Math Foundations 10 Work Plan

Units / Topics	Time Frame	Major Learning Indicators	Resources / Possible Assessments
10.1 Demonstrate understanding of factors of whole numbers by: • **Prime factors** • **Greatest Common Factors (GCF)** • **Least Common Multiple (LCM)** • **Principal square root** • **Cube root**	**December** **1 week** **6 classes**	○ Develop, generalize, explain, and apply strategies for determining the greatest common factors or least common multiples ○ Explain the relationship between factors and multiples. ○ Determine the prime factors of a whole number and explain the strategies used. ○ Analyze concretely, pictorially, or numerically and explain whether a whole number is a perfect square or a perfect cube. ○ Develop, generalize, explain, and apply strategies for determining the square root of a perfect square and the cube root of a perfect cube. ○ Investigate and report about the numbers 0 and 1 with respect to factors, multiples, square roots, and cube roots. ○ Solve problems that involve prime factors, greatest common factors, least common multiples, square roots, or cube roots	•
10.5 Understanding of Multiplication and factoring of polynomial expressions: • **Multiplying monomials, binomials, trinomials** • **Common factors** • **Trinomial factoring** • **Relating multiplication and factoring of polynomials**	**December** **1-2 weeks** **6 - 10 classes**	○ Develop, generalize, explain, and apply a strategy of symbolic manipulation to determine the product of two binomials by analyzing concrete and pictorial models. ○ Explain the relationship between the multiplication of two binomial expressions and the area of a rectangular region. ○ Develop (concretely, pictorially, or symbolically), explain, and apply understanding of how multiplication of binomials is related to the multiplication of two-digit numbers (e.g., use algebra tiles and base ten blocks to compare and relate the products of (x+1)(3x+2) and (11)(32)). ○ Develop, generalize, explain, and apply a strategy for multiplying polynomials. ○ Analyze the multiplication of two polynomials for errors and explain the strategy used. ○ Explain why evaluating at a value for the variable in a product of polynomials in factored form should give the same solution as evaluating the expanded and simplified form of the polynomial product at the same value (e.g., explain why x^2+5x+6 should have the same value as (x+3)(x+2) when evaluated at x = -4). ○ Explain, using concrete or visual models, how the processes of factoring and multiplication are related. ○ Develop (using concrete materials, pictures, or visualization), generalize, explain, and apply strategies for factoring and verifying the factors of binomials, including numerical binomial expressions (e.g., 32+20=4(8+5)).	•

		○ Sort a set of polynomials according to the type(s) of factoring that could be applied to them. ○ Explain and apply strategies for determining whether given factors are those of a given polynomial. ○ Develop, generalize, explain, and apply strategies for factoring a trinomial. ○ Critique the statement "any trinomial can be factored into two binomial factors". ○ Explain how differences of squares can be factored using trinomial factoring strategies. ○ Explain why it is important to look for common factors first when factoring a trinomial	
10.2 Demonstrate understanding of irrational numbers in both radical and exponential form: • **Representing** • **Simplifying** • **Identifying** • **Ordering** • **Relating to rational numbers** • **Application of laws of exponents**	**December – January** **1 – 2 weeks** **6-10 classes**	○ Sort, with justification, a set of numbers into rational and irrational numbers. ○ Create and explain a pattern that describes the decimal form of an irrational number (e.g., write the digits from 0 to 9 in order, then put two of each digit – 0011223344 ... – followed by three of each digit and so on). ○ Approximate the value of a given irrational number and explain the strategy used. ○ Order a set of Real numbers, including rational and irrational numbers, on a number line and explain the strategies used. ○ Express a radical as a mixed radical in simplest form (limited to numerical radicands). ○ Express a mixed radical as an entire radical (limited to numerical radicands). ○ Explain, using examples, how changing the value of the index of a radical impacts the value of the radical. ○ Represent, such as through the use of a graphic organizer, the relationships among the subsets of the Real numbers: natural, whole, integer, rational, and irrational. ○ Analyze patterns to generalize why $a^{-n} = \frac{1}{a^n}, a \neq 0.$ ○ Analyze patterns to generalize why $a^{\frac{1}{n}} = \sqrt[n]{a}, n \neq 0, n \in I$ and a > 0 ○ Extend and apply the laws of exponents ○ Analyze simplifications of expression involving radicals and powers ○ Express powers with rational exponents as radicals and vice versa ○ Create a representation that conveys the relationship between powers, rational numbers and irrational numbers	•

