TIPS4RM

Targeted Implementation and Planning Supports for Revised Mathematics

Combined Grades 7 and 8

Ontario

Developing Content and Reporting Targets for a Combined Grades 7 and 8 Mathematics Program

Crucial to planning an effective mathematics program for a combined Grade 7 and Grade 8 class is a study of the similarities and differences in the curriculum expectations for the two grades. To facilitate this comparison, the expectations are organized in parallel clusters in the Content and Reporting Targets chart. The intent is that clusters positioned side-by-side in the chart are taught simultaneously to the two grades, in the sequence shown.

Five different types of comparisons between expectations for Grade 7 and Grade 8 are used to determine which clusters can be taught simultaneously:

1. **Expectations that are virtually the same**
   These expectations are stated across the grade-level columns and are identified by the expectation codes for the two grades.

   Example:

Grade 7	Grade 8
7m82 and **8m78 –** make inferences and convincing arguments that are based on the analysis of charts, tables, and graphs.	

   The same lesson or set of lessons can be taught to the entire class, with differentiated follow-up activities to accommodate the additional depth of skill and knowledge that is developed in Grade 8.

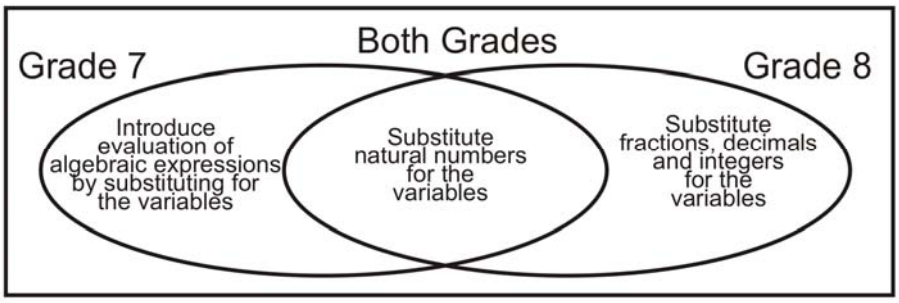
2. **Expectations that are similar but have minor grade-specific differences**
   These expectations are stated separately across the grade-level columns and are identified by the grade expectation code.

   Example:

Grade 7	Grade 8
7m67 – evaluate algebraic expressions by substituting natural numbers for the variables;	
8m62 – evaluate algebraic expressions with up to three terms, by substituting fractions, decimals, and integers for the variables.	

   In this example, expectations involving evaluating algebraic expressions by substitution are similar, but expectations in Grade 8 require more depth of skill. Students in Grade 7 evaluate algebraic expressions using natural numbers. Students in Grade 8 would benefit from some review and practice of this concept, but their skills must also be extended to include the substitution of fractions, decimals and integers. Grade 8 students need more depth of understanding and skill in substitution into algebraic expressions.

   A teacher's thinking, planning, and daily lessons might look like this:



   Thinking of the differences between the Grade 7 and Grade 8 expectations in this way helps in planning the extensions and supports for this topic each time it is addressed throughout the mathematics program.

3. A few expectations in some strands have no expectations in the other grade that can be easily taught at the same time.

These expectations are indicated by empty cells in the other grade column or by an obvious contrast in depth of treatment or level of abstraction between the two grades.

Example:

Ratio, Rate, and Percent	
Grade 7	**Grade 8**
	8m26 – identify and describe real-life situations involving two quantities that are directly proportional; **8m27 –** solve problems involving proportions, using concrete materials, drawings, and variables.

While students in both Grade 7 and Grade 8 develop an understanding of rates and solve problems involving unit rates, students in Grade 8 must also solve problems involving proportions. There is no extended learning for Grade 7.

The empty cells in the column for Grade 7 point to the need for the students in Grade 8 to learn something not required in Grade 7. This would usually result in separate lessons for the two grades.

The need for separate lessons for the two grades is less obvious in the case illustrated below.

