



**Kindergarten – Fourth Grade Math**

# **Kindergarten Mathematics**

While it is important to work toward the development of “higher-order problem-solving skills,” it is equally important—indeed, it is prerequisite to achieving “higher order” skills—to have a sound grasp of basic facts, and an automatic fluency with fundamental operations.

## **Patterns and Classification**

- Establish concepts of likeness and difference by sorting and classifying objects according to various attributes: size, shape, color, amount, function, etc.
- Define a set by the common property of its elements.
- In a collection of objects that includes a given set and an item that does not belong, indicate which item does not belong.
- Moving from concrete objects to pictorial representations, recognize patterns and predict the extension of a pattern.
- Extend a sequence of ordered concrete objects.

## **Numbers and Number Sense**

- Using concrete objects and pictorial representations, compare sets: same as (equal to), more than, less than, most, least
- Count forward from 1 to 31, first beginning with 1, and later from any given number backward from 10 from 1 to 10 by twos by fives and tens to 50
- Write numbers 1 to 31 (with special attention to the difference between certain written symbols, such as 6 and 9; 2 and 5; 1 and 7; 12 and 21, etc.).
- Count and write the number of objects in a set.
- Given a number, identify one more, one less.
- Identify ordinal position, first (1st) through sixth (6th).
- Identify pairs.
- Interpret simple pictorial graphs.
- Identify  $\frac{1}{2}$  as one of two equal parts of a region or object; find  $\frac{1}{2}$  of a set of concrete objects.

## **Money**

- Identify pennies, nickels, dimes, and quarters.
- Identify the one-dollar bill.
- Identify the dollar sign (\$) and cents sign (¢).
- Write money amounts using the cents sign (¢).

## **Computation**

- Add and subtract to ten, using concrete objects.
- Recognize the meaning of the plus sign (+).
- Subtraction: the concept of “taking away”; recognize the meaning of the minus sign (-).

## **Measurement**

- Identify familiar instruments of measurement, such as ruler, scale, thermometer.
- Compare objects according to:  
Linear measure long and short; longer than, shorter than measure length using non-standard units  
begin to measure length in inches height: taller than, shorter than Weight heavy, light heavier than, lighter than  
Capacity (volume) full and empty less full than, as full as, fuller than Temperature: hotter and colder
- Time  
Sequence events: before and after; first, next, last.  
Compare duration of events: which takes longer.  
Read a clock face and tell time to the hour and the half hour.

Know the days of the week and the months of the year.

Orientation in time: today, yesterday, tomorrow; morning, afternoon; this morning vs. yesterday morning, etc.

## **Geometry**

- Identify left and right hand.
- Identify top, bottom, middle.
- Know and use terms of orientation and relative position, such as:  
closed, open  
on, under, over  
in front, in back (behind)  
between, in the middle of  
next to, beside  
inside, outside  
around  
far from, near  
above, below  
to the right of, to the left of  
here, there
- Identify and sort basic plane figures: square, rectangle, triangle, circle. Identifying geometric solids: rectangular prism, pyramid, cylinder, sphere.
- Identify basic shapes in a variety of common objects and artifacts (windows, pictures, books, buildings, cars, etc.).
- Recognize shapes as the same or different.
- Make congruent shapes and designs.
- Compare size of basic plane figures (larger, smaller).

# **First Grade Mathematics:**

## **Patterns and Classification**

- Establish concepts of likeness and difference by sorting and classifying objects according to various attributes: size, shape, color, amount, function, etc.
- Define a set by the common property of its elements.
- In a collection of objects that includes a given set and an item that does not belong, indicate which item does not belong.
- Recognize patterns and predict the extension of a pattern.

## **Numbers and Number Sense**

- Write numbers 0 - 100.
- Count from 0 - 100 by ones; twos; fives; tens.
- Count by tens from a given single-digit number.
- Count forward and backwards.
- Use tallies.
- Identify ordinal position, 1st to 10th.
- Identify dozen; half-dozen; pair.
- Recognize place value: ones, tens, hundreds.
- Identify more and less; counting how many more or less.
- Given a number, identify one more and one less; ten more and ten less.
- Compare quantities using the signs  $<$ ,  $>$ , and  $=$ .
- Recognize fractions as part of a whole:  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$
- Create and interpret simple pictorial graphs and bar graphs.

