

Appendix A:
*Outcomes with
Achievement
Indicators
Organized by Strand*

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 7

Strand: Number	General Outcome: Develop number sense.
Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following set of indicators may be used to assess student achievement for each corresponding specific outcome. Students who have fully met the specific outcome are able to:</i>
1. 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]	<ul style="list-style-type: none"> ➤ Determine if a given number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10, and explain why. ➤ Sort a given set of numbers based upon their divisibility, using organizers such as Venn and Carroll diagrams. ➤ Determine the factors of a given number, using the divisibility rules. ➤ Explain, using an example, why numbers cannot be divided by 0.
2. Demonstrate an understanding of the addition, subtraction, multiplication and division of decimals to solve problems (for more than 1-digit divisors or 2-digit multipliers, the use of technology is expected). [ME, PS, T]	<ul style="list-style-type: none"> ➤ Solve a given problem involving the addition of two or more decimal numbers. ➤ Solve a given problem involving the subtraction of decimal numbers. ➤ Place the decimal in a sum or difference, using front-end estimation; e.g., for $4.5 + 0.73 + 256.458$, think $4 + 256$, so the sum is greater than 260. ➤ Solve a given problem involving the multiplication of decimal numbers with two digit multipliers (whole numbers or decimals) without the use of technology. ➤ Place the decimal in a product, using front-end estimation; e.g., for $\\$12.33 \times 2.4$, think $\\$12 \times 2$, so the product is greater than \$24. ➤ Solve a given problem involving the division of decimal numbers for 1-digit divisors (whole numbers or decimals) without the use of technology. ➤ Check the reasonableness of solutions, using estimation. ➤ Solve a given problem involving the multiplication or division of decimal numbers with more than 2-digit multipliers or 1-digit divisors (whole numbers or decimals) with the use of technology. ➤ Place the decimal in a quotient, using front-end estimation; e.g., for $51.50 \text{ m} \div 2.1$, think $50 \text{ m} \div 2$, so the quotient is approximately 25 m. ➤ Solve a given problem that involves operations on decimals (limited to thousandths), taking into consideration the order of operations.

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Grade 7

Strand: Number	General Outcome: Develop number sense.
3. Solve problems involving percents from 1% to 100%. [C, CN, PS, R, T]	<ul style="list-style-type: none"> ➤ Express a given percent as a decimal or fraction. ➤ Solve a given problem that involves finding a percent. ➤ Determine the answer to a given percent problem where the answer requires rounding, and explain why an approximate answer is needed; e.g., total cost including taxes.
4. Demonstrate an understanding of the relationship between positive terminating decimals and positive fractions and between positive repeating decimals and positive fractions. [C, CN, R, T]	<p>(It is intended that repeating decimals be limited to decimals with 1 or 2 repeating digits.)</p> <ul style="list-style-type: none"> ➤ Predict the decimal representation of a given fraction, using patterns; e.g., $\frac{1}{11} = 0.\overline{09}$, <p>$\frac{2}{11} = 0.\overline{18}$, $\frac{3}{11} = ? \dots$</p> ➤ Match a given set of fractions to their decimal representations. ➤ Sort a given set of fractions as repeating or terminating decimals. ➤ Express a given fraction as a terminating or repeating decimal. ➤ Express a given repeating decimal as a fraction. ➤ Express a given terminating decimal as a fraction. ➤ Provide an example where the decimal representation of a fraction is an approximation of its exact value.

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Grade 7

Strand: Number	General Outcome: Develop number sense.
<p>5. 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]</p>	<ul style="list-style-type: none"> ➤ Model addition of positive fractions, using concrete representations, and record symbolically. ➤ Determine the sum of two given positive fractions with like denominators. ➤ Determine a common denominator for a given set of positive fractions. ➤ Simplify a given positive fraction by identifying the common factor between the numerator and denominator. ➤ Model addition of positive fractions with unlike denominators, using concrete representations, and record symbolically. ➤ Determine the sum of two given positive fractions with unlike denominators. ➤ Model subtraction of positive fractions, using concrete representations, and record symbolically. ➤ Determine the difference of two given positive fractions with like denominators. ➤ Determine the difference of two given positive fractions with unlike denominators. ➤ Model addition and subtraction of mixed numbers with like denominators, using concrete representations, and record symbolically. ➤ Determine the sum or difference of two mixed numbers with like denominators. ➤ Model addition and subtraction of mixed numbers with unlike denominators, using concrete representations, and record symbolically. ➤ Determine the sum and difference of two mixed numbers with unlike denominators. ➤ Simplify the solution to a given problem involving the sum or difference of two positive fractions or mixed numbers. ➤ Solve a given problem involving the addition or subtraction of positive fractions or mixed numbers, and determine if the solution is reasonable.

