OBJECTIVE SHEET

EDGE FORMS ON GRADE

2

INTRODUCTION

Constructing and setting edge forms on grade is a skill all cement masons should know regardless of their specialty. As a student, you may have already acquired some skill at finishing concrete, but there is important work to be done by the cement mason before the concrete is even delivered to the site. Each pour begins with the construction of some type of formwork to contain the fresh concrete. Properly-constructed formwork ensures that the concrete is poured in precisely the right location and to the correct grade. As you will learn in this unit, basic formwork can be constructed from wood, composite material, or metal. Whatever material you may be using, these are skills you will use throughout your career.

FOCUS ASSIGNMENTS

FOCUS ASSIGNMENTS

1. Watch the video *Edge Forms on Grade*.
2. As you watch the video, write down a brief description of each step of the form construction.


Mathematics


Employability

UNIT OBJECTIVE

After completing this unit, you will show the following competencies by mastering the activities on the Job Sheets and by scoring at least 85% on the Written Test.

SPECIFIC OBJECTIVES

1. Label types of pours using edge forms.
2. Match edge form parts to their correct definitions.
3. Identify the parts of an edge form.
4. List materials used for edge form construction.
5. Construct edge forms on grade for a slab without foundation. (Job Sheet 1)
6. Construct edge forms on grade for a slab with foundation. (Job Sheet 2)

7. Construct edge forms for a patio with a radius. (Job Sheet 3)

8. Construct edge forms for a sidewalk. (Job Sheet 4)

EDGE FORMS ON GRADE

OBJECTIVE 1

Required Activities/ Resources
— Transparency1

Optional Activities/ Resources in Instructor's Guide

Label types of pours using edge forms.

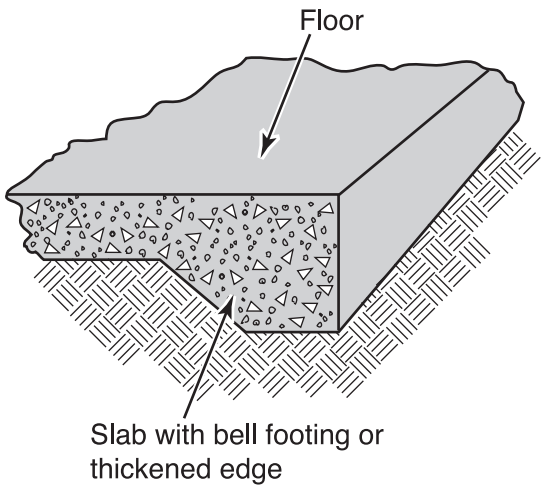
Your instructor will display a transparency showing different types of pours using edge forms.

WORDS YOU SHOULD KNOW	
slab	flat, horizontal, molded layer of concrete larger in its horizontal dimension than in thickness

- Floor without foundation; also called a bell footing (Figure 1)

  EXAMPLES: Parking lots and air strips, driveways and streets, sidewalks, approaches, and patios

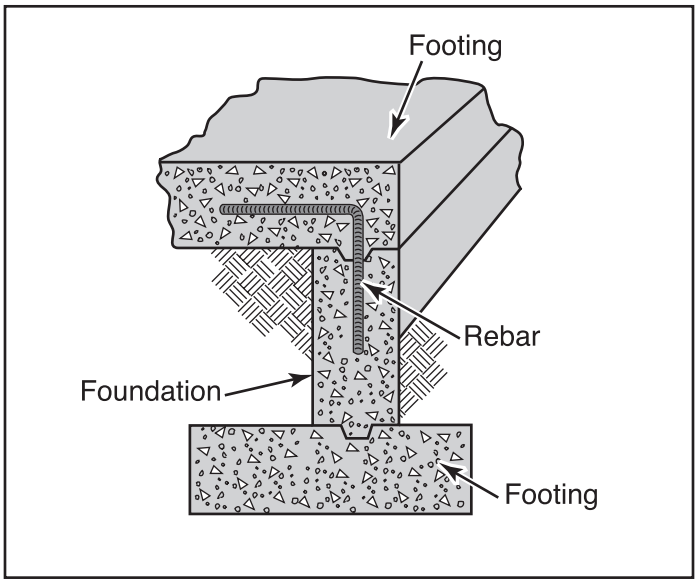
FIGURE 1



- Floor with foundation (Figure 2)

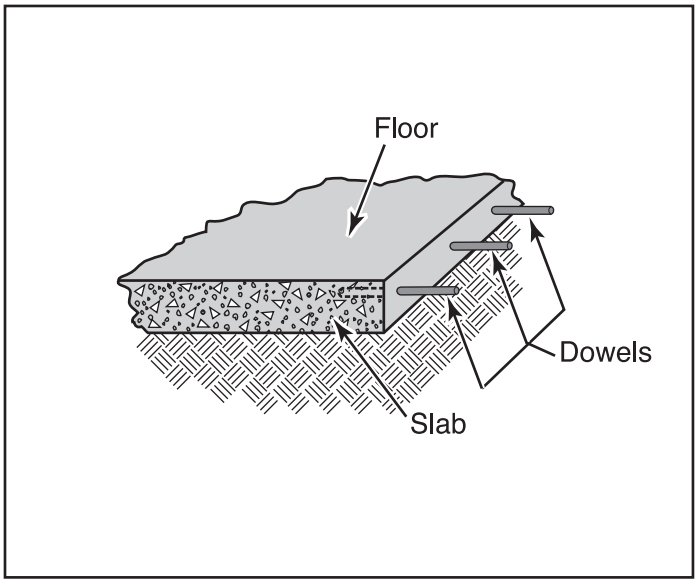
  EXAMPLES: Buildings, patios, porches

FIGURE 2



- Slab (Figure 3)

FIGURE 3



OBJECTIVE 2

Required Activities/ Resources
— Transparencies 2 and 3

Optional Activities/ Resources in Instructor's Guide

Match edge form parts to their correct definitions.

Your instructor will display transparencies of different form parts.

WORDS YOU SHOULD KNOW	
edge form	low form placed at perimeter of slab; used to limit horizontal spread of fresh concrete; made of wood, metal, or plastic composition
foundation	portion of wall, including footing, upon which building rests

- **block** — solid piece of wood or other material used to fill space between formwork members

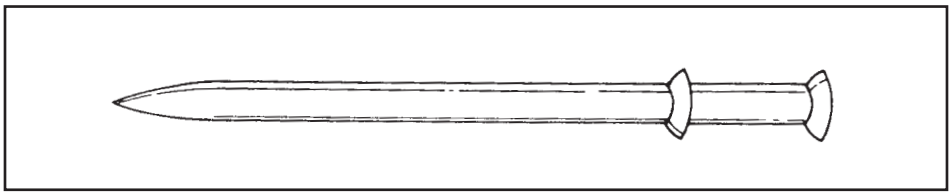
  ✔ **NOTE:** Adjectives are often attached to the word *block* to indicate the location or function of the block.

