

Grade 7	Grade 8	Grade 9
<p>Strand: Number General Outcome: Develop number sense.</p> <p>Specific Outcomes <i>It is expected that students will:</i></p> <ol style="list-style-type: none"> Determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10, and why a number cannot be divided by 0. [C, R] Demonstrate an understanding of the addition, subtraction, multiplication and division of decimals (for more than 1-digit divisors or 2-digit multipliers, the use of technology is expected) to solve problems. [ME, PS, T] Solve problems involving percents from 1% to 100%. [C, CN, PS, R, T] Demonstrate an understanding of the relationship between positive repeating decimals and positive fractions, and positive terminating decimals and positive fractions. [C, CN, R, T] Demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely, pictorially and symbolically (limited to positive sums and differences). [C, CN, ME, PS, R, V] Demonstrate an understanding of 	<p>Strand: Number (Number Concepts) <i>Students will:</i></p> <ul style="list-style-type: none"> use numbers to describe quantities represent numbers in multiple ways. <p>General Outcome: Demonstrate sense for rational numbers, including common fractions, integers and numbers</p> <p>Specific Outcomes <i>It is expected that students will:</i></p> <ol style="list-style-type: none"> Demonstrate and explain the meaning of a negative exponent, using patterns (limit to base 10). [C, CN, R, V] Represent any number in scientific notation. [R] Define, compare and order any rational numbers. [R, T, V] Demonstrate concretely, pictorially and symbolically that the product of reciprocals is equal to 1. [R, V] Express 3-term ratios in equivalent forms. [CN] Represent and apply fractional per cents, and per cents greater than 100, in fraction or decimal form, and vice versa. [CN, R] Represent square roots concretely, pictorially and symbolically. [R, V] 	<p>Strand: Number (Number Concepts) <i>Students will:</i></p> <ul style="list-style-type: none"> use numbers to describe quantities represent numbers in multiple ways. <p>General Outcome: Explain and illustrate the structure and the interrelationship of the sets of numbers within the rational number system.</p> <p>Specific Outcomes <i>It is expected that students will:</i></p> <ol style="list-style-type: none"> Give examples of numbers that satisfy the conditions of natural, whole, integral and rational numbers, and show that these numbers comprise the rational number system. [C, CN, PS, R] Describe, orally and in writing, whether or not a number is rational. [C, R] Give examples of situations where answers would involve the positive (principal) square root, or both positive and negative square roots of a number. [C, CN, PS, R] <p>General Outcome: Develop a number sense of powers with integral exponents and rational bases.</p> <ol style="list-style-type: none"> Illustrate power, base, coefficient and exponent, using rational numbers or variables as bases or coefficients. [R, V] Explain and apply the exponent laws for powers with integral exponents. [PS, R] Determine the value of powers with integral exponents, using the exponent laws. [PS, R] <p>Strand: Number (Number Operations) <i>Students will:</i></p> <ul style="list-style-type: none"> demonstrate an understanding of and proficiency with calculations decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

<p>addition and subtraction of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]</p> <p>7. Compare and order positive fractions, positive decimals (to thousandths) and whole numbers by using:</p> <ul style="list-style-type: none"> • benchmarks • place value • equivalent fractions and/or decimals. [CN, R, V] 	<p>8. Distinguish between a square root and its decimal approximation as it appears on a calculator. [T]</p> <p>Strand: Number (Number Operations) <i>Students will:</i></p> <ul style="list-style-type: none"> · demonstrate an understanding of and proficiency with calculations · decide which arithmetic operation or operations can be used to solve a problem and then solve the problem. <p>General Outcome: Apply arithmetic operations on rational numbers to solve problems.</p> <p>Specific Outcomes <i>It is expected that students will:</i></p> <p>9. Add, subtract, multiply and divide fractions concretely, pictorially and symbolically. [E, PS, V]</p> <p>10. Estimate, compute and verify the sum, difference, product and quotient of rational numbers, using only decimal representations of negative rationals. [E, PS, T]</p> <p>11. Estimate, compute (using a calculator) and verify approximate square roots of whole numbers and of decimals. [E, PS, T]</p> <p>General Outcome: Apply the concepts of rate, ratio, percentage and proportion to solve problems in meaningful contexts.</p>	<p>General Outcome: Use a scientific calculator or a computer to solve problems involving rational numbers.</p> <p>Specific Outcomes <i>It is expected that students will:</i></p> <p>7. Document and explain the calculator keying sequences used to perform calculations involving rational numbers. [C, PS, T]</p> <p>8. Solve problems, using rational numbers in meaningful contexts. [CN, PS]</p> <p>General Outcome: Explain how exponents can be used to bring meaning to large and small numbers, and use calculators or computers to perform calculations involving these numbers.</p> <p>9. Understand and use the exponent laws to simplify expressions with variable bases and evaluate expressions with numerical bases. [PS, R]</p> <p>10. Use a calculator to perform calculations involving scientific notation and exponent laws. [PS, R, T]</p>
---	--	--

