**W S** ***Number and Operations: Develop an understanding of whole number relationships and place value, including grouping in tens and ones.***

__ __ Count by ones forward and backward from 1 to 120, starting at any number when counting physical objects.
__ __ Order objects or events using ordinal numbers.
__ __ Write, compare, and order numbers to 120.
__ __ Compose and decompose numbers within 20.
__ __ Compose and decompose numbers into tens and ones (e.g. 18=10+8).
__ __ Group and count objects by tens, fives, and twos.
__ __ Classify a number as odd or even and demonstrate that it is odd or even.

**W S** ***Number and Operations and Algebra: Develop an understanding of addition and subtraction and strategies for addition and subtraction within 20***

__ __ Connect physical and pictorial representations to numerical equations.
__ __ Work with addition and subtraction equations and understand the meaning of the = sign as "same as."
__ __ Add three or more one-digit numbers using the commutative and associative properties of addition.
__ __ Solve word problems and create matching addition and subtraction equations within 20.
__ __ Understand the meaning of and the relationship between addition and subtraction.
__ __ Use understanding of tens and ones to add and subtract within 100.
__ __ Recognize, extend, and create repeating patterns.

**W S** ***Geometry: Describing shapes and space and composing and decomposing geometric shapes***

__ __ Compare and sort a variety of two- and three-dimensional figures according to their defining geometric attributes.
__ __ Identify and name two-dimensional figures, including those in real-world contexts.
__ __ Combine known shapes to create shapes and divide known shapes into other shapes.

**W S** ***Measurement: Ordering objects by measurable attributes***

__ __ Use a variety of non-standard tools for measuring length and learn what it means to measure.
__ __ Compare lengths using the transitive property (longer, equal to, or shorter).
__ __ Tell and write time in hours and half hours.
__ __ Name the days of the week and the months of the year, and use a calendar to determine a day or month.
__ __ Describe and compare measurable attributes of objects such as length and weight.

**W S** ***Data***

__ __ Represent data using tallies, tables, picture graphs, and bar-type graphs.
__ __ Ask and answer comparison questions about data.
__ __ Conduct surveys using an accurate and clear recording system.

**W S** ***Reasoning, problem solving and communication***

__ __ Make sense of problems and persevere in solving them.
__ __ Reason abstractly and quantitatively, relating mathematical equations and symbols to real world contexts and vice versa.
__ __ Communicate meaning with careful explanations through speech, written symbols and labels.
__ __ Determine whether answer is reasonable.
__ __ Apply previously learned structures and/or patterns to new problem situations.

# SUPPORTING MATH DEVELOPMENT AT HOME: YOUNGEST LEVEL

## Key principles for working with your child

- *Cultivate a love of math; model curiosity*
- *Look for opportunities to mathematize, to notice mathematical situations in the world around you*
- *Math isn't just about numbers: it's about building models, using logic, thinking spatially, looking for patterns*
- *Stop when you're not having fun; follow your child's lead and interests*
- *Be willing to not get to the answer*
- *Think out loud about your own mathematical thinking without needing a response from your child*

## Mathematical habits to model and cultivate

| Mathematize | Model | Explain | Strategize |
|---|---|---|---|
| turn everyday situations into mathematical problems | develop ways to represent problem situations | figure out why something works | make plans to tackle a problem |

## PLACES FOR MATH TALK

| in the car…. | waiting (for dinner, an appt)… | at a sports event… |
|---|---|---|
| • *Read numbers (on license plates, street signs, freeway exits)*<br>• *Ask how many more streets to get to 54th St. if we are at 47th.*<br>• *Notice if street numbers are ascending or descending*<br>• *Try counting forwards and backwards.*<br>• *Skip count forwards and backwards. If we count by 5s, will we get to 200 before we get to our destination?* | • *Count chairs/tables in a restaurant; estimate capacity*<br>• *Interview waiter for how many pizza boxes, napkins, etc will get used on a busy night vs. a slow night*<br>• *Play number games: I say a number, you say the one after (or the one before, 10 after, 10 before)* | • *Read scores and figure out differences between teams*<br>• *Estimate number of people in attendance*<br>• *Read speed of pitches or speed of bowling ball (look for opportunities to read numbers and discuss their meaning)*<br>• *Track their favorite team's stats.* |

