

# **St. John-Endicott Cooperative Schools Math Curriculum Standards**

## **with Performance Indicators**

### **Program Standards**

- Possess the mathematical skills for successful daily adult life.
- Be able to reason in a sound manner and use common sense in mathematics applications.
- Understand and apply mathematical and technical process skills.
- Understand mathematical manipulation and thinking and the impact of mathematics on science, technology, and daily life.
- Be able to read and apply mathematical concepts in technical manuals.
- Be able to use and apply current technology and be open to future technology.
- Be adequately prepared for next level of learning.

# Math Standards Kindergarten

## Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Think clearly and solve problems in math (classify, decide, estimate, solve, compare).
  - B. Talk and write clearly about math (present, persuade, collaborate, explain, recommend).
  - C. Make careful plans and use them (brainstorm, envision, research, plan, organize, persist).
  - D. Use the quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to use math to solve problems in a step-by-step manner (research, thesis, support, recommendations).
  - B. Be able to conduct research (locate, observe/gather, present).
  - C. Be able to use manipulatives to help solve problems.
  - D. Possess technical skills:
    - listen/dictate/write/present: instructions, chart, letter of request, proposal, report, summary
    - technology: word processing, Internet, AV production

## Course Content

- 3. Be able to use words to describe objects.**
  - A. Be able to sort and describe objects (color, weight, shape, length and other kinds of size).
  - B. Be able to use the words for size and position (more/less, most/least, few/many, large/small, big/little, heavy/light, thick/thin, over/under, above/below, top/bottom, right/left/middle, beside/in front of/behind, first/second/third/etc.).
  - C. Know basic shapes (square, circle, triangle, rectangle).
- 4. Understand two-part patterns.**
  - A. Be able to predict what comes next.
  - B. Be able to copy a pattern from a picture or model.
  - C. Be able to add to patterns.
  - D. Be able to make your own pattern.
- 5. Be able to count by memory to 100.**
  - A. Know number order from 0 to 9.
  - B. Know number order from 10 to 100.
  - C. Be able to see the repeated pattern in numbers from 0 to 100.
- 6. Be able to count movable objects up to 20.**
  - A. Be able to count up to 20 from memory.
  - B. Be able to touch and count each item in the right order.
- 7. Be able to match sets with numbers to ten.**
  - A. Be able to recognize the numbers 1 to 10.
  - B. Be able to count ordered objects up to 10.
  - C. Be able to count unordered objects up to 10.
- 8. Be able to recognize numbers 0 to 20 in random order.**
  - A. Be able to recognize numbers 0 to 20.
  - B. Be able to recognize number patterns.
  - C. Be able to point to numbers when asked to.
  - D. Be able to name numbers in random order.
- 9. Be able to write numbers 0 to 9.**
  - A. Be able to imagine the stroke pattern of each number.
  - B. Be able to write numbers using correct number formation.
- 10. Be able to do simple addition and subtraction using objects.**
  - A. Be able to join sets.
  - B. Be able to separate sets.
  - C. Be able to explain how you are joining and separating sets.

# Math Standards

## First Grade

### Course Abilities [Apply the following to each content standard.]

1. **Develop abilities in math.**
  - A. Think clearly and solve problems in math (classify, decide, estimate, solve, compare).
  - B. Talk and write clearly about math (present, persuade, collaborate, explain, recommend).
  - C. Make careful plans and use them (brainstorm, envision, research, plan, organize, persist).
  - D. Use the quality process (plan, draft, analyze, and revise when producing products).
2. **Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to use math to solve daily life problems in a step-by-step manner (collect facts, select operation, complete operations, solve and label solution).
  - B. Be able to conduct research (locate, observe/gather, present).
  - C. Be able to sort, pattern, graph, measure, and use manipulatives, clocks (to half-hour), money (count to \$1.00), calendars (length of a day, week, month, year), and shapes (square, circle, triangle, rectangle) to solve problems.
  - D. Possess technical skills:
    - listen/read/dictate/write/present: instructions, chart, letter of request, proposal, report, summary
    - technology: word processing, Internet, AV production

### Course Content

3. **Be able to read, write, and compare numbers to 100.**
  - A. Be able to count out loud to 100.
  - B. Be able to write numbers to 100 in order.
  - C. Be able to identify and write numbers to 100 out of order.
  - D. Be able to order two-digit numbers.
  - E. Be able to tell if numbers are greater than, less than, or equal.
4. **Be able to count to 100 in many ways.**
  - A. Be able to see the pattern in numbers from 0 to 100.
  - B. Be able to count and write by 2's (both evens and odds), 5's, and 10's to 100.
5. **Understand place value of ones and tens.**
  - A. Be able to group objects by ones and tens.
  - B. Be able to identify the ones place and tens place in two-digit numbers.
6. **Be able to do addition and subtraction process to 10.**
  - A. Know meaning of symbols (+, -, =).
  - B. Be able to use manipulatives to add and subtract.
  - C. Be able to add or subtract using numbers vertically and horizontally.
7. **Be able to add and subtract two-digit numbers without regrouping.**
  - A. Be able to solve two-digit addition and subtraction problems using manipulatives.
  - B. Be able to start process in the ones column.
  - C. Be able to correctly line up addition and subtraction problems with two-digit numbers.

