

## UNIT OBJECTIVES

### Unit A - Getting to Know Your Calculator

1. Enter numbers, fractions, and decimals into a calculator and read the output displayed by a calculator.
2. Use the parentheses keys on a calculator.
3. Add, subtract, multiply, and divide fractions with a calculator.
4. Add, subtract, multiply, and divide mixed numbers with a calculator.
5. Add, subtract, multiply, and divide decimals with a calculator.

### Unit B - Naming Numbers in Different Ways

1. Change percents to decimals.
2. Change decimals to percents.
3. Use a calculator to change fractions to decimals.
4. Change decimals from your calculator to fractions.
5. Solve problems that contain information in the form of fractions, decimals, or percents.

### Unit C - Finding Answers with Your Calculator

1. Read the problem and begin to understand the situation.
2. Figure out what the problem is asking you to find.
3. Decide what math operations (+, -, ×, ÷) to do as you solve a problem.
4. Use your calculator to work problems that have more than one step.

### Unit 1 - Learning Problem-solving Techniques

1. Read a problem and decide what is given and what is to be found.
2. Develop a plan for solving the problem.
3. Carry out your plan to solve the problem.
4. Check the answer and decide if it is reasonable.

### Unit 2 - Estimating Answers

1. Make rough estimates.
2. Round and truncate whole numbers to a given number of digits.
3. Round and truncate decimal numbers to a given number of digits.
4. Estimate answers to problems that involve several steps.
5. Check the answers to problems to make sure they are reasonable.

### Unit 3 - Measuring in English and Metric Units

1. Use the common measurement units for length, area, volume, capacity, and weight in the English system.
2. Use the common measurement units for length, area, volume, capacity, and weight in the metric system.
3. Convert measurement units from one form to another and carry out calculations that involve various measurement units.
4. Read measurements taken with common measuring tools.
5. Use tools to measure quantities and solve problems that involve these measurements.

### Unit 4 - Using Graphs, Charts, and Tables

1. Read tables.
2. Read and draw bar graphs.
3. Read circle graphs.
4. Read and draw line graphs.
5. Interpolate readings on a graph.
6. Extend a line graph so you can estimate more values.

### Unit 5 - Dealing with Data

1. Recognize a problem that needs more data, and find a source for that data.
2. Collect the data you need to solve a problem.
3. Organize the data to help you solve the problem.
4. Interpret or use the data so you can solve the problem.

## Unit 6 - Working with Lines and Angles

1. Name the different parts of lines, angles, and circles.
2. Recognize parallel and perpendicular lines.
3. Draw lines, angles, and circles.
4. Measure line segments and angles.
5. Draw lines and angles to produce parallel and perpendicular lines.
6. Use geometric figures to solve work-related problems.

## Unit 7 - Working with Shapes in Two Dimensions

1. Identify common figures (such as rectangles, squares, triangles, parallelograms, trapezoids, and circles) within objects.
2. Calculate the perimeter and area of common figures.
3. Calculate the circumference and area of circles.
4. Solve work-related problems that involve common figures.

## Unit 8 - Working with Shapes in Three Dimensions

1. Identify cylinders, rectangular solids, cones, and spheres.
2. Calculate surface area and volume for cylinders, rectangular solids, cones, and spheres.
3. Solve problems that involve cylinders, rectangular solids, cones, and spheres.

## Unit 9 - Using Ratios and Proportions

1. Read and interpret ratios.
2. Compare ratios.
3. Recognize and write proportions from given information.
4. Distinguish between direct and indirect relationships.
5. Solve proportions in practical, work-related problems.

## Unit 10 - Working with Scale Drawings

1. Read and use the scale of a drawing.
2. Find the dimensions of an object from a scale drawing.
3. Find distances and directions on land maps.
4. Make simple scale drawings.

## Unit 11 - Using Signed Numbers and Vectors

1. Identify signed numbers.
2. Find the absolute value of signed numbers.
3. Combine signed numbers.
4. Find the magnitude and direction of a vector.
5. Solve problems using signed numbers and vectors.

## Unit 12 - Using Scientific Notation

1. Write large and small numbers in power-of-ten notation.
2. Read and write numbers in scientific notation.
3. Enter numbers written in scientific notation into a calculator and read answers in scientific notation displayed by a calculator.
4. Combine numbers written in scientific notation to solve problems.