## FAMILY ACTIVITIES TO MATHEMATIZE

| reading stories | calendar | playing games |
|---|---|---|
| Make text to math connections<br>Read page numbers | How many days until we go to___? How many weeks? | Discuss strategies for a good move<br>Keep track of points |
| **family routines** | **traveling** | **other** |
| Giving allowance: how much will it take to save up for ___? How much will I have by the end of the month?<br>Give allowance in varying types of change | Use a map to figure out where you are; discuss routes; draw your own map<br>Study maps, map symbols & meanings | Jobs for hire: 2 cents for every weed<br>Measure out amounts for recipes<br>Estimate cost of groceries<br>Figure out budget for feeding pet<br>Cut coupons; calculate savings |

## RESOURCES FOR PROBLEM SOLVING

| Games | | | Websites | Tools |
|---|---|---|---|---|
| Rat a tat Cat<br>Sleeping Queens<br>Dominoes<br>Origami<br>Parcheesi | Pente<br>Yahtzee<br>Monopoly<br>Tangrams<br>Sorry | Blokus<br>Chess<br>Golf<br>War<br>Memory | http://talkingmathwithkids.com/<br>mathforum.org/students/elem/<br>www.mathplayground.com<br>www.coolmath-games.com<br>http://zenomath.org/play-math/<br>http://centerforgamescience.org/games/ | Playing cards<br>Measuring tape/rulers<br>Geoblocks; building blocks<br>Counters (e.g., beans); number line<br>Maps, Clocks |

| W | S | |
|---|---|---|
| | | ***Number and Operations: Developing an understanding of the base-ten numeration system and place-value concepts (to at least 1,000) and developing an understanding of fractions and fraction equivalence*** |
| __ | __ | Read, write, compare, order, and represent numbers to within 1,000 using numbers, words, and symbols. |
| __ | __ | Round whole numbers 1,000 to the nearest ten and hundred. |
| __ | __ | Understand fractions as numbers and represent them on a number line, and as equal shares. |
| __ | __ | Represent fractions as parts of a whole, parts of a set, points on the number line and equal shares. |
| __ | __ | Compare two fractions with the same numerator or denominator. |
| __ | __ | Represent and identify equivalent fractions. |
| __ | __ | Solve single- and multi-step word problems involving comparison of fractions and verify the solutions. |

| W | S | |
|---|---|---|
| | | ***Number and Operations and Algebra: Developing quick recall of addition facts and related subtraction facts and fluency with multi-digit addition and subtraction; and developing understandings of multiplication and division and strategies for basic multiplication facts and related division facts*** |
| __ | __ | Quickly recall basic addition facts and related subtraction facts for sums through 20. |
| __ | __ | Add and subtract numbers within 1,000 mentally, using models, drawings and strategies based on place value. |
| __ | __ | Accurately add and subtract multi-digit whole numbers using standard regrouping algorithms and explain why the procedure works. |
| __ | __ | Estimate sums and differences to determine reasonableness of answers. |
| __ | __ | Solve single- and multi-step word problems involving addition and subtraction of whole numbers and verify solutions. |
| __ | __ | Represent multiplication as equal groups, arrays, and connect each representation to the related equation. |
| __ | __ | Represent division as equal sharing and formation of equal groups of objects; connect each representation to the related equation, and find the number of shares in each group. |
| __ | __ | Apply and explain strategies to compute multiplication facts to 10 X 10 and the related division facts. |
| __ | __ | Quickly recall multiplication facts to 10 and how they are related to division. |
| __ | __ | Multiply any number from 11 through 19 by a single-digit number using the distributive property and place value. |
| __ | __ | Solve and create single- and multi-step word problems involving multiplication and division and verify solutions. |