# Math Standards

## Second Grade

### Course Abilities [Apply the following to each content standard.]

1. **Develop abilities in math.**
  - A. Think clearly and solve problems in math (classify, decide, estimate, solve, compare).
  - B. Talk and write clearly about math (present, persuade, collaborate, explain, recommend).
  - C. Make careful plans and use them (brainstorm, envision, research, plan, organize, persist).
  - D. Use the quality process (plan, draft, analyze, and revise when producing products).
2. **Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to estimate and solve one-step daily life problems (estimate and explain estimation strategies, use cues to select operation, write problem sentence, solve and label solution).
  - B. Be able to conduct research (locate, observe/gather, present).
  - C. Be able to use manipulatives, graphs, charts, clocks (to the quarter-hour and in five-minute intervals), calendars (length of a day, week, month, year), and shapes (cubes, spheres, cylinders, cones, pyramids, rectangular prisms) to solve problems.
  - D. Possess technical skills:
    - listen/read/write/present: instructions, chart, letter of request, proposal, report, summary
    - technology: word processing, Internet, AV production

### Course Content

3. **Be able to read, write, and compare numbers 100 to 999 and understand hundreds place value.**
  - A. Know that each place (hundreds, tens, ones) can be any number (0 to 9) and be able to read three-digit numbers.
  - B. Know that each hundreds number must have three digits and be able to make three-digit numbers.
  - C. Know  $<$ ,  $>$ ,  $=$ , and be able to use them appropriately when comparing numbers up to 999.
  - D. Know the sequence of numbers up to 999.
4. **Be able to regroup to the tens place.**
  - A. Know that a group of ten can be broken into ten ones and that ten ones equals a group of ten.
  - B. Be able to regroup numbers to 99.
5. **Be able to easily recall addition and subtraction facts and processes to 18 and know about multiplication.**
  - A. Know fact families and "double" facts.
  - B. Be able to work number sentences vertically and horizontally.
  - C. Be able to skip count starting at any point.
  - D. Be able to compare addition to multiplication and choose between the two.
6. **Be able to use standard linear (inch, foot, yard, centimeter, meter) and liquid (cup, pint, quart, gallon, liter) measures.**
  - A. Be able to properly place a ruler when measuring.
  - B. Be able to recognize an inch and centimeter and use rulers to measure up to 12 inches and 25 cm correctly.
  - C. Be able to measure down to one-half inch and one centimeter.
  - D. Be able to accurately measure out a given amount of liquid using cup, pint, quart, gallon, and liter.
  - E. Be able to determine an amount of liquid to the cup.
7. **Be able to recognize and label fractions in halves, thirds, and fourths.**
  - A. Know that a fraction is part of a whole and be able to identify a fractional part.
  - B. Be able to divide a circle, square, rectangle into  $1/2$ ,  $1/3$ ,  $2/3$ ,  $1/4$ , and  $3/4$ .

# Math Standards Third Grade

## Course Abilities [Apply the following to each content standard.]

1. **Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, decide, estimate, generalize, solve, compare, simplify).
  - B. Communications (present, persuade, collaborate, explain, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
2. **Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to use the four-step problem-solving process (locate facts, identify question, select operations, solve and label solution) and check for common sense.
  - B. Be able to conduct research (locate, observe/gather, present).
  - C. Be able to use charts, graphs, tables, manipulatives, clocks (to nearest minute), money (count to \$5.00), models and other resources to solve problems.
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, thank you letter, letter of request, letter of response, proposal, lab report, research report, summary
    - technology: word processing, database, Internet, AV production

## Course Content

3. **Be able to read, write, and compare whole numbers through four digits and round two- and three-digit numbers to the nearest ten.**
  - A. Be able to read and write to 9,999.
  - B. Be able to compare whole numbers for greater, lesser, and equal.
  - C. Be able to find tens, hundreds, and thousands places.
  - D. Know and be able to apply the rules for rounding off numbers.
4. **Be able to readily recall addition and subtraction facts through 18 and multiplication and division 0 to 9.**
  - A. Be able to use manipulatives to understand facts.
  - B. Be able to use strategies to memorize facts.
  - C. Be able to use basic facts in real-life situations.
  - D. Be able to check addition using subtraction and subtraction using addition.
5. **Be able to regroup numbers up to four digits in addition and subtraction.**
  - A. Be able to line up four-digit numbers to add and subtract.
  - B. Be able to regroup numbers greater than ten in the next column in addition.
  - C. Be able to complete each column in addition and subtraction before moving on to the next.
  - D. Be able to regroup in subtraction if the top digit is smaller than the digit below.
  - E. Be able to use manipulatives to understand regrouping.
6. **Be able to read, write, illustrate, and compare fractions with like denominators.**
  - A. Know placement of numerator and denominator and be able to say and write fractions correctly.
  - B. Know meaning of denominator as the whole and numerator as parts of the whole and be able to tell which fraction is larger.
  - C. Be able to use manipulatives and pictures to illustrate and compare fractions.
7. **Be able to identify, measure, and describe plane and geometric figures.**
  - A. Be able to identify, measure, label, and draw squares, circles, triangles, rectangles, pentagons, hexagons, and octagons.
  - B. Be able to identify and label cubes, spheres, cylinders, cones, pyramids, and rectangular prisms.
  - C. Be able to describe plane and geometric figures in terms of shape, sides, perimeter, area, and examples.
  - D. Be able to match congruent figures and draw a line of symmetry.
8. **Be able to perform basic operations using calculators (safely, effectively, efficiently, accurately).**
  - A. Know four basic functions of calculators (add, subtract, multiply, divide).
  - B. Be able to check answers with calculator for adding, subtracting, and multiplying.
  - C. Be able to use calculators for problem-solving.

