<table>
<thead>
<tr>
<th>Reporting Category</th>
<th>UMATHX  Suggested Lessons and Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1: Functional Relationships</td>
<td>Access UMATH X with the URL that your group was given. Login with a valid user name and password. Go to <a href="http://www.neufeldlearning.com">www.neufeldlearning.com</a> for: Frameworks for Learning Support Sheets</td>
</tr>
<tr>
<td>The student will describe functional relationships in a variety of ways.</td>
<td>Log into UMATH X and select from menu on left, the strand: Graphing Then select Section: Relations, Equations and Functions Then select the Lessons: Relations What is A Relations Domain and Range Functions What is a Function Examples 1-3 Vertical Line Test Examples 1-3 Function Notation Examples 1&amp;2</td>
</tr>
<tr>
<td>(A.1) Foundations for functions. The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways. The student is expected to</td>
<td>• Frameworks for Learning at <a href="http://www.neufeldlearning.com">www.neufeldlearning.com</a> Functions and Non Functions Linear Relations – Introduction #1 &amp; #2 • Support Sheets: Understanding Graphing at <a href="http://www.neufeldlearning.com">www.neufeldlearning.com</a> Relations, Equations and Functions Select: Graphing Relations, Equations and Functions Patterns to Words to Equations Examples 1-4</td>
</tr>
<tr>
<td>(A) describe independent and dependent quantities in functional relationships; Supporting Standard</td>
<td>Select: Graphing Linear Relations The Taxi Example Setup Equations Graph Equations The Elastic Example Setup Equations Graph Equations Lightning Example Setup Equations Graph Equations Baseball Example Setup Equations Graph Equations</td>
</tr>
<tr>
<td>(B) gather and record data and use data sets to determine functional relationships between quantities; Supporting Standard</td>
<td></td>
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</tbody>
</table>
(C) describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations; Supporting Standard

(D) represent relationships among quantities using [concrete] models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities; and Readiness Standard

(E) interpret and make decisions, predictions, and critical judgments from functional relationships. Readiness Stand

Category 2: Properties and Attributes of Functions

The student will demonstrate an understanding of the properties and attributes of functions.

Select: Graphing
Linear Relations
The Taxi Example
Setup Equations
Graph Equations
The Elastic Example
Setup Equations
Graph Equations
Lightning Example
Setup Equations
Graph Equations
Baseball Example
Setup Equations
Graph Equations

Select: Understanding Graphing
Equation of a Straight Line
Word Problems – Applications
The Taxi – Case 1 & 2
The Taxi – Summary
The Walker
The Basketball
Food

Select: Equations
Solving Inequalities
Graphing Linear Inequalities in Two Variables – Concept 1 & 2
Example 1, 2 & 3
Solving Systems of Linear Inequalities by Graphing
Example 1

Select: Algebra
Patterns, Patterns, Patterns
Patterns to Formulas
Examples 1, 3, 4, & 5

Frameworks for Learning
Algebra – Patterns to Formulas
Inequalities Introduction #1 & #2
Inequalities Graph on Number Line

Support Sheets: Understanding Graphing
Linear Relations
Equation of a Straight Line

Support Sheets: Understanding Equations
Solving Inequalities
(A.2) **Foundations for functions.** The student uses the properties and attributes of functions. The student is expected to

(A) identify and sketch the general forms of linear \((y = x)\) and quadratic \((y = x^2)\) parent functions; **Supporting Standard**

(B) identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete; **Readiness Standard**

(C) interpret situations in terms of given graphs or create situations that fit given graphs; and **Supporting Standard**

(D) collect and organize data, make and interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations. **Readiness Standard**

(A.3) **Foundations for functions.** The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations. The student is expected to …

(A) use symbols to represent unknowns and variables; and **Supporting Standard**

(B) look for patterns and represent generalizations algebraically. **Supporting Standard**
(A.4) **Foundations for functions.** The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations. The student is expected to

(A) find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations; **Readiness Standard**

(B) use the commutative, associative, and distributive properties to simplify algebraic expressions; and **Supporting Standard**

(C) connect equation notation with function notation, such as \( y = x + 1 \) and \( f(x) = x + 1 \). **Supporting Standard**

**Select: Algebra**
- Introduction...Math is Patterns
- Expressions, Terms, Variables - Definitions, Summary
- Substitution is...Math Scrabble - Scrabble 1,2,3 – Challenge
- Patterns...Squares – Perimeter and Area
- Patterns...Toothpicks - Introduction - Exploration
  To Formula - Pattern 1,2,3,4 – Summary
- Patterns...The Bridge – Introduction- Exploration
  To Formula – Pattern 1,2,3 – Summary

**Select: Algebra**
- Patterns, Formulas, Substitution
  - Patterns...Hockey Standings
  - Patterns...Squares – Perimeter and Area
  - Patterns...Toothpicks – Introduction, Exploration – To Formula – Summary

