

STANDARDS WITH SIX STRANDS

The Michigan Mathematics Curriculum Framework has the following standards within these six strands:

1. Patterns, Relationships and Functions
 1. Patterns
 2. Variability and Change

2. Geometry and Measurement
 1. Shape and Shape Relationships
 2. Position
 3. Measurement

3. Data Analysis and Statistics
 1. Collection, Organization and Presentation of Data
 2. Description and Interpretation
 3. Inference and Prediction

4. Number Sense and Numeration
 1. Concepts and Properties of Numbers
 2. Representation and Uses of Numbers
 3. Number Relationships

5. Numerical and Algebraic Operations and Analytical Thinking
 1. Operations and their Properties
 2. Algebraic and Analytical Thinking

6. Probability and Discrete Mathematics
 1. Probability
 2. Discrete Mathematics

Mathematics Curriculum

Strand: I – Patterns, Relationships and Functions

Grade: K - 2

Standard	1. Students recognize similarities and generalize patterns, use patterns to create models and make predictions, describe the nature of patterns and relationships, and construct representations of mathematical relationships.
Benchmarks	<ul style="list-style-type: none"> • Sort items by size. Compare size, length, height (K) • Recognize, describe and extend geometric and numerical patterns (K, 1, 2) • Use patterns to create models, make predictions, describe real world phenomena, solve problems (K, 1, 2) • Record data using tally marks and graphs. Interpret data using graphs (K, 1) • Identify patterns and relationships in tables, charts, schedules, etc. (2) • Explore various numeric patterns (ex. odd, even, addition, subtraction) (2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Use children in lines to discuss the concepts of size and height. • Use calendar daily. Patterns can be made by colors, numbers, shapes. • Use unifix cubes to create simple and complex color patterns. Have students describe their patterns. • Use number lines, clocks and coins to identify even-odd and skip counting patterns and to count by 5's. • Use number patterns to understand, describe and extend mathematical operations. • Use number chart with numbers missing and students fill in the missing numbers. • Create survey of favorite sports – use tally marks to make picture graph. • Teacher silently sorts students into two groups using one visible attribute. Students guess the attribute. • Explain arrows movement on 100's chart
Resources	<ul style="list-style-type: none"> • Unifix cubes • <u>Even Steven, Odd Todd</u>, Kathryn Cristaldi • <u>Mailbox</u> magazine • <u>Copy Cat</u> magazine • <u>Mouse Count</u>, Law, Felicia and Suzanne Chandler • <u>Number Ideas Through Pictures</u>, Charosh, Morris • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: I – Patterns, Relationships and Functions

Grade: K – 2

Standard	2. Students describe the relationships among variables, predict what will happen to one variable as another variable is changed, analyze natural variation and sources of variability, and compare patterns of change.
Benchmarks	<ul style="list-style-type: none"> • Identify changes in a pattern. Create new patterns using the change. (K) • Recognize changing shapes and numbers in a variety of settings (1, 2) • Use patterns and graphs to show changes and describe these changes (1, 2) • Notice patterns of repetition, growing and shrinking. Explore these changes and their frequency. Represent these changes using manipulatives. (2) • Demonstrate symmetry through paper folding (1, 2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Use numbers in sequence to observe growth and shrinkage of math operations. • Use calendar daily. • Ask questions: Describe the pattern. What are the missing elements? What are the missing numbers? • Create patterns using sound, e.g. musical rhythm. • Find numerical patterns on a hundreds chart. • Use Unifix cubes to represent CVC in phonics. • Use a calculator constant function to develop the concept of multiple. • Make a sequence book to show the growth of a seed.
Resources	<ul style="list-style-type: none"> • Manipulatives • <u>Mailbox</u> magazine • Sequence cards • Mathematics Their Way • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: II – Geometry and Measurement