| W | S | |
|---|---|---|
| | | ***Geometry: Describing and analyzing properties of two-dimensional shapes*** |
| __ | __ | Identify and sketch parallel, intersecting, perpendicular lines and line segments, and right angles. |
| __ | __ | Identify and describe triangles, quadrilaterals, pentagons, hexagons, and cubes. |
| __ | __ | Measure and calculate perimeters and areas of four-sided shapes. |
| __ | __ | Solve word problems involving perimeters of quadrilaterals and verify the solutions. |
| __ | __ | Partition circles and rectangles into same size portions. |
| __ | __ | Relate area to multiplication and addition. |

| W | S | |
|---|---|---|
| | | ***Measurement: Developing an understanding of the U.S. monetary system; developing an understanding of linear measurement and facility in measuring lengths; developing an understanding of telling time*** |
| __ | __ | Solve word problems involving dollar bills, quarters, dimes, nickels and pennies. |
| __ | __ | Identify each standard U.S. coin and its value, and name combinations of other coins with the same total value. |
| __ | __ | Determine the value of a collection of coins totaling less than $2.00. |
| __ | __ | Measure temperature in degrees Fahrenheit and degrees Celsius using a thermometer. |
| __ | __ | Estimate, measure, and compare weight, mass, and volume using appropriate-sized U.S. customary and metric units. |
| __ | __ | Use analog clocks to tell time to the minute using am and pm. |
| __ | __ | Measure and estimate lengths in standard units. |
| __ | __ | Select and use appropriate measuring tools. |

| W | S | |
|---|---|---|
| | | ***Data*** |
| __ | __ | Collect, organize, and represent data systematically in bar scaled graphs, pictographs, and line plots. |
| __ | __ | Interpret and analyze scaled bar graphs, pictographs, line plots, and scaled thermometers. |

| W | S | |
|---|---|---|
| | | ***Reasoning, problem solving and communication*** |
| __ | __ | Make sense of problems and persevere in solving them. |
| __ | __ | Reason abstractly and quantitatively, relating mathematical equations and symbols to real world contexts and vice versa. |
| __ | __ | Communicate meaning with careful explanations through speech, written symbols and labels. |
| __ | __ | Determine whether answer is reasonable. |
| __ | __ | Apply previously learned structures and/or patterns to new problem situations. |

# SUPPORTING MATH DEVELOPMENT AT HOME: MID LEVEL

## Key principles for working with your child

- *Cultivate a love of math; model curiosity*
- *Look for opportunities to mathematize, to notice mathematical situations in the world around you*
- *Math isn't just about numbers: it's about building models, using logic, thinking spatially, looking for patterns*
- *Stop when you're not having fun; follow your child's lead and interests*
- *Be willing to not get to the answer*
- *Think out loud about your own mathematical thinking without needing a response from your child*

## Mathematical habits to model and cultivate

| Mathematize | Model | Explain | Strategize |
|---|---|---|---|
| turn everyday situations into mathematical problems | develop ways to represent problem situations | figure out why something works | make plans to tackle a problem |

| PLACES FOR MATH TALK | | |
|---|---|---|
| **in the car….** | **waiting (for dinner, an appt)…** | **at a sports event…** |
| • *Read numbers (on license plates, street signs, freeway exits)*<br>• *Ask how many more streets to get to 54th St. if we are at 47th.*<br>• *Count forwards and backwards.*<br>• *Skip count forwards and backwards. If we count by 2s, will we get to 200 before we get to our destination? If we count by 100, will we get to 10,000 before we get there?* | • *Count chairs/tables in a restaurant; estimate capacity*<br>• *Estimate number of items, people, visitors…etc.*<br>• *Play number games: I say a number, you say the one after (or the one before, 10 after, 10 before)*<br>• *Use ages for games: "When you are 20, how old will I be?"* | • *Read scores and figure out differences between teams*<br>• *Estimate number of people in attendance*<br>• *Read speed of pitches or speed of bowling ball*<br>• *Track stats for different sports*<br>• *Record own stats; discuss pertinent stats & their meaning* |