10.3 Demonstrate understanding of SI and imperial units of measurement. • **Linear measurement** • **Surface area of spheres, cones, cylinders, prisms, and pyramids** • **Volumes** • **Relationships with measurements systems**	**January** **1-2 weeks** **6-10 classes**	○ Provide personal referents for linear measurements, including millimetre, centimetre, metre, kilometre, inch, foot, yard, and mile and explain the choices. ○ Justify the choice of units and or referents for determining or estimating linear, surface area, or volume measurements in different contexts ○ Explain the selection of measuring tools and the strategies used to determine linear measurements ○ Critique the statement: The length of a wall is greater in yards than in metres ○ Compare imperial and SI units ○ Strategies and /or formulas for converting with SI and imperial units (linear, surface area, and volume) ○ Verify with explanation, a conversion of units ○ Analyze 3D objects, their nets land labelled diagrams for determining surface area and volume ○ Problem solving using situational questions related to surface area and volume of spheres, cones, etc ○ Apply formulas for determining surface area and volume ○ Explain the relationship between volumes of right cones and right prisms and right pyramids and right prisms	•
10.4 Develop and apply the primary trigonometric ratios, SIN, COS, TAN to solve problems involving right triangles.	**January – February** **1-2 weeks** **6 – 10 classes**	○ Develop, generalize, explain, and apply relationships between the ratios of side lengths and angle sizes in similar right triangles. ○ Demonstrate how to identify the hypotenuse of a right triangle and the adjacent and opposite sides to an acute angle in that right triangle. ○ Solve problems, with or without the use of technology, involving one or more right triangles by applying primary trigonometric ratios and/or the Pythagorean Theorem. ○ Create and solve problems that involve indirect and direct linear measurements by using the primary trigonometric ratios, the Pythagorean Theorem, and measurement instruments such as a clinometer or metre stick	• Midterm Exam expected to cover at least half of this unit. First week of February in place of the Friday quiz
10.6 Expand and apply understanding of relations and functions: • **Relating data graphs and situations** • **Analyzing and interpreting**	**February** **1-2 weeks**	○ Provide and discuss examples of different types of relations relevant to one's life, family, or community (e.g., person A is the mother of person B, or person A is a brother of person B.). ○ Explain, by providing situational and graphical examples, the relationship between the categories of "relations" and "functions". ○ Critique the statement "Relations and functions are the same thing".	• This and the remaining units will be tied together for the remaining weeks of the term

• **Distinguish between relations and functions**		○ Graph, with or without technology, a set of data, and determine the restrictions on the domain and range. ○ Explain why data points should or should not be connected on the graph for a situation. ○ Provide and explain examples of situations that could be represented by a given graph. ○ Sketch a graph to represent a situation presented orally or in writing. ○ Determine, and express in a variety of ways, the domain and range of a graph, a set of ordered pairs, or a table of values. ○ Generalize, explain, and apply strategies for determining whether a set of ordered pairs or a graph represents a function.	
10.7 Demonstrate understanding of slope along with: • **Lines and segments** • **Rate of change** • **Parallel lines** • **Perpendicular lines**	**February** **1-2 weeks** **6-10 classes**	○ Provide examples, relevant to self, family, or community, to explain the importance of slope. ○ Illustrate and explain, using examples relevant to self, family, or community, how slope is rate of change. ○ Determine the slope of a line segment by using the measurement or calculation of the rise and run. ○ Classify lines in a given set as having positive or negative slopes, and explain how the sign of the slope affects the interpretation or meaning of the slope. ○ Explain the meaning of zero or slopes with no Real value. ○ Explain why the slope of a straight line can be determined by using any two distinct points on that line. ○ Draw a line given its slope and a point on the line. ○ Determine another point on a line, given the slope and a point on the line. ○ Generalize, explain, and apply strategies for determining whether two lines are parallel or perpendicular. ○ Apply knowledge and skills related to slope to solve situational questions relevant to self, family, and community (e.g., determine the slopes of the poles in a tepee and the impact of changing the slopes on the dimensions and strength of the tepee).	•
10.8 Demonstrate understanding of linear functions using: • **Words, ordered pairs, tables of values, function notation and equations**	**February – March** **1-2 weeks 6-10 classes**	○ Critique the statement “any straight line is the graph of a linear function”. ○ Explain, using examples, the impact of the domain of a linear function on the graph of the function (e.g., if the domain is not all Real numbers, then the graph will not show a solid line). ○ Analyze situations to identify, with justification, the independent	•