Grade: K – 2

Standard	1. Students develop spatial sense, use shape as an analytic and descriptive tool, identify characteristics and define shapes, identify properties and describe relationships among shapes.
Benchmarks	<ul style="list-style-type: none"> • Identify sides and corners of basic shapes (K) • Group shapes by properties (K) • Draw or construct shapes using a variety of media (K) • Compare, classify and draw familiar 1, 2 & 3 dimensional shapes (K, 1) • Know the difference between flat and space shapes. Describe attributes of space shapes. (1, 2) • Use shapes and properties of shapes to describe the physical world and solve problems (1) • Recognize congruence (2) • Explore perimeter (2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Draw shape pictures using construction paper. • Introduce geometric shapes using a ball, can and paper towel roll. • Identify geometric shapes around the classroom. • Press 3 dimensional shapes into clay making flat shapes. • Describe properties of shapes and ask students to identify the shape. • Use tangram pieces to explore flat shapes. • Find common items at home to identify as space shapes. • Construct two shapes on a geoboard. Length of square B should be triple the length of square A. (2) • Build one and two difference trains. Trace the blocks in the trains on paper.
Resources	<ul style="list-style-type: none"> • Tangram manipulatives • Common household items (can, ice cream cone, ball, etc.) • <u>Mailbox</u> magazine • <u>Angels are Easy as Pie</u>, Froman, Robert • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: II – Geometry and Measurement

Grade: K – 2

Standard	2. Students identify locations of objects, identify location relative to other objects, and describe the effects of transformations on an object.
Benchmarks	<ul style="list-style-type: none"> • Understand concepts: before/after; above/below/between; top/middle/bottom; left/right; inside/outside. (K) • Locate and describe objects in terms of their orientation, direction and relative position. Identify North, South, East and West. (1, 2) • Transform objects by sliding, flipping, turning, enlarging, reducing (1, 2) • Recognize and understand symmetry (K, 1, 2) • Use position, direction and orientation to solve problems (1) • Understand the use of number lines and graphs (2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Play games using concepts inside/outside, above/below/between, etc. • Use body parts to practice left and right. • Use apples cut in half to understand symmetry. • Explore symmetry by creating and drawing butterflies. • Construct obstacle course to illustrate concepts such as inside, behind, between, etc. • Use manipulatives to illustrate concepts. • Read <u>Johnny Appleseed</u> and mark his footsteps on US map. • Write directions to locate a place or object. • Locate and describe objects in terms of directions. • Explore what happens to objects that are flipped (reflected), turned (rotated) or slid (translated). Tracing the objects in the original position and in the final position allows discussion of transformation using math terms. • Explore transformation using grid paper or geoboard. • Make and follow directions using the position terms studied. Write directions from one place to the other (Ex. school to home).
Resources	<ul style="list-style-type: none"> • <u>Mailbox</u> magazine • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K • <u>Johnny Appleseed</u> • <u>Exploring Triangle</u>, Phillips, Jo • Rulers • Meter Sticks

Mathematics Curriculum

Strand: II – Geometry and Measurement

Grade: K – 2

Standard	3. Students compare attributes of two objects, or of one object with a standard, and analyze situations to determine what measurements should be made and to what level of precision.
Benchmarks	<ul style="list-style-type: none"> • Use standard tools for measuring length, weight. (K, 1, 2) • Select and use standard tools for measuring perimeter, volume, time, temperature, money. (K, 1, 2) • Compare attributes of objects and develop standard units of measurement (2) • Understand hot and cold (K) • Recognize that the number of units used to measure an object is related to the size of the unit (1, 2) • Estimate measures and compare to results. Develop strategies for estimation. (1, 2) • Use measurement to solve problems (1, 2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Use objects appropriate to season as units of measure. • Use paper rulers to measure objects on worksheets. • Measure with customary and metric rulers. • Weigh objects using pan balance and scale. • Identify hours, half hours and minutes on a clock. • Do activities with coins and dollars, including pricing and purchasing items. • Observe children counting money and making change. • Use paper clips to measure an object. Relate the process to standard measurement with a ruler. • Collect objects of various attributes (light, heavy, long, short). Compare attributes using appropriate vocabulary. • Use manipulative towers. • Use Geoboards. • Use standard tools in both metric and standard forms for measurement (rulers, tapes, grams, balances, etc.) and determine the appropriate tool with which to measure. • Estimate and then measure to find how close the estimate was to the actual measurement. • Brainstorm why results are different with different units of measure.
Resources	<ul style="list-style-type: none"> • <u>Mailbox</u> magazine • Rulers • Thermometers • Common objects of various sizes and weights • Judy clock

- Coins, paper money
- Spaghetti and Meatballs for All!, Marilyn Burns
- Measurement Mania, Lynette Long
- CD Roms:
 - Jumpstart Math K – 2
 - Mathblasters (Math) 1
 - Numbermaze (Math) K

