Mathematical Process Expectations

Problem Solving

2m1 • apply developing problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;

Reasoning And Proving

2m2 • apply developing reasoning skills (e.g., pattern recognition, classification) to make and investigate conjectures (e.g., through discussion with others);

Reflecting

2m3 • demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by explaining to others why they think their solution is correct);

Selecting Tools and Computational Strategies

2m4 • select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems;

Connecting

2m5 • make connections among simple mathematical concepts and procedures, and relate mathematical ideas to situations drawn from everyday contexts;

Representing

2m6 • create basic representations of simple mathematical ideas (e.g., using concrete materials; physical actions, such as hopping or clapping; pictures; numbers; diagrams; invented symbols), make connections among them, and apply them to solve problems;

Communicating

2m7 • communicate mathematical thinking orally, visually, and in writing, using everyday language, a developing mathematical vocabulary, and a variety of representations.

Number Sense and Numeration

Overall Expectations

2m8 • read, represent, compare, and order whole numbers to 100, and use concrete materials to represent fractions and money amounts to 100¢;

2m9 • demonstrate an understanding of magnitude by counting forward to 200 and backwards from 50, using multiples of various numbers as starting points;

2m10 • solve problems involving the addition and subtraction of one- and two-digit whole numbers, using a variety of strategies, and investigate multiplication and division.

Quantity Relationships

2m11 – represent, compare, and order whole numbers to 100, including money amounts to 100¢, using a variety of tools (e.g., ten frames, base ten materials, coin manipulatives, number lines, hundreds charts and hundreds carpets);

2m12 – read and print in words whole numbers to twenty, using meaningful contexts (e.g., storybooks, posters, signs);

2m13 – compose and decompose two-digit numbers in a variety of ways, using concrete materials (e.g., place 42 counters on ten frames to show 4 tens and 2 ones; compose 37¢ using one quarter, one dime, and two pennies) (Sample problem: Use base ten blocks to show 60 in different ways.);

2m14 – determine, using concrete materials, the ten that is nearest to a given two-digit number, and justify the answer (e.g., use counters on ten frames to determine that 47 is closer to 50 than to 40);

2m15 – determine, through investigation using concrete materials, the relationship between the number of fractional parts of a whole and the size of the fractional parts (e.g., a paper plate divided into fourths has larger parts than a paper plate divided into eighths) (Sample problem: Use paper squares to show which is bigger, one half of a square or one fourth of a square.);

2m16 – regroup fractional parts into wholes, using concrete materials (e.g., combine nine fourths to form two wholes and one fourth);

2m17 – compare fractions using concrete materials, without using standard fractional notation (e.g., use fraction pieces to show that three fourths are bigger than one half, but smaller than one whole);

2m18 – estimate, count, and represent (using the ¢ symbol) the value of a collection of coins with a maximum value of one dollar.

Counting

2m19 – count forward by 1's, 2's, 5's, 10's, and 25's to 200, using number lines and hundreds charts, starting from multiples of 1, 2, 5, and 10 (e.g., count by 5's from 15; count by 25's from 125);

2m20 – count backwards by 1's from 50 and any number less than 50, and count backwards by 10's from 100 and any number less than 100, using number lines and hundreds charts (Sample problem: Count backwards from 87 on a hundreds carpet, and describe any patterns you see.);

2m21 – locate whole numbers to 100 on a number line and on a partial number line (e.g., locate 37 on a partial number line that goes from 34 to 41).