Fractions and Decimals	
Grade 7	**Grade 8**
7m18 – divide whole numbers by simple fractions and by decimal numbers to hundredths, using concrete materials; **7m19 –** use a variety of mental strategies to solve problems involving the addition and subtraction of fractions and decimals; **7m24 –** add and subtract fractions with simple like and unlike denominators, using a variety of tools and algorithms; **7m25 –** demonstrate, using concrete materials, the relationship between the repeated addition of fractions and the multiplication of that fraction by a whole number.	**8m19 –** represent the multiplication and division of fractions, using a variety of tools and strategies; **8m20 –** solve problems involving addition, subtraction, multiplication, and division with simple fractions.

The study of fractions and decimals are partially the same, but the initial understandings developed in Grade 7 differ from the depth of understanding developed by students in Grade 8. In Grade 7, students spend more time on investigation, practice with manipulatives, and skill development. Both grades add and subtract fractions, however, the difference in the depth of understanding of multiplication and division requires separate lesson development for the two grades. As the students in Grade 8 develop understanding and proficiency in multiplication and division of fractions, students in Grade 7 spend extra time developing understanding of addition and subtraction, and using concrete materials to develop their understanding of multiplication and division with simple fractions.

Occasionally, the unmatched expectations can be included as an extension to a common lesson or as part of a discussion at a "teachable moment," instead of requiring a completely separate lesson.

4. Expectations that are different but can be addressed using the same type of class activity

These expectations are positioned in side-by-side in the Grade 7 and Grade 8 columns with separate cluster names for the two grades.

Example:

Grade 7	Grade 8
Surface Area and Volume of Right Prisms	**Surface Area and Volume of a Cylinder**
7m34 – sketch different polygonal prisms that share the same volume; **7m40 –** determine, through investigation using a variety of tools and strategies, the relationship between the height, the area of the base, and the volume of right prisms with simple polygonal bases, and generalize to develop the formula (i.e., Volume = area of base × height); **7m41 –** determine, through investigation using a variety of tools, the surface area of right prisms; **7m49 –** investigate, using concrete materials, the angles between the faces of a prism, and identify right prisms.	**8m37 –** determine, through investigation using a variety of tools and strategies, the relationship between the area of the base and height and the volume of a cylinder, and generalize to develop the formula (i.e., Volume = area of base × height); **8m38 –** determine, through investigation using concrete materials, the surface area of a cylinder; **8m39 –** solve problems involving the surface area and the volume of cylinders, using a variety of strategies.

The parallel structure of these expectations for the two grades can be addressed using the same type of rich task for both grades. Included are a series of lessons that illustrate how investigations on volume and surface area, completed by the entire class, address the expectations regarding right prisms in Grade 7 and cylinders in Grade 8.

5. Expectations address entirely different topics in the two grades

These expectations are positioned side-by-side in the Grade 7 and Grade 8 columns with separate cluster names for the two grades.

Example:

Grade 7	Grade 8
The Cartesian Coordinate System	**Pythagorean Relationship**
7m54 – plot points using all four quadrants of the Cartesian coordinate plane;	**8m49 –** determine the Pythagorean relationship, through investigation using a variety of tools and strategies; **8m50 –** solve problems involving right triangles geometrically, using the Pythagorean relationship.

To address the expectations of unrelated topics, separate lessons are taught to each grade for the entire unit. To minimize the disparity between the topics, a common theme might be used to link the two unrelated topics. Graphing in all four quadrants of the Cartesian coordinate system is introduced to Grade 7 students while the Pythagorean relationship is developed in Grade 8. Although these topics are very different, they can be taught simultaneously. A series of lessons is provided to assist teachers in presenting separate lessons.

There are a number of criteria to incorporate into a plan for implementing a math program for a combined Grade 7 and Grade 8 class. The clustering and sequencing shown in the Content and Reporting Targets chart is only one possibility. Other criteria include:

- ensuring necessary prior learning opportunities;
- providing opportunities to revisit key concepts and skills throughout the program;
- reporting requirements.

