

CARPENTRY



NAME:

DATE:

Schuylkill Technology Center- South Campus

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Mr. Kintzel
Carpentry Instructor

DUTY TITLE: 1200 Estimation

COURSE TITLE: Carpentry

COURSE CIP CODE: 46.0201

POS TASKS:

- 1201 Demonstrate knowledge of how to estimate bricks and blocks needed to complete a given task.
- 1202 Correctly estimate the amount of concrete needed to complete a given task.
- 1203 Correctly estimate the cost and amount of materials to finish an exterior wall.
- 1204 Correctly estimate the cost and amount of materials to finish an interior wall.
- 1205 Correctly estimate the cost and amount of materials to construct a floor.
- 1206 Correctly estimate the cost and amount of materials to construct a roof.
- 1207 Correctly estimate the cost and amount of materials to install siding for a house.

PUPOSE: This module is for remediation of the estimation contained within the separate units of the entire course. After analyzing the data from the NOCTI Pre-Test it was identified as a weak area. Carpenters need to be able to estimate the amount of material needed to perform tasks in building a house. They should also be able to cost the task being completed.

NOCTI:

Written Assessment

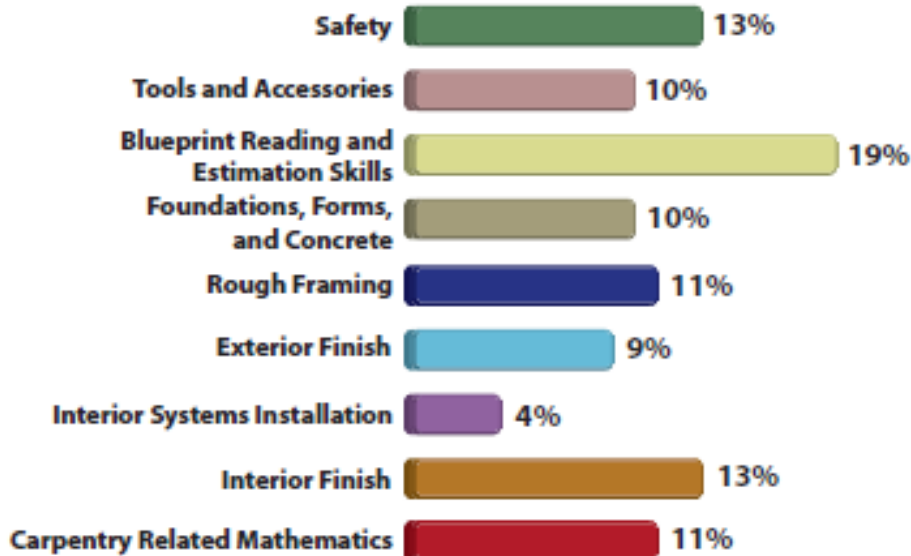
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

Administration Time: 3 hours

Number of Questions: 171

Number of Sessions: This assessment may be administered in one, two, or three sessions.

Areas Covered



Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

Administration Time: 2 hours and 45 minutes

Number of Jobs: 7

Areas Covered:

18% Tool and Material Identification

Participants will accurately identify a variety of tools and materials, including saws, bits, saw blades, wrenches, nails, fasteners, lumber, finishing, layout, and marking tools.

9% Square Layout

Participants will use the appropriate equipment and techniques to lay out and chalk a square.

8% Establish a Starting Course for Vinyl Siding using a Builder's Level

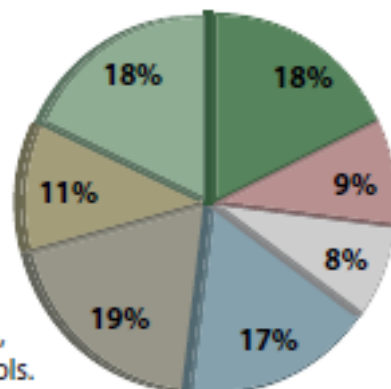
Participants will properly set up and use a builder's level to establish a level chalk line for the starting course of vinyl siding on a wall.

17% Blueprint Reading and Exterior Sole Plate Layout

Participants will lay out a sole plate according to instructions and include all necessary markings.

19% Rafter Layout

Participants will lay out one common rafter using provided plans and materials showing all necessary corrections and adjustments.



