

**Occupational Math - Technical
Southwest Wisconsin Technical College**

Information

Project Title: Occupational Math - Technical
Developer(s): Pete Esser & John Pluemer
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Revised By: John Pluemer
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Course Number: 31-804-315
Organization: Southwest Wisconsin Technical College
Division: General Education
Instructional Area: Mathematics
Instructional Level: One-Year Technical Diploma
Potential Hours of Instruction: 18
Total Credits: 1

Instruction Type	Periods	Outside	
		Hours	Credits
Classroom Presentation	18	0	1

Target Population

This course is designed to provide fundamental math skills to students entering technical occupations.

Course Description

Students taking Occupational Math - Technical make and convert various measurements. They compute dimensions of geometric shapes. Students use basic right triangle trigonometry to solve problems. They also perform basic algebraic operations. Students solve linear equations and rearrange algebraic formulas. In each topic area, students solve application problems.

Course Prerequisites

Occupational Math

Textbooks

Occupational Math - Technical

Author: Peter C Esser
Publisher: Lulu.com

Supplies

Scientific Calculator

Performance Expectations

Goals

1. Convert measurements.
2. Measure objects.
3. Compute dimensions of geometric shapes.
4. Find missing dimensions of right triangles
5. Perform basic algebraic operations
6. Solve linear equations

1. **Convert measurements.**

Linked Core Abilities

Work productively

Linked General Education Outcomes

Apply mathematical concepts to application problems

Criteria - *Criteria - Performance will be satisfactory when:*

- o learner uses the Conversion Factor Fraction method to convert from a given measurement to a desired measurement.
- o answer is expressed to the accuracy indicated by the question. (Example: Change 3.5 ft to centimeters (nearest tenth))
- o answer is written with the required new unit of measure.
- o learner completes test within scheduled class period.
- o test score is 80% or above.

Conditions for Assessment - *Conditions - Competence will be demonstrated:*

- o In a test.
- o Student may use any measurement conversion table calculator, and 1/2 page of notes may also be used.

Learning Objectives

- a. List the most commonly used units used for length, mass/weight, and capacity for a given system of measurement (English & metric).
- b. Determine the most appropriate unit of measure to describe a given situation.
- c. Estimate the length, weight, capacity for some common everyday objects.
- d. Determine conversion factors needed to convert the given measurement.
- e. Use the Conversion Factor Fraction Method to convert measurements within a given system of measurement.
- f. Express the converted measurement to the indicated precision with the correct units of measure.
- g. Use the Conversion Factor Fraction Method to convert measurements from English to metric and vice-versa.

2. Measure objects.

Linked Core Abilities

Communicate clearly

Linked General Education Outcomes

Apply mathematical concepts to application problems

Criteria - *Criteria - Performance will be satisfactory when:*

- o learner uses ruler or steel scale to measure specified items to within 1/32nd inch (English) or 1 mm (metric).
- o learner measures the capacity of specified containers and other 3-dimensional objects to within 5 ml.
- o learner measures the mass of specified objects to within 1 g.
- o measurement is written with the correct unit of measure.
- o measurement test is completed with 80% of all problems correct.

Conditions for Assessment - *Conditions - Competence will be demonstrated:*

- o using supplied steel rules, micrometers, and vernier calipers (English and metric versions), graduated cylinders/beakers, pan balance.
- o using designated objects to be measured.

Learning Objectives

- a. Identify various measuring instruments, such as steel rules, calipers, micrometers, graduated cylinders/beakers, balances/scales.
- b. List the ultimate accuracy that can be obtained by each type of measuring instrument.
- c. List the type of component dimensions each instrument can be used for.
- d. Identify the dimension of part/component needed to be measured.
- e. Select the correct measuring instrument needed to determine the desired dimension to the required level of precision.
- f. Determine measurement of the given part with the correct units of measure and correct level of precision.

3. Compute dimensions of geometric shapes.

Linked Core Abilities

Work productively

Linked General Education Outcomes

Apply mathematical concepts to application problems

Criteria - *Criteria - Performance will be satisfactory when:*

- o learner correctly identifies the name of the given 2-dimensional and 3-dimensional objects.
- o learner correctly identifies which of these three geometric measures is to be computed: perimeter, area, or volume.
- o learner correctly identifies the formula(s) necessary to solve the given geometric problem.
- o final answer is written to the indicated precision.
- o final answer is written with the correct units of measure.
- o when quiz/unit test is completed with an 80% or higher average.

Conditions for Assessment - *Conditions - Competence will be demonstrated:*

- o by completing unit test.

Learning Objectives

- a. Identify basic two-dimensional objects.
- b. Define perimeter/circumference, area.
- c. Select formula needed to compute perimeter, or area for a given 2-d geometric shape.
- d. Compute perimeter/area for a given 2-d object with answer written to the desired precision and units of measure.
- e. Identify basic three-dimensional objects.
- f. Define surface area, lateral surface area, and volume.
- g. Select formula(s) needed to compute surface area, lateral surface area, or volume for a given 3-d shape.
- h. Compute surface area, lateral surface area, or volume for a given 3-d object with answer written to the desired precision and units of measure.

4. Find missing dimensions of right triangles

Linked Core Abilities

Solve problems

Linked General Education Outcomes

Apply mathematical concepts to application problems

Criteria - *Criteria - Performance will be satisfactory when:*

- o learner defines terminology according to the text
- o calculations are accurate to desired precision
- o measures are expressed with correct units of measure
- o learner chooses correct formula or trig function where appropriate

- o learner shows work
- o learner accurately determines missing dimensions

Conditions for Assessment - *Competence will be demonstrated:*

- o using a scientific calculator
- o given machined part diagrams

Learning Objectives

- a. Define right triangle terminology (opposite, adjacent, hypotenuse)
- b. Use the Pythagorean Theorem to find dimensions of right triangles
- c. Define trig ratios (sin, cos, tan)
- d. Determine the trig function of a given angle
- e. Determine the length of a side using trig ratios
- f. Determine the size of an angle using trig ratios
- g. Apply right triangle trig to machining problems

5. Perform basic algebraic operations

Linked Core Abilities

Work productively

Linked General Education Outcomes

Apply mathematical concepts to application problems

Criteria - *Criteria - Performance will be satisfactory when:*

- o learner chooses a valid method for solving a problem
- o learner shows the steps used to solve the problem
- o Answer is within 1% of actual value
- o Answer is stated with appropriate precision

Conditions for Assessment - *Conditions for assessment:*

- o using a scientific calculator
- o through completion of a unit test

Learning Objectives

- a. Perform arithmetic operations on signed numbers
- b. Use order of operations
- c. Evaluate numeric expressions involving powers and roots
- d. Evaluate algebraic expressions
- e. Evaluate formulas

6. Solve linear equations

Linked Core Abilities

Work productively

Linked General Education Outcomes

Apply mathematical concepts to application problems

Criteria - *Criteria - Performance will be satisfactory when:*

- o learner chooses a valid method for solving a problem
- o learner writes an equation representing the problem
- o learner manipulates an existing formula to solve for an unknown
- o learner shows the steps used to solve the problem
- o Answer includes correct units of measure
- o Answer is within 1% of actual value

- o Answer is stated with appropriate precision

Conditions for Assessment - *Conditions for assessment:*

- o using a scientific calculator
- o through completion of a unit test

Learning Objectives

- a. Combine like terms
- b. Multiply algebraic expressions
- c. Solve linear equations with one variable
- d. Rearrange a formula to solve for an indicated first degree variable
- e. Translate phrases into equations using variables to represent unknowns
- f. Apply skills to a technical problem
- g. Rearrange algebraic formulas