- **dowel** — short piece of plain round steel inserted into concrete to tie two separate slabs together

- **dowel sleeve** — cylindrical cardboard or plastic tube in which dowel is inserted

- **duplex nail** — double-headed nail used in formwork for easy removal (Figure 4)

FIGURE 4



- **form material** — material that makes up the face of the form

- **form tie** — metal member used to prevent concrete forms from spreading due to pressure of fresh concrete

- **form-tie clamp** — metal device into which form tie is inserted; tightens sheathing to the form to keep it from spreading due to pressure of fresh concrete

- **gauge or jig** — tool or form guide

- **joint** — place where two members of formwork meet

- **keyway** — a recessed area used to interlock two separate pours
- **kicker** — support used to strengthen or position another piece or portion of formwork
- **reinforcing rod** — rod embedded in concrete in such a manner that it acts together with the concrete in resisting forces
- **scab or cleat** — short piece of wood fastened to two formwork members to secure a joint
- **spacer/spreader** — device that maintains wall forms at a given distance apart, before and during placement
- **stake** — small board or steel bar, sharpened on one end and driven into ground to help support formwork

  ✔ **NOTE:** Adjectives are often attached to the word *stake* to indicate the location or function of the stake.

- **tie wire** — wire attached to formwork to keep forms from spreading

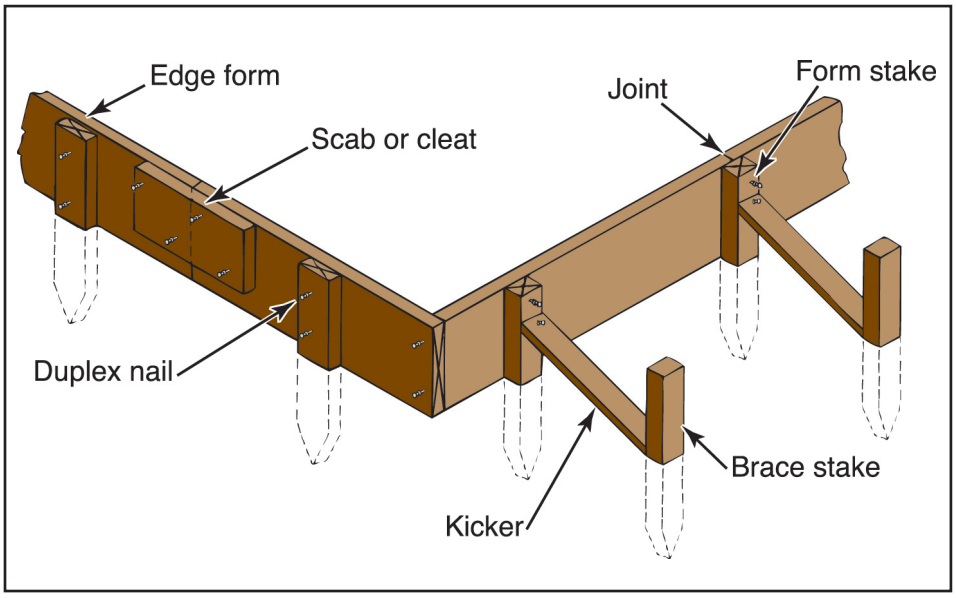
OBJECTIVE 3

Optional Activities/ Resources in Instructor's Guide

Identify the parts of an edge form.

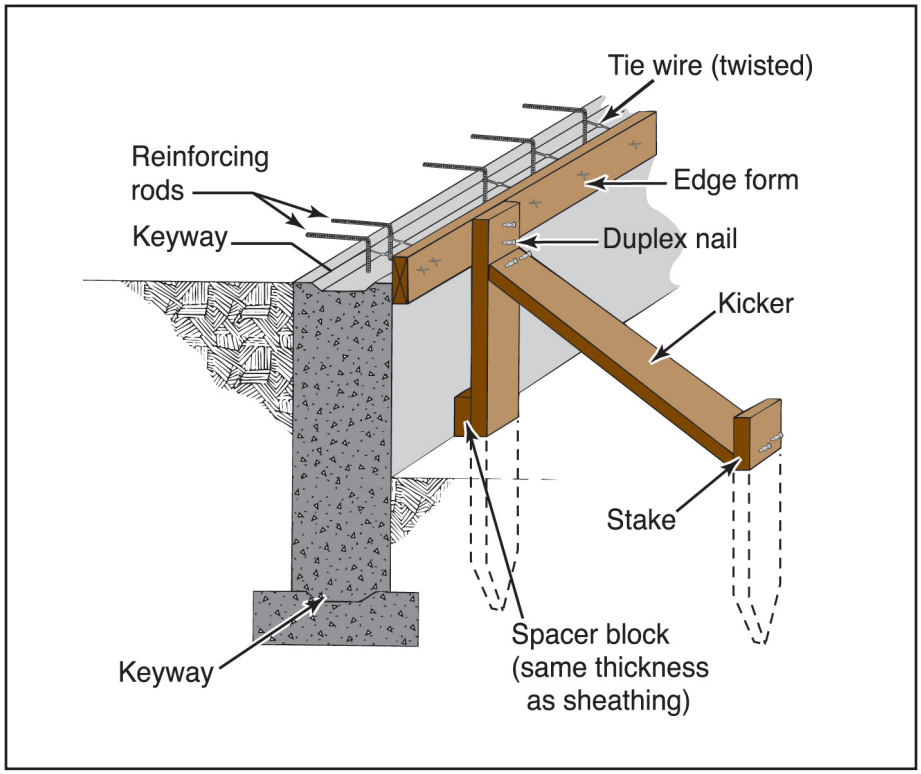
- Edge form without wall (Figure 5)

FIGURE 5



- Edge form with wall (Figure 6)

FIGURE 6



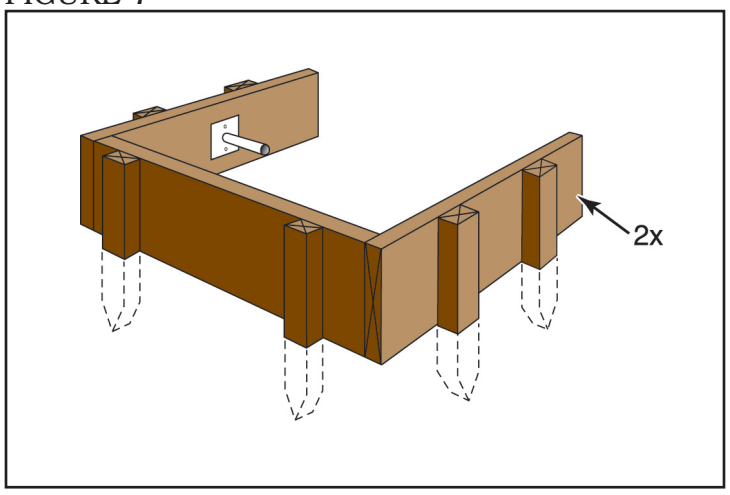
OBJECTIVE 4

List materials used for edge form construction.