# Math Standards

## Fourth Grade

### Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, decide, estimate, generalize, solve, relate, interpret, simplify).
  - B. Communications (present, persuade, collaborate, explain, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to solve one- and two-step problems using the four-step problem-solving method with time, money, and measurement in standard and metric units (determine problem, select operations, estimate, solve and label solution) and check for common sense.
  - B. Be able to conduct research (locate, observe/gather, present).
  - C. Be able to solve one-step problems using graphs, charts, tables, calculators and computers (safely, effectively, efficiently, accurately).
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, thank you letter, letter of request, letter of response, proposal, lab report, research report, summary
    - technology: word processing, database, Internet, AV production

### Course Content

- 3. Be able to read, write, and compare whole numbers through seven digits and decimals to hundredths.**
  - A. Be able to read and write to millions place.
  - B. Know each place value to million.
  - C. Be able to compare  $<$ ,  $>$ ,  $=$  to hundredths.
  - D. Be able to compare  $<$ ,  $>$ ,  $=$  for whole numbers.
  - E. Be able to read and write decimals to hundredths.
- 4. Be able to round four-digit numbers to the nearest thousand and estimate sums and differences.**
  - A. Know place value to round off to thousands.
  - B. Be able to find digit to the right.
  - C. Be able to estimate sums and differences.
  - D. Be able to solve sum or difference and determine why the estimate was close or not.
- 5. Be able to add and subtract whole numbers to seven places.**
  - A. Be able to line up seven-digit numbers (according to place value) to add and subtract.
  - B. Be able to regroup in addition.
  - C. Be able to correctly use commas.
  - D. Be able to regroup in subtraction.
  - E. Be able to check with addition and subtraction.
- 6. Know multiplication and division facts.**
  - A. Be able to demonstrate multiplication and division through the use of manipulatives.
  - B. Be able to readily recall multiplication facts to ten.
  - C. Be able to readily recall division facts to ten.
- 7. Be able to multiply using one- and two-digit multipliers and divide four-digit dividends by a one-digit divisor.**
  - A. Be able to line up numbers.
  - B. Be able to regroup numbers.
  - C. Be able to correctly place the partial products.
  - D. Be able to use zero as a place holder.
  - E. Be able to correctly place quotient.
  - F. Be able to find and correctly place a remainder.
- 8. Be able to regroup, add, and subtract fractions with like denominators.**
  - A. Be able to add and subtract numerators.
  - B. Be able to simplify to lowest terms, including creating a whole number if numerator is larger.
  - C. Be able to regroup if required.
- 9. Know and be able to use various intermediate geometric terms and shapes.**
  - A. Know figures up to eight sides.
  - B. Know lines, rays, points, and line segments.
  - C. Be able to plot coordinates on a line graph.
  - D. Know acute/obtuse/right angles, lines of symmetry/congruence, and parallel, perpendicular, and intersecting lines.

# Math Standards Fifth Grade

## Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, decide, estimate, generalize, solve, relate, interpret, simplify).
  - B. Communications (present, persuade, collaborate, explain, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to solve complex problems with whole numbers using the five-step method (read problem, properly label, select operations, estimate solution, apply operations) and explain process.
  - B. Be able to conduct research (locate, observe/gather, present).
  - C. Be able to use graphs, charts, tables, calculators, and computers to solve multi-step problems (safely, effectively, efficiently, accurately).
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, thank you letter, letter of request, letter of response, proposal, lab report, research report, summary
    - technology: word processing, spreadsheet, database, Internet, AV production