## **Money**

- Identify and recognize relative value of penny, nickel, dime, quarter.
- Recognize and use dollar (\$) and cents (¢) signs.
- Show how different combinations of coins equal the same amounts of money.

## **Computation**

### A. Addition (using concrete objects, and paper and pencil)

- Know the meaning of the plus (+) sign.
- Know what a "sum" is.
- Know addition facts to  $10 + 10$  (untimed mastery).
- Add in any order.
- Know what happens when you add zero.
- Know how to write addition problems horizontally and vertically.
- Know that when you add 3 numbers, you get the same sum regardless of grouping of addends.
- Solve two-digit addition problems with and without regrouping.

### B. Subtraction (using concrete objects, and paper and pencil)

- Understand subtraction as "taking away."
- Know the meaning of the minus sign ( $-$ ).
- Know what a "difference" is.
- Know subtraction facts corresponding to addition facts (untimed mastery).
- Know how to write subtraction problems horizontally and vertically.
- Solve two-digit subtraction problems with and without regrouping.
- Mentally subtract 10 from a two-digit number.

### C. Solving Problems and Equations

- Write an addition or subtraction equation to solve basic one-step story and picture problems.
- Solve simple equations in the form of  $\_\_\_ - 2 = 7$ ;  $5 + \_\_\_ = 7$ .

## Measurement

- Identify familiar instruments of measurement, such as ruler, scale, thermometer.
- Compare objects according to:

Linear measure

Measure length using non-standard units.

Measure length in inches and feet, and in centimeters.

Measure and draw line segments in inches and centimeters.

Weight

Compare weights of objects using a balance scale.

Measure weight in non-standard units and in pounds.

Capacity (volume)

Estimate and measure capacity in cups.

Identify quart, gallon.

Temperature: associate temperature in degrees Fahrenheit with weather.

- Time

Sequence events: before and after; first, next, last.

Compare duration of events: which takes more or less time.

Read a clock face and tell time to the half-hour.

Know the days of the week and the months of the year, both in order and out of sequence.

Orientation in time: today, yesterday, tomorrow; morning, afternoon, evening, night; this morning vs. yesterday morning, etc.

## Geometry

- Identify left and right hand.
- Identify top, bottom, middle.
- Know and use terms of orientation and relative position, such as:

closed, open around

on, under, over far from, near

in front, in back (behind) above, below

between, in the middle of to the right of, to the left of

next to, beside here, there

inside, outside

- Identify and draw basic plane figures: square, rectangle, triangle, circle.

- Describe square, rectangle, triangle according to number of sides.

- Identify basic solid figures: sphere, cube, cone.

- Identify basic shapes in a variety of common objects and artifacts (balls, cans, windows, pictures, books, buildings, cars, etc.).

- Make congruent shapes and designs.

# **Second Grade Mathematics:**

## **Numbers and Number Sense**

- Write numbers to 1,000.
- Read and write words for numbers from one to one-hundred.
- Order and compare numbers to 1,000, using the signs  $<$ ,  $>$ , and  $=$ .
- Count
  - by twos, threes, fives, and tens
  - by tens from any given number
  - by hundreds to 1,000; by fifties to 1,000
  - forward and backward
- Use a number line.
- Use tallies.
- Identify ordinal position, 1st to 20th, and write words for ordinal numbers, first to twentieth.
- Identify even and odd numbers.
- Identify dozen; half-dozen; pair.
- Recognize place value: ones, tens, hundreds, thousands.
- Write numbers up to hundreds in expanded form (for example  $64 = 60 + 4$ ;  $367 = 300 + 60 + 7$ ).
- Given a number, identify one more and one less; ten more and ten less.
- Round to the nearest ten.
- Create and interpret simple bar graphs.
- Identify and extend numerical and symbolic patterns.
- Record numeric data systematically and find the lowest and highest values in a data set.

