Blueprint for *MathLinks 8* Final Exam – Option 1

Number **General Outcome:** Develop number sense.	
Specific Outcome: Demonstrate an understanding of perfect square and square root, concretely, pictorially and symbolically (limited to whole numbers). [C, CN, R, V]	
Represent a given perfect square as a square region using materials, such as grid paper or square shapes.	
Determine the factors of a given perfect square, and explain why one of the factors is the square root and the others are not.	
Determine whether or not a given number is a perfect square using materials and strategies, such as square shapes, grid paper or prime factorization, and explain the reasoning.	MC #52, Conceptual
Determine the square root of a given perfect square and record it symbolically.	NR #6, Procedural MC #53, Procedural
Determine the square of a given number.	NR #54, Procedural
Specific Outcome: Determine the approximate square root of numbers that are not perfect squares (limited to whole numbers). [C, CN, ME, R, T]	
Estimate the square root of a given number that is not a perfect square using the roots of perfect squares as benchmarks.	MC #24, Conceptual MC #56, Conceptual
Approximate the square root of a given number that is not a perfect square using technology, e.g., calculator, computer.	NR #5, Procedural MC #25, Procedural
Explain why the square root of a number shown on a calculator may be an approximation.	
Identify a number with a square root that is between two given numbers.	
Specific Outcome: Demonstrate an understanding of percents greater than or equal to 0%. [CN, PS, R, V].	
Provide a context where a percent may be more than 100% or between 0% and 1%.	MC #14, Problem Solving MC #1, Problem Solving
Represent a given fractional percent using grid paper.	MC #40, Conceptual
Represent a given percent greater than 100 using grid paper.	NR #39, Conceptual WR #1a), Procedural/Problem Solving
Determine the percent represented by a given shaded region on a grid, and record it in decimal, fractional and percent form.	WR #1b), Procedural

Express a given percent in decimal or fractional form.	MC #57, Procedural
Express a given decimal in percent or fractional form.	
Express a given fraction in decimal or percent form.	
Solve a given problem involving percents.	MC #14, Procedural MC #27, Procedural
Solve a given problem involving combined percents, e.g., addition of percents, such as GST + PST.	MC #23, Procedural
Solve a given problem that involves finding the percent of a percent, e.g., A population increased by 10% one year and then increased by 15% the next year. Explain why there was not a 25% increase in population over the two years.	WR #1c), Problem Solving WR #1d), Problem Solving
Specific Outcome: Demonstrate an understanding of ratio and rate. [C, CN, V]	
Express a two-term ratio from a given context in the forms 3:5 or 3 to 5.	MC #2, Procedural
Express a three-term ratio from a given context in the forms 4:7:3 or 4 to 7 to 3.	
Express a part to part ratio as a part to whole fraction, e.g., frozen juice to water; 1 can concentrate to 4 cans of water can be represented as $\frac{1}{5}$, which is the ratio of concentrate to solution, or $\frac{4}{5}$, which is the ratio of water to solution.	
Identify and describe ratios and rates from real-life examples, and record them symbolically.	WR #2a), Procedural/Conceptual MC #17, Conceptual/Procedural
Express a given rate using words or symbols, e.g., 20 L per 100 km or 20 L/100 km.	MC #17, Conceptual/Procedural
Express a given ratio as a percent and explain why a rate cannot be represented as a percent.	
Specific Outcome: Solve problems that involve rates, ratios and proportional reasoning. [C, CN, PS, R]	
Explain the meaning of $\frac{a}{b}$ within a given context.	
Provide a context in which $\frac{a}{b}$ represents a: • fraction • rate • ratio • quotient • probability.	

Solve a given problem involving rate, ratio, or percent.	MC #3, Problem Solving MC #16, Problem Solving MC #17, Conceptual/Procedural NR #22, Procedural/Problem Solving WR #2a), Procedural/Conceptual
Specific Outcome: Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically. [C, CN, ME, PS]	
Identify the operation required to solve a given problem involving positive fractions.	
Provide a context that requires the multiplying of two given positive fractions.	
Provide a context that requires the dividing of two given positive fractions.	
Estimate the product of two given positive proper fractions to determine if the product will be closer to 0, $\frac{1}{2}$ or 1.	
Estimate the quotient of two given positive fractions and compare the estimate to whole number benchmarks.	
Express a given positive mixed number as an improper fraction and a given positive improper fraction as a mixed number.	
Model multiplication of a positive fraction by a whole number concretely or pictorially and record the process.	WR #4e), Procedural/Problem Solving
Model multiplication of a positive fraction by a positive fraction concretely or pictorially using an area model and record the process.	MC #48, Conceptual
Model division of a positive proper fraction by a whole number concretely or pictorially and record the process.	
Model division of a positive proper fraction by a positive proper fraction pictorially and record the process.	
Generalize and apply rules for multiplying and dividing positive fractions, including mixed numbers.	MC #49, Procedural MC #50, Problem Solving MC #51, Procedural
Solve a given problem involving positive fractions taking into consideration order of operations (limited to problems with positive solutions).	MC #20, Procedural NR #60, Procedural
Specific Outcome: Demonstrate an understanding of multiplication and division of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]	