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Grade 7

Strand: Number	General Outcome: Develop number sense.
<p>6. Demonstrate an understanding of addition and subtraction of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]</p>	<ul style="list-style-type: none"> ➤ Explain, using concrete materials such as integer tiles and diagrams, that the sum of opposite integers is zero. ➤ Solve a given problem involving the addition and subtraction of integers. ➤ Add two given integers, using concrete materials or pictorial representations, and record the process symbolically. ➤ Illustrate, using a number line, the results of adding negative and positive integers. ➤ Subtract two given integers, using concrete materials or pictorial representations, and record the process symbolically. ➤ Illustrate, using a number line, the results of subtracting negative and positive integers.
<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. <p>[CN, R, V]</p>	<ul style="list-style-type: none"> ➤ Order the numbers of a given set that includes positive fractions, positive decimals and/or whole numbers in ascending or descending order; and verify the result, using a variety of strategies. ➤ Identify a number that would be between two given numbers in an ordered sequence or on a number line. ➤ Identify incorrectly placed numbers in an ordered sequence or on a number line. ➤ Position fractions with like and unlike denominators from a given set on a number line, and explain strategies used to determine order. ➤ Order the numbers of a given set by placing them on a number line that contains benchmarks, such as 0 and 1 or 0 and 5. ➤ Position a given set of positive fractions, including mixed numbers and improper fractions, on a number line; and explain strategies used to determine position.

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Grade 7

Strand: Patterns and Relations (Patterns)	General Outcome: Use patterns to describe the world and to solve problems.
Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following set of indicators may be used to assess student achievement for each corresponding specific outcome. Students who have fully met the specific outcome are able to:</i>
1. Demonstrate an understanding of oral and written patterns and their equivalent linear relations. [C, CN, R]	<ul style="list-style-type: none"> ➤ Formulate a linear relation to represent the relationship in a given oral or written pattern. ➤ Provide a context for a given linear relation that represents a pattern. ➤ Represent a pattern in the environment, using a linear relation.
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, PS, R, V]	<ul style="list-style-type: none"> ➤ Create a table of values for a given linear relation by substituting values for the variable. ➤ Create a table of values, using a linear relation, and graph the table of values (limited to discrete elements). ➤ Sketch the graph from a table of values created for a given linear relation, and describe the patterns found in the graph to draw conclusions; e.g., graph the relationship between n and $2n + 3$. ➤ Describe, using everyday language in spoken or written form, the relationship shown on a graph to solve problems. ➤ Match a set of linear relations to a set of graphs. ➤ Match a given set of graphs to a given set of linear relations.

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Grade 7

Strand: Patterns and Relations (Variables and Equations)	General Outcome: Represent algebraic expressions in multiple ways.
Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following set of indicators may be used to assess student achievement for each corresponding specific outcome. Students who have fully met the specific outcome are able to:</i>
3. Demonstrate an understanding of preservation of equality by: <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]	<ul style="list-style-type: none"> ➤ Model the preservation of equality for each of the four operations, using concrete materials or pictorial representations; explain the process orally; and record the process symbolically. ➤ Write equivalent forms of a given equation by applying the preservation of equality, and verify, using concrete materials; e.g., $3b = 12$ is the same as $3b + 5 = 12 + 5$ or $2r = 7$ is the same as $3(2r) = 3(7)$. ➤ Solve a given problem by applying preservation of equality.
4. Explain the difference between an expression and an equation. [C, CN]	<ul style="list-style-type: none"> ➤ Identify and provide an example of a constant term, numerical coefficient and variable in an expression. ➤ Explain what a variable is and how it is used in a given expression. ➤ Represent a given oral or written pattern using an algebraic expression. ➤ Represent a given oral or written pattern using an equation. ➤ Identify and provide an example of a constant term, numerical coefficient and variable in an equation. ➤ Provide an example of an expression and an equation, and explain how they are similar and different.
5. Evaluate an expression, given the value of the variable(s). [CN, R]	<ul style="list-style-type: none"> ➤ Substitute a value for an unknown in a given expression, and evaluate the expression.