## **Fractions**

- Recognize these fractions as part of a whole set or region and write the corresponding numerical symbols:  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$ ,  $\frac{1}{6}$ ,  $\frac{1}{8}$ , 110.
- Recognize fractions that are equal to 1.

## **Money**

- Recognize relative values of a penny, nickel, dime, quarter, and dollar.
- Write amounts of money using \$ and ¢ signs, and the decimal point.
- Show how different combinations of coins equal the same amounts of money.
- Add and subtract amounts of money.

## **Computation**

### A. Addition

- Achieve timed mastery of addition facts (2 seconds).
- Recognize what an addend is.
- Know how to write addition problems horizontally and vertically.
- Know how to add in any order and check a sum by changing the order of the addends.
- Estimate the sum.
- Solve two-digit and three-digit addition problems with and without regrouping.
- Find the sum (up to 999) of any two whole numbers.
- Add three two-digit numbers.
- Practice doubling (adding a number to itself).

### B. Subtraction

- Understand the inverse relation between addition and subtraction; use addition to check subtraction.
- Know addition and subtraction “fact families.”
- Achieve mastery of subtraction facts.
- Estimate the difference.
- Know how to write subtraction problems horizontally and vertically.

- Solve two-digit and three-digit subtraction problems with and without regrouping.
- Given two whole numbers of 999 or less, find the difference.

#### C. Introduction to Multiplication

- Recognize the “times” sign ( $\times$ ).
- Know what “factor” and “product” mean.
- Understand that you can multiply numbers in any order.
- Multiplication facts: know the product of any single-digit number  $\times$  1, 2, 3, 4, 5.
- Know what happens when you multiply by 1, by 0, and by 10.
- Practice simple word problems involving multiplication.

#### D. Solving Problems and Equations

- Solve basic word problems.
- Write and solve simple equations in the form of  $\_\_\_ - 9 = 7$ ;  $7 + \_\_\_ = 16$ ;  $4 \times \_\_\_ = 8$ .

### Measurement

#### A. Linear Measure

- Make linear measurements in feet and inches, and in centimeters.
- Know that one foot = 12 inches.
- Know abbreviations: ft., in.
- Measure and draw line segments in inches to  $\frac{1}{2}$  inch, and in centimeters.
- Estimate linear measurements, then measure to check estimates.

#### B. Weight

- Compare weights of objects using a balance scale.
- Estimate and measure weight in pounds, and know abbreviation: lb.

#### C. Capacity (volume)

- Estimate and measure capacity in cups.
- Measure liquid volumes: cups, pints, quarts, gallons.
- Compare U.S. and metric liquid volumes: quart and liter (one liter is a little more than one quart).

#### D. Temperature

- Measure and record temperature in degrees Fahrenheit to the nearest 2 degrees.
- Know the degree sign:  $^{\circ}$

#### E. Time

- Read a clock face and tell time to five-minute intervals.
- Know how to distinguish time as a.m. or p.m.
- Understand noon and midnight.
- Solve problems on elapsed time (how much time has passed?).
- Using a calendar, identify the date, day of the week, month, and year.
- Write the date using words and numbers.

### Geometry

- Identify and draw basic plane figures: square, rectangle, triangle, circle.
- Describe square, rectangle, triangle according to number of sides; distinguish between square and rectangle as regards length of sides (a square has sides of equal length).
- Measure perimeter in inches of squares and rectangles.
- Identify solid figures—sphere, cube, pyramid, cone, cylinder—and associate solid figures with planar shapes: sphere (circle), cube (square), pyramid (triangle).
- Make congruent shapes and designs.
- Identify lines as horizontal; vertical; perpendicular; parallel.
- Name lines and line segments (for example, line AB; segment CD).
- Identify a line of symmetry, and create simple symmetric figures.