Optional Activities/ Resources in Instructor's Guide

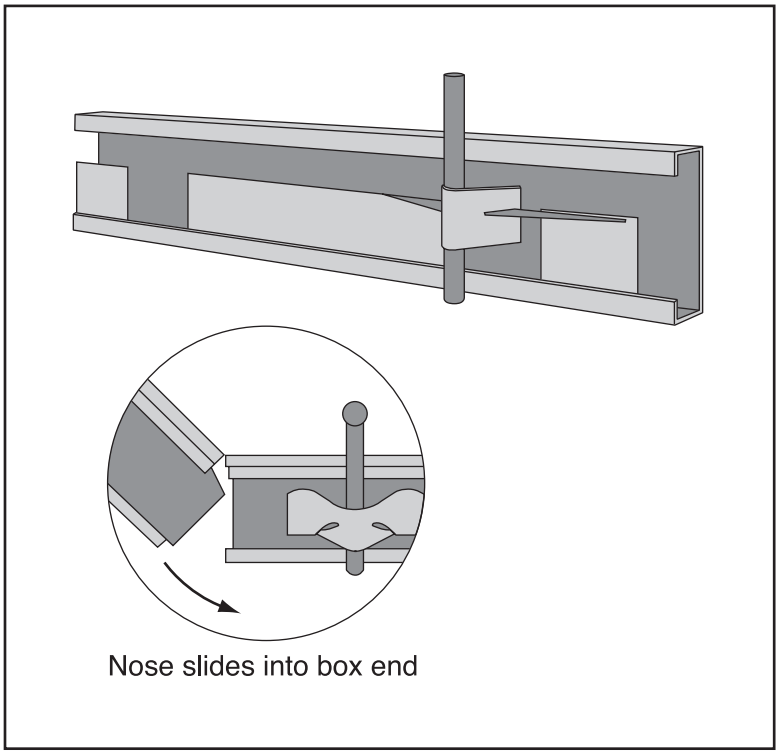
- All wood or composite (Figure 7)

FIGURE 7



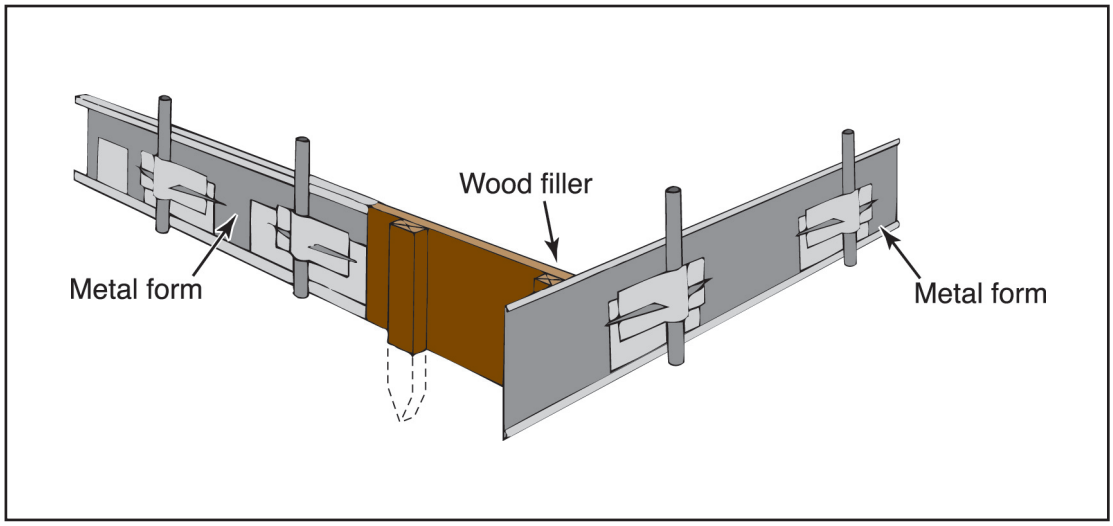
- All metal (Figure 8)

FIGURE 8



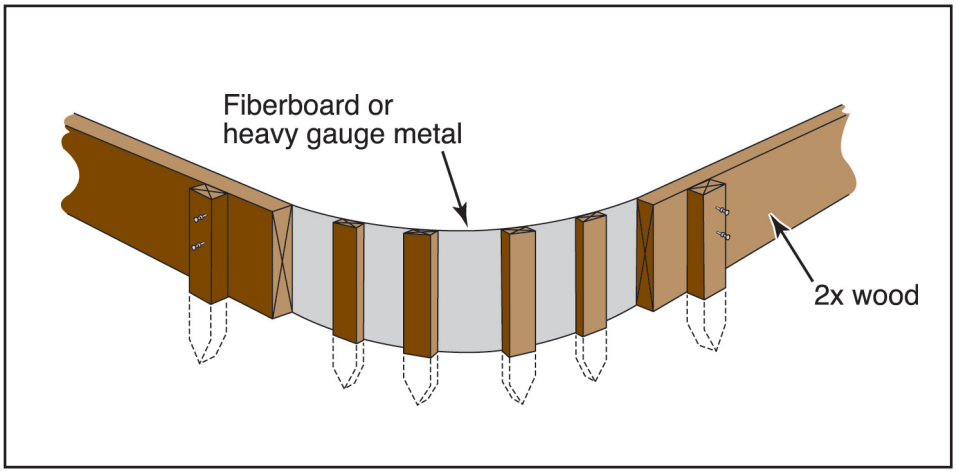
- Combination wood and metal (Figure 9)

FIGURE 9



- Combination fiberboard or metal and wood (Figure 10)

FIGURE 10



OBJECTIVE 5

Complete Job Sheet 1.

OBJECTIVE 6

Complete Job Sheet 2.

OBJECTIVE 7

Complete Job Sheet 3.

OBJECTIVE 8

Complete Job Sheet 4.

JOB SHEET 1

EDGE FORMS ON GRADE

2

Name _____Score_____

OBJECTIVE 5

Construct edge forms on grade for a slab without foundation.

WORDS YOU SHOULD KNOW	
screed	temporary guide for maintaining established grade while rodding concrete
plumb bob	tool or device attached to a string; used to set and/or check the plumb or perpendicular of a surface

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- Sledge hammer
- Claw hammer
- Power handsaw and extension cord equipped with a ground-fault circuit interrupter

CAUTION: Wear eye protection when operating power handsaw.