## Unit 13 - Precision, Accuracy, and Tolerance

1. Distinguish between counting and measuring, and between precision and accuracy.
2. Read and write measurements to show precision and tolerance.
3. Compare measurements to specified tolerances.
4. Use significant digits to indicate the accuracy of a measurement.
5. Use precision tools to make measurements.
6. Calculate with measurements and round the results.

## Unit 14 - Solving Problems with Powers and Roots

1. Read and write numbers expressed as powers.
2. Estimate the values of numbers written as powers.
3. Read and write numbers expressed as roots.
4. Find powers and roots of numbers using a calculator.
5. Solve problems that involve numbers as powers and roots.

## Unit 15 - Using Formulas to Solve Problems

1. Read and write a formula.
2. Rearrange the parts of a formula to fit your problem.
3. Substitute values into the formula and find an answer.
4. Use your calculator as you solve problems with formulas.

## Unit 16 - Solving Problems That Involve Linear Equations

1. Translate a problem into an equation.
2. Recognize and work with the parts of an equation.
3. Simplify and solve an equation.
4. Check the solutions of the equation and the problem.

## Unit 17 - Graphing Data

1. Graph data as points on a coordinate system.
2. Graph as equation.
3. Find the slope of a graphed line.
4. Find the intercepts of a graphed line.

## Unit 18 - Solving Problems That Involve Nonlinear Equations

1. Recognize some nonlinear equations (involving squares, square roots, and reciprocals of the variable) and become familiar with their graphs.
2. Solve a nonlinear equation, draw its graph, and check your work.
3. Find pairs of values for a nonlinear formula in a stated problem, graph the formula, and read values from the graph.

## Unit 19 - Working with Statistics

1. Distinguish between mean, mode and median as measures of central tendency.
2. Calculate the mean, mode and median for a set of data.
3. Draw a histogram to represent frequency distributions of data.
4. Distinguish between range, trend, and standard deviation as measures of variability.
5. Interpret the characteristics of a normal curve.
6. Calculate the range and standard deviation to describe a set of data.

## Unit 20 - Working with Probabilities

1. Find the probability of some simple events.
2. Count the number of ways an event can happen.
3. Draw diagrams and charts to help find probability.
4. Use your calculator to find probabilities.

## Unit 21 - Using Right-triangle Relationships

1. Name the parts of a right triangle.
2. Use the Pythagorean formula to find a side of a right triangle.
3. Use the characteristics of 3: 4: 5,  $45^\circ - 45^\circ$  and  $30^\circ - 60^\circ$  right triangles to solve practical problems.
4. Use the ratios for the sine, cosine, and tangent of an angle to solve problems that involve triangles.
5. Use your calculator as you solve problems that involve right triangles.

## Unit 22 - Using Trigonometric Functions

1. Use your calculator to find sine and cosine values.
2. Draw a graph of sine and cosine waves.
3. Find the amplitude, wavelength, period, and frequency of sine waves.
4. Find the phase shift between two sine waves.

## Unit 23 - Factoring

1. Identify and remove common monomial factors.
2. Combine algebraic expressions by:
  - a. multiplying two binomials together
  - b. squaring a binomial
  - c. finding the product of the sum and difference of two terms.
3. Identify factors in algebraic expressions by:
  - a. factoring trinomials
  - b. factoring the difference of two perfect squares
  - c. factoring perfect square trinomials
  - d. factoring appropriate polynomials
4. Solve problems that involve factoring.

## Unit 24 - Patterns and Functions

1. Decode and extend patterns.
2. Represent mathematical relationships as tables of data, ordered pairs, graphs, equations and word sentences.
3. Graph linear and quadratic functions.
4. Identify the domain and range of mathematical relations and functions.
5. Distinguish between mathematical relations and functions.
6. Use patterns and functions to solve problems at home and at work.

## Unit 25 - Quadratics

1. Solve quadratic equations by graphing.
2. Solve quadratic equations by factoring.
3. Solve quadratic equations with the quadratic formula.
4. Use graphing, factoring and the quadratic formula to solve the same problem and obtain the same results.
5. Solve practical problems using quadratic equations.

## Unit 26 - Systems of Equations

1. Solve a system of two equations by graphing.
2. Solve a system of two equations by substitution.
3. Solve a system of two equations by addition or subtraction.
4. Solve a system of two equations by using determinants.
5. Write appropriate equations in terms of unknowns for problems that involve two unknowns.
6. Solve problems that involve systems of equations.