# **Third Grade Mathematics:**

## **Numbers and Number Sense**

- Read and write numbers (in digits and words) up to six digits.
- Recognize place value up to hundred thousands.
- Order and compare numbers to 999,999, using the signs  $<$ ,  $>$ , and  $=$ .
- Count by twos, threes, fives, and tens; count by tens from any given number.
- Write numbers in expanded form.
- Use a number line.
- Identify ordinal position, 1st to 100th.
- Review: even and odd numbers; dozen; half-dozen; pair.
- Round to the nearest ten; to the nearest hundred.
- Identify perfect squares (and square roots) to 100, and recognize the square root sign:  $\sqrt{\quad}$
- Identify Roman numerals from 1 to 20 (I - XX).
- Understand what negative numbers are in relation to familiar uses (such as temperatures below zero).
- Locate positive and negative whole numbers on a number line.
- Create and interpret bar graphs and line graphs.
- Record outcomes for a simple event (for example, tossing a die) and display the results graphically.

## **Fractions and decimals**

- Recognize fractions to 101 and fractions whose denominator is 100.
- Identify numerator and denominator.
- Write mixed numbers.
- Recognize equivalent fractions (for example,  $\frac{1}{2} = \frac{63}{126}$ ).
- Compare fractions with like denominators, using the signs  $<$ ,  $>$ , and  $=$ .
- Know and write decimal equivalents to  $\frac{1}{4}$ ,  $\frac{1}{2}$ .
- Read and write decimals to the hundredths.

## **Money**

- Write amounts of money using \$ and  $\phi$  signs, and the decimal point.
- Make change, using as few coins as possible.
- Add and subtract amounts of money.
- Multiply and divide amounts of money by small whole numbers.

## **Computation**

### A. Addition

- Review and Practice Basic Addition Facts.
- Mentally Estimate a Sum.
- Use Mental Computation Strategies.
- Addition With And Without Regrouping: Find The Sum (Up To 10,000) Of Any Two Whole Numbers.

### B. Subtraction

- Understand Addition and Subtraction as Inverse Operations; Use Addition To Check Subtraction.
- Review and Practice Basic Subtraction Facts.
- Mentally Estimate the Difference.
- Use Mental Computation Strategies.
- Subtraction With And Without Regrouping: Given Two Whole Numbers Of 10,000 Or Less, Find The Difference.

## **Multiplication**

- Master basic multiplication facts to  $10 \times 10$ .
- Mentally multiply, by 10, 100, and 1,000.



- Multiply two whole numbers, with and without regrouping, in which one factor is 9 or less and the other is a multi-digit number up to three digits.
- Write numbers in expanded form using multiplication, for example:  $9,278 = (9 \times 1,000) + (2 \times 100) + (7 \times 10) + 8$ .
- Estimate a product.
- Solve word problems involving multiplication.

## Division

- Understand Multiplication and Division as Inverse Operations.
- Know the Meaning Of Dividend, Divisor, And Quotient.
- Know Basic Division Facts To  $100 \div 10$ .
- Know That You Cannot Divide By 0.
- Know That Any Number Divided By 1 = That Number.
- Divide Two- And Three-Digit Dividends by One-Digit Divisors.
- Solve Division Problems with Remainders.
- Check Division by Multiplying (And Adding Remainder).

## Solving Problems and Equations

- Solve two-step word problems.
- Solve equations in the form of  $\_\_ \times 9 = 63$ ;  $81 \div \_\_ = 9$ .
- Solve problems with more than one operation, as in  $(43 - 32) \times (5 + 3) = \_\_$ .
- Read and write expressions that use parentheses to indicate order of multiple operations.

## Measurement

### Linear Measure

- Make linear measurements in yards, feet, and inches; and, in centimeters and meters.
- Know that one foot = 12 inches; one yard = 36 inches; 3 feet = 1 yard; 1 meter = 100 centimeters; 1 meter is a little more than one yard.
- Measure and draw line segments in inches (to  $\frac{1}{4}$  inch), and in centimeters.
- Estimate linear measurements, then measure to check estimates.

### Weight

- Compare weights of objects using a balance scale.
- Estimate and measure weight in pounds and ounces; grams and kilograms.
- Know abbreviations: lb., oz., g, kg

### Capacity (Volume)

- Estimate and Measure Liquid Capacity In Cups, Pints, Quarts, Gallons, And Liters.
- Know That 1 Quart = 2 Pints; 1 Gallon = 4 Quarts.
- Compare U.S. And Metric Liquid Volumes: Quart and Liter (One Liter Is A Little More Than One Quart).

