

# Mathematics 7

*Outcomes*

### Website References

Website references contained within this document are provided solely as a convenience and do not constitute an endorsement by the Department of Education of the content, policies, or products of the referenced website.

The department does not control the referenced websites and subsequent links, and is not responsible for the accuracy, legality, or content of those websites. Referenced website content may change without notice.

Regional Education Centres and educators are required under the Department's Public School Programs Network Access and Use Policy to preview and evaluate sites before recommending them for student use. If an outdated or inappropriate site is found, please report it to <[curriculum@novascotia.ca](mailto:curriculum@novascotia.ca)>.

Mathematics Grade 7

© Crown copyright, Province of Nova Scotia, 2022

Prepared by the Department of Education and Early Childhood Development

This is the most recent version of the current curriculum materials as used by teachers in Nova Scotia.

The contents of this publication may be reproduced in part provided the intended use is for noncommercial purposes and full acknowledgment is given to the Nova Scotia Department of Education

## Mathematics Grade 7 Outcomes

**N01** Students will be expected to 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.

**Performance Indicators:**

N01.01 Determine if a given number is divisible by 2, 3, 4, 5, 6, 8, 9, or 10, and explain why.

N01.03 Determine the factors of a given number using the divisibility rules.

N01.04 Explain, using an example, why numbers cannot be divided by 0.

**N02** Students will be expected to demonstrate an understanding of the addition, subtraction, multiplication, and division of decimals to solve problems (for more than one-digit divisors or more than two-digit multipliers, the use of technology is expected).

**Performance Indicators:**

N02.01 Use estimation to determine the appropriate place value when calculating the sum or difference.

N02.02 Use estimation to determine the appropriate place value when calculating the product.

N02.03 Use estimation to determine the appropriate place value when calculating the quotient.

N02.04 Represent concretely, pictorially, and symbolically the multiplication and division of decimal numbers.

N02.05 Create and solve a given problem involving the addition of two or more decimal numbers.

N02.06 Create and solve a given problem involving the subtraction of decimal numbers.

N02.07 Create and solve a given problem involving the multiplication of decimal numbers.

N02.08 Create and solve a given problem involving the division of decimal numbers.

N02.09 Solve a given problem involving the multiplication or division of decimal numbers with two-digit multipliers or one-digit divisors (whole numbers or decimals) without the use of technology.

N02.10 Solve a given problem involving the multiplication or division of decimal numbers with more than two-digit multipliers or more than one-digit divisors (whole numbers or decimals) with the use of technology.

N02.11 Check the reasonableness of solutions using estimation.

N02.12 Solve a given problem that involves operations on decimals (limited to thousandths), taking into consideration the order of operations.

**N03** Students will be expected to solve problems involving percents from 1% to 100% (limited to whole numbers).

**Performance Indicators:**

- N03.01 Express a given percent as a decimal or fraction.
- N03.02 Use mental mathematics to solve percent problems, when appropriate.
- N03.03 Use estimation to determine an approximate answer or the reasonableness of an answer.
- N03.04 Solve a given problem that involves finding a percent.
- N03.05 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).

**N04** Students will be expected to demonstrate an understanding of the relationship between positive terminating decimals and positive fractions and between positive repeating decimals (with one or two repeating digits) and positive fractions.

**Performance Indicators:**

- N04.01 Predict the decimal representation of a given fraction using patterns.
- N04.02 Match a given set of fractions to their decimal representations.
- N04.03 Sort a given set of fractions as repeating or terminating decimals.
- N04.04 Express a given fraction as a terminating or repeating decimal.
- N04.05 Express a given repeating decimal as a fraction.
- N04.06 Express a given terminating decimal as a fraction.

**N05** Students will be expected to 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).

**Performance Indicators:**

- N05.01 Use benchmarks to estimate the sum or difference of positive fractions or mixed numbers.
- N05.02 Model addition and subtraction of given positive fractions or given mixed numbers, using concrete and pictorial representations, and record symbolically.
- N05.03 Determine the sum or difference of fractions mentally, when appropriate.
- N05.04 Determine the sum of two given positive fractions or mixed numbers with like denominators.
- N05.05 Determine the difference of two given positive fractions or mixed numbers with like denominators.
- N05.06 Determine a common denominator for a given set of positive fractions or mixed numbers.
- N05.07 Determine the sum of two given positive fractions or mixed numbers with unlike denominators.
- N05.08 Determine the difference of two given positive fractions or mixed numbers with unlike denominators.
- N05.09 Simplify a given positive fraction or mixed number by identifying the common factor between the numerator and denominator.
- N05.10 Simplify the solution to a given problem involving the sum or difference of two positive fractions or mixed numbers.
- N05.11 Solve a given problem involving the addition or subtraction of positive fractions or mixed numbers, and determine if the solution is reasonable.

