



Western Technical College

## 31804315 Applied Math 1 - Wood

### Course Outcome Summary

#### Course Information

<b>Description</b>	Students will develop basic math skills needed to solve general problems encountered in the carpentry trades. These include working with fractions and decimals, calculator operation, measurement and conversion, perimeter, area, volume, concrete estimation, board measure and lumber pricing concepts. This course is the first in a two-part sequence.
<b>Instructional Level</b>	Technical Diploma Courses
<b>Total Credits</b>	1
<b>Total Hours</b>	36

#### Textbooks

No textbook required.

#### Learner Supplies

Scientific calculator - \$10-20. **Vendor:** Campus Shop. Required.

#### Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Live Responsibly: Develop Resilience
3. Live Responsibly: Foster Accountability
4. Refine Professionalism: Improve Critical Thinking

#### Course Competencies

## 1. Calculate with real numbers

### Assessment Strategies

- 1.1. Skill Demonstration
- 1.2. Written Objective Test

### Criteria

- 1.1. learner can perform all critical steps for each algorithm in the right order
- 1.2. learner can recognize which fractional operations require common denominators
- 1.3. learner can recognize which fractional operations require mixed numbers to be written as improper
- 1.4. learner can recognize how to handle the decimal point for all decimal operations
- 1.5. learner uses correct spelling, comma, and hyphen placement to express decimal numbers using words
- 1.6. learner can perform calculations with at least 70% accuracy

### Learning Objectives

- 1.a. Convert between improper fractions and mixed numbers
- 1.b. Reduce fractions to lowest terms
- 1.c. Apply operations of addition, subtraction, multiplication and division to fractions
- 1.d. Convert numbers between fraction and decimal form
- 1.e. Convert decimals between written (word) and numeric form
- 1.f. Round decimal values to a specified precision
- 1.g. Apply operations of addition, subtraction, multiplication and division to decimal numbers
- 1.h. Evaluate arithmetic expressions using proper rules of order
- 1.i. Solve applied problems related to the transportation trades involving fractions and decimals

## 2. Determine area and perimeter of various shapes

### Assessment Strategies

- 2.1. Skill Demonstration
- 2.2. Written Objective Test

### Criteria

- 2.1. learner uses the Pythagorean Theorem to determine unknown side length in a right triangle
- 2.2. learner uses correct formulas to calculate the area of simple geometric figures
- 2.3. learner calculates perimeter of simple geometric shapes including polygons and circles
- 2.4. learner perform necessary unit conversions to ensure uniform units in area and perimeter calculations
- 2.5. learner uses correct formulas to calculate area of compound geometric figures
- 2.6. learner calculates perimeter of compound geometric shapes including straight edges and arcs
- 2.7. learner can perform all calculations with at least 70% accuracy

### Learning Objectives

- 2.a. Calculate area of a circle given the radius or diameter
- 2.b. Calculate the circumference of a circle given the radius or diameter
- 2.c. Calculate the area of triangles and quadrilaterals
- 2.d. Calculate the unknown side length and perimeter of a triangle using the Pythagorean Theorem
- 2.e. Determine the area and perimeter of compound shapes
- 2.f. Convert unlike units as necessary to determine the area or perimeter of geometric figures

## 3. Use concepts of area and perimeter to estimate building materials

### Assessment Strategies

- 3.1. Skill Demonstration
- 3.2. Written Objective Test

### Criteria

- 3.1. learner can estimate the number of shingles, rolls of underlayment, pieces of drip edge and feet of ridge vent needed for a given style and size of roof
- 3.2. learner can estimate the number of sheets of sheathing needed for the exterior walls of a house of given dimensions while allowing for a certain percentage of waste
- 3.3. learner can determine the total square footage of a home based on given dimensions within 1% of the exact value
- 3.4. learner can perform all calculations with at least 70% accuracy

### Learning Objectives

- 3.a. Determine the number of bundles of shingles, pieces of drip edge, rolls of underlayment, and length of ridge vent needed for gable and hip roof designs with given dimensions
- 3.b. Calculate the number of sheets of exterior sheathing needed for simple single- and double-story houses while allowing a specified percent waste
- 3.c. Determine the total square footage of a house (having straight walls) given exterior dimensions