- **Support Sheets : Understanding Equations**
  - Solve One- Step Equations
  - Solve Two- Step Equations
  - Solve Multi- Step Equations

**Select: Graphing**
- **Slope of a Line**
  - Introductions to Slope
  - Slope – Order, Steepness Factor, Definition
  - Formula
  - Parallel Lines – Introduction, Example 1-3
  - Perpendicular Lines – Introduction, Example 1-3
  - Positive and Negative Slope – Example 1-4, Pattern
  - Special Slopes – Example 1 -4, Pattern
  - Sketch Line, Given Point and Slope – Example 1-4

**Select: Graphing**
- **Equation of a Straight Line**
  - Graph \( y = mx + b \) – Example 1-4, Patterns to Summary, Ex.5-9
  - Slope, Y-Intercept Equations – Concept, Examples 1-4
  - Exercise: Slope, Y-intercept – Concept, Examples 1-4
  - Slope- Point Form of the Equation – Example 1 – Solution 1&2
  - Word Problems – Applications – The Taxi – Case 1&2 – Summary, The Walker

**Frameworks for Learning**
- Simplifying Expressions - #1
- Simplifying Expressions - #2,
- Simplifying Expressions - #3
Category 3: Linear Functions

The student will demonstrate an understanding of linear functions.

(A.5) Linear functions. The student understands that linear functions can be represented in different ways and translates among their various representations. The student is expected to:

- (A) determine whether or not given situations can be represented by linear functions; Supporting Standard
- (B) determine the domain and range for linear functions in given situations; and Supporting Standard
- (C) use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions. Readiness Standard

(A.6) Linear functions. The student understands the meaning of the slope and intercepts of the graphs of linear functions and zeros of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations. The student is expected to:

- (A) develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations; Supporting Standard
- (B) interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs; Readiness Standard

Select: Equations
- Solving One-Step Equations – All Lessons
- Solving Two – Step Equations – All Lessons
- Solving Multi-Step Equations – All Lessons

Select: Algebra
- Adding Expressions – All Lessons
- Subtracting Expressions – All Lessons
- Multiplying Expressions – All Lessons
- Factoring Expressions – All Lessons
- Dividing Expressions – All Lessons

- Frameworks for Learning
  - Factoring Trinomials
  - Compound Inequalities

- Support Sheet: Understanding Equations
  - Adding Expressions
  - Subtracting Expressions
  - Multiplying Expressions
  - Factoring Expressions
  - Dividing Expressions

Select: Graphing
- Slope of a Line
  - Introductions to Slope
  - Slope – Order, Steepness Factor, Definition Formula
  - Parallel Lines – Introduction, Example 1-3
  - Perpendicular Lines – Introduction, Example 1-3
  - Positive and Negative Slope – Example 1-4, Pattern
  - Special Slopes – Example 1 -4, Pattern
  - Sketch Line, Given Point and Slope – Example 1-4
(C) investigate, describe, and predict the effects of changes in \( m \) and \( b \) on the graph of \( y = mx + b \); **Readiness Standard**

(D) graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and \( y \)-intercept; **Supporting Standard**

(E) determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations; **Supporting Standard**

(F) interpret and predict the effects of changing slope and \( y \)-intercept in applied situations; and **Readiness Standard**

(G) relate direct variation to linear functions and solve problems involving proportional change. **Supporting Standard**

### Reporting Category 4: Linear Equations and Inequalities

**The student will formulate and use linear equations and inequalities.**

(A.7) **Linear functions.** The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to

- (A) analyze situations involving linear functions and formulate linear equations or inequalities to solve problems; **Supporting Standard**
- (B) investigate methods for solving linear equations and inequalities using [concrete] models, graphs, and the properties of equality, select a method, and solve the equations and inequalities; and **Readiness Standard**

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Select: **Graphing**

**Equation of a Straight Line**
- Graph \( y = mx + b \) – Example 1-4, Patterns to Summary, Ex.5-9
- Slope, \( y \)-Intercept Equations – Concept, Examples 1-4
- Exercise: Slope, \( y \)-intercept – Concept, Examples 1-4
- Slope- Point Form of the Equation – Example 1 – Solution 1&2
- Word Problems – Applications – The Taxi – Case 1&2 – Summary, The Walker

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**Frameworks for Learning**

- Slope – Introduction
- Slope and Constant Difference
- Linear Equation \( y = mx + b \)

**Support Sheets: Understanding Graphing**

- Slope of a Line
- Equation of a Straight Line

Select: **Graphing**

**Relations, Equations and Functions**
- Relations – Example2: Tiles Part 1

Select: **Linear Relations**

- The Taxi Example – Setup Equations
- The Elastic Example – Setup Equations
- Lightning Example – Setup Equations