## Course Content

- 3. Be able to read, write, and estimate whole numbers through nine digits and decimals to thousandths.**
  - A. Be able to read whole numbers and decimals and write whole numbers and decimals that are orally given.
  - B. Be able to estimate sums, differences, and products of whole numbers and decimals by rounding.
- 4. Be able to multiply using three-digit numbers.**
  - A. Be able to round to estimate products.
  - B. Be able to complete each partial step.
  - C. Be able to use zero as a place holder.
  - D. Be able to add partial steps to find total.
- 5. Be able to divide using two-digit divisors.**
  - A. Be able to round to estimate quotient.
  - B. Be able to complete each partial step.
  - C. Be able to complete whole process.
  - D. Be able to apply division skills to solve problems.
- 6. Be able to work with metric units using manipulatives.**
  - A. Know metric prefixes (kilo, centi, milli) and values.
  - B. Be able to measure length, width, and volume.
- 7. Be able to add/subtract fractions with like denominators to  $\frac{1}{16}$  and multiply/divide to  $\frac{1}{8}$ .**
  - A. Be able to add and subtract numerator.
  - B. Be able to make an improper fraction.
  - C. Be able to cross-multiply.
  - D. Be able to invert a divisor.
  - E. Be able to reduce to lowest terms.
- 8. Be able to compare and order fractions and decimals using  $<$ ,  $>$ ,  $=$ .**
  - A. Know terms and symbols  $<$ ,  $>$ ,  $=$ .
  - B. Be able to compare decimals using place value.
  - C. Be able to find a common denominator.
  - D. Be able to compare numerators once common denominators are found.
- 9. Understand and be able to apply  $+$ ,  $-$ ,  $\times$ ,  $\div$  to decimals to thousandths.**
  - A. Be able to write decimals as fractions.
  - B. Be able to identify correct place value after decimal.
  - C. Be able to add decimals to thousandths.
  - D. Be able to subtract decimals to thousandths.
  - E. Be able to multiply decimals to thousandths.
  - F. Be able to divide decimals to thousandths.
- 10. Be able to recognize, identify, and classify various geometric terms and shapes.**
  - A. Be able to identify and measure acute, obtuse, and right angles.
  - B. Be able to identify basic and complex geometric shapes and classify geometric shapes by attribute.

# Math Standards Sixth Grade

## Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to solve multi-step problems using a step-by-step problem-solving method (gather/evaluate/process information, plan operations, solve, check for common sense).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use calculators, computers, and other technology to assist in problem-solving (safely, effectively, efficiently, accurately) and to create, evaluate, and solve problems with graphs, charts, and tables.
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

## Course Content

- 3. Be able to use standard and metric units of measure.**
  - A. Know and know how to find the standard and metric units of measure (linear, weight, volume).
  - B. Be able to change units within a system.
  - C. Be able to choose best unit of measure.
  - D. Be able to estimate solutions involving measurement.
  - E. Be able to apply operations to units of measurement.
- 4. Be able to compare and order integers.**
  - A. Be able to compare  $<$ ,  $>$ ,  $=$  for positive and negative whole numbers.
  - B. Be able to place positive and negative whole numbers on a line graph.
  - C. Be able to apply values of positive and negative numbers.
  - D. Be able to record and write positive and negative numbers.
  - E. Be able to list positive and negative numbers from least to greatest and greatest to least.
- 5. Be able to integrate the use of the four operations with whole and decimal numbers estimating and finding actual answers.**
  - A. Know place value (hundred thousandths to trillions).
  - B. Be able to read and write numbers from hundred thousandths to trillions (standard form and words).
  - C. Be able to round whole numbers to millions.
  - D. Be able to add whole numbers and decimal numbers from millionths to trillions.
  - E. Be able to subtract numbers with decimals.
  - F. Be able to multiply up to three-digit places.
  - G. Be able to divide by two-digit divisors.
  - H. Be able to use estimating strategies.
  - I. Be able to compute average (mean).
- 6. Be able to estimate and calculate averages and percentages and know about ratios and proportions.**
  - A. Know terms average, ratio, proportion, percentage.
  - B. Be able to determine an average.
  - C. Be able to estimate and find a percentage of a number.
  - D. Be able to convert decimals, percents, and fractions from one to another.
  - E. Be able to write a ratio and proportion.
- 7. Possess a basic understanding of the four operations with fractions and mixed numbers.**
  - A. Know the principles of prime factorization (least common multiple and greatest common factor).
  - B. Be able to find a common denominator.
  - C. Be able to add and subtract fractions.
  - D. Be able to multiply and divide fractions.
  - E. Be able to reduce to lowest terms.
  - F. Be able to convert improper fractions and create whole and mixed numbers.
- 8. Be able to calculate the linear dimensions of polygons and the area of squares, rectangles, and triangles.**
  - A. Be able to identify and illustrate basic geometric figures and measure and construct angles.
  - B. Know and be able to apply formulas for perimeter, area, circumference, and volume of geometric figures.