Combined Grades 7 and 8 Content and Reporting Targets

Term 1 – Content Targets	Term 2 – Content Targets	Term 3 – Content Targets
Number Sense and Numeration: • multiples and factors • exponents • square roots • integers **Data Management and Probability:** • collecting data • organizing data • displaying data • determining data relationships **Patterning and Algebra:** • representing linear growing patterns • modelling linear relationships • determining the general term of a linear growing pattern	**Number Sense and Numeration:** • fractions • decimals **Measurement:** • area of trapezoids and composite shapes (Grade 7) • circumference and area of the circle (Grade 8) • measurement relationships for area **Geometry and Spatial Sense:** • similar figures • congruent figures (Grade 7) • geometric properties of lines and angles • properties of polyhedra, quadrilaterals and the circle (Grade 7) **Patterning and Algebra:** • solve equations	**Number Sense and Numeration:** • ratio and unit rates • percent • solve problems using proportions (Grade 8) **Geometry and Spatial Sense:** • Transformations • The Cartesian coordinate system • Tiling the plane (Grade 7) • Pythagorean relationship (Grade 8) **Measurement:** • surface area and volume of right prisms (Grade 7) • surface area and volume of cylinders (Grade 8) • properties of polyhedra (Grade 8) • measurement relationships **Data Management and Probability:** • experimental and theoretical probability • making predictions based on probability

Across the Strands and Terms: The Mathematical Processes

7m1, 8m1 • develop, select, apply, and compare a variety of problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;

7m2, 8m2 • develop and apply reasoning skills (e.g., recognition of relationships, generalization through inductive reasoning, use of counter-examples) to make mathematical conjectures, assess conjectures and justify conclusions, and plan and construct organized mathematical arguments;

7m3, 8m3 • 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 assessing the effectiveness of strategies and processes used, by proposing alternative approaches, by judging the reasonableness of results, by verifying solutions);

7m4, 8m4 • select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems;

7m5, 8m5 • make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, current events, art and culture, sports);

7m6, 8m6 • create a variety of representations of mathematical ideas (e.g., numeric, geometric, algebraic, graphical, pictorial; onscreen dynamic representations), connect and compare them, and select and apply the appropriate representations to solve problems;

7m7, 8m7 • communicate mathematical thinking orally, visually, and in writing, using mathematical vocabulary and a variety of appropriate representations, and observing mathematical conventions.

Term One – Combined Grades 7 and 8 Sample Content and Reporting Targets

NUMBER SENSE and NUMERATION	**Multiples and Factors**	
	7m12 – generate multiples and factors, using a variety of tools and strategies.	**8m15 –** determine common factors and common multiples using the prime factorization of numbers.
	Exponents and Square Roots	
	7m16 – represent perfect squares and square roots, using a variety of tools; **8m25 –** estimate, and verify using a calculator, the positive square roots of whole numbers, and distinguish between whole numbers that have whole-number square roots and those that do not.	
		8m11 – express repeated multiplication using exponential notation; **8m12 –** represent whole numbers in expanded form using powers of ten.
	Integers	
	7m13 – identify and compare integers found in real-life contexts; **7m14 –** represent and order integers, using a variety of tools.	
	7m26 – add and subtract integers, using a variety of tools.	
		8m21 – represent the multiplication and division of integers, using a variety of tools.
		8m18 – use estimation when solving problems involving operations with [whole numbers, decimals, percents,] integers, [and fractions,] to help judge the reasonableness of a solution; **8m22 –** solve problems involving operations with integers, using a variety of tools; **8m23 –** evaluate expressions that involve integers, including expressions that contain brackets and exponents, using order of operations.