Mathematics Curriculum

Strand: III – Data Analysis and Statistics

Grade: K - 2

Standard	1. Students collect and explore data, organize data into a useful form, and develop skill in representing and reading data displayed in different formats.
Benchmarks	<ul style="list-style-type: none"> • Collect and group objects such as leaves, rocks, etc. (K) • Make comparisons: more/less/the same (K) • Collect and explore data through counting, measuring, conducting surveys, doing experiments. (1, 2) • Organize data using concrete objects, pictures, tallies, tables, graphs, charts and diagrams. (K, 1, 2) • Identify information needed to answer questions or solve problems and implement strategies to obtain, organize and present the information. (1, 2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Develop graphs that relate to students' experience (ex. Books read, teeth lost, etc.). • Classify objects by color, weight, shape. Classify objects by category. • Use everyday objects to construct bar, picture, circle and line graphs (ex. Candy).
Resources	<ul style="list-style-type: none"> • <u>Lemonade for Sale</u>, Murphy, Stuart • <u>The Best Vacation Ever</u>, Murphy, Stuart • <u>Mailbox</u>, Feb./Mar. 2002, p. 7. • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: III – Data Analysis and Statistics

Grade: K – 2

Standard	2. Students examine data and describe characteristics of a distribution, relate data to the situation from which they arose, and use data to answer questions convincingly and persuasively.
Benchmarks	<ul style="list-style-type: none"> • Collect, organize and analyze data to find sets with more/less/the same. (K) • Recognize phrases such as “How many more?” as related to graphs (K) • Read and explain data students have collected (1, 2) • Read data from other sources (2) • Describe the shape of the data using informal language and draw conclusions based on the data (1, 2) • Answer questions about the source, collection, organization and presentation of data. (1, 2) • Formulate questions and problems. Gather and interpret data to answer questions. (1, 2) • Draw, explain and justify conclusions, such as trends, based on data. (2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Tally and graph common objects (ex. Candy, manipulatives, etc.) • Present a “Question of the Day” to the group and formulate number sentences based on the yes/no responses. • Develop questions based on collected data to involve students in accurately interpreting data. • Use student constructed graphs to make predictions. • Discuss reliability of student-constructed graphs. • Create a summary that answers key questions about data. • Develop conclusions based on data collected.
Resources	<ul style="list-style-type: none"> • Graphs • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: III – Data Analysis and Statistics

Grade: K – 2

Standard	3. Students draw defensible inferences about unknown outcomes, make predictions, and identify the degree of confidence they have in their predictions.
Benchmarks	<ul style="list-style-type: none">• Develop questions and answers about a collection of objects (K)• Make and explain predictions based on data to answer questions and solve problems (K, 1, 2)• Create surveys to answer questions (1)• Make and test hypotheses (1, 2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Use thermometers. Place in different areas to predict same or different temperature readings. Collect, compare and chart data.• Develop and conduct surveys based on real-life experiences. Explain and justify findings.
Resources	<ul style="list-style-type: none">• CD Roms: Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: IV – Number Sense and Numeration

Grade: K – 2

Standard	1. Students experience counting and measuring activities to develop intuitive sense about numbers, develop understanding about properties of numbers, understand the need for and existence of different sets of numbers, and investigate properties of special numbers.
Benchmarks	<ul style="list-style-type: none"> • Understand whole numbers: read, write, count using whole numbers. (K, 1, 2) • Sequence numbers 1 – 20 (K) • Understand ordinal numbers (K, 1) • Apply understanding of ordinal numbers to solve problems (1) • Investigate basic concepts of fractions: 1/2, 1/3, 1/4. (1, 2) • Understand base-10 place value system (1, 2) • Develop an understanding of the properties of numbers and special numbers 0 and 1 (2) • Apply understanding of number systems to model and solve problems (2) • Understand commutative property ($2+1 = 1+2$) (2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Match number cards 0 –12 to words zero – twelve and build Unifix towers to match. • Fold circles and squares to discover the fractions. • Use manipulatives to tell math stories. • Use manipulatives to identify ordinal numbers. • Create number books to practice printing numerals. • Use a calendar to demonstrate how many times an event will occur (Ex. Soccer practice is every Wednesday. How many times will we have practice in May?) • Create a number book drawing concepts for numbers.
Resources	<ul style="list-style-type: none"> • Unifix cubes • Number and word cards • Manipulatives • <u>The M&M's Counting Book</u> • <u>Bat Jamboree</u>, Kathi Appelt • <u>The 512 Ants on Sullivan Street</u>, Carol A Losi • <u>If You Made A Million</u>, David M. Schwartz • <u>Fraction Fun</u>, Adler, David • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: IV – Number Sense and Numeration

