Blueprint for *MathLinks 7* Final Exam – Option 1

Number **General Outcome:** Develop number sense.	
Specific Outcome: 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]	
Determine if a given number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10 and explain why.	MC #37, Conceptual
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.	MC #35, Conceptual
Explain, using an example, why numbers cannot be divided by 0.	
Specific Outcome: 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 a given problem involving the addition of two or more decimal numbers.	
Solve a given problem involving the subtraction of decimal numbers.	
Solve a given problem involving the multiplication of decimal numbers.	
Solve a given problem involving the multiplication or division of decimal numbers with 2-digit multipliers or 1-digit divisors (whole numbers or decimals) without the use of technology.	MC #53, Procedural
Solve a given problem involving the multiplication or division of decimal numbers with more than a 2-digit multiplier or 1-digit divisor (whole number or decimal), with the use of technology.	
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.	
Place the decimal in a product using front-end estimation, e.g., for \$12.33 × 2.4, think \$12 × 2, so the product is greater than \$24.	WR #2d), Procedural
Place the decimal in a quotient using front-end estimation, e.g., for 51.50 m ÷ 2.1, think 50 m ÷ 2, so the quotient is approximately 25 m.	
Check the reasonableness of solutions using estimation.	MC #47, Problem Solving

Solve a given problem that involves operations on decimals (limited to thousandths) taking into consideration the order of operations.	MC #17, Conceptual MC #48, Procedural MC #19, WR #2d), Problem Solving
Specific Outcome: Solve problems involving percents from 1% to 100%. [C, CN, PS, R, T].	
Express a given percent as a decimal or fraction.	MC #18, Procedural
Solve a given problem that involves finding a percent.	MC #51, Procedural MC #23, Problem Solving MC #50, NR #22, Problem Solving
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.	
Specific Outcome: Demonstrate an understanding of the relationship between positive repeating decimals and positive fractions, and positive terminating decimals and positive fractions. [C, CN, R, T]	
Predict the decimal representation of a given fraction using patterns, e.g., $\frac{1}{11} = 0.\overline{09}$, $\frac{2}{11} = 0.\overline{18}$, $\frac{3}{11} = ?$	
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.	
Specific Outcome: 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]	
Model addition and subtraction of a given positive fraction or a given mixed number using concrete representations, and record symbolically.	MC #38, Conceptual MC #39, Problem Solving
Determine the sum of two given positive fractions or mixed numbers with like denominators.	
Determine the difference of two given positive fractions or mixed numbers with like denominators.	
Determine a common denominator for a given set of positive fractions or mixed numbers.	
Determine the sum of two given positive fractions or mixed numbers with unlike denominators.	NR #46, Conceptual

Determine the difference of two given positive fractions or mixed numbers with unlike denominators.	
Simplify a given positive fraction or mixed number by identifying the common factor between the numerator and denominator.	MC #36, Procedural
Simplify the solution to a given problem involving the sum or difference of two positive fractions or mixed numbers.	MC #52, Problem Solving
Solve a given problem involving the addition or subtraction of positive fractions or mixed numbers and determine if the solution is reasonable.	
Specific Outcome: Demonstrate an understanding of addition and subtraction of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]	
Explain, using concrete materials such as integer tiles and diagrams, that the sum of opposite integers is zero.	
Illustrate, using a number line, the results of adding or subtracting negative and positive integers, e.g., a move in one direction followed by an equivalent move in the opposite direction results in no net change in position.	MC #40, Procedural
Add two given integers using concrete materials or pictorial representations and record the process symbolically.	MC #6, Problem Solving
Subtract two given integers using concrete materials or pictorial representations and record the process symbolically.	
Solve a given problem involving the addition and subtraction of integers.	MC #41, Conceptual MC #17, Procedural MC #20, Problem Solving
Specific Outcome: Compare and order positive fractions, positive decimals (to thousandths) and whole numbers by using: • benchmarks • place value • equivalent fractions and/or decimals. [CN, R, V]	
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.	MC #33, Conceptual
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.	
Patterns and Relations (Patterns) **General Outcome:** Use patterns to describe the world and solve problems.	
Specific Outcome: Demonstrate an understanding of oral and written patterns and their equivalent linear relations. [C, CN, R]	
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.	MC #57, Problem Solving
Represent a pattern in the environment using a linear relation.	WR #3c), Problem Solving
Specific Outcome: 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]	
Create a table of values for a given linear relation by substituting values for the variable.	MC #54, Procedural
Create a table of values using a linear relation and graph the table of values (limited to discrete elements).	WR #3d), Problem Solving
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 $2n + 3$.	WR #3e), Problem Solving
Describe the relationship shown on a graph using everyday language in spoken or written form to solve problems.	
Match a given set of linear relations to a given set of graphs.	MC #56, Problem Solving
Match a set of graphs to a given set of linear relations.	
Patterns and Relations (Variables and Equations) **General Outcome:** Represent algebraic expressions in multiple ways.	
Specific Outcome: Demonstrate an understanding of preservation of equality by: • modelling preservation of equality, concretely, pictorially and symbolically • applying preservation of equality to solve equations. [C, CN, PS, R, V]	