- Handsaw
- 100-foot tape
- Folding rule or steel tape
- Hand level
- Chalk line
- Builder's level and rod
- Plumb bob
- Stakes
- Form material
- 8d and 16d duplex nails
- String line
- Personal protective equipment

✔ **NOTE:** Refer to C.F.R. 1926.28 Sub Part C in regard to personal protective equipment.

PROCEDURE

Yes No

❑ ❑ 1.Perform site layout.

❑ ❑ 2. Set a string line to the edge of the concrete form line.

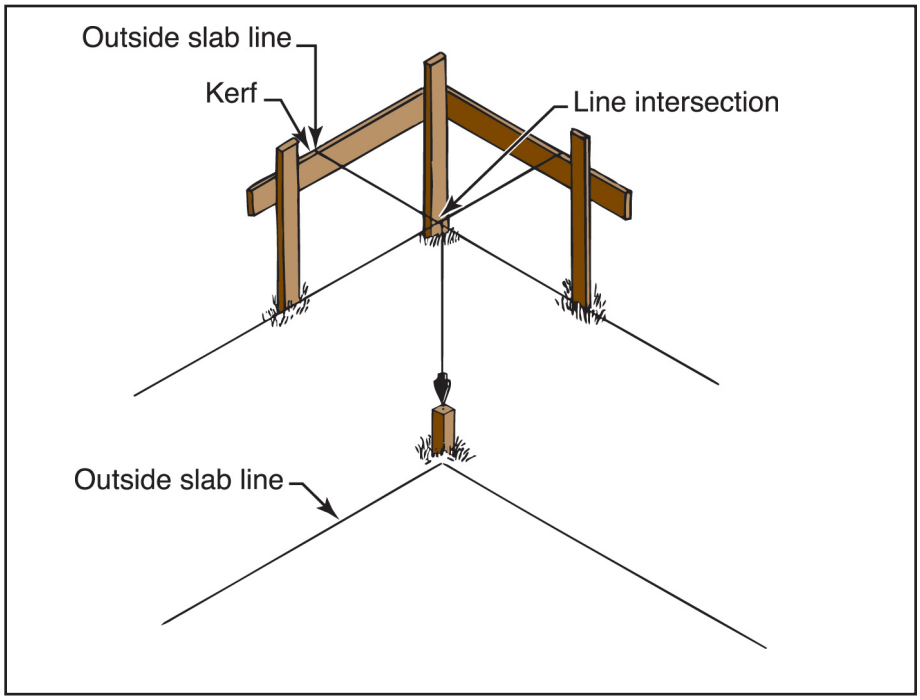
✔ **NOTE:** A quick way to make a hitch knot is to make two loops around the stake and then pull the bottom line up over the loops. This knot can be tied and untied quickly.

❑ ❑ 3. Secure the line to the batter boards where the new lines were established.

❑ ❑ 4. Attach a plumb bob to the line intersection.

❑ ❑ 5. Drive the corner form stake and set a nail exactly at the point of plumb bob. (Figure 1)

FIGURE 1



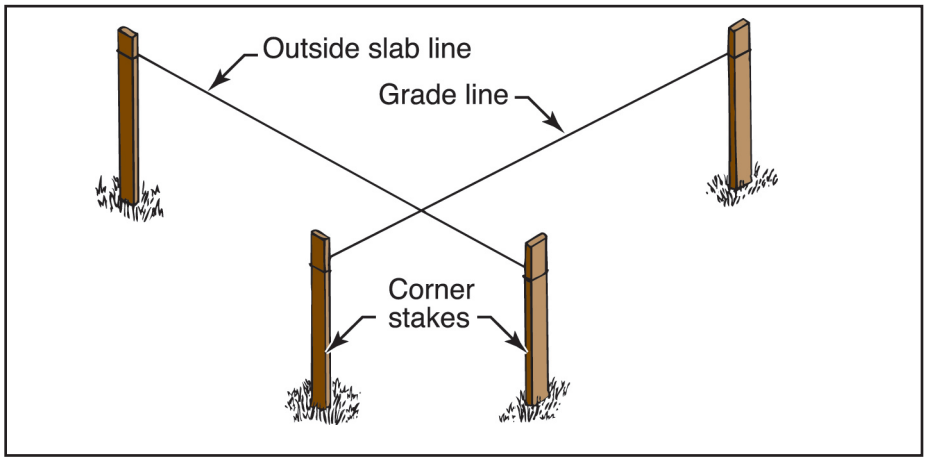
❑ ❑ 6. Repeat the previous two steps on the remaining three corners.

❑ ❑ 7. Establish the grade on all corner stakes.

Yes No

❑ ❑ 8. Secure a line to the first corner stake on the established grade and stretch the line tight to the established grade on the next corner stake. (Figure 2)

FIGURE 2

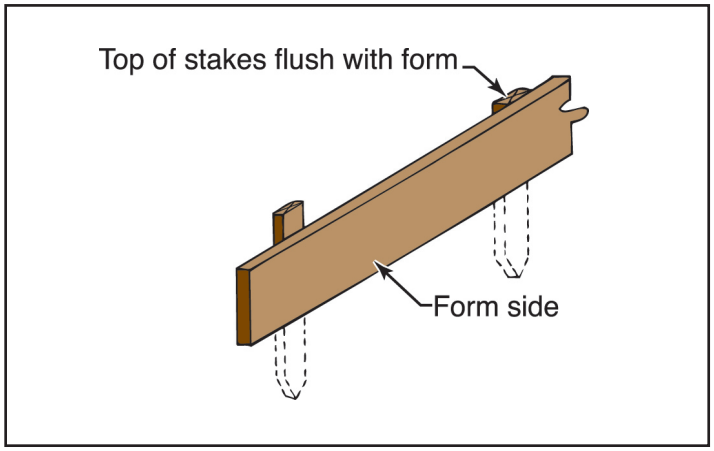


✔ **NOTE:** Be sure that the line is tight and that there is no sag in the line.

❑ ❑ 9. Set the form to the top of the established string line.