Identify the operation required to solve a given problem involving integers.	
Provide a context that requires multiplying two integers.	MC #29, Problem Solving
Provide a context that requires dividing two integers.	
Model the process of multiplying two integers using concrete materials or pictorial representations and record the process.	
Model the process of dividing an integer by an integer using concrete materials or pictorial representations and record the process.	MC #58, Conceptual
Solve a given problem involving the division of integers (2-digit by 1-digit) without the use of technology.	
Solve a given problem involving the division of integers (2-digit by 2-digit) with the use of technology.	
Generalize and apply a rule for determining the sign of the product and quotient of integers.	
Solve a given problem involving integers taking into consideration order of operations.	MC #12, Procedural MC #19, Conceptual NR #60, Procedural WR #4f), Problem Solving
Patterns and Relations (Patterns) **General Outcome:** Use patterns to describe the world and solve problems.	
Specific Outcome: Graph and analyze two-variable linear relations. [C, ME, PS, R, T, V]	
Determine the missing value in an ordered pair for a given equation.	
Create a table of values by substituting values for a variable in the equation of a given linear relation.	MC #11, Procedural/Problem Solving WR #4a), Procedural WR #4c), Procedural/Problem Solving
Construct a graph from the equation of a given linear relation (limited to discrete data).	MC #59, Conceptual
Describe the relationship between the variables of a given graph.	MC #36, Problem Solving WR #4b), Problem Solving
Patterns and Relations (Variables and Equations) **General Outcome:** Represent algebraic expressions in multiple ways.	
Specific Outcome: Model and solve problems using linear equations of the form: • $ax = b$ • $\frac{x}{a} = b, a \neq 0$ • $ax + b = c$ • $\frac{x}{a} = b = c, a \neq 0$ • $a(x + b) = c$	

concretely, pictorially and symbolically, where *a*, *b* and *c* are integers. [C, CN, PS, V]	
Model a given problem with a linear equation and solve the equation using concrete models, e.g., counters, integer tiles.	MC #36, Conceptual
Verify the solution to a given linear equation using a variety of methods, including concrete materials, diagrams and substitution.	
Draw a visual representation of the steps used to solve a given linear equation and record each step symbolically.	
Solve a given linear equation symbolically.	MC #45, Procedural
Identify and correct an error in a given incorrect solution of a linear equation.	MC #44, Conceptual
Apply the distributive property to solve a given linear equation, e.g., $2(x + 3) = 5$; $2x + 6 = 5$;…	
Solve a given problem using a linear equation and record the process.	MC #37, Conceptual/Procedural MC #46, Conceptual
Shape and Space (Measurement) **General Outcome:** Use direct or indirect measurement to solve problems.	
Specific Outcome: Develop and apply the Pythagorean theorem to solve problems. [CN, PS, R, T, V]	
Model and explain the Pythagorean theorem concretely, pictorially or using technology.	MC #26, Conceptual MC #55, Conceptual
Explain, using examples, that the Pythagorean theorem applies only to right triangles.	WR #3a), Conceptual
Determine whether or not a given triangle is a right triangle by applying the Pythagorean theorem.	
Determine the measure of the third side of a right triangle, given the measures of the other two sides, to solve a given problem.	NR #5, Procedural
Solve a given problem that involves Pythagorean triples, e.g., 3, 4, 5 or 5, 12, 13.	WR #3b), Problem Solving WR #3c), Problem Solving
Specific Outcome: Draw and construct nets for 3-D objects. [C, CN, PS, V]	
Match a given net to the 3-D object it represents.	MC #10, Conceptual
Construct a 3-D object from a given net.	
Draw nets for a given right circular cylinder, right rectangular prism, and right triangular prism, and verify by constructing the 3-D objects from the nets.	
Predict 3-D objects that can be created from a given net and verify the prediction.	