Grade: K - 2

Standard	2. Students recognize that numbers are used in different ways such as counting, measuring, ordering and estimating, understand and produce multiple representations of a number, and translate among equivalent representations.
Benchmarks	<ul style="list-style-type: none"> • Represent whole numbers using concrete, pictorial and symbolic representations (K, 1, 2) • Recognize different representations for the same number and explain why they are the same (K, 1, 2) • Represent fractions using concrete, pictorial and symbolic representations (1, 2) • Investigate counting, ordering, naming, locating and measuring. (K, 1, 2) • Develop strategies for estimating quantity and evaluate the reasonableness of these estimates (K, 1, 2) • Find a number before, after and between (K, 1) • Select appropriate numbers and operations to solve problems (1, 2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Play number games (Ex. I'm thinking of a number between....). • Compare written numbers to dot patterns and tally marks. • Play estimation games with common objects in jars. • Keep track of the number of days students have been in school. • Use concrete objects of 2 different colors to demonstrate fractions. • Illustrate that "2+5" is the same as "7" by using counters. • Use rubber stamps to make pictorial representations of addition and subtraction problems. • Use boxes of hundred items (paper clips, toothpicks) to represent a whole number. • Estimate how many objects it will take to cover one's hand (use jelly beans, M&M's, etc.)
Resources	<ul style="list-style-type: none"> • <u>Seven Blind Mice</u>, Ed Young • <u>Hershey's Fraction Book</u> • <u>Fabulous Fractions</u>, Lynette Long • Spinners • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: IV – Number Sense and Numeration

Grade: K – 2

Standard	3. Students investigate relationships such as equality, inequality, inverses, factors and multiples, and represent and compare very large and very small numbers.
Benchmarks	<ul style="list-style-type: none"> • Make comparisons more/less/the same (K, 1, 2) • Use terms less than/greater than/ equal to (1, 2) • Classify numbers as even or odd (1, 2)\ • Use part-whole relationships to explore shapes (K, 1, 2) • Apply understanding of number relationships to solve problems (1, 2) • Use whole relationships to explore numbers, develop number concepts and understand computation (2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Spinner game – Spinner A has even numbers, Spinner B has odd numbers. Student spins each one and combines numbers (ex. 9, 4, 94). Students compare numbers to determine greater than/ less than. • Group concrete objects by attributes to illustrate greater than and less than. • Color even and odd numbers on a number chart to illustrate the pattern. • Use graphing and counting games to practice more/less/the same. • Practice order, using cards for each statement. Each student writes a two-digit number and orders them from greatest to smallest or smallest to greatest. • Use a calculator to find multiples of 2, 5, 10. • Use a hundreds chart to find odd/even number patterns. • Investigate when ten is a big number. Ten cavities is a large number, but ten stars in the sky is a small number.
Resources	<ul style="list-style-type: none"> • Sadlier-Oxford Kindergarten Progress in Mathematics • <u>One Hundred Hungry Ants</u> • <u>Remainder of One</u> • Mathematics Their Way • CD Roms: <ul style="list-style-type: none"> Jumpstart Math K – 2 Mathblasters (Math) 1 Numbermaze (Math) K

Mathematics Curriculum

Strand: V – Numerical and Algebraic Operations and Analytical Thinking

Grade: K – 2

Standard	1. Students understand and use various types of operations to solve problems.
Benchmarks	<ul style="list-style-type: none"> • Name symbols “+”, “-“, “=” (K) • Add numbers to 6 (K) • Subtract using 0 – 6 (K) • Develop addition and subtraction sentences. Use number line to solve problems. (K) • Add and subtract through 18 (1, 2) • Add with 3 addends (1, 2) • Compute 2 digits with renaming. (1) • Compute 2 and 3 digits, addition and subtraction, with renaming. (2) • Add and subtract money (1, 2) • Use manipulatives to model and record operations and construct story problems (1, 2) • Use manipulatives to model and record operations. Relate models to symbolic expressions and algorithms. (2) • Use appropriate form of computation (mental math, calculator, estimation, paper and pencil) to solve a problem and understand why method is used (1, 2) • Apply operations efficiently and accurately in solving problems (1, 2) • Explore commutative and distributive properties (2) • Explore use of calculators and computers (K, 1, 2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Use calculators for simple addition problems. • Add and subtract using manipulatives. • Use manipulatives to illustrate story problems. • Use needlepoint mesh and overhead projector to demonstrate regrouping in addition and subtraction. • Ask students to identify “matching” problems, and determine which is easier to add ($9+3+7=?$ Or $7+3+9=?$). • Quick 2 – 3 minute computation practice, e.g. drills, facts, partner or self-check
Resources	<ul style="list-style-type: none"> • Manipulatives • <u>The Lunch Line</u>, Nagel, Karen • <u>Monster Money Book</u>, Leedy, Noreen • <u>Mission on Addition</u>, Leedy, Noreen • <u>666 Jellybeans! All That! An Intro to Algebra</u>, Weiss, Malcom • <u>A Remainder of One</u>, Pinczes, Elinor