❑ ❑ 10. Hold the form to the line, drive stakes to grade and nail at correct elevation. (Figure 3)

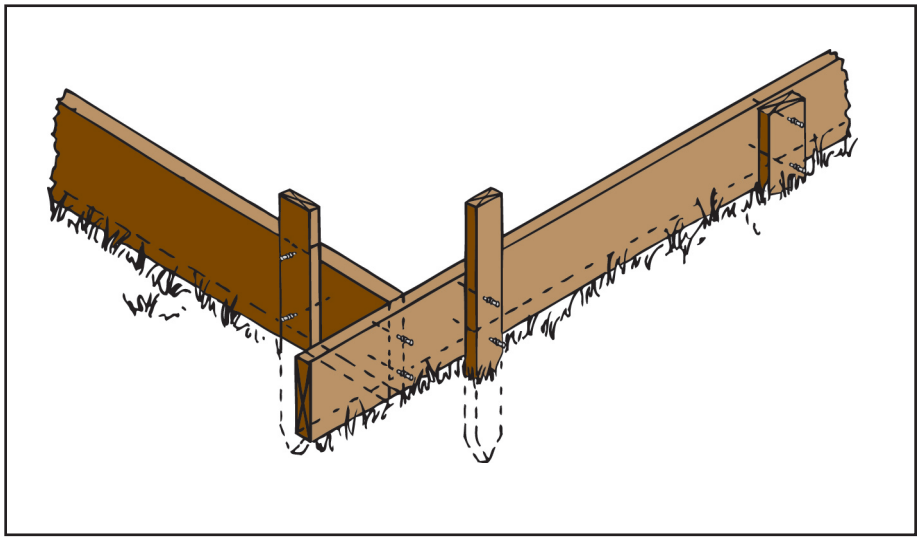
FIGURE 3



Yes No

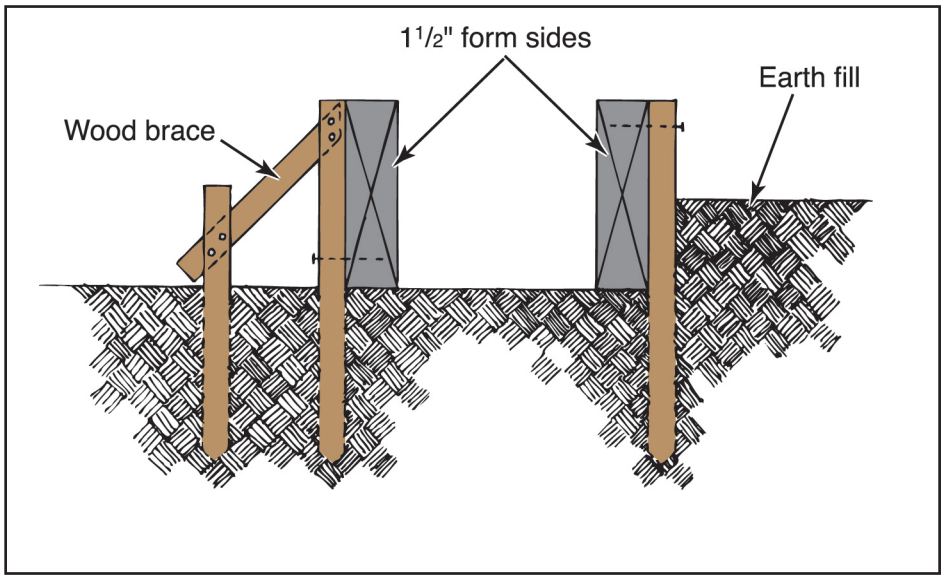
❑ ❑ 11. Tie all corners together using duplex nails. (Figure 4)

FIGURE 4



❑ ❑ 12. Brace the forms with wood braces or earth fill. (Figure 5)

FIGURE 5



❑ ❑ 13. Have the instructor check your work.

❑ ❑ 14. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
Used plumb bob correctly	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 2

EDGE FORMS ON GRADE

2

Name _____Score_____

OBJECTIVE 6

Construct edge forms on grade for a slab with foundation.

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- Sledge hammer
- Claw hammer
- Power handsaw and extension cord equipped with a ground-fault circuit interrupter

CAUTION: Wear eye protection when operating power handsaw.

- Handsaw
- 100-foot tape
- Folding rule or steel tape
- Hand level
- String line
- Chalk line
- Builder's level and rod
- Plumb bob
- Rotohammer
- Stakes
- 2 x 10 form material
- 8d and 16d duplex nails
- Tie wire
- Dowels
- Personal protective equipment

✔ **NOTE:** Refer to C.F.R. 1926.28 Sub Part C in regard to personal protective equipment.

PROCEDURE

Yes No

❑ ❑ 1. Lay out the form material on top of the wall or on the ground.

❑ ❑ 2. Determine elevation, measure down width of form on outside of stem wall.

Yes No

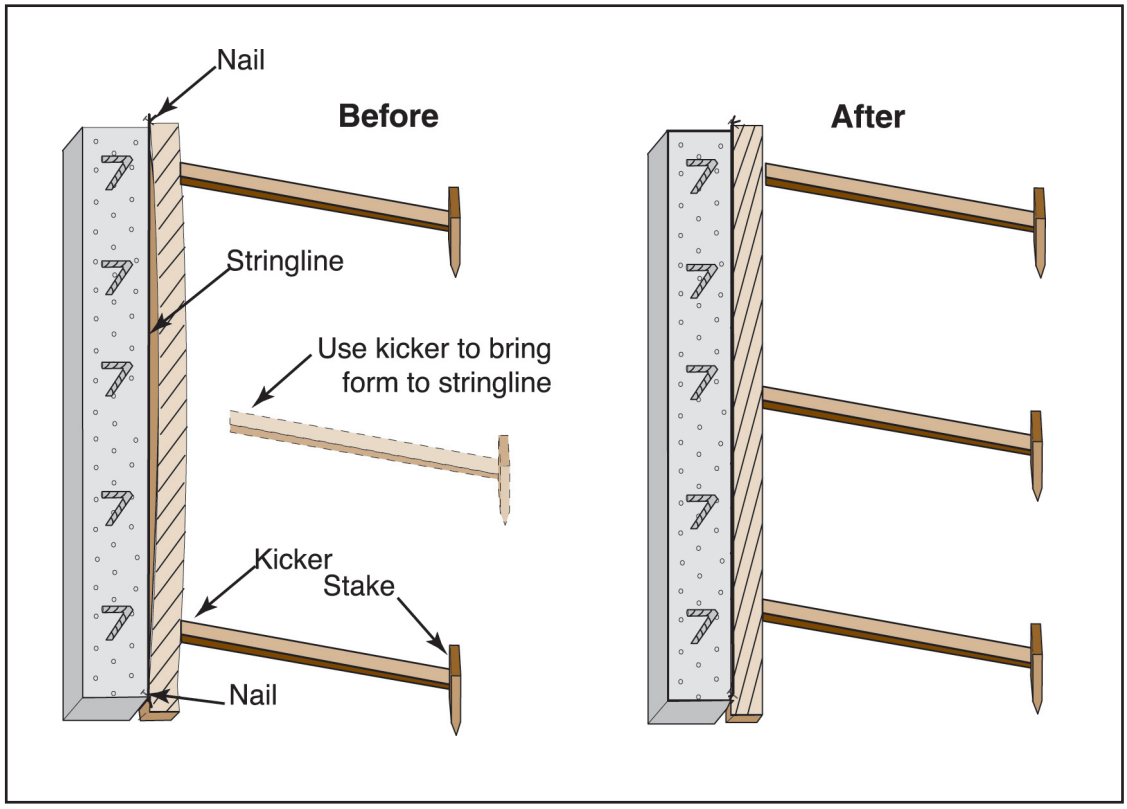
❑ ❑ 3. Snap chalkline.

