SHOPWARE

Instructor's Guide

Residential Construction Framing

Floor Framing • Wall Framing • Ceiling Framing • Roof Framing

Program Objectives

After watching this series, viewers will know:

- How the frame carries the load of the house
- How to frame the floors, walls, ceiling, and roof using conventional framing materials
- OSHA-approved safety practices for the jobsite
- "Green" building tips and strategies
- What framing carpenters do

Pre-Viewing Activities

Before viewing this series, discussion of the topic may be initiated by:

- Inviting a framing carpenter, residential building contractor, or residential building architect to talk about these jobs
- Visiting a construction site to observe a house being framed
- Getting familiar with the basic tools and supplies used by a framing carpenter

Vocabulary Terms

Anchor bolt – An anchor bolt attaches objects to concrete. The wood plate on which the house framing bears is fastened to the foundation with anchor bolts. They are placed in the foundation no more than 4 feet apart.

Band rafter or fascia – The board that is nailed to the end of the common rafters at the overhang cut.

Beam – A horizontal bearing member such as a joist.

Bird's mouth – The notch cut in to the roof rafter that allows it to fit snugly over the top plate.

Bottom or sole plate – The 2x4 that is the lowermost part of the wall frame. Laid horizontally on the subfloor, it carries the bottom ends of the studs.

Bracing – The application of materials to framed construction to make it rigid and to keep corners square and plumb.

Double top or cap plate – The uppermost part of the wall frame. Installed after all the walls are up and properly braced, it ties the walls and partitions together at the top and gives them extra strength.

Ceiling joists – In conventional roof construction, the beams that form the ceiling frame and support the ceiling load. They usually run parallel to the rafters.

Column or bearing post – Made of steel, timber, or concrete, it rests on footings and is the principal load-carrying vertical member of the structure.

Common rafter – An individual member of the roof frame. Common rafters usually run at a right angle from the exterior walls and rest on the ridge board.

Conventional roof construction – Also known as the joist and rafter method, it involves framing the roof by applying joists and rafters one piece at a time.

Cripple stud – A short stud that is sometimes added above or below the header of doors and windows. Also called simply a "cripple."

Engineered I-joists – These provide improved structural characteristics. They use less wood and are lighter weight, straighter, and manufactured to resist twisting, bowing, and shrinking.

Floor joists – The beams that form the floor frame.

Header – The wood member that is installed where windows or doors occur in outside walls or partitions. It supports the lower ends of the studs that have been cut. For the same purpose, it is placed at the bottom of a window opening. In this case, it may be referred to as a "rough sill" or "sill header."

Header joist – In platform construction, the band that is nailed to the ends of the floor joists, resting on the foundation wall.

Lookouts – In roof framing, a series of horizontal members that are nailed to the rafters and extend from the rafter ends to the face of the sheathing.

Partition channel – A wall-framing component that is used to provide better anchorage where interior partitions intersect with one another or with an outside wall.

Permanent bracing – Stiffens framed construction and makes it rigid, keeping corners square and plumb. Prevents warping, sagging, and shifting.

Platform framing – A type of conventional framing in which each floor of the structure forms a complete platform, fully independent of the walls. The subflooring extends to the outside edges of the platform-framed building, providing the surface upon which the exterior walls and interior partitions are erected.

Rake or fly rafter – Rafters that run parallel to the slope of the roof and create the overhang between the gable wall and the exterior edge of the roof.

Ridge or ridge board – The highest horizontal running member of the roof frame. It aligns the rafters and supports them at their upper ends.

Sheathing – Material applied to the wall, roof, or floor (known as subflooring) frame to add strength and rigidity, provide a nailing surface, and help carry the load.

Sill or sill plate – One or two thicknesses of 2-inch treated lumber that are secured to the top of the foundation wall. It provides the bearing surface for the outside of the structure.

Tail cut or overhang cut – The cut at the lowest edge of the rafter.

Top, ridge, or plumb cut – The cut of the rafter where it meets the ridge board.

Trimmer or trimmer stud – A stud that supports the header over an opening.