- CD Roms:
Jumpstart Math K – 2
Mathblasters (Math) 1
Numbermaze (Math) K

Mathematics Curriculum

Strand: V – Numerical and Algebraic Operations and Analytical Thinking

Grade: K – 2

Standard	2. Students analyze problems to determine an appropriate process for solution, and use algebraic notations to model or represent problems.
Benchmarks	<ul style="list-style-type: none">• Write and solve story problems for addition and subtraction. Use manipulatives to solve open sentences. (K, 1, 2)• Look for patterns in order to solve problems (1)• Use pictures and manipulatives to explore algebraic concepts (1, 2)• Use analytic thinking to describe situations and solve problems (1, 2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Use manipulatives, such as Unifix, to illustrate and help solve open sentences.• Tell addition and subtraction stories using a variety of objects (Ex. Apples, seeds, animals) and ask students to draw the story. Apply a number sentence to the story. Have them tell whether they needed to add or subtract.• Role-play addition and subtraction stories.• Solve open sentences with shapes and placeholders.• Use input-output tables to determine “What is the rule?” (Ex. 5, 7, 9, 11……. Rule = +2)
Resources	<ul style="list-style-type: none">• Manipulatives• Unifix Cubes• CD Roms:<ul style="list-style-type: none">Jumpstart Math K – 2Mathblasters (Math) 1Numbermaze (Math) K

Mathematics Curriculum

Strand: VI – Probability and Discrete Mathematics

Grade: K – 2

Standard	1. Students develop an understanding of the notion of certainty and of probability as a measure of the degree of likelihood that can be assigned to a given event based on the knowledge available, and make critical judgments about claims that are made in probabilistic situations.
Benchmarks	<ul style="list-style-type: none">• Understand difference between events that can and cannot occur (K, 1, 2)• Understand events as more or less likely (1, 2)• Judge the reasonability of an answer (K)• Explain difference between chance and certainty and give examples (1, 2)• Conduct probability experiments and record outcome (K, 1, 2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Use dice or penny tossing to illustrate probability.• Present students with problems. Brainstorm solutions and test those solutions.• Talk about chance and certainty pertaining to weather. (Ex. Create statement cards, such as, “It will rain tomorrow” or “The sun will rise tomorrow”. Have students sort them into two piles and explain why.)• Show students a paper bag with five green, two blue and one red Unifix cube. Have them predict which color is most likely to be drawn first and explain why. Draw one cube, record and replace. Do this ten times and see if prediction was accurate.
Resources	<ul style="list-style-type: none">• Manipulatives• CD Roms:<ul style="list-style-type: none">Jumpstart Math K – 2Mathblasters (Math) 1Numbermaze (Math) K

Mathematics Curriculum

Strand: VI – Probability and Discrete Mathematics

Grade: K – 2

Standard	2. Students investigate practical situations such as scheduling, routing, sequencing, networking, organizing and classifying, and analyze ideas like recurrence relations, induction, iteration, and algorithm design.
Benchmarks	<ul style="list-style-type: none">• Explore sets by sorting and classifying by common attributes (K, 1, 2)• Organize objects and events in a series (K)• Model and trace figures (1)• Use manipulatives and diagrams to explore problems involving counting and arranging objects (1, 2)• Solve problems with multiple solutions (2)
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Use manipulatives and classroom objects to sort and classify.• Play board games to practice counting and ordering.• Give an assortment of addition problems and ask students to sort according to answers. How many ways can an answer be obtained? (Ex. $1+3=4$, $2+2=4$, etc.)• Using only pennies, nickels and dimes, how many ways can you make change for 25 cents?
Resources	<ul style="list-style-type: none">• Manipulatives• Board games, including <u>Sorry</u>• CD Roms:<ul style="list-style-type: none">Jumpstart Math K – 2Mathblasters (Math) 1Numbermaze (Math) K