# Math Standards Seventh Grade

## Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to use a variety of strategies in the problem-solving process (patterns, tables, diagrams, simplify, brainstorm, guess and check) in a step-by-step manner (research, thesis, support, recommendations).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use calculators, computers, and other technology to assist in problem-solving (safely, effectively, efficiently, accurately) and to create, evaluate, and solve problems with graphs, charts, and tables.
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

## Course Content

- 3. Be completely comfortable with operations with integers.** [Use this standard to allow students to either catch up or enhance higher level skills.]
  - A. Understand positive and negative numbers.
  - B. Be able to name opposite integers.
  - C. Be able to apply four operations to integers.
  - D. Be able to apply appropriate operations.
  - E. Be able to solve problems using operations.
  - F. Be able to use a calculator with integers.
- 4. Be able to apply standard and metric measures for temperature, volume, area, mass, and money to real-life situations.**
  - A. Know the advantages of each system.
  - B. Be able to select appropriate unit.
  - C. Be able to use measuring devices.
  - D. Be able to translate within a system.
  - E. Be able to translate between systems.
  - F. Be able to apply all terms properly.
- 5. Be able to apply ratios, proportions, averages, and percentages to real-life situations.**
  - A. Be able to find equivalent ratios.
  - B. Be able to use equivalent fractions and cross products to solve problems.
  - C. Be able to calculate mean, median, mode, and range.
  - D. Be able to use percent, fraction, decimal equivalents.
  - E. Be able to set up and solve percentage problems.
  - F. Be able to combine processes to solve problems.
  - G. Be able to use a calculator to solve problems related to ratios, proportions, averages, and percentages.
  - H. Be able to apply all terms properly.
- 6. Be able to apply fractions and decimals to real-life situations.**
  - A. Be able to define and know how to calculate repeating and nonrepeating decimals.
  - B. Be able to write decimals in scientific notation.
  - C. Be able to convert between fractions and decimals.
  - D. Know when to use decimals or fractions.
  - E. Be able to use operations with decimals & fractions.
  - F. Be able to use a calculator with fractions & decimals.
- 7. Be able to use geometric principles to draw and compare lengths, area, and volume.**
  - A. Know perpendicular and parallel lines, congruence, and similar figures.
  - B. Be able to measure and construct lengths, angles, and plane geometric figures and draw 3-D figures.
  - C. Be able to calculate and compare area, perimeter, circumference, and volume of geometric figures.
- 8. Be able to solve basic algebraic equations.**
  - A. Know meaning of variables.
  - B. Know inverse operations.
  - C. Know properties of equality ( $=$ ,  $+$  and  $-$ ,  $x$  and  $\div$ ).
  - D. Be able to substitute answer to check.

# Math Standards Eighth Grade

## Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to use a variety of strategies in the problem-solving process (patterns, tables, diagrams, simplify, brainstorm, guess and check) in a step-by-step manner (research, thesis, support, recommendations).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use calculators, computers, and other technology to assist in problem-solving (safely, effectively, efficiently, accurately) and to create, evaluate, and solve problems with graphs, charts, and tables.
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

## Course Content

- 3. Be able to solve consumer-related problems.**
  - A. Be able to find and use formulas.
  - B. Be able to determine profit and loss.
  - C. Be able to determine commission and gratuity.
  - D. Be able to determine sales tax.
  - E. Be able to determine discount, sale price, and original price.
  - F. Be able to determine unit cost.
  - G. Be able to determine interest, principal, and balance.
- 4. Be able to analyze and interpret statistics and graphs.**
  - A. Be able to find range, mean, median, and mode.
  - B. Be able to make line plots, stem and leaf, and scattergrams.
  - C. Be able to find data from a graph.
  - D. Be able to use terms properly.
  - E. Be able to plot points on coordinate plane.
  - F. Be able to find odds and probability and make predictions based on them.
- 5. Be able to solve problems using operations with rational numbers.**
  - A. Be able to apply four operations to integers.
  - B. Be able to apply four operations to real numbers.
  - C. Be able to choose appropriate operations to solve problems.
- 6. Be able to solve problems using measurement, precision, and conversion.**
  - A. Be able to measure lengths, volume, and weights in English and metric systems.
  - B. Be able to round off measurement and error.
  - C. Know greatest possible error.
  - D. Be able to convert within each of the two systems.
  - E. Be able to use scientific notation for minute numbers.
- 7. Be able to draw conclusions and solve problems using geometric principles.**
  - A. Be able to calculate areas and perimeters of triangles, quadrilaterals, and other polygons.
  - B. Be able to apply volumes and surfaces of prisms, cones, pyramids, cylinders, and spheres.
  - C. Know the vocabulary of polygons.
  - D. Be able to find missing value of polygons.
  - E. Be able to draw conclusions using geometric principles.
  - F. Be able to solve problems using geometric principles.
- 8. Be able to solve multi-step algebraic equations and solve and graph linear equations.**
  - A. Be able to apply order of operations.
  - B. Be able to substitute and evaluate.
  - C. Be able to solve problems by trial and error.
  - D. Be able to solve one-step equations.
  - E. Be able to solve two-step equations.
  - F. Be able to transform using grouping symbols.
  - G. Know about functions.
  - H. Know about range and domain.
  - I. Be able to make tables of solutions.
  - J. Be able to graph solutions from a table.
- 9. Be able to translate from English terms to algebraic equations.**
  - A. Know key words for the four operations.
  - B. Be able to write expressions.
  - C. Be able to recognize the unknown.
  - D. Be able to write equation from written/oral problem.