#### **4. Determine the volume of various geometric spaces**

##### **Assessment Strategies**

- 4.1. Skill Demonstration
- 4.2. Written Objective Test

##### **Criteria**

- 4.1. learner uses appropriate formula to calculate the volume of a rectangular solid
- 4.2. learner uses appropriate formula to calculate the volume of a cylinder or half-cylinder
- 4.3. learner calculates the volume of compound geometric solids composed of rectangular solids, cylinders, and half- and quarter-cylinders
- 4.4. learner performs necessary conversions on given dimensions to ensure consistent units when calculating volume
- 4.5. learner performs all calculations with at least 70% accuracy

##### **Learning Objectives**

- 4.a. Calculate the volume, in cubic feet and gallons, of a rectangular solid
- 4.b. Calculate the volume, in cubic feet and gallons, of a cylinder or half-cylinder
- 4.c. Calculate the volume, in cubic feet and gallons, of a composite solid
- 4.d. Perform unit conversions as necessary to put dimensions of a geometric solid in feet or inches

#### **5. Calculate concrete needs for poured footings, slabs, and walls**

##### **Assessment Strategies**

- 5.1. Skill Demonstration
- 5.2. Written Objective Test

##### **Criteria**

- 5.1. learner uses building perimeter to determine volume of concrete needed for foundation footings in cubic feet and cubic yards
- 5.2. learner uses building perimeter to determine the volume of concrete needed for poured concrete walls in cubic feet and cubic yards
- 5.3. learner uses floorplan dimensions to determine the volume of concrete needed for a floor slab in cubic feet and cubic yards
- 5.4. learner performs all calculations with at least 70% accuracy

##### **Learning Objectives**

- 5.a. Determine the amount of concrete needed for foundation footings on a house with straight foundation walls
- 5.b. Determine the volume of concrete necessary for poured concrete foundation walls
- 5.c. Determine the volume of concrete needed for a concrete floor slab

#### **6. Calculate board-foot content and pricing for lumber**

##### **Assessment Strategies**

- 6.1. Skill Demonstration
- 6.2. Written Objective Test

##### **Criteria**

- 6.1. learner can determine the volume, in board feet, of a piece of lumber given necessary dimensions without a formula
- 6.2. learner can convert between board feet and mbf price structures for lumber pricing
- 6.3. learner can convert between lineal foot, board foot, and per piece pricing structures for lumber
- 6.4. learner can determine the number of lineal feet of decking boards needed for a deck given the necessary dimensions
- 6.5. learner can perform all calculations with at least 70% accuracy

##### **Learning Objectives**

- 6.a. Compute the number of board feet contained within a piece of lumber with dimensions in inches

- 6.b. Estimate the number of board feet contained in a tightly-stacked pile of lumber
- 6.c. Determine the price per board foot given the price per mbf and vice versa
- 6.d. Calculate the price per lineal foot of dimensional lumber given the price per board foot and vice versa
- 6.e. Calculate the price per board (per piece) for lumber given the price per board foot and vice versa
- 6.f. Determine the total cost of decking boards (or of a hardwood floor) given the necessary dimensions and price of lumber

## **7. Perform conversions on measurements**

### **Assessment Strategies**

- 7.1. Skill Demonstration
- 7.2. Written Objective Test

### **Criteria**

- 7.1. learner can convert foot-inch measurements to inches only, and vice versa
- 7.2. learner can convert fractional parts of an inch to decimal equivalents and vice versa
- 7.3. learner can convert units of length, volume and weight using the unit-fraction conversion method when given necessary conversion facts
- 7.4. learner can convert units of area and volume (having square or cubed units) using the unit-fraction conversion method when given necessary conversion facts
- 7.5. learner can perform all calculations with 70% accuracy

### **Learning Objectives**

- 7.a. Convert between foot-inch measurements and inches-only measurements
- 7.b. Determine the decimal equivalent of a fractional inch measurement
- 7.c. Determine the nearest fractional approximation for a decimal value in 1/8ths, 1/16ths, or 1/32nds of an inch.
- 7.d. Use the unit-fraction conversion method to convert length, volume, and weight measurements
- 7.e. Use the unit-fraction conversion method to convert area and volume measurements having exponents of 2 or 3, respectively
- 7.f. Distinguish between exact and approximate conversion facts based on the type of equality symbol shown