	<p>12. Use concepts of rate, ratio, proportion and per cent to solve problems in meaningful contexts. [E, PS, T]</p> <p>13. Calculate combined percentages in a variety of meaningful contexts. [CN, E, PS, T]</p> <p>14. Derive and apply unit rates. [PS, R]</p> <p>15. Express rates and ratios in equivalent forms. [PS, R]</p>	
<p>Strand: Patterns and Relations (Patterns) General Outcome: Use patterns to describe the world and solve problems. Specific Outcomes <i>It is expected that students will:</i> 1. Demonstrate an understanding of oral and written patterns and their equivalent linear relations. [C, CN, R] 2. Create a table of values from a linear relation, graph the table of values, and analyze the graph to draw conclusions and solve problems. [C, CN, R, V]</p> <p>Strand: Patterns and Relations (Variables and Equations) General Outcome: Represent algebraic expressions in multiple ways. Specific Outcomes</p>	<p>Strand: Patterns and Relations (Patterns) <i>Students will:</i> · use patterns to describe the world and to solve problems. General Outcome: Use patterns, variables and expressions, together with their graphs, to solve problems. Specific Outcomes <i>It is expected that students will:</i> 1. Generalize a pattern arising from a problem-solving context, using mathematical expressions and equations, and verify by substitution. 2. Substitute numbers for variables in expressions, and graph and analyze the relation. [C, PS, R, V] 3. Translate between an oral or written expression and an equivalent algebraic expression.</p>	<p>Strand: Patterns and Relations (Patterns) <i>Students will:</i> · use patterns to describe the world and to solve problems. General Outcome: Generalize, design and justify mathematical procedures, using appropriate patterns, models and technology. Specific Outcomes <i>It is expected that students will:</i> 1. Use logic and divergent thinking to present mathematical arguments in solving problems. [C, PS, R] 2. Model situations that can be represented by first-degree expressions. [CN, PS] 3. Write equivalent forms of algebraic expressions, or equations, with rational coefficients. [C, CN, R]</p> <p>Strand: Patterns and Relations (Variables and Equations) <i>Students will:</i> · represent algebraic expressions in multiple ways. General Outcome: Solve and verify linear equations and inequalities in one variable.</p>