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Grade 7

<p>Strand: Patterns and Relations (Variables and Equations) (continued)</p>	<p>General Outcome: Represent algebraic expressions in multiple ways.</p>
<p>6. Model and solve, concretely, pictorially and symbolically, problems that can be represented by one-step linear equations of the form $x + a = b$, where a and b are integers. [CN, PS, R, V]</p>	<ul style="list-style-type: none"> ➤ Represent a given problem with a linear equation; and solve the equation, using concrete models, e.g., counters, integer tiles. ➤ Draw a visual representation of the steps required to solve a given linear equation. ➤ Solve a given problem, using a linear equation. ➤ Verify the solution to a given linear equation, using concrete materials and diagrams. ➤ Substitute a possible solution for the variable in a given linear equation into the original linear equation to verify the equality.
<p>7. Model and solve, concretely, pictorially and symbolically, problems that can be represented by linear equations of the form:</p> <ul style="list-style-type: none"> • $ax + b = c$ • $ax = b$ • $\frac{x}{a} = b, a \neq 0$ <p>where a, b and c are whole numbers. [CN, PS, R, V]</p>	<ul style="list-style-type: none"> ➤ Model a given problem with a linear equation; and solve the equation, using concrete models, e.g., counters, integer tiles. ➤ Solve a given linear equation by inspection and by systematic trial. ➤ Draw a visual representation of the steps used to solve a given linear equation. ➤ Solve a given problem, using a linear equation, and record the process. ➤ Verify the solution to a given linear equation, using concrete materials and diagrams. ➤ Substitute a possible solution for the variable in a given linear equation into the original linear equation to verify the equality.

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Grade 7

Strand: Shape and Space (Measurement)	General Outcome: Use direct and indirect measurement to solve problems.
Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following set of indicators may be used to assess student achievement for each corresponding specific outcome. Students who have fully met the specific outcome are able to:</i>
<p>1. Demonstrate an understanding of circles by:</p> <ul style="list-style-type: none"> • describing the relationships among radius, diameter and circumference • 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. <p>[C, CN, PS, R, V]</p>	<ul style="list-style-type: none"> ➤ Illustrate and explain that the diameter is twice the radius in a given circle. ➤ Draw a circle with a given radius or diameter, with and without a compass. ➤ Illustrate and explain that the circumference is approximately three times the diameter in a given circle. ➤ Explain that, for all circles, pi is the ratio of the circumference to the diameter $\left(\frac{C}{d}\right)$ and its value is approximately 3.14. ➤ Solve a given contextual problem involving circles. ➤ Explain, using an illustration, that the sum of the central angles of a circle is 360°.
<p>2. Develop and apply a formula for determining the area of:</p> <ul style="list-style-type: none"> • triangles • parallelograms • circles. <p>[CN, PS, R, V]</p>	<ul style="list-style-type: none"> ➤ Illustrate and explain how the area of a rectangle can be used to determine the area of a parallelogram. ➤ Generalize a rule to create a formula for determining the area of parallelograms. ➤ Solve a given problem involving the area of triangles, parallelograms and/or circles. ➤ Illustrate and explain how the area of a rectangle or a parallelogram can be used to determine the area of a triangle. ➤ Generalize a rule to create a formula for determining the area of triangles. ➤ Illustrate and explain how to estimate the area of a circle without the use of a formula. ➤ Apply a formula for determining the area of a given circle.

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Grade 7

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 relationships among them.
Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following set of indicators may be used to assess student achievement for each corresponding specific outcome. Students who have fully met the specific outcome are able to:</i>
3. Perform geometric constructions, including: <ul style="list-style-type: none"> • perpendicular line segments • parallel line segments • perpendicular bisectors • angle bisectors. [CN, R, V]	<ul style="list-style-type: none"> ➤ Identify line segments on a given diagram that are parallel or perpendicular. ➤ Describe examples of parallel line segments in the environment. ➤ Draw a line segment parallel to another line segment, and explain why they are parallel. ➤ Describe examples of perpendicular line segments in the environment. ➤ Draw a line segment perpendicular to another line segment, and explain why they are perpendicular. ➤ Describe examples of perpendicular bisectors in the environment. ➤ Draw the perpendicular bisector of a line segment, using more than one method, and verify the construction. ➤ Describe examples of angle bisectors in the environment. ➤ Draw the bisector of a given angle, using more than one method, and verify that the resulting angles are equal.