**N06** Students will be expected to demonstrate an understanding of addition and subtraction of integers, concretely, pictorially, and symbolically.

**Performance Indicators:**

- N06.01 Explain, using concrete materials such as integer tiles and diagrams, that the sum of opposite integers is zero.
- N06.02 Illustrate, using a number line, the results of adding or subtracting negative and positive integers.
- N06.03 Add two given integers, using concrete materials and/or pictorial representations, and record the process symbolically.
- N06.04 Subtract two given integers, using concrete materials and/or pictorial representations, and record the process symbolically.
- N06.05 Illustrate the relationship between adding integers and subtracting integers.
- N06.06 Solve a given problem involving the addition and subtraction of integers.

**N07** Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.

**Performance Indicators:**

- N07.01 Position proper fractions with like and unlike denominators from a given set on a number line, and explain strategies used to determine order.
- N07.02 Position a given set of positive fractions, including mixed numbers and improper fractions, on a number line; and explain strategies used to determine order.
- N07.03 Position a given set of positive decimals on a number line and explain strategies used to determine order.
- N07.04 Compare and 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.
- N07.05 Identify a number that would be between two given numbers in an ordered sequence or on a number line.
- N07.06 Identify incorrectly placed numbers in an ordered sequence or on a number line.
- N07.07 Position 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.
- N07.08 Position a given set that includes positive fractions, positive decimals, and/or whole numbers on a number line and explain strategies used to determine order.

**PR01** Students will be expected to demonstrate an understanding of oral and written patterns and their equivalent linear relations.

**Performance Indicators:**

- PR01.01 Formulate a linear relation to represent the relationship in a given oral or written pattern.
- PR01.02 Provide a context for a given linear relation that represents a pattern.
- PR01.03 Represent a pattern in the environment using a linear relation.

**PR02** Students will be expected to create a table of values from a linear relation, graph the table of values, and analyze the graph to draw conclusions and solve problems.

**Performance Indicators:**

PR02.01 Create a table of values for a given linear relation by substituting values for the variable.

PR02.02 Create a table of values, using a linear relation, and graph the table of values (limited to discrete elements).

PR02.03 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  $2n + 3$ ).

PR02.04 Describe, using everyday language, in spoken or written form, the relationship shown on a graph to solve problems.

PR02.05 Match a given set of linear relations to a set of graphs.

PR02.06 Match a given set of graphs to a given set of linear relations.

**PR03** Students will be expected to demonstrate an understanding of preservation of equality by modelling preservation of equality, concretely, pictorially, and symbolically applying preservation of equality to solve equations.

**Performance Indicators:**

PR03.01 Model the preservation of equality for each of the four operations, using concrete materials and/or pictorial representations; explain the process orally; and record the process symbolically.

PR03.02 Write equivalent forms of a given equation by applying the preservation of equality, and verify using concrete materials (e.g.,  $3b = 12$  is equivalent to  $3b + 5 = 12 + 5$  or  $2r = 7$  is equivalent to  $3(2r) = 3(7)$ ).

PR03.03 Solve a given problem by applying preservation of equality.

**PR04** Students will be expected to explain the difference between an expression and an equation.

**Performance Indicators:**

PR04.01 Identify and provide an example of a constant term, numerical coefficient, and variable in an expression and an equation.

PR04.02 Explain what a variable is and how it is used in a given expression.

PR04.03 Provide an example of an expression and an equation and explain how they are similar and different.

**PR05** Students will be expected to evaluate an expression given the value of the variable(s).

**Performance Indicator:**

PR05.01 Substitute a value for an unknown in a given expression and evaluate the expression.

**PR06** Students will be expected to 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.

**Performance Indicators:**

PR06.01 Represent a given problem with a linear equation, and solve the equation using concrete models.

PR06.02 Draw a visual representation of the steps required to solve a given linear equation.

PR06.03 Solve a given problem using a linear equation and record the process.

PR06.04 Verify the solution to a given linear equation using concrete materials and diagrams.

PR06.05 Substitute a possible solution for the variable in a given linear equation into the original linear equation to verify the equality.

