

Statewide Manufacturing Curriculum:

Contextualized Math
Module

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FOUNDATIONS FOR DESIGN

- ✓ Instruction emphasizes learning by doing through projects and simulations; therefore, the instructor is a facilitator or learning coach.
- ✓ Each module emphasizes communication, teamwork, and critical thinking.
- ✓ Content is contextualized for manufacturing professions and their programs of study.
- ✓ Learning outcomes often require learners to meet and interact with academic and manufacturing professionals, engage in collaborative and individual projects involving authentic materials and resources, visit manufacturing and academic facilities, and complete documents and writing tasks for career paths with the guidance of learning facilitators.
- ✓ Specific units within modules may serve as precursors for additional units within the module. Many lessons and units may be repeated and expanded from one module to another.
- ✓ Self-advocacy and continual self-assessment and self-monitoring are inherent to each module while students must be introduced to, required to meet with, and encouraged to consult with program coordinator as well as academic and employment professionals.
- ✓ Site visits to manufacturing and learning facilities, guest speakers, and conferences with employment and academic professionals are integral to the relevance and value of the program for students.

ASSUMPTIONS:

- ✓ Each agency or instructor who may use these modules or this program will adapt instructional strategies, content level of difficulty, learning activities and projects to meet the needs of the program's target population and adult learners of lower and higher academic levels.

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- ✓ Referenced resources, relevant internet links, learning activities (created, suggested, attached, or referenced) will be used, modified, or omitted based on student need and restraints of class time and resources.
- ✓ This curriculum will work in established internal partnerships within the academic community as well as external partnerships/relationships in the employment community.
- ✓ Units and lessons will be adapted to fit within varying contact hours of a program.

Rationale: As adult education students train to enter the workforce, they need skills in a large variety of mathematical concepts. Many of these concepts need to be reviewed and relearned and may be best learned in the context of the field that the student plans to enter.

Module Description: The mathematics skills module offers the adult learner the opportunity to learn the basic mathematics skills necessary for use in the industrial workplace and/or post-secondary education. The module presents mathematics in the practical context of industries such as process operations technology, drafting, engineering technology, and automotive technology. Students develop study skills in math including review of arithmetic skills as they apply to career problems. The course covers fractions, rounding, scientific notation, decimal fractions, ratios, proportions, percentages, averages, estimates, graphic representation, and some practical geometry and trigonometry.

i-Pathways Alignment with the Statewide Manufacturing Curriculum: The lessons identified in this document have connections with both i-Pathways and the intended learning objectives identified in the Statewide Manufacturing Curriculum. The i-Pathways lessons can be used to build background knowledge, reinforce content, or provide learners with additional practice in a specific skill development.

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Module Objectives:

Students will:

- Develop study skills in math
- Learn how to work with whole numbers in the context of industry technology
- Learn how to work with fractions in the context of industry technology
- Learn how to work with decimal fractions in the context of industry technology
- Learn how to work with ratios and proportions in the context of industry technology
- Learn how to work with percent proportions in the context of industry technology
- Learn how to work with percents, averages, and estimates in the context of industry technology
- Learn how to work with exponents and roots with order of operations in applied settings
- Learn how to work with industrial applications of basic measurements
- Learn how to work with graphic representation of data from work settings
- Learn how to work with formulas and equations in the context of industry technology
- Learn how to work with practical geometry and trigonometry problems in the context of industry technology

Methods of Instruction

- Teacher modeling
- Skills practice
- Individual and group work

Methods for Evaluating Student Performance

- Student demonstration
- Teacher observation

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- Examinations

Module Overview

- A. Study Skills for Mathematics
- B. Whole Numbers
- C. Fractions
- D. Decimal Fractions
- E. Ratios and Proportions
- F. Percent Proportions
- G. Percents, Averages, and Estimates
- H. Exponents and Roots with Order of Operations
- I. Basic Measurements
- J. Interpreting Graphic Data
- K. Formulas and Equations
- L. Practical Geometry and Trigonometry

Module Outline

1. Study skills in math
 - a. Math anxiety inventory diagnostic test
 - b. Designing personal success strategy in math
2. Whole numbers in contextualized formats
 - a. Integers, absolute value, inequality
 - b. Addition
 - c. Subtraction
 - d. Multiplication and division
 - e. Order of operations
3. Fractions in the context of industry technology
 - a. Fractions and equivalent fractions
 - b. Factors and lowest terms
 - c. Fractions on the graphing calculator
 - d. Multiplication and division - area
 - e. Addition and subtraction of like fractions and least common

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- denominators
 - f. Addition and subtraction of unlike fractions - perimeter
 - g. Complex fractions
 - h. Order of operations
 - i. Conversions between improper fractions and mixed numbers
4. Decimal fractions
 - a. Significant digits
 - b. Rounding
 - c. Scientific notation
 - d. Addition of decimal fractions
 - e. Subtraction of decimal fractions
 - f. Multiplication of decimal fractions
 - g. Division of decimal fractions
 - h. Decimal and common fraction equivalents
 5. Ratios and Proportions in the industrial context
 - a. Ratios, rates, and unit rates
 - b. Proportions
 6. Percent proportions
 7. Percents, averages and estimates in the industrial and business context
 - a. Simple interest
 - b. Discount calculations
 - c. Computation of averages
 - d. Determining estimates
 8. Exponents and roots with order of operations in applied settings
 - a. Roots
 - b. Combined operations of exponents and roots
 9. Industrial applications of basic measurements
 - a. Length and angle of measurement
 - b. Volume
 - c. Weight and mass
 - d. Work
 - e. Energy
 - f. Temperature
 - g. Time
 10. Graphic representation of data from work settings

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- a. Line graphs
 - b. Pie graphs
 - c. Bar and stacked bar graphs
11. Formulas and equations
- a. Representing industrial data in formulas and equations
 - b. Solving equations of industrial problems
 - c. Formulas commonly used in industry
12. Practical geometry and trigonometry
- a. Pythagorean Theorem
 - b. Basic trigonometric functions