DATA MANAGEMENT and PROBABILITY	Collecting and Organizing Data; Determining Data Relationships	
	7m73, 8m68 – collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject and record observations or measurements; **7m74, 8m70 –** collect and organize categorical, discrete, or continuous primary data and secondary data and display the data in charts, tables, and graphs (including: relative frequency tables and circle graphs in Grade 7 and histograms and scatter plots in Grade 8) that have appropriate titles, labels and scales that suit the range and distribution of the data, using a variety of tools.	
	7m75, 8m71 – select an appropriate type of graph to represent a set of data, graph the data using technology, and justify the choice of graph (i.e., from types of graphs already studied, including in Grade 8 histograms and scatterplots).	
	7m76 – distinguish between a census and a sample from a population; **8m72 –** explain the relationship between a census, a representative sample, sample size, and a population.	
	7m77 – identify bias in data collection methods.	
		8m69 – organize into intervals a set of data that is spread over a broad range; **8m75 –** demonstrate an understanding of the appropriate uses of bar graphs and histograms by comparing their characteristics.
	7m78, 8m73 – read, interpret, and draw conclusions from primary data and from secondary data presented in charts, tables, and graphs (including relative frequency tables and circle graphs in Grade 7 and frequency tables with intervals, histograms, and scatter plots in Grade 8).	
	7m79 – identify, through investigation, graphs that present data in misleading ways.	
	7m80 – determine, through investigation, the effect on a measure of central tendency (i.e., mean, median, and mode) of adding or removing a value or values.	**8m74 –** determine, through investigation, the appropriate measure of central tendency (i.e., mean, median, or mode) needed to compare sets of data.
	7m81 – identify and describe trends, based on the distribution of the data presented in tables and graphs, using informal language.	**8m77 –** identify and describe trends, based on the rate of change of data from tables and graphs, using informal language.
	7m82, 8m78 – make inferences and convincing arguments that are based on the analysis of charts, tables, and graphs.	
		8m76 – compare two attributes or characteristics using a scatter plot, and determine whether or not the scatter plot suggests a relationship; **8m79 –** compare two attributes or characteristics, using a variety of data management tools and strategies (i.e., pose a relevant question, then design an experiment or survey, collect and analyse the data, and draw conclusions).

PATTERNING and ALGEBRA	Patterns and Relationships	
	7m60 – represent linear growing patterns, using a variety of tools and strategies; **7m61 –** make predictions about linear growing patterns, through investigation with concrete materials.	
	7m62 – develop and represent the general term of a linear growing pattern, using algebraic expressions involving one operation.	**8m56 –** represent, through investigation with concrete materials, the general term of a linear pattern, using one or more algebraic expressions.
	7m63 – compare pattern rules that generate a pattern by adding or subtracting a constant, or multiplying or dividing by a constant to get the next term with pattern rules that use the term number to describe the general term.	
		8m57 – represent linear patterns graphically (i.e., make a table of values that shows the term number and the term, and plot the coordinates on a graph), using a variety of tools.
		8m58 – determine a term, given its term number, in a linear pattern that is represented by a graph or an algebraic equation.
		8m60 – model linear relationships using tables of values, graphs, and equations through investigation using a variety of tools.
	7m64 – model real-life relationships involving constant rates where the initial condition starts at 0, through investigation using tables of values and graphs; **7m65 –** model real-life relationships involving constant rates using algebraic equations with variables to represent the changing quantities in the relationship.	