Trussed roof construction – A style of roof framing in which prefabricated components are attached to the structure in units.

Unit rise – In roof framing, the degree of slope for every foot.

Unit run – In roof framing, always 12 inches.

Suggestions for a Post-Viewing Discussion and/or Exam

1. What part of the body is similar in function to the frame of a house?

2. Name at least three important functions of the house frame.

3. Why is it important to maintain accuracy throughout every stage of the framing process?

4. Name at least four of the basic tools and supplies used by a framing carpenter.

5. List at least five safety rules that should always be followed at the construction site.

6. What are the most common spacing intervals for joists?

7. True or False: It is common practice to build shorter exterior walls first.

8. What is the most common technique for the floor framing process?

9. What is an important first step that the lead carpenter must take before beginning any new phase of building?

10. What symbol would be used in a wall layout to indicate where a full-length stud would be located? What about a cripple stud, trimmer, or corner stud?

11. What does permanent bracing do?

12. What is the function of the cap or double top plate?

13. How is a conventional roof constructed?

14. Name three cuts that must be laid out on a common roof rafter.

15. What runs parallel to installed joists: headers or trimmers?

16. Why do you use fiberglass sill sealer?

17. Why save the straightest studs to frame around openings?

18. What does it mean to say "the overhang rafters have been left to run wild"?

19. What runs perpendicular to the joists, replacing the need for an interior foundation wall?

20. Name three major functions of sheathing.

Answers to Post-Viewing Discussion and/or Exam Questions

1. What part of the body is similar in function to the frame of a house?

The skeleton.

2. Name at least three important functions of the house frame.

- **Encloses the structure**
- **Distributes the load of the structure downward, ultimately to the ground**
- **Provides the framework for the interior and exterior skins, doors, and windows**
- **Creates spaces where the plumbing, the heating/cooling and electrical systems, and the insulation will be installed**

3. Why is it important to maintain accuracy throughout every stage of the framing process?

To ensure that the structure will be straight, square, and plumb.

4. Name at least four of the basic tools and supplies used by a framing carpenter.

- **Circular power saw**
- **Hammer**
- **Level**
- **Chalk and chalk line**
- **Framing square**
- **Nail gun**
- **Carpenter's pencil**
- **Metal tape measure**

5. List at least five safety rules that should always be followed at the construction site.

- **Wear safety glasses, goggles, or a face shield when sawing or using chemicals**
- **Wear gloves when handling rough materials**
- **Wear a hardhat whenever there is overhead construction**
- **Wear appropriate footwear such as good work boots**
- **Learn how to use power tools properly**
- **If you're uncertain about something, ask for information or help**
- **Stay alert at all times: be aware of the areas above, below, and around you**
- **Wear sunscreen**
- **Drink plenty of fluids**
- **Never enter a jobsite after using drugs or consuming alcohol**
- **Store unused tools properly**
- **Bend or remove exposed nails**
- **Learn how to prevent falls**
- **Always keep the jobsite well organized and clear of debris**

6. What are the most common spacing intervals for joists?

16 or 24 inches on center.

7. True or False: It is common practice to build shorter exterior walls first.

False — the longest exterior walls are built first, then the shorter exterior walls, then the interior partitions.

8. What is the most common technique for the floor framing process?

Platform framing.

9. What is an important first step that the lead carpenter must take before beginning any new phase of building?

Review the plans.

10. What symbol would be used in a wall layout to indicate where a full-length stud would be located? What about a cripple stud, trimmer, or corner stud?

- **(X) Full-length stud**
- **(O) Cripple stud**
- **(T) Trimmer**
- **(C) Corner stud (2–3 studs clustered together)**

11. What does permanent bracing do?

Stiffens framed construction and makes it rigid. Keeps corners square and plumb. Prevents warping, sagging, and shifting.

12. What is the function of the cap or double top plate?

To tie the walls and partitions together at the top and give them extra strength. Also gives the wall its overall height.

13. How is a conventional roof constructed?

One piece at a time with ceiling joists and rafters.