### Temperature

- Measure and Record Temperature In Degrees Fahrenheit And Celsius.
- Know the Degree Sign:  $^{\circ}$
- Identify Freezing Point of Water As  $32^{\circ} \text{ F} = 0^{\circ} \text{ C}$ .

### Time

- Read A Clock Face and Tell Time To The Minute As Either A. m. or p.m.; tell time in terms of both “minutes before” and “minutes after” the hour.
- Solve problems on elapsed time (how much time has passed?).
- Using a calendar, identify the date, day of the week, month, and year.
- Write the date using words (for name of month) and numbers, and only numbers.

## Geometry

- Identify lines as horizontal, vertical, perpendicular, or parallel.
- Name lines and line segments (for example, line AB; segment CD).
- Polygons: recognize vertex (plural: vertices); identify sides as line segments (for example,

side CD); identify pentagon, hexagon, and octagon (regular).

- Identify angles by letter names (for example,  $\angle$  \_\_\_\_\_ A B C ) ; identify a right angle; know that there are four right angles in a square or rectangle.
- Compute area in square inches (in <sup>2</sup>) and square centimeters (cm <sup>2</sup>).
- Recognize and draw congruent figures; identify a line of symmetry, and create symmetric figures.
- Identify solid figures: sphere, cube, rectangular solid, pyramid, cone, cylinder.

# **Fourth Grade Mathematics:**

## **Numbers and Number Sense**

- Read and write numbers (in digits and words) up to nine digits.
- Recognize place value up to hundred millions.
- Order and compare numbers to 999,999,999 using the signs  $<$ ,  $>$ , and  $=$ .
- Write numbers in expanded form.
- Use a number line; locate positive and negative whole numbers on a number line.
- Round to the nearest ten; to the nearest hundred; to the nearest thousand.
- Identify perfect squares (and square roots) to 144; recognize the square root sign:  $\sqrt{\quad}$
- Identify Roman numerals from 1 to 1,000 (I - M), and identify years as written in Roman numerals.
- Create and interpret bar graphs and line graphs.
- Plot points on a coordinate plane (grid), using ordered pairs of positive whole numbers.
- Know the meanings of multiple, factor, prime number, and composite number.

## **Fractions and Decimals**

### Fractions

- Recognize fractions to one-twelfth.
- Identify numerator and denominator.
- Write mixed numbers; change improper fractions to mixed numbers and vice versa.
- Recognize equivalent fractions (for example,  $\frac{1}{2} = \frac{63}{126}$ ).
- Put fractions in lowest terms.
- Rename fractions with unlike denominators to fractions with common denominators.
- Compare fractions with like and unlike denominators, using the signs  $<$ ,  $>$ , and  $=$ .
- Solve problems in the form of  $\frac{23}{4} = 5\frac{3}{4}$ .
- Add and subtract fractions with like denominators.
- Express simple outcomes as fractions (for example, 3 out of 4 as  $\frac{3}{4}$ ).

### Decimals

- Read and write decimals to the nearest thousandth.
- Read and write decimals as fractions (for example,  $0.39 = \frac{39}{100}$ ).
- Write decimal equivalents for halves, quarters, eighths, and tenths.
- Compare fractions to decimals using the signs  $<$ ,  $>$ , and  $=$ .
- Write decimals in expanded form.
- Round decimals to the nearest tenth; to the nearest hundredth.
- Compare decimals, using the signs  $<$ ,  $>$ , and  $=$ .
- Read and write decimals on a number line.
- Add and subtract with decimal numbers to two places.

## **Money**

- Solve problems involving making change in amounts up to \$100.00.
- Solve multiplication and division problems with money.