Specific Outcome: Determine the surface area of: • right rectangular prisms • right triangular prisms • right cylinders to solve problems. [C, CN, PS, R, V]	
Explain, using examples, the relationship between the area of 2-D shapes and the surface area of a given 3-D object.	
Identify all the faces of a given prism, including right rectangular and right triangular prisms.	
Describe and apply strategies for determining the surface area of a given right rectangular or right triangular prism.	MC #28, Problem Solving
Describe and apply strategies for determining the surface area of a given right cylinder.	NR #8, Procedural
Solve a given problem involving surface area.	MC #18, Problem Solving MC #28, Problem Solving WR #2c), Procedural,/Problem Solving
Specific Outcome: Develop and apply formulas for determining the volume of right prisms and right cylinders. [C, CN, PS, R, V]	
Determine the volume of a given right prism, given the area of the base.	NR #22, Procedural
Generalize and apply a rule for determining the volume of right cylinders.	
Explain the connection between the area of the base of a given right 3-D object and the formula for the volume of the object.	
Demonstrate that the orientation of a given 3-D object does not affect its volume.	
Apply a formula to solve a given problem involving the volume of a right cylinder or a right prism.	MC #4, Problem Solving NR #29, Problem Solving WR #2b), Procedural
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: Draw and interpret top, front and side views of 3-D objects composed of right rectangular prisms. [C, CN, R, T, V]	
Draw and label the top, front, and side views for a given 3-D object on isometric dot paper.	
Compare different views of a given 3-D object to the object.	MC #9, Conceptual

Predict the top, front and side views that will result from a described rotation (limited to multiples of 90 degrees) and verify predictions.	
Draw and label the top, front and side views that result from a given rotation (limited to multiples of 90 degrees).	
Build a 3-D block object, given the top, front and side views, with or without the use of technology.	
Sketch and label the top, front and side views of a 3-D object in the environment with or without the use of technology.	MC #9, Conceptual
Shape and Space (Transformations) **General Outcome:** Describe and analyze position and motion of objects and shapes.	
Specific Outcome: Demonstrate an understanding of tessellation by: • explaining the properties of shapes that make tessellating possible • creating tessellations • identifying tessellations in the environment. [C, CN, PS, T, V]	
Identify, in a given set of regular polygons, those shapes and combinations of shapes that will tessellate, and use angle measurements to justify choices, e.g., squares, regular n-gons.	MC #38, Conceptual MC #47, Conceptual
Identify, in a given set of irregular polygons, those shapes and combinations of shapes that will tessellate, and use angle measurements to justify choices.	
Identify a translation, reflection or rotation in a given tessellation.	
Identify a combination of transformations in a given tessellation.	
Create a tessellation using one or more 2-D shapes, and describe the tessellation in terms of transformations and conservation of area.	
Create a new tessellating shape (polygon or non-polygon) by transforming a portion of a given tessellating polygon, e.g., one by M. C. Escher, and describe the resulting tessellation in terms of transformations and conservation of area.	
Identify and describe tessellations in the environment.	
Statistics and Probability (Data Analysis) **General Outcome:** Collect, display and analyze data to solve problems.	
Specific Outcome: Critique ways in which data is presented. [C, R, T, V]	

Compare the information that is provided for the same data set by a given set of graphs, including circle graphs, line graphs, bar graphs, double bar graphs and pictographs, to determine the strengths and limitations of each graph.	NR #7, Conceptual
Identify the advantages and disadvantages of different graphs, including circle graphs, line graphs, bar graphs, double bar graphs and pictographs, in representing a specific given set of data.	
Justify the choice of a graphical representation for a given situation and its corresponding data set.	WR #3d), Problem Solving WR #4d), Problem Solving
Explain how the format of a given graph, such as the size of the intervals, the width of bars and the visual representation, may lead to misinterpretation of the data.	WR #3d), Problem Solving
Explain how a given formatting choice could misrepresent the data.	
Identify conclusions that are inconsistent with a given data set or graph and explain the misinterpretation.	MC #13, Problem Solving MC #15, Conceptual
Statistics and Probability (Chance and Uncertainty) **General Outcome:** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.	
Specific Outcome: Solve problems involving the probability of independent events. [C, CN, PS, T]	
Determine the probability of two given independent events and verify the probability using a different strategy.	MC #30, Conceptual MC #31, Conceptual
Generalize and apply a rule for determining the probability of independent events.	MC #21,Conceptual NR #41, Procedural MC #42, Procedural MC #43, Procedural
Solve a given problem that involves determining the probability of independent events.	MC #21, Procedural MC #32, Conceptual/Procedural MC #33, Conceptual/Procedural MC #34, Conceptual/Procedural NR #35, Problem Solving