## Unit 27 - Inequalities

1. Order two or more numbers using appropriate symbols such as  $<$ ,  $>$ ,  $=$ ,  $\leq$  and  $\geq$ .
2. Solve linear inequalities in one variable and graph their solutions.
3. Solve combined inequalities.
4. Solve inequalities that involve absolute values and graph their solutions.
5. Graph linear inequalities in two variables.
6. Solve practical problems expressed in terms of inequalities.
7. Solve linear programming problems.

## Unit 28 - Geometry in the Workplace 1

1. Apply geometry to problems that involve the areas of rectangles, triangles, trapezoids, circles, sectors and segments of circles.
2. Apply geometry to problems that involve tangent lines, perpendicular lines, bisecting lines and angles.
3. Apply the Pythagorean theorem and the sine, cosine and tangent functions to right triangles to relate sides and angles.
4. Draw auxiliary diagrams to help solve for an unknown dimension or an unknown angle.
5. Solve geometry problems that involve a series of successive calculations.

## Unit 29 - Geometry in the Workplace 2

1. Apply solid geometry to problems that involve the volumes and surface areas of cylinders, cubes, spheres, cones, and frustums of cones.
2. Apply solid geometry principles to solve problems normally encountered in the workplace.
3. Draw auxiliary diagrams to help solve for an unknown dimension or an unknown angle.
4. Solve workplace problems in solid geometry that require a series of successive calculations to reach the final answer.

## Unit 30 - Solving Problems with Computer Spreadsheets

1. Describe a computer spreadsheet and tell how it's used.
2. Define and use proper spreadsheet terminology.
3. Load and use simple spreadsheet templates to solve practical problems.

## Unit 31 - Solving Problems with Computer Graphics

1. Describe a computer graphics program and tell what it can do for you.
2. Enter data into a prepared template to produce bar graphs, circle graphs, and line graphs.
3. Use a computer graphics program to create bar graphs, circle graphs, and line graphs.
4. Enter parameters into a prepared template to graph linear and quadratic functions.
5. Use the graphs created by a computer graphics program to solve practical problems

## Unit 32 - Quality Assurance and Process Control 1

1. Distinguish between a manufacturing process and its product.
2. Make process charts.
3. Construct histograms, run charts, scatter diagrams and normal distribution curves from data obtained by counting or measuring.
4. Use measures of central tendency and dispersion to describe data shown on bell-shaped curves.
5. Calculate process capability and tolerance band.
6. Compare data for process capability and tolerance band on normal distribution curves to determine production quality.

## Unit 33 - Quality Assurance and Process Control 2

1. Use a measurement control chart for  $\bar{x}$  and  $R$  to keep a process in control.
2. Use an attribute control chart for  $p$  to keep a process in control.
3. Design control charts for  $\bar{x}$  and  $R$  for a process.
4. Interpret control charts to detect an out-of-control process.
5. Use single, double, and multiple sampling plans from MIL-STD-105E.
6. Develop single sampling plans using MIL-STD-105E.

## Unit 34 - Spatial Visualization

1. Determine point, line, and plane symmetry of geometric figures.
2. Use orthographic drawing techniques to draw two-dimensional projections of objects.
3. Draw basic geometric views using isometric and one- and two-point perspective drawing techniques.

### **Unit 35 - Coordinate Geometry**

1. Determine the locus of points meeting given conditions.
2. Determine if lines are perpendicular or parallel.
3. Find the length and midpoint of line segments.
4. Use an equation to represent a circle in a coordinate plane.
5. Add vectors in a coordinate plane.
6. Interpret and depict simple (basic) objects in a three-dimensional coordinate system.

### **Unit 36 - Logic**

1. Understand inductive and deductive reasoning and the differences between them.
2. Apply the language and symbols of logic to occupational situations and determine appropriate conclusions.
3. Perform geometric constructions.
4. Use postulates and theorems to build geometric proofs involving lines, triangles, and quadrilaterals.
5. Solve problems using logical reasoning and geometric theorems.

### **Unit 37 - Transformations**

1. Construct congruent geometric figures using reflections, translations, and rotations.
2. Construct similar geometric figures using dilations.
3. Illustrate congruence and similarity transformations in the coordinate plane.