PENNSYLVANIA CORE STANDARDS:

Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Pennsylvania Core Standards for Mathematics Standard 2.1

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.

CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.

CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.

REVISION: 8/2014

CERTIFICATION: NOCTI

DIRECTIONS and PROCEDURES:

1. Read the complete module
2. Complete the following procedure steps
3. Take notes during theory class.
4. Complete the job sheets in the job sheet packet
5. Complete the performance assessments in the performance assessment packet
6. Pass the Post-Test with a minimum score of 70%
7. Complete the final box of the KWL worksheet

PERFORMANCE OBJECTIVE:

Upon Completion of this remedial module the student should be able to score advanced in the areas that were weak in the NOCTI Pre-Test. This module is intended to re-emphasize the concepts that students scored low on.

This will be accomplished through the use of:

Theory in the classroom

Demonstrations by the instructor

Both graded and non-graded job assignments relating to the mastery of the POS tasks

Written unit test

Performance assessments to rate the students competency of the tasks

SAFETY:

Safety rules and regulations of the carpentry trade as well as any applicable OSHA standards and appropriate PPE.

STUDENT ACCOMMODATIONS:

Students who are in need of accommodations will receive the following:

Presentation accommodations

Setting accommodations

Response accommodations

Timing/Scheduling accommodations

REFERENCES:

1. Residential Construction Academy text: Basic Principles for Construction

Wolverine Siding Installation Manual

GMS Concrete Web Site

RCA Carpentry Textbook

Vogt, Floyd. Carpentry. New York: Thompson Delmar Learning, 2003

RCA Carpentry E-resource CD

Vogt, Floyd. Carpentry. New York: Thompson Delmar Learning, 2003

RCA Carpentry Instructor's Resource Guide

Vogt, Floyd. Carpentry. New York: Thompson Delmar Learning, 2003

EQUIPMENT & SUPPLIES:

1. Module
2. Student notebook
3. Job sheets packet
4. Student performance assessment packet
5. Building plans
6. Carpentry Shop

Information outline

Calculating the required number of standard construction blocks:

Block producers are often asked how many standard blocks are needed for a project. The table below provides a very fast, simple and accurate way to find the answer.

MEASUREMENTS FOR 8X16 FACE BLOCK	
Length	To calculate the number of construction blocks by a specific length: Multiply the length by .75 Example: 140 ft. x .75 = 105 blocks (includes the mortar joints)
Height	To calculate the number of rows of construction blocks by a specific height: Multiply the height by 1.5 Example: 8 ft. x 1.5 = 12 rows (includes the mortar joints)
Area	To calculate the number of construction blocks by a specific area: Multiply by 1.125 Example: 160 Sq. Ft. x 1.125 = 180 blocks (includes the mortar joint)

Mortar Quantities: 3 bags per 100 blocks

Add to Block Amount: 5% to 10% should be added to all quantities for breakage, spillage and errors.

NOTE: These measurements are for a general guideline only. For exact amounts, [contact](#) American Concrete Products.

Calculating the required number of standard construction bricks:

To calculate the number of bricks required, the area of the wall should be known. Multiply the length of the wall by the height of the wall to get the area. For example: Length of the wall is 4 ft., height of the wall is 2 ft., multiply the two figures together, 4 ft. x 2 ft. = 8 ft. of wall area. The following amounts are suggested per square foot of wall area.

Face Brick 7 brick per SF/wall area
Modular 6 brick per SF/wall area
Kingsize Brick

Mortar Quantities: Face Brick Modular 7 bags per 1000 brick. Kingsize Brick 8 bags per 1000 brick.

Add to Brick Amount: 5% to 10% should be added to all quantities for breakage, spillage and errors.

NOTE: These measurements are for a general guideline only. For exact amounts, [contact](#) American Concrete Products.



Georgia Masonry Supply Estimating Guide

Masonry Estimating Guidelines:

The Masonry Estimating Guide is a "rule of thumb" calculator intended to assist users in planning for the correct amount of materials required for a particular project. It is presented in table format below. **NOTE: Approximately 5% to 10% should be added to all quantities for breakage, spillage and errors.**

Georgia Masonry Supply makes no guarantees to the accuracy of any estimates based on the information provided in this guide, and takes no responsibility for its use.

