

Unit Title: “Variables and Patterns”

Course: Middle School Mathematics

Subject Area: Mathematics

Time Frame: 20 days

Standards

Middle School Mathematics Standards	Sunshine State Standards Benchmarks	NCEE New Standards
<p>The student will:</p> <p>9.1 Sketch coordinate graphs to show relationship between two variables.</p> <p>9.2 Describe regular or predictable change in data from given patterns.</p> <p>9.3 Select the appropriate range of values for given variables.</p> <p>9.4 Create tables, graphs, and simple symbolic rules that describe the patterns of change.</p> <p>9.5 Describe relationships among forms of data representation – words, tables, graphs, and symbolic rules.</p> <p>9.6 Make decisions using tables, graphs, and rules.</p>	<p>MA.D.1.3.1 The student describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none">• Uses manipulatives and graphic materials to generate tables and charts to develop algebraic expressions, equations, or formulas.• Given instances of a pattern, expresses a generalization of the pattern using algebraic expressions.• Given an algebraic expression of a relationship or pattern, supplies specific instances of the relationship or pattern.• Predicts outcomes based on a generalization of a pattern or relationship. <p>MA.D.1.3.2 The student creates and interprets tables,</p>	<p>The student:</p> <p>M3a Discovers, describes, and generalizes patterns, including linear, quadratic relationships, i.e., those of the form $f(n) = n^2$ or $f(n) = cn^2$, for constant c, including $A = \pi r^2$, and represents them with variables and expressions.</p> <p>M3b Represents relationships with tables, graphs in the coordinate plane, and verbal or symbolic rules.</p>

	<p>graphs, equations, and verbal descriptions to explain cause-and-effect relationships.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Interprets and creates tables, function tables, and graphs (all four quadrants). • Writes expressions and equations to describe relationships. • Graphs equations to explain cause-and-effect relationships. <p>MA.E.1.3.1 The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Generates and collects data for analysis. • Interprets and analyzes data presented in a variety of forms, including box-and-whisker graphs and scatter plots. • Constructs, interprets, and explains displays of data, such as tables and graphs (circle graphs, single- and multiple-bar graphs, and single- and multiple-line graphs) and explains how different display of data lead to different interpretations. 	
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Desired Results

Enduring Understanding	Essential Questions	Knowledge and Skills
<p>Student will understand</p> <ul style="list-style-type: none"> Variables in a given situation are those quantities that change. Patterns describe a regular or predictable change in data. The relationships among forms of representation – words, tables, graphs, and symbolic rules. 	<ul style="list-style-type: none"> How can mathematics be used to show how quantities change over time? What does it mean when we see regular and predictable changes in a table of data or a graph? How can we use these predictable changes to find out about other possible data? Where in the world around us can we find these patterns? Why do some straight-line graphs rise as x increases, while other fall? When can an equation describe the information in a table? In a graph? When is a graphing calculator helpful in analyzing data? 	<p>Students will know</p> <ul style="list-style-type: none"> Key terms (e.g., change, coordinate graph, coordinate pair, distance/rate/rate of speed, income/cost/profit, pattern, relationship, rule, scale, table, variable, x-axis, y-axis, x-coordinate, y-coordinate) Procedures for using graphing calculator <p>Students will be able to</p> <ul style="list-style-type: none"> Collect, organize, and represent data Identify patterns and make inferences about situations based on such information. Analyze patterns or relationships in a graph or table and interpret the relationship between variables. Analyze linear relationships and express them as written and symbolic rules. Use graphing calculators to organize and represent data and to analyze linear relationships.

Acceptable Evidence

Performance Tasks	Quizzes, Test, and Work Samples	Observations and Dialogues
<ul style="list-style-type: none"> Variables and Coordinate Graphs Students conduct a jumping jack experiment to explore what happens to a person's ability to perform (endurance) after exerting energy over a period of time. As students graph their jumping jack data, they learn about variables, coordinate axes, 	<p>Check-Up 1 Quiz A Check-Up 2 Quiz B Unit Test</p>	<p>Teacher observations of students during work on performance tasks. Accountable talk during work on performance tasks.</p>

choosing appropriate scales for graphs, and plotting data points. Then they begin to make interpretations from their graphs.

- **Graphing Change**

Students look at data collected over a five-day trial run of a bike tour. They learn to examine data and create summary reports, tables, and graphs that show the relationship between distance and time. The advantages and disadvantages of using verbal descriptions, tables, or graphs to represent a situation are explored. Students understand the relationships among these representations and move freely among them.

- **Analyzing Graphs and Tables**

Students consider business questions involved with running bicycle tours. They learn to make and interpret graphs and tables for a variety of situations. Students are encouraged to describe the patterns of change in words.

- **Patterns and Rules**

Students create and analyze tables and graphs for situations involving distance, rate, and time to find a pattern that relates distance and time for a given rate. They are asked to express this pattern as a rule, first in words and then in symbols. Students develop an understanding of the relationships among the various representations.

- **Using the Graphing Calculator**

Students use graphing calculators to make tables and graphs. They explore the shapes of graphs and describe the similarities and differences of rules.