Lesson Plan
Grade 9 Academic
Lesson: 18
Unit/Chapter: Linear Relations
Topic: Exploring Linear Relations

**homework check:** NPM 9 p. 146 #3 – 8, 13, 16, 18

**note:** Exploring Linear Relations

Linear relations can appear as an equation that is a direct variation or a partial variation. A direct variation is a relation in which one variable is a multiple of another. A partial variation is a relation in which one variable is a multiple of the other plus a constant amount. You can determine whether a relation is a direct variation or a partial variation by examining the equation, graph, or a table of values.

**In a table of values:**
A direct variation has the point (0, 0) as an ordered pair.
A partial variation has the point (0, b) as an ordered pair.

**On a Graph:**
A direct variation crosses the y axis at the origin.
A partial variation crosses the y axis anywhere other than the origin.

**In an Equation:**
A direct variation has the form \( y = mx \).
A partial variation has the form \( y = mx + b \).

A solution to a linear relation is any ordered pair that appears in the table of values, or any point that lies on the line, or any ordered pair that makes the equation true when substituted in as x and y.

The y intercept has several other names that include initial condition, initial value, fixed costs, or the variable \( b \) in the equation. The value of \( b \) is important in determining direct or partial variations. In all of these cases, the y intercept occurs when the x value is zero.

The slope is also known as the rate of change and can be determined several different ways: from a table of values using first differences, from a graph using a rate triangle, or from an equation using the number in the \( m \) position.

The formula for slope where \( m = \frac{\text{rise}}{\text{run}} \) can also be written as \( m = \frac{\Delta y}{\Delta x} \). Because slope is a rate of change, the slope is a ratio of the change in the y values to the change in the x values. The delta symbol \( \Delta \) signifies that change. Also note, the direction of the line as either a positive increase or a negative decrease is reflected in the positive or negative value of the slope.

**homework assignment:** NPM 9 p. 153 #1 – 3, p. 156 #3, 7, 8, 11, 17