To help you better understand the use of this guide, we have provided the following **example**: If a mason needs to know how much block, mortar and sand must be purchased to erect a 20' long x 10' high wall, the Estimating Guide reveals that there are 1-1/8 blocks per square foot of wall area. The area is 200 SF, which requires 225 blocks ($1\text{-}1/8 \times 200 = 225$ blocks). Three bags of mortar are estimated for every 100 block, therefore 6-3/4 bags of mortar are needed ($(225 \text{ block} \times 3 \text{ bags mortar}) / 100 \text{ block} = 6\text{-}3/4$ bags of mortar). One cubic yard of sand is required for every 7 bags of mortar, therefore, the mason must also purchase .96 yards of sand ($(1 \text{ cubic yard of sand} \times 6\text{-}3/4 \text{ bags of mortar}) / 7 \text{ bags mortar} = .96$ yards of sand).

Masonry Estimating Guide

(Intended for "Rule of Thumb" use only.)

Brick and Block Unit Quantities

2½" High Block (2½" x 8" x 16")	3.1 block per SF of wall area
Half High Block (4" x 4" x 16)	2.25 block per SF of wall area
Standard Block (4", 8", 10", 12")	1.125 block per SF of wall area
Face Brick Modular	7 brick per SF of wall area
Oversize Brick	6 brick per SF of wall area
Utility Brick	3 brick per SF of wall area

Mortar Quantities

Block	3 bags per 100 block
Face Brick Modular	7 bags per 1000 brick
Oversize Brick	8 bags per 1000 brick
Utility Brick	10 bags per 1000 brick

Sand Quantities

Sand	1 CY per 7 bags mortar
	1 yard sand=1.25 ton
	1 yard sand per 1,000 brick
	1 yard sand per 200 bloc

Horizontal Wall Reinforcing Quantities

Horizontal Wall Reinforcing for block
Every other course or every 16"

SF/1.33

Cavity Fill Insulation Quantities

Cavity Fill Insulation

4 CF per bag

Estimated Volume Required To Fill Core Voids in Block

6" x 8" x 16"	2 core	0.17 CF/block
8" x 8" x 16"	2 core	0.25 CF/block
10" x 8" x 16"	2 core	0.33 CF/block
12" x 8" x 16"	2 core	0.39 CF/block

Approximate Concrete Required to Fill Bond Beam Lintels (BBL)

6" x 8" x 16"	BBL	0.173 CF concrete per LF
8" x 8" x 16"	BBL	0.22 CF concrete per LF
8" x 8" x 16"	Deep BBL	0.46 CF concrete per LF
12" x 8" x 16"	BBL	0.37 CF concrete per LF
12" x 8" x 16"	Deep BBL	0.74 CF concrete per LF

Typical CMU Dimensions

Nominal Dimensions (Inches)	Actual Dimensions (Inches)	Minimum Faceshell Thickness (Inches)	Minimum Web Thickness (Inches)
4 x 8 x 16	3 5/8 x 7 5/8 x 15 5/8	3/4	3/4
6 x 8 x 16	5 5/8 x 7 5/8 x 15 5/8	1	1
8 x 8 x 16	7 5/8 x 7 5/8 x 15 5/8	1 1/4	1
10 x 8 x 16	9 5/8 x 7 5/8 x 15 5/8	1 1/4	1 1/8
12 x 8 x 16	11 5/8 x 7 5/8 x 15 5/8	1 1/4	1 1/8



1) Estimating Concrete

- a) Ready-mix concrete is sold by the cubic yard or cubic meter.
- b) To determine the number of cubic yards of concrete needed for a job, find the number of cubic feet and divide by 27.

2) Methods of Estimating Materials for Walls and Ceiling Joists

a) Studs

- i) Determine the total linear feet of exterior wall.
- ii) If spaced 16" OC, estimate one stud for every linear foot of wall.
- iii) For 24-inch spacing, divide the total linear feet of wall by 1.333.

b) Plates

- i) Multiply the total linear feet by 3.
- ii) Add 5% for waste.

c) Headers and Sills

- i) Calculate the width for each opening and add 6 inches to each.

d) Wall Sheathing

- i) Multiply the total linear feet of wall by the wall height to find square feet of wall.
- ii) Add it to the gable area using the triangle area formula ($A = 1/2 \times \text{base} \times \text{height}$).
- iii) Deduct the area of any larger openings.