Term Two – Combined Grades 7 and 8 Sample Content and Reporting Targets

MEASUREMENT	**Measurement Relationships**	
	7m33 – research and report on real-life applications of area measurements.	
	7m35 – solve problems that require conversion between metric units of measure; **7m36 –** solve problems that require conversion between metric units of area (i.e., square centimetres, square metres).	**8m33 –** solve problems that require conversions involving metric units of area, [volume, and capacity] (i.e., square centimetres and square metres; [cubic centimetres and cubic metres; millilitres and cubic centimetres)].
	Area of Trapezoids and Composite Shapes	**Circumference and Area of Circles**
	7m37 – determine, through investigation using a variety of tools and strategies, the relationship for calculating the area of a trapezoid, and generalize to develop the formula [i.e., Area = (sum of lengths of parallel sides × height) ÷ 2]; **7m38 –** solve problems involving the estimation and calculation of the area of a trapezoid; **7m39 –** estimate and calculate the area of composite two-dimensional shapes by decomposing into shapes with known area relationships.	**8m34 –** measure the circumference, radius, and diameter of circular objects, using concrete materials; **8m35 –** determine, through investigation using a variety of tools and strategies, the relationships for calculating the circumference and the area of a circle, and generalize to develop the formulas [i.e., Circumference of a circle = $\pi \times$ diameter; Area of a circle = $\pi \times (\text{radius})^2$]; **8m36 –** solve problems involving the estimation and calculation of the circumference and the area of a circle.

NUMBER SENSE and NUMERATION	Fractions and Decimals	
	7m11 – represent, compare, and order decimals to hundredths and fractions, using a variety of tools.	**8m13 –** represent, compare, and order rational numbers (i.e., positive and negative fractions and decimals to thousandths).
	7m19 – use a variety of mental strategies to solve problems involving the addition and subtraction of fractions and decimals; **7m24 –** add and subtract fractions with simple like and unlike denominators, using a variety of tools and algorithms.	**8m20 –** solve problems involving addition, subtraction, multiplication, and division with simple fractions.
	7m18 – divide whole numbers by simple fractions and by decimal numbers to hundredths, using concrete materials; **7m25 –** demonstrate, using concrete materials, the relationship between the repeated addition of fractions and the multiplication of that fraction by a whole number.	**8m19 –** represent the multiplication and division of fractions, using a variety of tools and strategies.
	7m15 – select and justify the most appropriate representation of a quantity (i.e., fraction, decimal, percent) for a given context; **7m27 –** determine, through investigation, the relationships among fractions, decimals, percents, [and ratios].	**8m14 –** translate between equivalent forms of a number (i.e., decimals, fractions, percents).
	7m20 – solve problems involving the multiplication and division of decimal numbers to thousandths by one-digit whole numbers, using a variety of tools and strategies.	**8m24 –** multiply and divide decimal numbers by various powers of ten.
	7m21, 8m16 – solve multi-step problems arising from real-life contexts and involving whole numbers and decimals, using a variety of tools and strategies.	
	7m23 – evaluate expressions that include whole numbers and decimals, including expressions that contain brackets, using order of operations.	
	7m22 – use estimation when solving problems involving operations with whole numbers, decimals, [and percents], to help judge the reasonableness of a solution; **8m18 –** use estimation when solving problems involving operations with whole numbers, decimals, [percents, integers], and fractions, to help judge the reasonableness of a solution.	

GEOMETRY and SPATIAL SENSE	**Similar and Congruent Figures**	
	7m53 – distinguish between and compare similar shapes and congruent shapes, using a variety of tools and strategies.	
	7m52 – demonstrate an understanding that enlarging or reducing two-dimensional shapes creates similar shapes.	
	7m50 – identify, through investigation, the minimum side and angle information (i.e., side-side-side; side-angle-side; angle-side-angle) needed to describe a unique triangle.	
	7m51 – determine, through investigation using a variety of tools, relationships among area, perimeter, corresponding side lengths, and corresponding angles of congruent shapes.	**8m46 –** determine, through investigation using a variety of tools, relationships among area, perimeter, corresponding side lengths, and corresponding angles of similar shapes.
	Geometric Properties and Relationships	
	7m46 – construct related lines (i.e., parallel; perpendicular; intersecting at 30º, 45º, and 60º), using angle properties and a variety of tools and strategies; **7m48 –** construct angle bisectors and perpendicular bisectors, using a variety of tools and strategies, and represent equal angles and equal lengths using mathematical notation.	**8m44 –** construct a circle, given its centre and radius, or its centre and a point on the circle, or three points on the circle.
		8m47 – determine, through investigation using a variety of tools and strategies, the angle relationships for intersecting lines and for parallel lines and transversals, and the sum of the angles of a triangle; **8m48 –** solve angle-relationship problems involving triangles, intersecting lines, and parallel lines and transversals.
	7m47 – sort and classify triangles and quadrilaterals by geometric properties related to symmetry, angles, and sides, through investigation using a variety of tools and strategies; **8m43 –** sort and classify quadrilaterals by geometric properties, including those based on diagonals, through investigation using a variety of tools.	