		and a dependent variable. ○ Analyze situations, graphs, tables of values, equations, or sets of ordered pairs to determine if the relationship described is linear. ○ Match corresponding types of representations of linear relations (e.g., situations, graphs, tables of values, equations, and sets of ordered pairs). ○ Develop, generalize, explain, and apply strategies for determining the intercepts (as values and ordered pairs) of a linear relation from its graph. ○ Determine the slope, domain, and range of the graph of a linear relation. ○ Sketch examples of linear relations to demonstrate the number of x or y intercepts possible for any line. ○ Match, with explanation, slopes and y-intercepts to graphs of linear relations. ○ Solve a situational question that involves the intercepts, slope, domain, or range of a linear relation. ○ Express the equation of a linear relation in different forms (including the slope-intercept or general form) and compare the graphs of the linear relations. ○ Generalize, explain, and apply strategies for drawing or sketching the graph of a linear relation in slope-intercept, general, or slope-point form, or function notation. ○ Graph, with and without technology, a linear relation given in slope-intercept, general, or slope-point form, and explain the strategy used to create the graph. ○ Analyze a set of linear relations for equivalent linear relations (e.g., $2x + 3y = 6$ is equivalent to $4x + 6y = 12$) and explain the reasoning. ○ Explain the relationship between linear functions written in function notation and written as equations with two variables, and how to change between the two forms. ○ Apply knowledge and skills related to function notation to solve situational questions. ○ Determine the related range value, given a domain value for a linear function (e.g., if $f(x) = 3x – 2$, determine $f(–1)$) and explain what the resulting value tells about the linear function. ○ Determine the related domain value, given a range value for a linear function (e.g., if $g(t) = 7 + t$, determine t so that $g(t) = 15$) and explain what the resulting value tells about the linear function. ○ Explain why a linear function would never have a term of x^2 when in simplified form.	

10.9 Demonstrate understanding of writing and application of equations of linear relations
• **Graphing**
• **Point that satisfies relation and slope**
• **Two distinct points that satisfy relation**
• **Equation of parallel and perpendicular lines to relation**
	March
	
	1-2 weeks
	
	6-10 classes
		○ Develop, generalize, explain, and apply strategies for writing an equation for a linear relation using data obtained from a graph.
		○ Develop, generalize, explain, and apply strategies for writing an equation for a linear relation when given:
		  ○ a point that satisfies the relation and the slope of the relation
		  ○ two points that satisfy the relation
		  ○ the coordinates of a point that satisfy the relation and the equation of a line parallel or perpendicular to the line.
		○ Compare and critique the structure and purposes of different forms of linear relations, including y=mx+b, Ax+By=C, and y-y1=m(x-x1) (e.g., there is no way to write a vertical linear relation in the form y = mx+b).
		○ Graph and write equations for linear data generated within an experiment or collected from a situation.
		○ Apply knowledge and skills of linear relations and their equations to solve situational questions
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10.10 Solving Systems of linear equations in two variables algebraically and graphically	**March**
	
	1-2 weeks
	
	6-10 classes
		○ Match, with justification, situations and systems of linear equations.
		○ Sketch, describe, provide and explain situational examples of the different ways that the graphs of two linear equations (two variables) can intersect and explain the meaning of the points of intersection.
		○ Develop, generalize, explain, and apply strategies for solving systems of equations graphically, with and without the use of technology and verify the solutions.
		○ Develop, generalize, explain, and apply strategies, including verification of solutions, for solving systems of equations algebraically.
		○ Critique the statement “two lines always intersect at exactly one point”.
		○ Apply knowledge and skills with systems of linear equations to solve situational questions.
			• Final Exam with focus on units covered since February.
			  ○ 85% Feb. – Mar.
			  ○ 15% Nov.- Jan

Marking Scheme

Assignments	25%	Will be cover several topics, limited class time will be given to complete these
Class work	10%	Ongoing during each class – should be completed and submitted at the end of the week
Friday Quiz	15%	Last 20 minutes of class every Friday
Midterm	25%	First week of February
Final Exam	25%	Last week of March