- iv) Add 5% for waste.
 - v) Finally, divide the total area by 32 to determine number of sheets.
- e) Ceiling Joists
- i) Divide the length of the building by the joist spacing in feet.
 - ii) Add one to start.
 - iii) Double this number for the other half of the building if applicable.
- f) Estimating materials for Floors
- i) Floor joists:
 - (1) First divide the length of the building by the spacing and add one.
 - (2) Next multiply the number of rows of floor joists.
 - (3) Last, add the number needed for doubling and for band joists.
 - ii) Bridging – multiply the length of the building by three for each row of bridging.
 - iii) Panel Subfloor – divide the area of the floor by thirty-two.

3) Estimating for Roofs

- a) Common Rafters for Gable Roof
 - i) Divide the length of the building by the spacing of the rafters.
 - ii) Add 1 as a starter.
 - iii) Multiply the total by 2.
- b) Common Rafters with Hip or Valley Rafters
 - i) Use the same procedure as for gable roof, then add 2 rafters for each hip and valley rafter.
- c) Hip and Valley
 - i) Count the number of hips and valleys.
- d) Ridge board for Gable Roof
 - i) The length of the building plus the length of overhangs.
- e) Ridge board for Hip Roof
 - i) Subtract the width of the building from the length of the building.
 - ii) Add 4 inches.
- f) Gable End Studs
 - i) Width of the building divided by the on-center spacing plus 2 extra will be enough for 2 gable ends.
- g) Gable Roof Fascia
 - i) Double the number of gable ridge boards.
- h) Hip Roof Fascia
 - i) Twice the building length plus twice the building width.
 - ii) Add 8 times the rafter projection.
- i) Trusses
 - i) Building length divided by on-center spacing.
 - ii) Add 1 to start.
- j) Bracing Material

- i) Building width divided by 4 gives the number of rows of top, bottom, and web bracing.
 - ii) Add extra for ground bracing the first truss.
- k) Sheathing Gable Roof
- i) Length of rafter times length of ridge.
 - ii) Divide this number by 32.
 - iii) Round up to nearest whole number.
 - iv) Equals sheathing for one side.
- l) Sheathing a Hip Roof
- i) Calculate as though a gable roof.
 - ii) Add 5%.
- m) Gable End Sheathing
- i) Multiply the total rise by the rafter run.
 - ii) Multiply this number by 2.
 - iii) Divide by 32.
 - iv) This will allow material for 2 gable ends.

4) Estimating for Siding

a) Siding

- i) Calculate the wall area.
- ii) Add the gable area and dormers, bays, and porches to get the total building area.
- iii) Deduct the total window and door area.
- iv) Add a waste factor for cuts as needed.



HOUSE AREA		
BUILDING PERIMETER	$2' \times (40' + 22')$	$= 124 \text{ SQ. FT.}$
WALL AREA	$124' \times 9'$	$= 1116 \text{ SQ. FT.}$
LEFT GABLE	$\frac{22' \times 6'}{2}$	$= 66 \text{ SQ. FT.}$
RIGHT GABLE	$\frac{22' \times 6'}{2}$	$= 66 \text{ SQ. FT.}$
TOTAL HOUSE AREA	$\frac{2}{2}$	1248 SQ. FT.

OPENING AREA		
10 WINDOWS 3' X 4'		$= 120 \text{ SQ. FT.}$
2 WINDOWS 2' X 4'		$= 16 \text{ SQ. FT.}$
2 DOORS 3' X 7'		$= 42 \text{ SQ. FT.}$
TOTAL OPENING AREA		$= 178 \text{ SQ. FT.}$

b) Panel Siding

- i) Building perimeter multiplied times wall height.
- ii) Then divide by the area per sheet.

c) Shingle Siding

- i) The number of squares of shingles needed to cover a certain area depends on how much they are exposed to the weather.
- ii) Divide the wall area by the coverage of a bundle.

d) Aluminum or Vinyl Siding

- i) Sold by the square.
- ii) Determine the wall area.
- iii) Deduct for the openings.
- iv) Divide by 100.
- v) Add for waste as needed.
- vi) Measure the total linear feet required for each accessory.