14. Name three cuts that must be laid out on a common roof rafter.

• Top, ridge, or plumb cut
• Bird's mouth
• Tail cut

15. What runs parallel to installed joists: headers or trimmers?

Trimmers (actually double joists). Headers run at right angles to joists.

16. Why do you use fiberglass sill sealer?

To fill irregularities, keep out dirt and drafts, and eliminate heat loss.

17. Why save the straightest studs to frame around openings?

To achieve a smoother finish.

18. What does it mean to say "the overhang rafters have been left to run wild"?

It means that they have not yet been cut to uniform length.

19. What runs perpendicular to the joists, replacing the need for an interior foundation wall?

Beams. They also serve to support the internal ends of the floor joists.

20. Name three major functions of sheathing.

• Add strength and rigidity
• Provide a nailing surface for roofing materials
• Help carry the load of the roof downward

Also available from www.films.com

Green-ovating: Home Renovations for a Sustainable World
Spotlighting the best practices, technologies, and materials available to residential remodelers and builders, this four-part series shows how existing homes can be transformed to improve energy efficiency, eco-friendliness, livability, and sustainability while enhancing the health and well-being of their occupants. Remodeler and builder Robert Post accompanies leading designers, builders, landscape architects, and other practicing green professionals to working jobsites where they discuss and illustrate the practical application of green principles to every aspect of remodeling and renovation. **Correlates to all National CTE Organizational Standards (including the provisions of the Perkins Act).** Viewable/printable discussion questions are available online. A Shopware Production. 4-part series, 38–42 minutes each.

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DVD (Chaptered) ISBN 978-1-61616-042-5

Inside the Carpenter's Toolbox
How do carpenters turn building materials into buildings? To find out, this program takes a look at the tools and construction materials carpenters depend on every day. After a rundown on manufactured wood products like plywood, OSB, I-beam joists, and glu-lams as well as the fasteners that hold them all together, the video covers a variety of carpentry tools divided into four groups: planning and drawing, measuring and marking, cutting and shaping, and fastening and assembly. Types of carpenters—rough, finish, and general—are also mentioned, and safety is reinforced throughout. A viewable/printable instructor's guide is available online. Correlates to all National **CTE Organizational Standards (including the provisions of the Perkins Act).** A Shopware Production. (19 minutes)

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Measurement: The Long and the Short of It
Emphasizing hands-on practice, this program is an excellent tool for introducing the basics of linear measurement: its history, terminology, systems, and practical applications. Using both customary and metric rulers, *Measurement: The Long and the Short of It* will guide your students through the process of taking measurements, performing related calculations using whole numbers and fractions, and arriving at answers they can feel confident with. By the time the program is over, students will understand exactly what measurement is—and why it's relevant to their lives. Includes a workbook. **Correlates to all applicable state and national standards.** A Shopware Production. Recommended for middle school, high school, and vocational/technical school. (16 minutes)

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Alternative Framing Techniques
Alternative framing techniques can reduce structural lumber requirements and costs, as well as offer design improvements, such as openings in steel-frame studs that allow for the running of plumbing or electrical systems. This video looks at some of the more popular industry options in terms of materials and construction plans. A viewable/printable instructor's guide is available online. **Correlates to the Competencies and Objectives of the National Center for Construction Education & Research.** A Shopware Production. (14 minutes)

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Framing for Rough-ins
Partitions and walls containing plumbing pipes or heating ducts often need to be constructed differently in order to safely accommodate these systems and meet building codes. This program details a number of common industry techniques used in these situations, including accompanying electrical considerations. A viewable/printable instructor's guide is available online. **Correlates to the Competencies and Objectives of the National Center for Construction Education & Research.** A Shopware Production. (15 minutes)

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Carpenters (from the series *Made with the Trades*)
Once your students have taken the tour and seen what the skilled construction trades have to offer, they will want to know more about specific jobs that may interest them. This fast-paced program provides a concise profile of carpenters, looking at educational background, apprenticeships, salary, and the work itself. (13 minutes)

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