<p><i>It is expected that students will:</i></p> <p>3. Demonstrate an understanding of preservation of equality by:</p> <ul style="list-style-type: none"> • modelling preservation of equality, concretely, pictorially and symbolically • applying preservation of equality to solve equations. [C, CN, PS, R, V] <p>4. Explain the difference between an expression and an equation. [C, CN]</p> <p>5. Evaluate an expression given the value of the variable(s). [CN, R]</p> <p>6. Model and solve problems that can be represented by one-step linear equations of the form $x + a = b$, concretely, pictorially and symbolically, where a and b are integers. [CN, PS, R, V]</p> <p>7. Model and solve problems that can be represented by linear equations of the form:</p> <ul style="list-style-type: none"> • $ax + b = c$ • $ax = b$ • $x, b, a, a \neq 0$ concretely, pictorially and symbolically, where a, b and c are whole numbers. [CN, PS, R, V] 	<p>[C, CN]</p> <p>Strand: Patterns and Relations (Variables and Equations)</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • represent algebraic expressions in multiple ways. <p>General Outcome: Solve and verify one-step and two-step linear equations with rational number solutions.</p> <p>Specific Outcomes</p> <p><i>It is expected that students will:</i></p> <p>4. Illustrate the solution process twostep, single-variable, first-degree equation, using concrete materials diagrams. [CN, PS, V]</p> <p>5. Solve and verify one- and two-firstdegree equations of the form:</p> <ul style="list-style-type: none"> • $x + a = b$ • $ax = b$ • $xa = b$ • $ax + b = c$ • $xa + b = c$ <p>where a, b and c are integers.</p> <p>6. Create and solve problems, first-degree equations. [PS]</p>	<p>Specific Outcomes</p> <p><i>It is expected that students will:</i></p> <p>4. Illustrate the solution process for a first-degree, single-variable equation, using concrete materials or diagrams. [PS, R, V]</p> <p>5. Solve and verify first-degree, single variable equations of forms, such as:</p> <ul style="list-style-type: none"> • $ax = b + cx$ • $a(x + b) = c$ • $ax + b = cx + d$ • $a(bx + c) = d(ex + f)$ • $ax = b$ <p>where a, b, c, d, e and f are all rational numbers (with a focus on integers), and use equations of this type to model and solve problem situations. [C, PS, V]</p> <p>6. Solve, algebraically, first-degree inequalities in one variable, solutions on a number line solutions. [PS, R, V]</p> <p>General Outcome: Generalize arithmetic operations from the set of rational numbers to the set of polynomials.</p> <p>7. Identify constant terms, coefficients and variables in polynomial expressions. [C]</p> <p>8. Evaluate polynomial expressions, given the value(s) of the variable(s). [E]</p> <p>9. Represent and justify the addition and subtraction of polynomial expressions, using concrete materials and diagrams. [C, R, V]</p> <p>10. Perform the operations of addition and subtraction on polynomial expressions. [R]</p> <p>11. Represent multiplication, division and factoring of monomials, binomials, and trinomials of the form x^2+bx+c, using concrete materials and diagrams. [R, V]</p> <p>12. Find the product of two monomials, a monomial and a polynomial, and two binomials. [R]</p>
---	--	---

		<p>13. Determine equivalent forms of algebraic expressions by identifying common factors and factoring trinomials of the form x^2+bx+c. [PS, R]</p> <p>14. Find the quotient when a polynomial is divided by a monomial. [R]</p>
<p>Strand: Shape and Space (Measurement) General Outcome: Use direct or indirect measurement to solve problems. Specific Outcomes <i>It is expected that students will:</i> 1. Demonstrate an understanding of circles by: <ul style="list-style-type: none"> • describing the relationships among radius, diameter and circumference of circles • relating circumference to pi • determining the sum of the central angles • constructing circles with a given radius or diameter • solving problems involving the radii, diameters and circumferences of circles. [C, CN, R, V] 2. Develop and apply a formula for determining the area of: <ul style="list-style-type: none"> • triangles • parallelograms • circles. [CN, PS, R, V] Strand: Shape and Space (3-D objects and 2-D shapes) General Outcome: Describe the characteristics of 3-D objects and 2-D shapes, and analyze the</p>	<p>Strand: Shape and Space (Measurement) <i>Students will:</i> <ul style="list-style-type: none"> • describe and compare everyday phenomena, using either direct or indirect measurement General Outcome: Apply indirect measurement procedures to problems. Specific Outcomes <i>It is expected that students will:</i> 1. Use concrete materials and diagrams to develop the Pythagorean relationship. [CN, R] 2. Use the Pythagorean relationship to calculate the measure of the third side, of a right triangle, given the other two sides in 2-D applications. [PS] 3. Describe patterns, and generalize the relationships by determining the areas and perimeters of quadrilaterals and the areas and circumferences of circles. [C, CN, PS, T] 4. Estimate, measure and calculate the surface area and volume of any right prism or cylinder. [E, PS, T] 5. Estimate and calculate the area of composite figures. [E, PS, R]</p>	<p>Strand: Shape and Space (Measurement) <i>Students will:</i> <ul style="list-style-type: none"> • describe and compare everyday phenomena, using either direct or indirect measurement General Outcome: Use trigonometric ratios to solve problems involving a right triangle. Specific Outcomes <i>It is expected that students will:</i> 1. Explain the meaning of sine, cosine and tangent ratios in right triangles. [C] 2. Demonstrate the use of trigonometric ratios (sine, cosine and tangent) in solving right triangles. [PS] 3. Calculate an unknown side or an unknown angle in a right triangle, using appropriate technology. [PS, T] 4. Model and then solve given problem situations involving only one right triangle. [PS, T, V] General Outcome: Describe the effects of dimension changes in related 2-D shapes and 3-D objects in solving problems involving area, perimeter, surface area and volume. 5. Relate expressions for volumes of pyramids to volumes of prisms, and volumes of cones to volumes of cylinders. [CN, R] 6. Calculate and apply the rate of volume to surface area to solve design problems in three dimensions. [PS, T, V] 7. Calculate and apply the rate of area to perimeter to solve design problems in two dimensions. [PS, T, V] Strand: Shape and Space (3-D Objects and 2-D Shapes)</p>

