



Mathematics in the Plant

Course 103: Mathematics in the Plant

Begins with mathematical basics—numbers, numerals, subtraction, addition, multiplication, and division. Examines common and decimal fractions, ratios and proportions, powers and roots. Discusses the uses and functions of a calculator. Moves on to geometry, algebra, and formulas for problem solving. Concludes by explaining properties of triangles and trig and inverse trig functions.

TPC Training is accredited by IACET to offer **1.0 CEU** for this program.



Lesson 1: Whole Numbers

Topics

Numbers and Numerals; Decimal Systems; Positive and Negative Numbers; Addition; Carrying; Shortcuts in Addition; Multiplication; Subtraction; Borrowing; Division

Objectives

- Describe the difference between a number and a numeral.
- Demonstrate how to add three four-digit numbers, with carrying.
- Demonstrate how to subtract two four-digit numbers, with borrowing.
- Demonstrate how to multiply a four-digit number by a two-digit number.
- Demonstrate how to divide a four-digit number by a two-digit number.

Lesson 2: Common Fractions

Topics

Definition of a Fraction; Value of a Fraction; Improper Fractions; Mixed Numbers; Equivalent Fractions; Reducing Fractions; Common Denominators; Lowest Common Denominator; Adding Fractions; Subtracting Fractions; Subtracting Mixed Numbers; Multiplying Fractions; Canceling; Dividing Fractions

Objectives

- State the definition of a fraction.
- Demonstrate how to reduce a fraction to its lowest terms.
- Demonstrate how to find the lowest common denominator of two fractions.
- Demonstrate how to add three common fractions having different denominators.

Lesson 3: Decimal Fractions

Topics

Decimal Form; Rounding Off; Adding Decimal Fractions; Rounding Off in Addition; Subtracting Decimal Fractions; Rounding Off in Subtraction; Decimal Fractions in the Shop; Multiplying Decimal Fractions; Rounding Off in Multiplication; Adding Extra Zeros; Dividing Decimal Fractions; Rounding Off in Division; Changing Common Fractions to Decimal Form; Changing Mixed Numbers to Decimal Form; Changing Decimal Fractions to Common Fractions

Objectives

- Describe the difference between a decimal fraction and a common fraction.
- Demonstrate how to round off a decimal fraction to a specified number of places.
- Demonstrate how to multiply one decimal fraction by another.
- Demonstrate how to round off the products and quotients of decimal fractions.
- Demonstrate how to change fractions from common form to decimal form, and vice-versa.

Lesson 4: Ratios and Proportions

Topics

Comparing Numbers; Ratios; Expressing Ratios; Writing Ratios; Units in Ratios; Proportion

Objectives

- Demonstrate how to calculate the ratio of two numbers.
- Demonstrate how to use a ratio to express a change.
- Demonstrate how to use a ratio to solve a typical plant problem.

Lesson 5: Powers and Roots

Topics

Repeating Multiplication and Division; Exponential Form; Multiplying in Exponential Form; Dividing in Exponential Form; Zero Power; Fractions with Exponents; Products with Exponents; Powers of Powers; Powers of Sums and Differences; Roots; Fractional Exponents; Decimal Exponents; Negative Fractional Exponents

Objectives

- Demonstrate how to calculate the value of a number given in exponential form.
- Demonstrate how to write products and quotients of numbers given in exponential form.
- Demonstrate how to calculate the value of a number raised to a fractional power.
- Demonstrate how to calculate the value of a number raised to a negative power.

Lesson 6: Calculators

Topics

Using This Lesson; What a Calculator Does; Inside a Calculator; Internal Logic; Basic Functions; Special Functions; Special-Purpose Calculators

Objectives

- Explain the importance of an algorithm in a calculator.
- Describe how a calculator with arithmetic logic performs calculations.
- Describe how a calculator with algebraic logic performs calculations.
- Describe how a calculator with RPN logic differs from other calculators.

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Lesson 7: Geometry

Topics

Lines and Curves; Circles; Angles; Measuring Angles; Polygons; Triangles; Quadrilaterals; Constructions

Objectives

- Explain the differences among a line, a line segment, and a ray.
- Identify a radius, a chord, and a diameter of a circle.
- Demonstrate how to measure an angle with a protractor.
- Define a circle.
- Identify a right triangle, an equilateral triangle, and an isosceles triangle in a drawing.
- Demonstrate how to duplicate an angle using a straightedge and a compass.

Lesson 8: Algebra

Topics

Need for Algebra; Symbols, Expressions, and Equations; Order of Operations; Parentheses; Numbers and Variables; Equations; Algebraic Laws; Writing Equations; Solving Equations

Objectives

- Demonstrate how to calculate the value of an expression by performing mixed operations in the correct order.
- Demonstrate how to write an algebraic equation, based on a relationship stated in words.
- Demonstrate how to solve an algebraic equation for a specific variable.

Lesson 9: Using Formulas

Topics

A Real Problem; Solving the Problem; Length, Area, and Volume; Solving Other Problems

Objectives

- Identify values as length, area, or volume, based on their units of measurement.
- Demonstrate how to calculate the surface area and volume of a rectangle, a circle, a cylinder, and a sphere, given the dimensions of each and a list of formulas from which to choose.
- Demonstrate how to calculate the length of one side of a right triangle, given the other two sides.

Lesson 10: Trigonometry

Topics

Properties of Triangles; Trig Functions; Trig Tables; Inverse Trig Functions; Using Trig Functions

Objectives

- State the definition of the sine, cosine, and tangent of an angle.
- Demonstrate how to find the value of the sine, cosine, and tangent of a given angle, using either a trig table or a calculator.
- Demonstrate how to find the inverse sine, inverse cosine, and inverse tangent of a given value, using either a trig table or a calculator.
- Demonstrate how to solve a geometric problem, using trigonometry.