The shelves are typically supported by two or more wall standards. A wall standard is a perforated metal strip that can be screwed to a wall or to the inside of a cabinet. Metal shelf supports or small pegs fit into holes in the standard in order to support shelves at various heights. Wall standards are sometimes called shelf track standards or adjustable shelf standards.

After You Read: Self-Check
1. How should base shoe molding be nailed?
2. Name a technique carpenters use to mark a length of baseboard when fitting a joint.
3. When should baseboard be scribed to a wall?
4. What is crown molding?

Academic Integration: Mathematics
5. Perimeter A dining room measures 13' × 15', has one 42" × 84" door, and two 36" wide × 48" tall windows. How many lineal feet of baseboard, crown molding, and door and window casing will be required? Add 10% to your figures to account for waste. Round up to the nearest even number.

Step 1: Calculate the perimeters of the room, the door, and the windows.
Step 2: To calculate the crown molding needed, use the perimeter of the room plus 10%.
Step 3: To calculate the baseboard needed, subtract the width of the door from the perimeter of the room and add 10%.
Step 4: To calculate the door and window casing needed, add the perimeters of the door and windows, then subtract the width of the door before adding 10%.

Go to glencoe.com for this book’s OLC to check your answers.
Chapter Summary

In wood construction, molding and trim are used both as decoration and for practical purposes, such as to protect walls. They are available in many patterns and shapes. Most are made of solid wood, but some are made from short pieces joined together or from synthetic materials. Cost varies depending on style and type of wood. Curved molding and trim can be made in various ways.

Casing refers to all the trim around doors or windows. Square cuts and miter cuts are commonly used for joints. Window trim may consist of the casing alone or of the casing plus a stool and an apron. Shutters may also be added.

Baseboard moldings may consist of a base, a small cap, and a shoe. Walls that are not plumb may make scribing a joint necessary in order to achieve a tight fit. Joints are cope when one member is trimmed to fit against the face of another. Cutting a return is done to create a finished look when one member is thicker than another. Molding may also be placed along the ceiling, used for a chair rail, or used to trim a closet.

Review Content Vocabulary and Academic Vocabulary

1. Use each of these content vocabulary and academic vocabulary words in a sentence or diagram.

Content Vocabulary

• molding (p. 751)
• trim (p. 751)
• casing (p. 758)
• side casing (p. 758)
• head casing (p. 758)
• reveal (p. 759)
• return (p. 762)

Academic Vocabulary

• reinforces (p. 751)
• absorbs (p. 759)
• accurate (p. 765)

2. Work with a classmate to define the following terms used in the chapter: S4S (p. 751), trim out (p. 751), mop board (p. 751), rosettes (p. 760), stool (p. 760), apron (p. 760), picture framing (p. 762), sprung moldings (p. 764), base shoe (p. 764), scribing (p. 766), preacher (p. 766), return (p. 768), chair rail (p. 773).

Speak Like a Pro

Review Key Concepts

3. Describe two non-decorative uses for molding and trim.
4. Identify the two types of cuts made for window and door casings.
5. Describe three types of molding and trim.
6. List the steps involved in scribing molding.
7. Describe how to trim to an uneven surface.
8. Identify where coping joints are used.
Critical Thinking

9. Synthesize What problems may arise if baseboard were installed before carpeting?

Academic and Workplace Applications

Mathematics

10. Identifying Operations in Word Problems
Specifications for the remodeling of an apartment call for 300 lineal feet of window and door casing. The owners of the apartment are trying to decide if they want painted trim using paint grade casing at $0.77 per lineal foot, or stainable red oak trim at $1.26 per lineal foot. Calculate the difference between the total cost of each type of trim. Round up to the nearest $0.01.

The word difference in a math story problem refers to the operation of subtraction.

Step 1: Calculate the cost of each type of trim by multiplying the price by the total number of lineal feet.

Step 2: Subtract the smaller number from the larger number to obtain the difference.

Engineering

11. Creating a Schematic Locate a room within a structure you know where a chair railing could be installed. Write out a plan for installing the chair rail. Create a sketch of the room, including all measurements, materials, and procedures necessary to complete the installation.

Information Literacy Skills

12. Researching Architecture Wood molding and trim details have a long history of use in houses. Research the following American architectural styles: Greek Revival and Craftsman Style. Identify the types of molding and trim used around windows and doors in these styles. In addition, compare and contrast the types of baseboard and ceiling trim used in each type of architecture. Report your findings in a one-page report. Include simple sketches of relevant types of trim.

Multiple Choice

Directions Choose the phrase that best answers the following questions.

13. What are two species of wood that are characteristically smooth, close-grained, and free from pitch streaks?
   a. Sitka spruce and northern pine
   b. southern pine and yellow poplar
   c. northern pine and yellow poplar
   d. oak and northern pine

14. What is the name for the horizontal member that laps the window sill and extends beyond the casing?
   a. apron
   b. stool
   c. casing
   d. molding

15. Which type of cut ensures tight joints even if the moisture content of the wood changes slightly?
   a. coped cut
   b. miter cut
   c. crown cut
   d. all of the above

*These questions will help you practice for national certification assessment.