| FAMILY ACTIVITIES TO MATHEMATIZE | | |
|---|---|---|
| **reading stories** | **calendar** | **playing games** |
| Make text to math connections<br>Read page numbers and make estimates; compare to actual reading rate | How many days until we go to___?<br>How many weeks? | Discuss strategies for a good move<br>Keep track of points |
| **family routines** | **traveling** | **other** |
| Giving allowance: how much will it take to save up for ___? How much will I have by the end of the month?<br>Give allowance in varying types of change | Use a map to figure out where you are; discuss routes; draw your own map<br>Study maps, map symbols & meanings | Jobs for hire: 2 cents for every weed<br>Measure out amounts for recipes<br>Estimate cost of groceries<br>Figure out budget for feeding pet<br>Cut coupons; calculate savings |

| RESOURCES FOR PROBLEM SOLVING | | | | |
|---|---|---|---|---|
| **Games** | | | **Websites** | **Tools** |
| Origami<br>Life<br>Tangrams<br>Mastermind<br>Dominoes | Farkle<br>Yahtzee<br>Monopoly<br>Blackjack | Blokus<br>Chess<br>War | http://talkingmathwithkids.com/<br>mathforum.org/students/elem/<br>www.mathplayground.com<br>www.coolmath-games.com<br>howtosmile.org/<br>http://zenomath.org/play-math/<br>http://centerforgamescience.org/games/ | Playing cards<br>Measuring tape/rulers<br>Geoblocks; building blocks<br>Maps |

**W S** ***Operations and Algebraic Thinking***

__ __ Understand and use factors and multiples, including finding factor pairs of numbers up to 100 and determining whether a given whole number is prime or composite.
__ __ Extend understanding of multiplication as a comparison (3x7 is three times as many as 7 and 7 times as many as 3, not just 3 groups of 7).
__ __ Solve multi-step word problems using whole numbers, and represent these problems using equations with a letter standing in for the unknown quantity.
__ __ Solve single and multi-step word problems involving fractions and decimals.
__ __ Use estimation strategies to assess whether answers are reasonable.
__ __ Describe and create a rule for numerical and geometric patterns and extend the patterns.

**W S** ***Number and Operations: Base Ten***

__ __ Generalize understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place.
__ __ Use strategies based on place value and properties of multiplication to multiply multi-digit whole numbers, and accurately apply the standard algorithm.
__ __ Use strategies based on place value and properties of division to divide up to four-digit dividends by two-digit divisors.
__ __ Compare and find equivalencies between fractions and decimals.
__ __ Read, write and compare decimals to the thousandth, and use and understand placement of the decimal point when multiplying or dividing by powers of 10.
__ __ Add, subtract, multiply and divide decimals to the hundredths, using and understanding concrete models and strategies based on place value.

**W S** ***Number and Operations: Fractions***

__ __ Extend understanding of fractions to include multiplication and division (e.g. 5/3 = 5 x 1/3 = 5 ÷ 3).
__ __ Add and subtract fractions with unlike denominators using equivalent fractions.
__ __ Apply and extend previous understanding of multiplication to multiply fractions, explaining why procedures makes sense.
__ __ Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions (e.g. 3 ÷ ½ or ½ ÷ 3), explaining why procedures make sense.