# Math Standards

## Algebra I

### Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply algebra knowledge and skills to a variety of purposes.**
  - A. Be able to solve problems using linear and quadratic equations and other mathematical principles (understand problem, analyze data, translate into algebraic form, solve, apply common sense).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use technology to assist in problem-solving (safely, effectively, efficiently, accurately).
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

### Course Content

- 3. Be able to connect arithmetic and algebraic principles.**
  - A. Be able to translate life problems from mathematical to algebraic expressions.
  - B. Know the sign rules for addition and multiplication of real numbers.
  - C. Know order of operations for evaluating mathematical expressions.
  - D. Know the properties of arithmetic as they apply to algebra.
  - E. Be able to translate from the concrete level of thinking to the abstract level.
- 4. Be able to simplify expressions using real numbers.**
  - A. Be able to identify terms, variables, and coefficients.
  - B. Be able to do four operations with real numbers.
  - C. Be able to combine like terms.
  - D. Be able to express fractional coefficients in lowest terms.
  - E. Know and be able to apply order of operations.
  - F. Know associative, commutative, distributive properties.
- 5. Be able to determine, solve, and graph linear equations with one or more variables.**
  - A. Be able to use basic operations to isolate variable.
  - B. Be able to translate words into algebraic symbols and equations.
  - C. Be able to graph linear equations by plotting points.
  - D. Be able to recognize and use the slope-intercept form of a line for graphing.
- 6. Understand and be able to use polynomials.**
  - A. Be able to identify, add, and subtract types of polynomials and their parts.
  - B. Be able to identify and factor a common monomial factor.
  - C. Be able to multiply and divide polynomials.
  - D. Be able to recognize special binomials (square binomial, perfect squares, difference of squares).
  - E. Know the zero product property and know how to relate to factors of polynomials.
- 7. Be able to solve and graph linear inequalities.**
  - A. Be able to use number line, symbolism ( $\neq$ ,  $<$ ,  $>$ ,  $\leq$ ,  $\geq$ ).
  - B. Know difference between equality and inequality.
  - C. Be able to solve inequalities.
  - D. Be able to graph a line in a coordinate plane.
  - E. Know that multiplying or dividing by a negative reverses the direction of the inequality.
- 8. Be able to solve equations which contain rational expressions.**
  - A. Be able to identify a rational expression.
  - B. Be able to apply operations to rational expressions.
  - C. Be able to identify and solve linear equations.
  - D. Be able to identify/solve equations by substitutions, factoring, and graphing.
  - E. Be able to translate life problems into math language.
- 9. Be able to solve quadratic equations by factoring.**
  - A. Be able to recognize quadratic equations.
  - B. Be able to recognize and use distributive property.
  - C. Be able to find the greatest monomial factor.
  - D. Be able to factor through reverse FOIL.
  - E. Be able to apply the zero product property.
  - F. Be able to solve linear equations.

# Math Standards

## Alternate Algebra I

### Course Abilities [Apply the following to each content standard.]

1. **Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
2. **Be able to apply algebra knowledge and skills to a variety of purposes.**
  - A. Be able to solve problems using algebraic equations and other mathematical principles (understand problem, analyze data, translate into algebraic form, solve, apply common sense).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use technology to assist in problem-solving (safely, effectively, efficiently, accurately).
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

### Course Content

3. **Be able to operate with integers.**
  - A. Know the sign rules for add, subtract, multiply, and divide.
  - B. Be able to apply order of operations.
  - C. Be able to calculate using the four basic operations.
4. **Be able to select and apply formulas.**
  - A. Be able to evaluate algebraic equations.
  - B. Be able to apply formulas for triangle, rectangle, square, parallelogram, trapezoid, and circle.
  - C. Be able to insert data into formula.
  - D. Be able to graph an equation.
5. **Be able to solve equations.**
  - A. Be able to apply properties of arithmetic.
  - B. Be able to identify terms, variables, and coefficients.
  - C. Be able to combine like terms.
  - D. Be able to use associative, commutative, and distributive properties.
  - E. Be able to use four basic operations to isolate a variable.
  - F. Know difference between equality and inequality.
  - G. Be able to solve inequalities.
  - H. Be able to solve proportions.
  - I. Be able to identify and solve linear equations.