**PR07** Students will be expected to model and solve, concretely, pictorially, and symbolically, where  $a$ ,  $b$ , and  $c$  are whole numbers, problems that can be represented by linear equations of the form  $ax + b = c$ ;  $ax = b$ ;  $x \div a = b$ ,  $a \neq 0$

**Performance Indicators:**

PR07.01 Represent a given problem with a linear equation, and solve the equation using concrete models.

PR07.02 Draw a visual representation of the steps used to solve a given linear equation.

PR07.03 Solve a given problem using a linear equation and record the process.

PR07.04 Verify the solution to a given linear equation using concrete materials and diagrams.

PR07.05 Substitute a possible solution for the variable in a given linear equation into the original linear equation to verify the equality.

**M01** Students will be expected to demonstrate an understanding of circles by: 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.

**Performance Indicators:**

M01.01 Illustrate and explain that the diameter is twice the radius in a given circle.

M01.02 Illustrate and explain that the circumference is approximately three times the diameter in a given circle.

M01.03 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.

M01.04 Explain, using an illustration, that the sum of the central angles of a circle is  $360^\circ$ .

M01.05 Draw a circle with a given radius or diameter, with and without a compass.

M01.06 Solve a given contextual problem involving circles.

**M02** Students will be expected to develop and apply a formula for determining the area of triangles, parallelograms, and circles.

**Performance Indicators:**

- M02.01 Illustrate and explain how the area of a rectangle can be used to determine the area of a triangle.
- M02.02 Generalize a rule to create a formula for determining the area of triangles.
- M02.03 Illustrate and explain how the area of a rectangle can be used to determine the area of a parallelogram.
- M02.04 Generalize a rule to create a formula for determining the area of parallelograms.
- M02.05 Illustrate and explain how to estimate the area of a circle without the use of a formula.
- M02.06 Generalize a rule to create a formula for determining the area of a given circle.
- M02.07 Solve a given problem involving the area of triangles, parallelograms, and/or circles.

**G02** Students will be expected to identify and plot points in the four quadrants of a Cartesian plane, using integral ordered pairs.

**Performance Indicators:**

- G02.01 Label the axes of a four quadrant Cartesian plane and identify the origin.
- G02.02 Identify the location of a given point in any quadrant of a Cartesian plane using an integral ordered pair.
- G02.03 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.

**SP01** Students will be expected to demonstrate an understanding of central tendency and range by determining the measures of central tendency (mean, median, mode) and range  
determining the most appropriate measures of central tendency to report findings.

**Performance Indicators:**

- SP01.01 Determine mean, median, and mode for a given set of data, and explain why these values may be the same or different.
- SP01.02 Determine the range for a given set of data.
- SP01.03 Provide a context in which the mean, median, or mode is the most appropriate measure of central tendency to use when reporting findings.
- SP01.04 Solve a given problem involving the measures of central tendency.

**SP02** Students will be expected to determine the effect on the mean, median, and mode when an outlier is included in a data set.

**Performance Indicators:**

- SP02.01 Analyze a given set of data to identify any outliers.
- SP02.02 Explain the effect of outliers on the measures of central tendency for a given data set.
- SP02.03 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.
- SP02.04 Provide examples of situations in which outliers would and would not be used in reporting the measures of central tendency.



**SP03** Students will be expected to construct, label, and interpret circle graphs to solve problems

**Performance Indicators:**

SP03.01 Identify common attributes of circle graphs, such as

- 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%

SP03.02 Create and label a circle graph, with technology, to display a given set of data.

SP03.03 Find and compare circle graphs in a variety of print and electronic media, such as newspapers, magazines, and the Internet.

SP03.04 Translate percentages displayed in a circle graph into quantities to solve a given problem.

SP03.05 Interpret a given or constructed circle graph to answer questions.

**SP04** Students will be expected to express probabilities as ratios, fractions, and percents.

**Performance Indicators:**

SP04.01 Determine the probability of a given outcome occurring for a given probability experiment, and express it as a ratio, fraction, and percent.

SP04.02 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).

**SP06** Students will be expected to 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.

**Performance Indicators:**

SP06.01 Determine the theoretical probability of a given outcome involving two independent events.

SP06.02 Conduct a probability experiment for an outcome involving two independent events, with and without technology, to compare the experimental probability with the theoretical probability.

SP06.03 Solve a given probability problem involving two independent events.