**W S** ***Geometry and Measurement***

__ __ Solve problems involving measurement and conversion among measurement units within a given measurement system (e.g. cm to m or oz to lbs).
__ __ Define and measure angles, using appropriate tools.
__ __ Classify and categorize two-dimensional shapes by properties (lines, angles, etc.).
__ __ Understand concepts of volume and accurately measure volume using unit cubes.
__ __ Relate volume to concepts of multiplication and division, and understand and apply formulas for the volume of rectangular prisms (v= l x w x h and v= b x h).
__ __ Apply understanding of area, perimeter and volume to solve problems.
__ __ Graph points on the coordinate plane and understand the coordinate value of the points.

**W S** ***Reasoning, problem solving and communication***

__ __ Make sense of problems and persevere in solving them.
__ __ Reason abstractly and quantitatively, relating mathematical equations and symbols to real world contexts and vice versa.
__ __ Communicate meaning with careful explanations through speech, written symbols and labels.
__ __ Determine whether answer is reasonable.
__ __ Apply previously learned structures and/or patterns to new problem situations.

# SUPPORTING MATH DEVELOPMENT AT HOME: OLDEST LEVEL

## Key principles for working with your child

- *Cultivate a love of math; model curiosity*
- *Look for opportunities to mathematize, to notice mathematical situations in the world around you*
- *Math isn't just about numbers: it's about building models, using logic, thinking spatially, looking for patterns*
- *Stop when you're not having fun, follow your child's lead and interests*
- *Be willing to not get to the answer*
- *Think out loud about your own mathematical thinking without needing a response from your child*

## Mathematical habits to model and cultivate

| Mathematize | Model | Explain | Strategize |
|---|---|---|---|
| turn everyday situations into mathematical problems | develop ways to represent problem situations | figure out why something works | make plans to tackle a problem |

## PLACES FOR MATH TALK

| in the car…. | waiting (for dinner, an appt)… | at a sports event… |
|---|---|---|
| • *Estimate time to destination and figure out actual elapsed time*<br>• *Try counting forwards and backwards. If we count by .001, will we get to 2 before we get to our destination?*<br>• *Use a map to navigate*<br>• *Look for decimal notations (gas station) and discuss meanings* | • *Play number games: I say a number, you say half of it, a fourth of it; triple it*<br>• *Give clues to figure out a number someone is thinking of: between 100 & 130; a multiple of 4 but not 8.*<br>• *Bring along logic puzzles & brainteasers (see websites below)* | • *Record own stats*<br>• *Track stats for different teams, compare, estimate & predict*<br>• *Discuss pertinent stats & their meaning*<br>• *Discuss likelihood of events (e.g., making a free-throw)*<br>• *Estimate number of participants in a crowd.* |

## FAMILY ACTIVITIES TO MATHEMATIZE

| reading stories | reading newspapers or magazines | playing games |
|---|---|---|
| Make text to math connections<br>Estimate how long it will take to finish a chapter book; compare to actual reading rate | Study weather maps<br>Interpret representations of data<br>Look for big numbers and discuss their use | Discuss strategies for a good move or to win the game |
| **family routines** | **traveling** | **other** |
| Grocery budgets; savings with coupons; best buy; compare price per unit<br>Determine the sale price<br>Estimating tax and tip | Use a map to figure out where you are; compare routes; draw your own map<br>Study maps, map symbols & meanings; use map scale | Look for opportunities to use fractions, decimals, & percents<br>How many more do I need?<br>How much further do I have to go? |

## RESOURCES FOR PROBLEM SOLVING

| Games | | | Websites | Tools |
|---|---|---|---|---|
| Dominoes<br>Mastermind<br>Battleship<br>Quoridor | Tangrams<br>Yahtzee<br>24<br>Farkle | Blokus<br>Chess<br>Poker<br>Quarto | www.mathforum.com<br>nrich.maths.org<br>www.mathplayground.com<br>mathforum.org/students/elem/<br>www.coolmath-games.com<br>http://zenomath.org/play-math/<br>http://centerforgamescience.org/games/<br>www.mathsnacks.org | Playing cards<br>Measuring tape/rulers<br>Building tools<br>Maps |