❑ ❑ 4. Place board against stem wall and anchor into concrete with bottom of form to chalkline.

❑ ❑ 5. Drive a nail on both ends of the form on the concrete side. Pull stringline taunt between the nails.

❑ ❑ 6. Secure the form material tightly against the wall adjusting the form to the stringline using the brace and/or the method as indicated by the instructor. (Figure 1)

FIGURE 1



❑ ❑ 7. Have the instructor check your work.

❑ ❑ 8. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
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1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 3

EDGE FORMS ON GRADE

2

Name _____Score_____

OBJECTIVE 7

Construct edge forms for a patio with a radius.

BASIC SKILLS


Mathematics


Employability

EQUIPMENT AND SUPPLIES

- Sledge hammer
- Claw hammer
- Power handsaw and extension cord equipped with a ground-fault circuit interrupter

CAUTION: Wear eye protection when operating power handsaw.

- Handsaw
- 100-foot tape
- Folding rule or steel tape
- Hand level
- String line
- Chalk line
- Builder's level and rod
- Drawings or dimensions furnished by instructor
- Stakes
- 2 x 4s with radius material
- Nails: 6d box nails, 8d and 16d duplex nails
- 1 x 4s or 2 x 4s for braces
- Personal protective equipment

✔ **NOTE:** Refer to C.F.R. 1926.28 Sub Part C in regard to personal protective equipment.

PROCEDURE

Yes No

❑ ❑ 1. Locate the form lines for the slab (established by instructor).

❑ ❑ 2. Drive the corner-line stakes.

Yes No

❑ ❑ 3. Lay out the forming material along this line, keeping the ends butted together.

❑ ❑ 4. Establish the grade on the corner-line stakes, remembering to allow for slope from the building to the outer edge of slab.

✔ **NOTE:** A common practice is ¼ inch per foot.

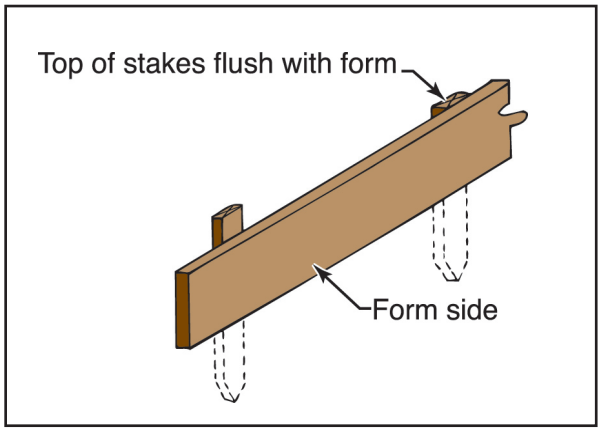
❑ ❑ 5. Secure a line to one corner stake on the established grade and stretch the line tight to the established grade on the next corner stake.

✔ **NOTE:** Be sure that the line is kept tight and that there is no sag in the line.

❑ ❑ 6. Set the form to the top of the established string line.

❑ ❑ 7. Nail 2 x 4 forming material to the stakes with the top of the 2 x 4 flush with the grade line. (Figure 1)

FIGURE 1



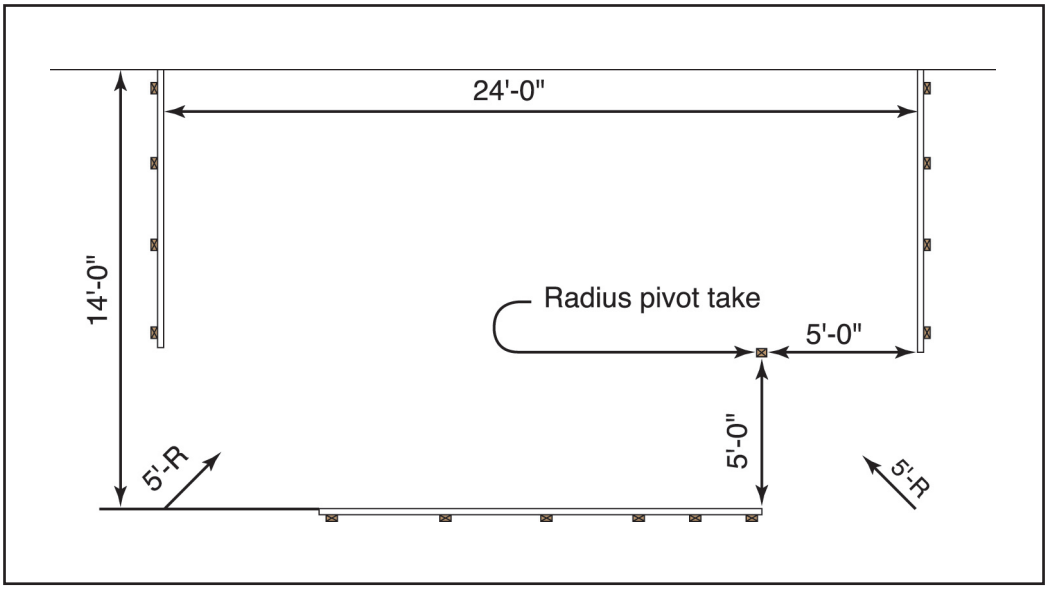
❑ ❑ 8. Lay out radius pivot stakes. (Figure 2)

A. Measure at right angles from the two forms the correct distance of the radius (5'-0").

B. Drive a radius stake where the 5-foot measurements intersect.

C. Check measurements again and drive a nail into the top of the stake at the exact point where 5-foot measurements intersect.

FIGURE 2



Yes No

D. Repeat steps 1 through 3 to lay out other radius pivot stake.

❑ ❑ 9. Drive stakes for the radius. (Figure 3)

A. Hook the end of the tape on the nail in the pivot stake.

B. Stretch the tape to both forms and check the measurement.

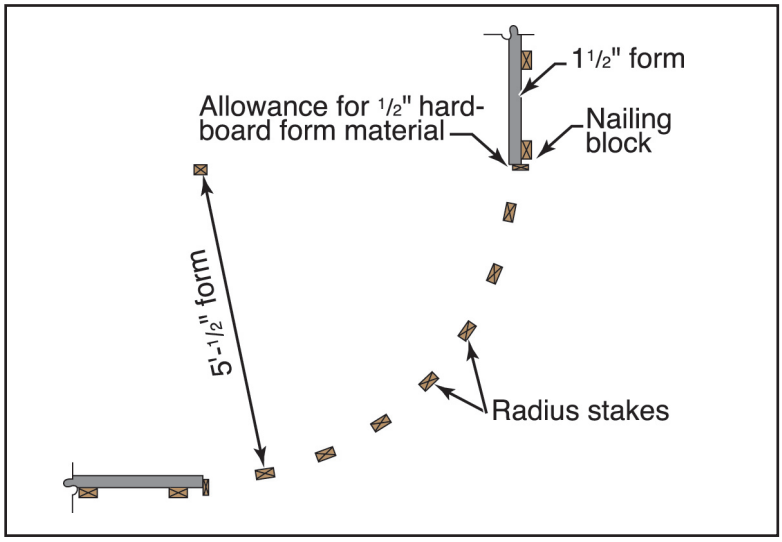
✔ **NOTE:** If adjustment is necessary, force the stake over enough to compensate for difference.