# Math Standards

## Algebra II

### Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply algebra knowledge and skills to a variety of purposes.**
  - A. Be able to relate algebra models to the real world (gather data, hypothesize, plot and analyze graphs, conclude, apply common sense).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use technology to assist in problem-solving (safely, effectively, efficiently, accurately).
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

### Course Content

- 3. Be able to solve, graph, and analyze linear equations and inequalities.**
  - A. Be able to write an equivalent equation or inequality in simplest form.
  - B. Know slope-intercept, standard, point-slope form.
  - C. Be able to use ordered pairs to graph or in a solution set.
  - D. Know the relationship between the ordered pairs and graph and equation.
  - E. Know slope, intercepts, domain, and range.
- 4. Be able to solve, graph, and analyze nonlinear equations/inequalities by various methods.**
  - A. Be able to write an equivalent equation or inequality in simplest form.
  - B. Be able to solve: factoring, completing the square, and quadratic formula.
  - C. Be able to determine ordered pairs in a solution set.
  - D. Be able to relate ordered pairs, graph, and equation.
  - E. Be able to find vertex, maximum, and minimum.
  - F. Know domain and range.
- 5. Be able to solve, graph, and analyze systems of equations/inequalities by various methods.**
  - A. Be able to solve by graphing, substitution, and linear combination.
  - B. Know and be able to identify the types of solutions.
- 6. Understand and apply functions.**
  - A. Know the definition of a function.
  - B. Be able to use functional notation and graph functions.
  - C. Know the attributes of families of functions.
  - D. Be able to develop functions from data points.
- 7. Be able to solve trigonometric functions using triangles.**
  - A. Know sine, cosine, and tangent relationships for right triangle.
  - B. Be able to solve missing parts of a right triangle.
  - C. Know and be able to apply laws of cosine and sine.
  - D. Know cases of multiple or no solutions.
- 8. Understand and use the exponential and logarithmic functions.**
  - A. Know the relationship between exponential and logarithmic functions.
  - B. Know the methods of solving simple logarithmic and exponential equations.
  - C. Know the basic properties of and be able to use logarithms to solve problems.
- 9. Be able to perform operations and solve equations using complex numbers.**
  - A. Know definition of complex numbers.
  - B. Be able to apply the basic operations with radicals.
  - C. Be able to solve equations with complex solutions.
- 10. Be able to perform operations and solve equations using radicals.**
  - A. Be able to simplify radicals.
  - B. Know the four basic operations with radicals.
  - C. Know relationship between rational exponents and their radical form.
  - D. Be able to solve linear equations with radical solutions.
  - E. Be able to solve quadratic equations with radical solutions.

# Math Standards

## Geometry

### Course Abilities [Apply the following to each content standard.]

1. **Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
2. **Be able to apply geometry knowledge and skills to a variety of purposes.**
  - A. Be able to use geometry and other mathematical concepts to solve problems (research, thesis, support, recommendations) and be able to use logical reasoning through proofs (deductive and inductive reasoning, two-column proofs, conditional statements, indirect proofs).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use technology to assist in problem-solving and constructions (safely, effectively, efficiently, accurately).
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

### Course Content

3. **Understand the basic terms and symbols of geometry.**
  - A. Be able to apply the undefined terms of geometry.
  - B. Know how basic mathematical systems are built.
  - C. Be able to identify the basic geometric symbols.
  - D. Be able to apply the basic definitions of geometry.
4. **Understand area, perimeter, and volume.**
  - A. Be able to use basic formulas.
  - B. Be able to apply formulas to life problems.
  - C. Be able to apply the concept of unit label to linear, area, and volume measurement.
5. **Understand the various types of symmetry and transformation.**
  - A. Be able to recognize and use point, line, and rotational symmetry.
  - B. Be able to apply the properties of the basic mappings.
6. **Be able to use concepts of congruence and similarity to compare lengths, areas, and volumes.**
  - A. Be able to apply the concepts of congruence and similarity.
  - B. Be able to identify the corresponding parts of congruent figures.
  - C. Be able to apply methods of proving congruence and similarity.
7. **Understand angle, line, and circle relationships.**
  - A. Be able to apply the relationship of angles with regard to parallel and perpendicular lines and circles.
  - B. Be able to apply parallel and perpendicular postulates and theorems.
  - C. Be able to apply different types of angles.
  - D. Be able to apply the relationship between circles and angles.
  - E. Be able to apply the relationship between circles and lines.
8. **Be able to use geometric instruments to make drawings.**
  - A. Be able to identify and correctly use basic construction instruments.
  - B. Be able to perform basic constructions.
  - C. Be able to solve problems by using constructions.
  - D. Be able to conjecture theorems and postulates by using computer-aided constructions.

# Math Standards Analysis

## Course Abilities [Apply the following to each content standard.]

- 1. Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
- 2. Be able to apply math analysis knowledge and skills to a variety of purposes.**
  - A. Be able to use advanced mathematical principles to solve problems (research, thesis, support, recommendations).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use technology to assist in problem-solving (safely, effectively, efficiently, accurately).
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