<p>relationships among them.</p> <p>Specific Outcomes <i>It is expected that students will:</i> 3. Perform geometric constructions, including:</p> <ul style="list-style-type: none"> • perpendicular line segments • parallel line segments • perpendicular bisectors • angle bisectors. [CN, R, V] <p>Strand: Shape and Space (Transformations) General Outcome: Describe and analyze position and motion of objects and shapes. Specific Outcomes <i>It is expected that students will:</i> 4. Identify and plot points in the four quadrants of a Cartesian plane using integral ordered pairs. [C, CN, V] 5. Perform and describe transformations (translations, rotations or reflections) of a 2-D shape in all four quadrants of a Cartesian plane (limited to integral number vertices). [CN, PS, T, V]</p>	<p>6. Estimate, measure and calculate the surface area of composite 3-D objects. [E, PS, R]</p> <p>7. Estimate, measure and calculate the volume of composite 3-D objects. [E, PS, R] Strand: Shape and Space (3-D Objects and 2-D Shapes) <i>Students will:</i> · describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them. General Outcome: Link angle measures and the properties of parallel lines to the classification and properties of quadrilaterals. Specific Outcomes <i>It is expected that students will:</i> 8. Identify, investigate and classify quadrilaterals, regular polygons and circles, according to their properties. [PS, R, T] 9. Build 3-D objects from a variety of representations (nets, skeletons). [PS, V]</p> <p>Strand: Shape and Space (Transformations) <i>Students will:</i> perform, analyze and create transformations.</p>	<p><i>Students will:</i> · describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them. General Outcome: Specify conditions under which triangles may be similar or congruent, and use these conditions to solve problems. Specific Outcomes <i>It is expected that students will:</i> 8. Recognize when, and explain why, two triangles are similar, and use the properties of similar triangles to solve problems. [C, PS, R, T] 9. Recognize when, and explain why, two triangles are congruent, and use the properties of congruent triangles to solve problems. [C, CN, PS, R, T] 10. Relate congruence to similarity in the context of triangles. [CN, R] 11. Draw the plan and elevations of a 3-D object from sketches and models. [C, R, T, V] 12. Sketch or build a 3-D object, given its plan and elevation views. [C, PS, T, V] 13. Recognize and draw the locus of points in solving practical problems. [PS, T, V]</p> <p>Strand: Shape and Space (Transformations) <i>Students will:</i> · perform, analyze and create transformations General Outcome: Apply coordinate geometry and pattern recognition to predict the effects of translations, rotations, reflections and dilatations on 1-D lines and 2-D shapes. Specific Outcomes <i>It is expected that students will:</i> 14. Draw the image of a 2-D shape as a result of:</p> <ul style="list-style-type: none"> · a single transformation · a dilatation · combinations of translations and/or reflections. [PS, T, V]
--	--	---