## **Computation**

### Multiplication

- Review and reinforce basic multiplication facts to  $10 \times 10$ .
- Mentally multiply by 10, 100, and 1,000.
- Identify multiples of a given number; common multiples of two given numbers.
- Multiply by two-digit and three-digit numbers.
- Write numbers in expanded form using multiplication.
- Estimate a product.
- Use mental computation strategies for multiplication, such as breaking a problem into partial products, for example:  $3 \times 27 = (3 \times 20) + (3 \times 7) = 60 + 21 = 81$ .

- Check multiplication by changing the order of the factors.
- Multiply three factors in any given order.
- Solve word problems involving multiplication.

#### Division

- Understand multiplication and division as inverse operations.
- Review the meaning of dividend, divisor, and quotient.
- Review and reinforce basic division facts to  $100 \div 10$ . \_\_\_\_\_
- Identify different ways of writing division problems:  $28 \div 7$   $7 \overline{)28}$   $28/7$
- Identify factors of a given number; common factors of two given numbers.
- Review: you cannot divide by 0; any number divided by 1 = that number.
- Estimate the quotient.
- Divide dividends up to four-digits by one-digit and two-digit divisors.
- Solve division problems with remainders.
- Check division by multiplying (and adding remainder).

#### Solving Problems and Equations

- Solve two-step word problems.
- Solve equations in the form of  $\_\_\_ \times 9 = 63$ ;  $81 \div \_\_\_ = 9$ .
- Solve problems with more than one operation, as in  $(72 \div 9) \times (36 \div 4) = \_\_\_$
- Equality properties Know that equals added to equals are equal. Know that equals multiplied by equals are equal.
- Use letters to stand for any number, as in working with a formula (for example, area of rectangle:  $A = L \times W$ ).

### Measurement

- Linear measure: estimate and make linear measurements in yards, feet, and inches (to  $1/8$  in.); and in meters, centimeters, and millimeters.
- Weight: estimate and measure weight in pounds and ounces; grams and kilograms.
- Capacity (volume): estimate and measure liquid capacity in teaspoons, tablespoons, cups, pints, quarts, gallons; and in milliliters and liters.
- Know the following equivalences among U. S. customary units of measurement, and solve problems involving changing units of measurement:

#### Linear measure

- 1 ft. = 12 in.
- 1 yd. = 3 ft. = 36 in.
- 1 mi. = 5,280 ft.
- 1 mi. = 1,760 yd.

#### Weight

- 1 lb. = 16 oz.
- 1 ton = 2,000 lb.

#### Capacity (volume)

- 1 cup = 8 fl. oz. (fluid ounces)
- 1 pt. = 2 c.
- 1 qt. = 2 pt.
- 1 gal. = 4 qt.

- Know the following equivalences among metric units of measurement, and solve problems involving changing units of measurement:

#### Linear measure

- 1 cm = 10 mm (millimeters)
- 1 m = 1,000 mm
- 1 m = 100 cm
- 1 km = 1,000 m

#### Mass

- 1 cg (centigram) = 10 mg (milligrams)
- 1 g = 1,000 mg

1 g = 100 cg

1 kg = 1,000 g

Capacity (volume)

1 cl (centiliter) = 10 ml (milliliters)

1 liter = 1,000 ml

1 liter = 100 cl

• Time: solve problems on elapsed time.

### **Geometry**

• Identify and draw points, segments, rays, lines.

• Identify and draw lines: horizontal; vertical; perpendicular; parallel; intersecting.

• Identify angles; identify angles as right, acute, or obtuse.

• Identify polygons: Triangle, quadrilateral, pentagon, hexagon, and octagon (regular)

Parallelogram, trapezoid, rectangle, square

• Identify and draw diagonals of quadrilaterals.

• Circles: Identify radius (plural: radii) and diameter; radius =  $\frac{1}{2}$  diameter

• Recognize similar and congruent figures.

• Know the formula for the area of a rectangle (Area = length x width) and solve problems involving finding area in a variety of square units (such as mi<sup>2</sup>; yd<sup>2</sup>; ft<sup>2</sup>; in<sup>2</sup>; km<sup>2</sup>; m<sup>2</sup>; cm<sup>2</sup>; mm<sup>2</sup>) • Compute volume of rectangular prisms in cubic units (cm<sup>3</sup>, in<sup>3</sup>).