Operational Sense

2m22 – solve problems involving the addition and subtraction of whole numbers to 18, using a variety of mental strategies (e.g., "To add 6 + 8, I could double 6 and get 12 and then add 2 more to get 14.");

2m23 – describe relationships between quantities by using whole-number addition and subtraction (e.g., "If you ate 7 grapes and I ate 12 grapes, I can say that I ate 5 more grapes than you did, or you ate 5 fewer grapes than I did.");

2m24 – represent and explain, through investigation using concrete materials and drawings, multiplication as the combining of equal groups (e.g., use counters to show that 3 groups of 2 is equal to 2 + 2 + 2 and to 3 x 2);

2m25 – represent and explain, through investigation using concrete materials and drawings, division as the sharing of a quantity equally (e.g., "I can share 12 carrot sticks equally among 4 friends by giving each person 3 carrot sticks.");

2m26 – solve problems involving the addition and subtraction of two-digit numbers, with and without regrouping, using concrete materials (e.g., base ten materials, counters), student-generated algorithms, and standard algorithms;

2m27 – add and subtract money amounts to 100¢, using a variety of tools (e.g., concrete materials, drawings) and strategies (e.g., counting on, estimating, representing using symbols).

Measurement

Overall Expectations

2m28 • estimate, measure, and record length, perimeter, area, mass, capacity, time, and temperature, using non-standard units and standard units;

2m29 • compare, describe, and order objects, using attributes measured in non-standard units and standard units.

Attributes, Units, and Measurement Sense

2m30 – choose benchmarks – in this case, personal referents – for a centimetre and a metre (e.g., "My little finger is about as wide as one centimetre. A really big step is about one metre.") to help them perform measurement

2m31 – estimate and measure length, height, and distance, using standard units (i.e., centimetre, metre) and non-standard units;

2m32 – record and represent measurements of length, height, and distance in a variety of ways (e.g., written, pictorial, concrete) (Sample problem: Investigate how the steepness of a ramp affects the distance an object travels. Use cash-register tape for recording distances.);

2m33 – select and justify the choice of a standard unit (i.e., centimetre or metre) or a nonstandard unit to measure length (e.g., "I needed a fast way to check that the two teams would race the same distance, so I used paces.");

2m34 – estimate, measure, and record the distance around objects, using non-standard units (Sample problem: Measure around several different doll beds using string, to see which bed is the longest around.);

2m35 – estimate, measure, and record area, through investigation using a variety of non-standard units (e.g., determine the number of yellow pattern blocks it takes to cover an outlined shape) (Sample problem: Cover your desk with index cards in more than one way. See if the number of index cards needed stays the same each time.);

2m36 – estimate, measure, and record the capacity and/or mass of an object, using a variety of non-standard units (e.g., "I used the pan balance and found that the stapler has the same mass as my pencil case.");

2m37 – tell and write time to the quarter-hour, using demonstration digital and analogue clocks (e.g., "My clock shows the time recess will start [10:00], and my friend's clock shows the time recess will end [10:15].");

2m38 – construct tools for measuring time intervals in non-standard units (e.g., a particular bottle of water takes about five seconds to empty);

2m39 – describe how changes in temperature affect everyday experiences (e.g., the choice of clothing to wear);

2m40 – use a standard thermometer to determine whether temperature is rising or falling (e.g., the temperature of water, air).

Measurement Relationships

2m41 – describe, through investigation, the relationship between the size of a unit of area and the number of units needed to cover a surface (Sample problem: Compare the numbers of hexagon pattern blocks and triangle pattern blocks needed to cover the same book.);

2m42 – compare and order a collection of objects by mass and/or capacity, using non-standard units (e.g., "The coffee can holds more sand than the soup can, but the same amount as the small pail.");

2m43 – determine, through investigation, the relationship between days and weeks and between months and years.

Geometry and Spatial Sense

Overall Expectations

2m44 • identify two-dimensional shapes and three-dimensional figures and sort and classify them by their geometric properties;

2m45 • compose and decompose two-dimensional shapes and three-dimensional figures;

2m46 • describe and represent the relative locations of objects, and represent objects on a map.