## Course Content

- 3. Be able to express advanced mathematical ideas and relationships orally and in writing.**
  - A. Be able to apply the concepts of group and field.
  - C. Be able to prove by direct, indirect, math induction, and truth tables.
  - B. Be able to work with a conjunction and a disjunction.
- 4. Possess a working knowledge of trigonometry and be able to manipulate trigonometric identities.**
  - A. Be able to apply the definitions of trigonometric functions based on unit circle.
  - D. Be able to apply the results of combining functions.
  - E. Be able to apply common identities.
  - B. Be able to graph using the six trigonometric functions and variables.
  - F. Be able to establish new identification based on other identification.
  - C. Be able to find amplitude, period, and phase.
  - G. Be able to solve trigonometric equations.
- 5. Be able to apply trigonometry to find solutions.**
  - A. Be able to apply the polar coordinate system.
  - B. Be able to apply complex numbers and limits.
- 6. Understand vectors and matrices.**
  - A. Know what a vector and a matrix is.
  - C. Be able to show a proof with vectors and matrices.
  - B. Be able to apply operations of vectors and matrices.
  - D. Be able to solve systems using matrices.
- 7. Understand sequences and series.**
  - A. Know the difference between arithmetic and geometric sequences and series.
  - B. Know what a sequence and a series is.
  - C. Know the difference between finite and infinite.
- 8. Understand the basics of analytic geometry.**
  - A. Know the four different conic sections.
  - B. Be able to identify the equations of the conic sections.
  - C. Be able to graph the conic sections by using the major components of each.
- 9. Be able to use logarithms and exponential functions.**
  - A. Be able to apply real number exponents.
  - B. Be able to apply logarithmic functions and exponential functions.
  - C. Be able to apply relationship between a logarithmic and exponential function.
  - D. Be able to apply laws and properties of logarithmic and exponential functions.
  - E. Be able to solve logarithmic and exponential equations.
- 10. Understand limits.**
  - A. Know what a limit is.
  - B. Be able to find the limit of a function.
  - C. Be able to apply limits to the other areas of mathematics.

# Math Standards

## Consumer Math

### Course Abilities [Apply the following to each content standard.]

1. **Develop abilities in math.**
  - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
  - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
  - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
  - D. The quality process (plan, draft, analyze, and revise when producing products).
2. **Be able to apply math knowledge and skills to a variety of purposes.**
  - A. Be able to use basic math operations with integers, decimals, fractions, and percentages to solve adult-life problems (research, thesis, support, recommendations, common sense).
  - B. Be able to conduct research (locate, observe/gather, analyze, conclude).
  - C. Be able to use technology to assist in problem-solving (safely, effectively, efficiently, accurately).
  - D. Possess technical skills:
    - read/write/present: instructions, table, chart, lab report, specifications, proposal, letters (complaint, recommendation), manual, form, checklist, technical research, bid, technical analysis, summary
    - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

### Course Content

3. **Be able to apply math and problem-solving methods to the process of earning income.**
  - A. Be able to communicate about income (want ads, resumes, interviews, wages/salaries, cooperation, math terms).
  - B. Be able to compare salaries and convert hourly wages to weekly and yearly income.
  - C. Be able to figure a pay check with standard FICA and income tax deductions.
  - D. Be able to calculate raises and determine pay for quota and piecemeal work.
4. **Be able to apply math and problem-solving methods to income and sales taxes.**
  - A. Be able to communicate about taxes (forms, manuals, basic terms, cooperation, math terms).
  - B. Be able to complete the 1040EZ form and calculate cost of sales tax for various purchases.
5. **Be able to apply math and problem-solving methods to daily transportation.**
  - A. Be able to communicate about transportation (want ads, interest, loans, basic terms, cooperation, math terms).
  - B. Be able to calculate total cost of purchasing cars (loans, maintenance, fuel, insurance, parking, storage).
  - C. Be able to calculate costs of public transportation and compare to cost of purchase or to cost of a combined plan.
6. **Be able to apply math and problem-solving methods to housing.**
  - A. Be able to discuss housing costs intelligently (want ads, deposits, leases, cooperation, math terms).
  - B. Be able to calculate total cost of various rental options (deposits, monthly rent, phone, utilities, sharing plans).
  - C. Be able to calculate total cost of a basic home purchase (down payment, monthly payments, taxes, insurance, utilities, phone, use of escrow, maintenance).
  - D. Be able to compare rent to purchase.
7. **Be able to apply math and problem-solving methods to shopping, purchasing, and gambling.**
  - A. Be able to communicate when shopping (advertising, credit, layaway, cooperation, math terms).
  - B. Be able to analyze sales for actual costs including comparing by cost per unit.
  - C. Be able to determine with justification the generally most economical grocery store which is available.
  - D. Be able to compare costs of outright purchase, layaway, credit card, and bank loan for various purchases.
  - E. Be able to determine odds of various gambling games, to analyze odds of lotteries and pull tabs, and to formulate a plan to prevent gambling from becoming a personal problem.
8. **Be able to apply math and problem-solving methods to banking, savings, and investment.**
  - A. Be able to communicate about savings and basic investment (cooperation, basic terms, math terms).
  - B. Be able to calculate various forms of simple and compound interest and compare different available savings options.
  - C. Be able to select, establish, and maintain a checking account.
9. **Be able to apply math and problem-solving methods to budgets.**
  - A. Be able to discuss budgets intelligently (cooperation, basic terms, math terms).
  - B. Be able to determine various living expenses from general budget plans and from life.
  - C. Be able to apply general budget plans to a given real-life situation.
  - D. Be able to establish and maintain a budget.