Select: **Graphing**

**Word Problems – Applications**
- The Taxi – Case 1 &2 – Task 1: Find the Equation

Select: **Graphing**

**Linear Relations**
- The Taxi – Graph Equations
- The Elastic Example – Setup Equations
- Lightning Example – Setup Equations – Graph
- Baseball Example – Setup Equations

Select: **Graphing**

**Equation of a Straight Line**
- Graph \( y = mx + b \) – Example 1-4, Patterns to Summary, Ex.5-9
- Slope, \( y \)-Intercept Equations – Concept, Examples 1-4
- Exercise: Slope, \( y \)-intercept – Concept, Examples 1-4
- Slope- Point Form of the Equation – Example 1 – Solution 1&2
(C) interpret and determine the reasonableness of solutions to linear equations and inequalities. **Supporting Standard**

(A.8) **Linear functions.** The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to

(A) analyze situations and formulate systems of linear equations in two unknowns to solve problems; **Supporting Standard**
(B) solve systems of linear equations using [concrete] models, graphs, tables, and algebraic methods; and **Readiness Standard**
(C) interpret and determine the reasonableness of solutions to systems of linear equations. **Supporting Standard**

**Reporting Category 5:** **Quadratic and Other Nonlinear Functions**

**The student will demonstrate an understanding of quadratic and other nonlinear functions.**

(A.9) **Quadratic and other nonlinear functions.** The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions. The student is expected to

(A) determine the domain and range for quadratic functions in given situations; **Supporting Standard**

- **Frameworks for Learning**
  - System of Linear Equations – Introduction
  - System of Linear Equation
  - Problems Involving Linear Relationship

**Select:** **Equations**

- **Solving Inequalities**
  - Inequalities on a Number Line
  - Solving Inequalities
  - Solving Compound Inequalities
  - Graphing Linear Inequalities in Two Variables – Concept 1&2
    - Example 1, 2 & 3
  - Solving Systems of Linear Inequalities by Graphing
    - Example 1

**Select:** **Equations**

- **Solving Linear Systems**
  - The Meaning of a Linear System
  - The Meaning of Solving a Linear System
  - Solving a Linear System by Graphing
  - Solving Linear System by Substitution
  - Solving Linear System by Elimination
  - Solving Linear System by Comparison
  - Solving Problems Using Linear Systems

**Select:** **Graphing**

- **Quadratic Function**
  - Introductory Examples
  - Definitions – Parabolas, Quadratic Functions

**Select:** **Graphing**

- **Quadratic Function**
  - Maximize Cage Area
  - Maximize Potato Income
  - Bob’s Beach Ball
  - Hit the Brakes
(B) investigate, describe, and predict the effects of changes in \( a \) on the graph of \( y = ax^2 + c \); **Supporting Standard**

(C) investigate, describe, and predict the effects of changes in \( c \) on the graph of \( y = ax^2 + c \); and **Supporting Standard**

(D) analyze graphs of quadratic functions and draw conclusions. **Readiness Standard**

**Supporting Standard**

(A.10) **Quadratic and other nonlinear functions.** The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods. The student is expected to

(A) solve quadratic equations using [concrete] models, tables, graphs, and algebraic methods; and **Readiness Standard**

(B) make connections among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts (x-intercepts) of the graph of the function. **Supporting Standard**

(A.11) **Quadratic and other nonlinear functions.** The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations. The student is expected to

(A) use patterns to generate the laws of exponents and apply them in problem-solving situations; **Supporting Standard**

(B) analyze data and represent situations involving inverse variation using [concrete] models, tables, graphs, or algebraic methods; and **Supporting Standard**

(C) analyze data and represent situations involving exponential growth and decay using [concrete] models, tables, graphs, or algebraic methods. **Supporting Standard**

**Select:** **Graphing**

**Quadratic Function**

[Select options]

**Select:** **Graphing**

**Quadratic Function**

[Select options]

**Select:** **Graphing**

[Select options]

**Select:** **Exponents**

**The Meaning of Exponents**

[Select options]

**Select:** **Exponents**

**The Power Key – An Introduction**

**An Introduction to Formulas**
<table>
<thead>
<tr>
<th>Select: Exponents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exponent Rules</td>
</tr>
<tr>
<td>Multiplication of Powers with the Same Base</td>
</tr>
<tr>
<td>Expanding the Exponents – The Pattern</td>
</tr>
<tr>
<td>Division of Powers with the Same Base</td>
</tr>
<tr>
<td>Raising a Power to an Exponent</td>
</tr>
<tr>
<td>Raising a Product to an Exponent</td>
</tr>
<tr>
<td>A Power with a Negative Exponent</td>
</tr>
<tr>
<td>A Power with Exponent 0</td>
</tr>
<tr>
<td>Summary of Exponent Rules</td>
</tr>
<tr>
<td>Powers with Rational Bases</td>
</tr>
</tbody>
</table>