Geometric Properties

2m47 – distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools (e.g., attribute blocks, geometric solids, connecting cubes);

2m48 – identify and describe various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort and classify them by their geometric properties (i.e., number of sides or number of vertices), using concrete materials and pictorial representations (e.g., "I put all the figures with five or more vertices in one group, and all the figures with fewer than five vertices in another group.");

2m49 – identify and describe various three-dimensional figures (i.e., cubes, prisms, pyramids) and sort and classify them by their geometric properties (i.e., number and shape of faces), using concrete materials (e.g., "I separated the figures that have square faces from the ones that don't.");

2m50 – create models and skeletons of prisms and pyramids, using concrete materials (e.g., cardboard; straws and modelling clay), and describe their geometric properties (i.e., number and shape of faces, number of edges);

2m51 – locate the line of symmetry in a two-dimensional shape (e.g., by paper folding; by using a Mira).

Geometric Relationships

2m52 – compose and describe pictures, designs, and patterns by combining two-dimensional shapes (e.g., "I made a picture of a flower from one hexagon and six equilateral triangles.");

2m53 – compose and decompose two-dimensional shapes (Sample problem: Use Power Polygons to show if you can compose a rectangle from two triangles of different sizes.);

2m54 – cover an outline puzzle with two-dimensional shapes in more than one way;

2m55 – build a structure using three-dimensional figures, and describe the two-dimensional shapes and three-dimensional figures in the structure (e.g., "I used a box that looks like a triangular prism to build the roof of my house.").

Location and Movement

2m56 – describe the relative locations (e.g., beside, two steps to the right of) and the movements of objects on a map (e.g., "The path shows that he walked around the desk, down the aisle, and over to the window.");

2m57 – draw simple maps of familiar settings, and describe the relative locations of objects on the maps (Sample problem: Draw a map of the classroom, showing the locations of the different pieces of furniture.);

2m58 – create and describe symmetrical designs using a variety of tools (e.g., pattern blocks, tangrams, paper and pencil).

Patterning and Algebra

Overall Expectations

2m59 • identify, describe, extend, and create repeating patterns, growing patterns, and shrinking patterns;

2m60 • demonstrate an understanding of the concept of equality between pairs of expressions, using concrete materials, symbols, and addition and subtraction to 18.

Patterns and Relationships

2m61 – identify and describe, through investigation, growing patterns and shrinking patterns generated by the repeated addition or subtraction of 1's, 2's, 5's, 10's, and 25's on a number line and on a hundreds chart (e.g., the numbers 90, 80, 70, 60, 50, 40, 30, 20, 10 are in a straight line on a hundreds chart);

2m62 – identify, describe, and create, through investigation, growing patterns and shrinking patterns involving addition and subtraction, with and without the use of calculators (e.g., 3 + 1 = 4, 3 + 2 = 5, 3 + 3 = 6, …);

2m63 – identify repeating, growing, and shrinking patterns found in real-life contexts (e.g., a geometric pattern on wallpaper, a rhythm pattern in music, a number pattern when counting dimes);

2m64 – represent a given growing or shrinking pattern in a variety of ways (e.g., using pictures, actions, colours, sounds, numbers, letters, number lines, bar graphs) (Sample problem: Show the letter pattern A, AA, AAA, AAAA, … by clapping or hopping.);

2m65 – create growing or shrinking patterns (Sample problem: Create a shrinking pattern using cut-outs of pennies and/or nickels, starting with 20 cents.);

2m66 – create a repeating pattern by combining two attributes (e.g., colour and shape; colour and size) (Sample problem: Use attribute blocks to make a train that shows a repeating pattern involving two attributes.);

2m67 – demonstrate, through investigation, an understanding that a pattern results from repeating an operation (e.g., addition, subtraction) or making a repeated change to an attribute (e.g., colour, orientation).