	<p>General Outcome: Create and analyze design problems and architectural patterns, using the properties of scaling, proportion and networks.</p> <p>Specific Outcomes</p> <p><i>It is expected that students will:</i></p> <p>10. Represent, analyze and describe enlargements and reductions. [CN, R]</p> <p>11. Draw and interpret scale diagrams. [PS, T]</p> <p>12. Represent, analyze and describe regions and colouring problems. [C, PS, V]</p> <p>13. Describe, analyze and solve network problems; e.g., bus routes, a telephone exchange. [C, E, PS]</p>	<p>15. Identify the single transformation that connects a shape with its image. [R]</p> <p>16. Demonstrate that a triangle and its dilatation image are similar. [R]</p> <p>17. Demonstrate the congruence of a triangle with its:</p> <ul style="list-style-type: none"> · translation image · rotation image · reflection image.[R]
<p>Strand: Statistics and Probability (Data Analysis)</p> <p>General Outcome: Collect, display and analyze data to solve problems.</p> <p>Specific Outcomes</p> <p><i>It is expected that students will:</i></p> <p>1. Demonstrate an understanding of central tendency and range by:</p> <ul style="list-style-type: none"> • determining the measures of central tendency (mean, median, mode) and range • determining the most appropriate measures of central tendency to report findings. [C, PS, R, T] <p>2. Determine the effect on the mean, median and mode when an outlier is included in a data set. [C,</p>	<p>Strand: Statistics and Probability (Data Analysis)</p> <p><i>Students will:</i></p> <p>collect, display and analyze data to make predictions about a population.</p> <p>General Outcome</p> <p>General Outcome: Develop and implement a plan for the collection, display and analysis of data, using technology, as required.</p> <p>Specific Outcomes</p> <p><i>It is expected that students will:</i></p> <p>1. Formulate questions for investigation, using existing data. [C, CN, R]</p>	<p>Strand: Statistics and Probability (Data Analysis)</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> · collect, display and analyze data to make predictions about a population. <p>General Outcome: Collect and analyze experimental results expressed in two variables, using technology, as required.</p> <p>Specific Outcomes</p> <p><i>It is expected that students will:</i></p> <p>1. Design, conduct and report on an experiment to investigate a relationship between two variables. [C, CN, PS]</p> <p>2. Create scatter plots for discrete and continuous variables. [C, V]</p> <p>3. Interpret a scatter plot to determine if there is an apparent relationship. [E, R]</p> <p>4. Determine the lines of best fit from a scatter plot for an apparent linear relationship by:</p> <ul style="list-style-type: none"> · inspection

<p>CN, PS, R] 3. Construct, label and interpret circle graphs to solve problems. [C, CN, PS, R, T, V]</p> <p>Strand: Statistics and Probability (Chance and Uncertainty) General Outcome: Use experimental or theoretical probabilities to represent and solve problems involving uncertainty. Specific Outcomes <i>It is expected that students will:</i> 4. Express probabilities as ratios, fractions and percents. [C, CN, R, V, T] 5. Identify the sample space (where the combined sample space has 36 or fewer elements) for a probability experiment involving two independent events. [C, ME, PS] 6. Conduct a probability experiment to compare the theoretical probability (determined using a tree diagram, table or another graphic organizer) and experimental probability of two independent events. [C, PS, R, T]</p>	<p>2. Select, defend and use appropriate methods of collecting data: · designing and using surveys · research, using electronic media. [C, PS, T] 3. Display data by hand or by computer in a variety of ways, including box and whisker plots. [C, T, V]</p> <p>General Outcome: Evaluate and use measures of central tendency and variability. 4. Determine and use the most appropriate measure of central tendency in a given context. [CN, PS, T] 5. Describe the variability of data sets, using such techniques as range, and box and whisker plots. [C, PS, T] 6. Construct sets of data given measures of central tendency and variability. [PS, R] 7. Determine the effect on the mean, median and/or mode when: · a constant is added or subtracted from each value · each value is multiplied or divided by the same constant · a significantly different value is included. [E, PS, R]</p> <p>Strand: Statistics and Probability</p>	<p>· using technology (equations are not expected). [E, PS, T] 5. Draw and justify conclusions from the line of best fit. [C, R] 6. Assess the strengths, weaknesses and biases of samples and data collection methods. [C, R, T] 7. Critique ways in which statistical information and conclusions are presented by the media and other sources. [C, CN]</p> <p>Strand: Statistics and Probability (Chance and Uncertainty) <i>Students will:</i> use experimental or theoretical probability to represent and solve problems involving uncertainty. General Outcome: Explain the use of probability and statistics in the solution of complex problems. Specific Outcomes <i>It is expected that students will:</i> 8. Recognize that decisions based on probability may be a combination of theoretical calculations, experimental results and subjective judgments. [PS, R] 9. Demonstrate an understanding of the role of probability and statistics in society. [C, CN] 10. Solve problems involving the probability of independent events. [PS, T]</p>
---	---	---

(Chance and Uncertainty)

Students will:

· use experimental or theoretical probability to represent and solve problems involving uncertainty.

General Outcome: Compare theoretical and experimental probability of independent events.

Specific Outcomes

It is expected that students will:

8. Use computer or other simulations to solve probability and data collection problems. [E, PS, T]

9. Recognize that if n events are equally likely the probability of any one of them occurring is $\frac{1}{n}$. [R]

10. Determine the probability of two independent events where the combined sample space has 52 or fewer elements. [PS, R, V]

11. Predict population characteristics from sample data. [C, CN]