<table>
<tr><td rowspan="5">PATTERNING and ALGEBRA</td><td colspan="2">Solving Equations</td></tr>
<tr><td></td><td>8m59 – describe different ways in which algebra can be used in real-life situations.</td></tr>
<tr><td colspan="2">7m68 – make connections between evaluating algebraic expressions and determining the term in a pattern using the general term;
8m63 – make connections between solving equations and determining the term number in a pattern, using the general term.</td></tr>
<tr><td colspan="2">7m66 – translate phrases describing simple mathematical relationships into algebraic expressions, using concrete materials;
8m61 – translate statements describing mathematical relationships into algebraic expressions and equations.</td></tr>
<tr><td>7m69 – solve linear equations of the form $ax = c$ or $c = ax$ and $ax + b = c$ or variations such as $b + ax = c$ and $c = bx + a$ (where a, b, and c are natural numbers) by modelling with concrete materials, by inspection, or by guess and check, with and without the aid of a calculator.</td><td>8m64 – solve and verify linear equations involving a one-variable term and having solutions that are integers, by using inspection, guess and check, and a “balance” model.</td></tr>
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Term Three – Combined Grades 7 and 8 Sample Content and Reporting Targets

<table>
<tr><td rowspan="6">NUMBER SENSE and NUMERATION</td><td colspan="2">Ratio, Rate, and Percent</td></tr>
<tr><td colspan="2">7m29 – demonstrate an understanding of rate as a comparison, or ratio, of two measurements with different units;
7m30 – solve problems involving the calculation of unit rates;
8m29 – solve problems involving rates.</td></tr>
<tr><td>7m27 – determine, through investigation, the relationships among [fractions, decimals], percents, and ratios;</td><td>8m14 – translate between equivalent forms of a number (i.e., decimals, fractions, percents).</td></tr>
<tr><td>7m28 – solve problems that involve determining whole number percents, using a variety of tools.</td><td>8m17 – solve problems involving percents expressed to one decimal place and whole-number percents greater than 100;
8m28 – solve problems involving percent that arise from real-life contexts.</td></tr>
<tr><td></td><td>8m26 – identify and describe real-life situations involving two quantities that are directly proportional;
8m27 – solve problems involving proportions, using concrete materials, drawings, and variables.</td></tr>
<tr><td colspan="2">7m22 – use estimation when solving problems involving operations with whole numbers, decimals, and percents, to help judge the reasonableness of a solution;
8m18 – use estimation when solving problems involving operations with whole numbers, decimals, percents, [integers, and fractions], to help judge the reasonableness of a solution.</td></tr>
<tr><td rowspan="6">GEOMETRY and SPATIAL SENSE</td><td>The Cartesian Coordinate System</td><td>Pythagorean Relationship</td></tr>
<tr><td>7m54 – plot points using all four quadrants of the Cartesian coordinate plane.</td><td>8m49 – determine the Pythagorean relationship, through investigation using a variety of tools and strategies;
8m50 – solve problems involving right triangles geometrically, using the Pythagorean relationship.</td></tr>
<tr><td colspan="2">Location and Movement: Applying Transformations</td></tr>
<tr><td>7m55 – identify, perform, and describe dilatations (i.e., enlargements and reductions), through investigation using a variety of tools;
7m56 – create and analyse designs involving translations, reflections, dilatations, and/or simple rotations of two-dimensional shapes, using a variety of tools and strategies.</td><td>8m52 – graph the image of a point, or set of points, on the Cartesian coordinate plane after applying a transformation to the original point(s) (i.e., translation; reflection in the x-axis, the y-axis, or the angle bisector of the axes that passes through the first and third quadrants; rotation of 90°, 180°, or 270° about the origin);
8m53 – identify, through investigation, real-world movements that are translations, reflections, and rotations.</td></tr>
<tr><td>7m57 – determine, through investigation using a variety of tools, polygons, or combinations of polygons that tile a plane, and describe the transformation(s) involved.</td><td></td></tr>
<tr><td></td><td>8m45 – investigate and describe applications of geometry in the real world.</td></tr>
<tr><td></td><td>8m51 – determine, through investigation using concrete materials, the relationship between the numbers of faces, edges, and vertices of a polyhedron (i.e., number of faces + number of vertices = number of edges + 2).</td></tr>
</table>