Expressions and Equality

2m68 – demonstrate an understanding of the concept of equality by partitioning whole numbers to 18 in a variety of ways, using concrete materials (e.g., starting with 9 tiles and adding 6 more tiles gives the same result as starting with 10 tiles and adding 5 more tiles);

2m69 – represent, through investigation with concrete materials and pictures, two number expressions that are equal, using the equal sign (e.g., "I can break a train of 10 cubes into 4 cubes and 6 cubes. I can also break 10 cubes into 7 cubes and 3 cubes. This means 4 + 6 = 7 + 3.");

2m70 – determine the missing number in equations involving addition and subtraction to 18, using a variety of tools and strategies (e.g., modelling with concrete materials, using guess and check with and without the aid of a calculator) (Sample problem: Use counters to determine the missing number in the equation 6 + 7 = + 5.);

2m71 – identify, through investigation, and use the commutative property of addition (e.g., create a train of 10 cubes by joining 4 red cubes to 6 blue cubes, or by joining 6 blue cubes to 4 red cubes) to facilitate computation with whole numbers (e.g., "I know that 9 + 8 + 1 = 9 + 1 + 8. Adding becomes easier because that gives 10 + 8 = 18.");

2m72 – identify, through investigation, the properties of zero in addition and subtraction (i.e., when you add zero to a number, the number does not change; when you subtract zero from a number, the number does not change).

Data Management and Probability

Overall Expectations

2m73 • collect and organize categorical or discrete primary data and display the data, using tally charts, concrete graphs, pictographs, line plots, simple bar graphs, and other graphic organizers, with labels ordered appropriately along horizontal axes, as needed;

2m74 • read and describe primary data presented in tally charts, concrete graphs, pictographs, line plots, simple bar graphs, and other graphic organizers;

2m75 • describe probability in everyday situations and simple games.

Collection and Organization of Data

2m76 – demonstrate an ability to organize objects into categories, by sorting and classifying objects using two attributes simultaneously (e.g., sort attribute blocks by colour and shape at the same time);

2m77 – gather data to answer a question, using a simple survey with a limited number of responses (e.g., What is your favourite season?; How many letters are in your first name?);

2m78 – collect and organize primary data (e.g., data collected by the class) that is categorical or discrete (i.e., that can be counted, such as the number of students absent), and display the data using one-to-one correspondence in concrete graphs, pictographs, line plots, simple bar graphs, and other graphic organizers (e.g., tally charts, diagrams), with appropriate titles and labels and with labels ordered appropriately along horizontal axes, as needed (Sample problem: Record the number of times that specific words are used in a simple rhyme or poem.).

Data Relationships

2m79 – read primary data presented in concrete graphs, pictographs, line plots, simple bar graphs, and other graphic organizers (e.g., tally charts, diagrams), and describe the data using mathematical language (e.g., "Our bar graph shows that 4 more students walk to school than take the bus.");

2m80 – pose and answer questions about class-generated data in concrete graphs, pictographs, line plots, simple bar graphs, and tally charts (e.g., Which is the least favourite season?);

2m81 – distinguish between numbers that represent data values (e.g., "I have 4 people in my family.") and numbers that represent the frequency of an event (e.g., "There are 10 children in my class who have 4 people in their family.");

2m82 – demonstrate an understanding of data displayed in a graph (e.g., by telling a story, by drawing a picture), by comparing different parts of the data and by making statements about the data as a whole (e.g., "I looked at the graph that shows how many students were absent each month. More students were away in January than in September.").

Probability

2m83 – describe probability as a measure of the likelihood that an event will occur, using mathematical language (i.e., impossible, unlikely, less likely, equally likely, more likely, certain) (e.g., "If I take a new shoe out of a box without looking, it's equally likely that I will pick the left shoe or the right shoe.");

2m84 – describe the probability that an event will occur (e.g., getting heads when tossing a coin, landing on red when spinning a spinner), through investigation with simple games and probability experiments and using mathematical language (e.g., "I tossed 2 coins at the same time, to see how often I would get 2 heads. I found that getting a head and a tail was more likely than getting 2 heads.") (Sample problem: Describe the probability of spinning red when you spin a spinner that has one half shaded yellow, one fourth shaded blue, and one fourth shaded red. Experiment with the spinner to see if the results are what you expected.).