Model the preservation of equality for each of the four operations using concrete materials or using pictorial representations, explain the process orally and record it symbolically.	MC #6, Problem Solving
Solve a given problem by applying preservation of equality.	MC #44, Conceptual MC #12, Procedural
Specific Outcome: Explain the difference between an expression and an equation. [C, CN]	
Identify and provide an example of a constant term, a numerical coefficient and a variable in an expression and an equation.	MC #55, Conceptual NR #59, Conceptual
Explain what a variable is and how it is used in a given expression.	
Provide an example of an expression and an equation, and explain how they are similar and different.	
Specific Outcome: Evaluate an expression given the value of the variable(s). [CN, R]	
Substitute a value for an unknown in a given expression and evaluate the expression.	
Specific Outcome: 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]	
Represent a given problem with a linear equation and solve the equation using concrete models, e.g., counters, integer tiles.	MC #42, Conceptual
Draw a visual representation of the steps required to solve a given linear equation.	
Solve a given problem using a linear equation.	MC #43, Procedural NR #60, Problem Solving
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.	
Specific Outcome: Model and solve problems that can be represented by linear equations of the form: • $ax + b = c$ • $ax = b$ • $\frac{x}{a} = b$, $a \neq 0$ concretely, pictorially and symbolically, where a, b and c are whole numbers. [CN, PS, R, V]	
Model 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 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.	
Shape and Space (Measurement) **General Outcome:** Use direct or indirect measurement to solve problems.	
Specific Outcome: Demonstrate an understanding of circles by: • 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]	
Illustrate and explain that the diameter is twice the radius in a given circle.	
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 ($\frac{C}{d}$), and its value is approximately 3.14.	NR #45, Conceptual
Explain, using an illustration, that the sum of the central angles of a circle is 360°.	
Draw a circle with a given radius or diameter with and without a compass.	
Solve a given contextual problem involving circles.	MC #24, Conceptual
Specific Outcome: Develop and apply a formula for determining the area of: • triangles • parallelograms • circles. [CN, PS, R, V]	
Illustrate and explain how the area of a rectangle can be used to determine the area of a triangle.	MC #28, Problem Solving
Generalize a rule to create a formula for determining the area of triangles.	MC #27, Problem Solving
Illustrate and explain how the area of a rectangle can be used to determine the area of a parallelogram.	MC #47, Procedural