[C] Communication	[PS] Problem Solving
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	[V] Visualization

Grade 7

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>	Achievement Indicators <i>The following set of indicators may be used to assess student achievement for each corresponding specific outcome. Students who have fully met the specific outcome are able to:</i>
4. Identify and plot points in the four quadrants of a Cartesian plane, using integral ordered pairs. [C, CN, V]	<ul style="list-style-type: none"> ➤ Label the axes of a four quadrant Cartesian plane, and identify the origin. ➤ Identify the location of a given point in any quadrant of a Cartesian plane, using an integral ordered pair. ➤ Plot the point corresponding to a given integral ordered pair on a Cartesian plane with units of 1, 2, 5 or 10 on its axes. ➤ Draw shapes and designs in a Cartesian plane, using given integral ordered pairs. ➤ Create shapes and designs, and identify the points used to produce the shapes and designs, in any quadrant of a Cartesian plane.
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). [C, CN, PS, T, V]	<p>(It is intended that the original shape and its image have vertices with integral coordinates.)</p> <ul style="list-style-type: none"> ➤ Identify the coordinates of the vertices of a given 2-D shape on a Cartesian plane. ➤ Describe the horizontal and vertical movement required to move from a given point to another point on a Cartesian plane. ➤ Determine the distance between points along horizontal and vertical lines in a Cartesian plane. ➤ Describe the positional change of the vertices of a given 2-D shape to the corresponding vertices of its image as a result of a transformation, or successive transformations, on a Cartesian plane. ➤ Perform a transformation or consecutive transformations on a given 2-D shape, and identify coordinates of the vertices of the image. ➤ Describe the image resulting from the transformation of a given 2-D shape on a Cartesian plane by identifying the coordinates of the vertices of the image.

[C] Communication	[PS] Problem Solving
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Grade 7

Strand: Statistics and Probability (Data Analysis)	General Outcome: Collect, display and analyze data to solve problems.
Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following set of indicators may be used to assess student achievement for each corresponding specific outcome. Students who have fully met the specific outcome are able to:</i>
1. Demonstrate an understanding of central tendency and range by: <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]	<ul style="list-style-type: none"> ➤ Determine mean, median and mode for a given set of data, and explain why these values may be the same or different. ➤ Determine the range for a given set of data. ➤ Solve a given problem involving the measures of central tendency. ➤ Provide a context in which the mean, median or mode is the most appropriate measure of central tendency to use when reporting findings.
2. Determine the effect on the mean, median and mode when an outlier is included in a data set. [C, CN, PS, R]	<ul style="list-style-type: none"> ➤ Analyze a given set of data to identify any outliers. ➤ Explain the effect of outliers on the measures of central tendency for a given data set. ➤ Identify outliers in a given set of data, and justify whether or not they are to be included in reporting the measures of central tendency. ➤ Provide examples of situations in which outliers would and would not be used in reporting the measures of central tendency.
3. Construct, label and interpret circle graphs to solve problems. [C, CN, PS, R, T, V]	<ul style="list-style-type: none"> ➤ Find and compare circle graphs in a variety of print and electronic media, such as newspapers, magazines and the Internet. ➤ Identify common attributes of circle graphs, such as: <ul style="list-style-type: none"> • title, label or legend • the sum of the central angles is 360° • the data is reported as a percent of the total, and the sum of the percents is equal to 100%. ➤ Translate percentages displayed in a circle graph into quantities to solve a given problem. ➤ Interpret a given circle graph to answer questions. ➤ Create and label a circle graph, with and without technology, to display a given set of data.

[C] Communication	[PS] Problem Solving
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Grade 7

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>	Achievement Indicators <i>The following set of indicators may be used to assess student achievement for each corresponding specific outcome. Students who have fully met the specific outcome are able to:</i>
4. Express probabilities as ratios, fractions and percents. [C, CN, R, T, V]	<ul style="list-style-type: none"> ➤ Determine the probability of a given outcome occurring for a given probability experiment, and express it as a ratio, fraction and percent. ➤ Provide an example of an event with a probability of 0 or 0% (impossible) and an example of an event with a probability of 1 or 100% (certain).
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]	<ul style="list-style-type: none"> ➤ Provide an example of two independent events, such as: <ul style="list-style-type: none"> • spinning a four section spinner and rolling an eight-sided die • tossing a coin and rolling a twelve-sided die • tossing two coins • rolling two dice and explain why they are independent. ➤ Identify the sample space (all possible outcomes) for each of two independent events, using a tree diagram, table or other graphic organizer.
6. Conduct a probability experiment to compare the theoretical probability (determined using a tree diagram, table or other graphic organizer) and experimental probability of two independent events. [C, PS, R, T]	<ul style="list-style-type: none"> ➤ Determine the theoretical probability of a given outcome involving two independent events. ➤ Conduct a probability experiment for an outcome involving two independent events, with and without technology, to compare the experimental probability with the theoretical probability. ➤ Solve a given probability problem involving two independent events.

Appendix A