C. Keeping the tape stretched tightly, move around the radius from one form to the other, driving stakes at 12-inch intervals.

✔ **NOTE:** Be sure to allow for the thickness of the hardboard. Keep the stakes plumb and the face of the stakes flat to the radius.

D. Repeat steps 1 though 3 to drive the stakes for the second radius.

FIGURE 3



Yes No

❑ ❑ 10. Nail a nailing block on the end of each straight form, allowing for the thickness of the radius form material.

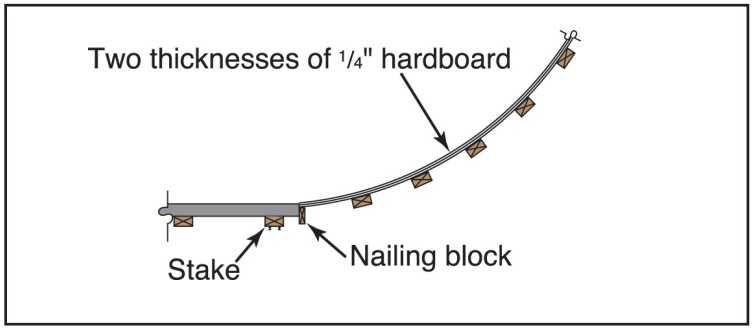
❑ ❑ 11. Establish the grade on the radius stakes.

❑ ❑ 12. Nail the hardboard to the stakes. (Figure 4)

✔ **NOTE:** With this size radius, use two thicknesses of ¼-inch hardboard with staggered joints.

A. Hold two pieces of hardboard flush on top, and nail to the nailing block on one of the straight forms.

FIGURE 4



Yes No

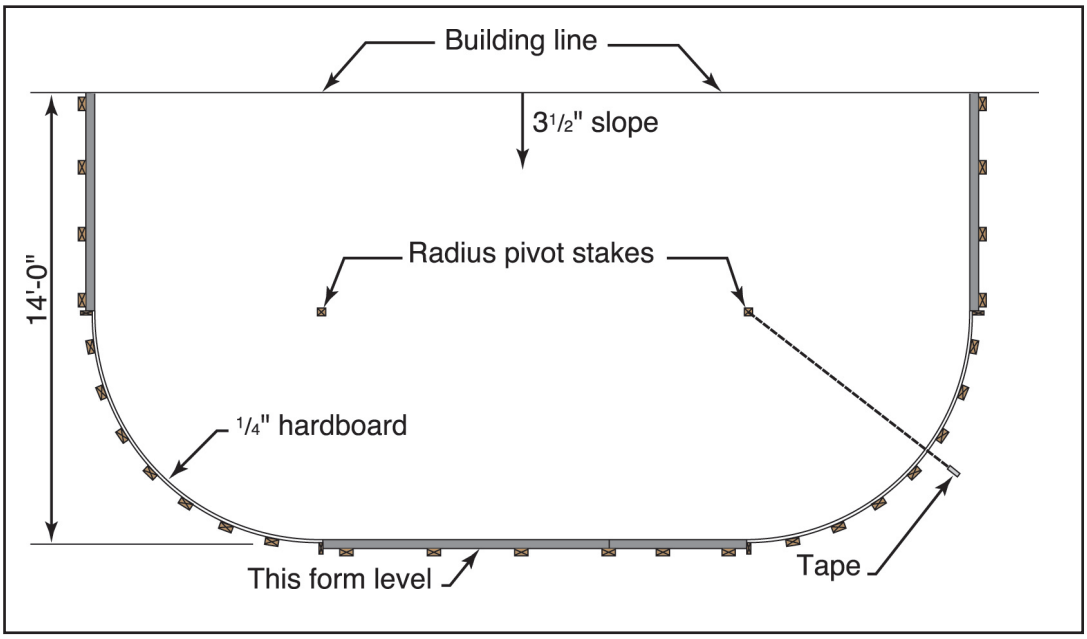
B. Continue nailing the hardboard to each stake on the radius, keeping the top edge of the form on grade and adding pieces of hardboard as necessary until the end of the radius is reached.

✔ **NOTE:** If the joints in the hardboard do not center on the stakes, drive an intermediate stake at the joint and nail.

C. Cut the hardboard even with the end of the straight form and nail to the nailing block.

❑ ❑ 13. Repeat procedures in step 12 to nail the forms on the second radius. (Figure 5)

FIGURE 5

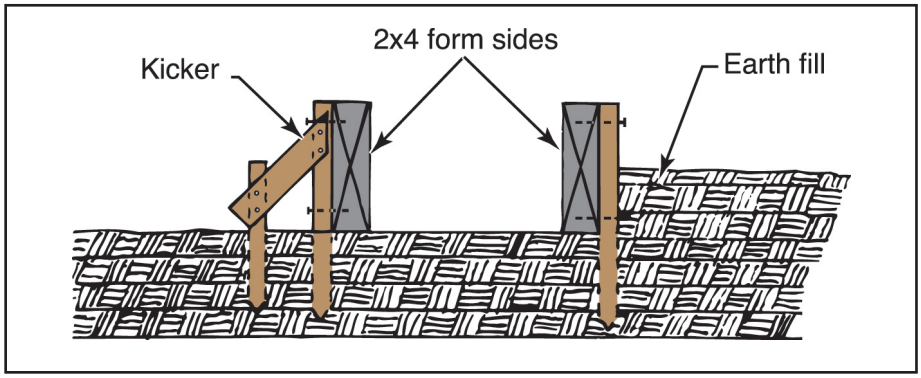


Yes No

❑ ❑ 14. Brace forms using the wood brace or the earth fill method. (Figure 6)

✔ **NOTE:** Earth fill material may be used in maintaining the radius dimension. Any stakes sticking up above the form may be cut off flush with the top of the form.

FIGURE 6



❑ ❑ 15. Have the instructor check your work.

❑ ❑ 16. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

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Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
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1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 4

EDGE FORMS ON GRADE

2

Name _____Score_____

OBJECTIVE 8

Construct edge forms for a sidewalk.

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- Sledge hammer
- Claw hammer
- Power handsaw and extension cord equipped with a ground-fault circuit interrupter

CAUTION: Wear eye protection when operating power handsaw.