Generalize a rule to create a formula for determining the area of parallelograms.	MC #4, Problem Solving
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.	MC #25, Conceptual NR #10, Procedural WR #2c), Problem Solving
Solve a given problem involving the area of triangles, parallelograms and/or circles.	MC #29, MC #49, WR #2a), WR #2b), Problem Solving
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 Outcome: Perform geometric constructions, including: • perpendicular line segments • parallel line segments • perpendicular bisectors • angle bisectors. [CN, R, V]	
Describe examples of parallel line segments, perpendicular line segments, perpendicular bisectors and angle bisectors in the environment.	MC #32, Conceptual MC #21, NR #26, Problem Solving
Identify line segments on a given diagram that are parallel or perpendicular.	MC #30, Problem Solving
Draw a line segment perpendicular to another line segment and explain why they are perpendicular.	
Draw a line segment parallel to another line segment and explain why they are parallel.	
Draw the bisector of a given angle using more than one method and verify that the resulting angles are equal.	
Draw the perpendicular bisector of a line segment using more than one method and verify the construction.	
Shape and Space (Transformations) **General Outcome:** Describe and analyze position and motion of objects and shapes.	
Specific Outcome: Identify and plot points in the four quadrants of a Cartesian plane using integral ordered pairs. [C, CN, V]	
Label the axes of a four quadrant Cartesian plane and identify the origin.	MC #1, Conceptual
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.	WR #3e), Procedural

Draw shapes and designs, using given integral ordered pairs, in a Cartesian plane.	
Create shapes and designs, and identify the points used to produce the shapes and designs in any quadrant of a Cartesian plane.	
Specific Outcome: 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]	
(It is intended that the original shape and its image have vertices with integral coordinates.) 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.	
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.	MC #31, Conceptual
Determine the distance between points along horizontal and vertical lines in a Cartesian plane.	
Perform a transformation or consecutive transformations on a given 2-D shape and identify coordinates of the vertices of the image.	MC #2, Procedural NR #3, Problem Solving
Describe the positional change of the vertices of a 2-D shape to the corresponding vertices of its image as a result of a transformation or a combination of successive transformations.	
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.	
Statistics and Probability (Data Analysis) **General Outcome:** Collect, display and analyze data to solve problems.	
Specific Outcome: 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. [C, PS, R, T]	
Determine mean, median and mode for a given set of data, and explain why these values may be the same or different.	MC #13, MC #14, MC #15, Problem Solving
Determine the range of given sets of data.	
Provide a context in which the mean, median or mode is the most appropriate measure of central tendency to use when reporting findings.	

Solve a given problem involving the measures of central tendency.	WR #3a), WR #3b), Problem Solving
Specific Outcome: Determine the effect on the mean, median and mode when an outlier is included in a data set. [C, CN, PS, R]	
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 the reporting of the measures of central tendency.	MC #16, Problem Solving
Provide examples of situations in which outliers would and would not be used in reporting the measures of central tendency.	
Specific Outcome: Construct, label and interpret circle graphs to solve problems. [C, CN, PS, R, T, V]	
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%.	
Create and label a circle graph, with and without technology, to display a given set of data.	WR #4a), WR #4b), Problem Solving
Find and compare circle graphs in a variety of print and electronic media, such as newspapers, magazines and the Internet.	MC #11, Problem Solving
Translate percentages displayed in a circle graph into quantities to solve a given problem.	
Interpret a given circle graph to answer questions.	WR #4c), Problem Solving
Statistics and Probability (Chance and Uncertainty) **General Outcome:** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.	
Specific Outcome: Express probabilities as ratios, fractions and percents. [C, CN, R,V, T]	
Determine the probability of a given outcome occurring for a given probability experiment, and express it as a ratio, fraction and percent.	MC #7, Conceptual
Provide an example of an event with a probability of 0 or 0% (impossible) and an event with a probability of 1 or 100% (certain).	MC #23, Problem Solving
Specific Outcome: 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]	

Provide an example of two independent events, such as: • spinning a four section spinner and 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 another graphic organizer.	NR #8, Conceptual MC #58, WR #1a), WR#1b), Problem Solving
Specific Outcome: 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]	
Determine the theoretical probability of a given outcome involving two independent events.	MC #34, Conceptual
Conduct a probability experiment for an outcome involving two independent events, with and without technology, to compare the experimental probability to the theoretical probability.	MC #5, Procedural MC #7, MC #9, Problem Solving
Solve a given probability problem involving two independent events.	WR #1c), Problem Solving