<table>
<tr><td rowspan="6">MEASUREMENT</td><td colspan="2">Measurement Relationships</td></tr>
<tr><td colspan="2">7m35 – solve problems that require conversion between metric units of measure;
7m36 – solve problems that require conversion between metric units of area (i.e., square centimetres, square metres);
7m42 – solve problems that involve the surface area and volume of right prisms and that require conversion between metric measures of capacity and volume (i.e., millilitres and cubic centimetres);
8m33 – solve problems that require conversions involving metric units of area, volume, and capacity (i.e., square centimetres and square metres; cubic centimetres and cubic metres; millilitres and cubic centimetres).</td></tr>
<tr><td>7m17 – explain the relationship between exponential notation and the measurement of area [and volume].</td><td></td></tr>
<tr><td></td><td>8m32 – research, describe, and report on applications of volume and capacity measurement.</td></tr>
<tr><td>Surface Area & Volume of Right Prisms</td><td>Surface Area & Volume of a Cylinder</td></tr>
<tr><td>7m41 – determine, through investigation using a variety of tools, the surface area of right prisms;
7m49 – investigate, using concrete materials, the angles between the faces of a prism, and identify right prisms.</td><td>8m38 – determine, through investigation using concrete materials, the surface area of a cylinder.</td></tr>
<tr><td>7m34 – sketch different polygonal prisms that share the same volume;
7m40 – determine, through investigation using a variety of tools and strategies, the relationship between the height, the area of the base, and the volume of right prisms with simple polygonal bases, and generalize to develop the formula (i.e., Volume = area of base × height).</td><td>8m37 – determine, through investigation using a variety of tools and strategies, the relationship between the area of the base and height and the volume of a cylinder, and generalize to develop the formula (i.e., Volume = area of base × height);
8m39 – solve problems involving the surface area and the volume of cylinders, using a variety of strategies.</td></tr>
<tr><td rowspan="6">DATA MANAGEMENT and PROBABILITY</td><td colspan="2">Probability</td></tr>
<tr><td colspan="2">7m84 – make predictions about a population when given a probability;
8m80 – compare, through investigation, the theoretical probability of an event (i.e., the ratio of the number of ways a favourable outcome can occur compared to the total number of possible outcomes) with experimental probability, and explain why they might differ.</td></tr>
<tr><td colspan="2">7m86 – perform a simple probability experiment involving two independent events, and compare the experimental probability with the theoretical probability of a specific outcome;
8m81 – determine, through investigation, the tendency of experimental probability to approach theoretical probability as the number of trials in an experiment increases, using class-generated data and technology-based simulation models.</td></tr>
<tr><td>7m85 – represent in a variety of ways all the possible outcomes of a probability experiment involving two independent events (i.e., one event does not affect the other event), and determine the theoretical probability of a specific outcome involving two independent events.</td><td></td></tr>
<tr><td>7m83 – research and report on real-world applications of probabilities expressed in fraction, decimal, and percent form.</td><td></td></tr>
<tr><td></td><td>8m82 – identify the complementary event for a given event, and calculate the theoretical probability that a given event will not occur.</td></tr>
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