- Handsaw
- 100-foot tape
- Folding rule or steel tape
- Hand level
- String line
- Builder's level and rod
- Stakes
- 2 x 4 form material
- 8d and 16d duplex nails
- Personal protective equipment

✔ **NOTE:** Refer to C.F.R. 1926.28 Sub Part C in regard to personal protective equipment.

PROCEDURE

Yes No

✔ **NOTE:** The sidewalk will be 4'-0" x 24'-0" x 4".

❑ ❑ 1. Establish the sidewalk location.

✔ **NOTE:** Check with your instructor.

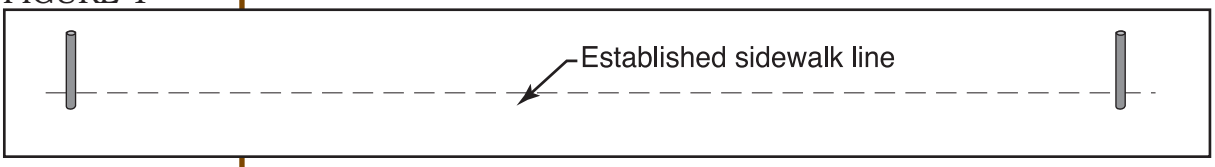
❑ ❑ 2. Set the line stakes for one side of the sidewalk. (Figure 1)

A. Locate the side you are going to set first.

Yes No

B. Locate the line stakes at each end of this side, approximately 24 feet apart.

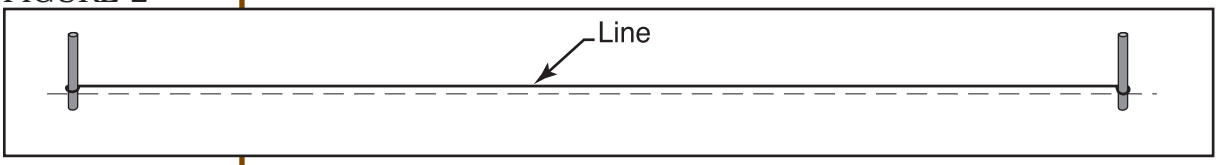
FIGURE 1



C. Establish the sidewalk grade on the two line stakes.

D. Secure a line to one line stake on the established grade and stretch the line tight to the established grade on the opposite stake. (Figure 2)

FIGURE 2

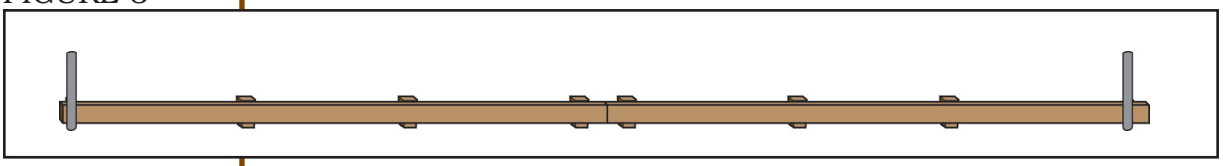


E. Lay out the form material for this section of sidewalk, starting at one end and laying the boards end to end.

F. Set the form to the top of the established string line.

❑ ❑ 3. Nail 2 x 4 form material to the stakes with the top of the form flush with the grade line. (Figure 3)

FIGURE 3



❑ ❑ 4. Align the form and brace, if necessary.

✔ **NOTE:** Refer to Job Sheet 1, if necessary.

Yes No

❑ ❑ 5. Construct a jig or gauge for positioning the opposite side of the sidewalk form.

A. Cut a 2 x 4 six inches longer than the width of the sidewalk.

B. Nail 2 1 x 2 scabs or cleats to each end of both spreaders with the end of the scab extending beyond the spreader end.

❑ ❑ 6. Set the form stakes for the opposite side of the sidewalk.

A. Lay out the 2 x 4 form for this side of the sidewalk, starting even with one end of the completed form and laying 2 x 4s end to end.

B. Lay the jig between the established form, snugging them together.

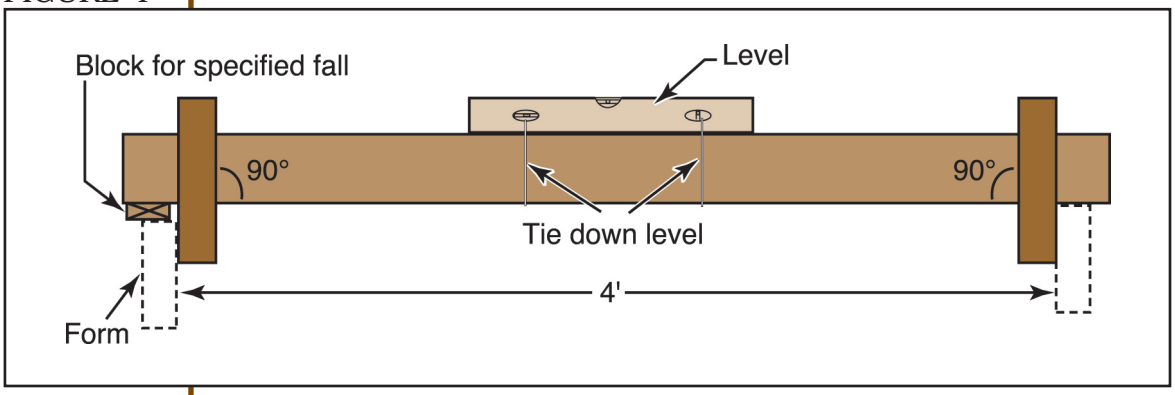
C. With the form held in place, drive the stakes opposite those in the erected form; drive the stakes down with solid blows of the sledge hammer, making sure the jig is 90° to established form.

✔ **NOTE:** If the stakes are not driven straight down, the completed form will be forced out of alignment.

D. Establish the grade by tying a level on the top of the jig. (Figure 4)

✔ **NOTE:** Check with your instructor for grade on this form.

FIGURE 4



Yes No

E. Drive the stakes down to grade.

F. Nail 2 x 4 forming material to the stakes with the top of the form flush with the top of the stake.

G. Repeat steps A through F for the entire length of the side.

❑ ❑ 7. Align the second side of the form, maintaining 4'-0" between the two sides.

❑ ❑ 8. Cut two 2 x 4s long enough to go across the ends of the forms for bulkheads.

❑ ❑ 9. Nail the bulkheads in place, with the tops of the bulkheads flush with the tops of both side forms.

❑ ❑ 10. Drive a stake at the center of each bulkhead to keep concrete from forcing the bulkhead out.

✔ **NOTE:** A scab can be nailed across the joint where the two forms butt each other or they may be toenailed together.

❑ ❑ 11. Have the instructor check your work.

❑ ❑ 12. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS