# National MSMS Course 3

2020-2021 MATHia Enhancements

CARNEGIE LEARNING

| | Module | Textbook Topic | MATHia Unit | Workspace | Description | Enhancements |
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| 1 | **Transforming Geometric Objects** | Topic 2: Similarity | Dilating Figures on the Coordinate Plane | Defining Similarity | Students watch an animation showing how similar figures can be created by drawing and measuring lines from a point of dilation. Students distinguish between enlargement and reduction dilations and use the corresponding side length ratios to determine the scale factors of dilations. Students learn that shapes created by dilations are similar figures, which have congruent corresponding angle measures and proportional corresponding side lengths. | NEW UNITS: The *Similar Figures on the Coordinate Plane* unit was spliced into two units: *Dilating Figures on the Coordinate Plane* and *Mapping Similar Figures Using Transformations* |
| | | Topic 3: Line and Angle Relationships | Triangle Sum and Exterior Angle Theorems | Introduction to Triangle Sum and Exterior Angle Theorems | Students are informally introduced to the Triangle Sum Theorem. They derive the Exterior Angle Theorem using the Triangle Sum Theorem and substitution. | NEW UNIT NAME: Formerly, *Angles and Triangles* |
| | | | The Angle-Angle Similarity Theorem | Introduction to the Angle-Angle Similarity Theorem | Students revisit the definition of similarity and how dilations produce similar figures. Students then recall what they have learned about corresponding angles when two parallel lines are crossed by a transversal. These facts are combined to suggest the Angle-Angle Similarity Theorem. Students then use the theorem to identify similar and non-similar triangles. | NEW Unit for 2020-2021<br>NEW Concept Builder for 2020-2021 |

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| | | | | Identifying Similar Triangles | Students construct informal arguments to establish facts about the congruence between pairs of angles. Then they use the angle-angle criterion to decide if two triangles are similar (or not). | NEW Mastery Workspace for 2020-2021 |
| **2** | **Developing Functional Foundations** | Topic 1: From Proportions to Linear Relationships | Representations of Proportional Relationships | Representing Proportional Relationships Algebraically | Students identify a constant of proportionality from a scenario. They use the constant of proportionality to select an equation that models a proportional relationship in a scenario. Students use an equation modeling a proportional relationship to determine a value for an independent variable when the value for the dependent variable is given. | NEW UNITS: The *Representing Proportional Relationships* unit was spliced into 3 units: *Representations of Proportional Relationships*, *Using Similar Triangles to Describe the Steepness of a Line*, and *Exploring Slopes.* |
| | | | | Comparing Proportional Relationships in Different Forms | Given two proportional relationships in different representations -- equation, graph, table, or description -- students compare the relationships' rate of change in a contextual or noncontextual scenario. | NEW Mastery Workspace for 2020-2021 |
| | | | Using Similar Triangles to Describe the Steepness of a Line | Writing Equations for Lines | Students use slope triangles to determine the slopes of lines graphed on the coordinate plane. They then use the slope of the line, including slopes of 0, to write the equation for the line. Students then translate the line and write the equation for the translated line. Students learn that equations of the form y = mx represent straight lines graphed through the origin | NEW Mastery workspace for 2020-2021 |

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| | | | | | and equations of the form y = mx + b represent translations of those lines. | |
| | | | Exploring Slopes | Comparing Proportional and Non-Proportional Relationships | Students are given two linear relationships in two different representations -- equation, graph, table, or description -- of. They compute the y-intercept and rate of change. Then they determine if one, both, or neither of the equations is a proportional relationship. | NEW Mastery workspace for 2020-2021 |
| | | Topic 2: Linear Relationships | Using Tables, Graphs, and Equations | Multiple Representations of Linear Equations | Students represent scenarios with linear expressions. They compare multiple representations of linear functions and determine whether a table, graph, or equation match a given scenario. Students match graphed lines and equations to given scenarios. | NEW UNITS: The *Linear Models* unit was spliced into 2 units: *Using Tables, Graphs, and Equations* and *Linear Relationships in Tables.* |
| | | | Slope-Intercept Form of a Line | Connecting Slope-Intercept and Point-Slope Forms | Students watch an animation showing a situation involving a California roller coaster whose initial drop can be modeled by a linear equation in point-slope form. Students then write linear equations in point-slope form to describe lines on a coordinate plane given two points. They convert these equations in point-slope form into slope-intercept form to determine the y-intercept of each line. | NEW UNITS: The *Writing Equations of a Line* workspace was spliced into 2 units: *Slope-Intercept Form of a Line* and *Point-Slope Form of a Line*. |

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| | | | Graphing Linear Equations | Graphing Given an Integer Slope and y-Intercept | Students will write the equations of lines given an integer slope and a y-intercept. | NEW NAME: Formerly, *Graphs of Linear Equations in Two Variables.*<br>CONTENT CHANGE: Analyzing Models of Linear Relationships was moved to the *Slope-Intercept Form of a Line* unit. |
| | | Topic 3: Introduction to Functions | Defining Functional Relationships | Classifying Relations and Functions | Students watch an animation and follow worked examples as they learn how to classify relations as functions or non-functions. | NEW UNITS: The *Relations and Functions* unit was spliced into 3 units: *Defining Functional Relationships*, *Describing Graphs of Functions*, and *Comparing Functions Using Different Representations*.<br>CONTENT WAS REORDERED. |
| | | | Comparing Functions Using Different Representations | Comparing Linear Relationships in Different Forms | Given two linear functions in different representations -- equation, graph, table, or description -- with a contextual or noncontextual scenario, students compare the equations' slopes or y-intercepts. | NEW Mastery workspace for 2020-2021<br>NEW Unit for 2020-2021 |
| | | Topic 4: Patterns in Bivariate Data | Analyzing Patterns in Scatter Plots | Estimating Lines of Best Fit | Students describe the patterns of association in scatter plots and select the most appropriate line of best fit for a scatter plot. They use an interactive Explore Tool to plot, analyze, interpret, and reason with lines of best fit using real-world data. | NEW UNIT NAME: Formerly, Lines of Best Fit |
| | | | Patterns of Association of Two-Way Tables | Building Marginal Frequency | Students construct a Marginal Frequency Distribution from an input Data Table for a contextual scenario. | NEW UNIT NAME: Formerly *Categorical Data* |

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| | | | | Distributions | | |
| **3** | **Modeling Linear Equations** | Topic 1: Solving Linear Equations | Solving Multi-Step Equations | Solving Multi-Step Equations | Students practice solving equations algebraically using a variety of strategies, including using a balance tool. | REARRANGED CONTENT: The Exploring Two-Step Equations workspace was moved to Course 2. The Solving Multi-Step Equations workspace was added to the *Solving Multi-Step Equations* unit.<br>NEW UNIT NAME: Formerly, *Solving Linear Equations with Similar Terms* |
| | | | Analyzing Linear Equations Involving the Distributive Property | Analyzing Models of Linear Relationships Involving the Distributive Property | Students analyze scenarios of one-step linear relationships involving the distributive property. They are given an equation that models the scenario. Students then match the different expressions in the equation to verbal descriptions of these quantities in the context of the scenario. | NEW UNIT NAME: Formerly, *Linear Models and the Distributive Property*<br>RELOCATED CONTENT: The Solving with the Distributive Property workspaces were relocated to the *Solving Linear Equations with Variables on Both Sides* unit. |
| | | | Interpreting the Number of Solutions to Equations | Solving Equations with One Solution, Infinite, and No Solutions | Students follow worked examples as they learn to identify equations with one solution, no solutions, and infinite solutions. Students also check the solutions to equations. | NEW UNIT: These workspaces were formerly in the *Solving Linear Equations with Variables on Both Sides* unit. |
| | | | Solving Linear Equations with Variables on Both Sides | Solving with the Distributive Property Over Multiplication | Students will solve equations with variables embedded in distribution expressions. | NEW UNIT NAME: Formerly, *Linear Equations with Variables on Both Sides* |

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| | | | | Solving with Variables on Both Sides with Rationals (No Type In) | Students will solve equations with variables on both sides of the equals sign. | NEW Mastery Workspace for 2020-2021.<br>This workspace replaces Solving with Integers (No Type In). In the new workspace, the equations include a wider variety of rational numbers as coefficients and constants. |
| | | | | Solving with Variables on Both Sides with Rationals (Type In) | Students will solve equations with variables on both sides of the equals sign. | NEW Mastery Workspace for 2020-2021.<br>This workspace replaces Solving with Integers (Type In). In the new workspace, the equations include a wider variety of rational numbers as coefficients and constants. |
| **4** | **Expanding Number Systems** | Topic 1: The Real Number System | The Real Numbers | Introduction to Irrational Numbers | Students determine perfect squares and their square roots. They use rational approximations to determine decimal approximations of square roots of non-perfect squares. Students watch an animation about the real number system and classify real numbers as rational or irrational. | NEW UNIT NAME: Formerly, *Rational and Irrational Numbers* |
| | | | | Solving for Side-Lengths in Area and Volume Problems | Students are given the area or volume of a figure and solve for the side length of a square or cube. | NEW Mastery workspace for 2020-2021 |

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| | | Topic 2: Pythagorean Theorem | The Pythagorean Theorem | Exploring the Pythagorean Theorem | Students explore a variety of right triangles and answer questions about proofs of the Pythagorean Theorem and its converse. | NEW UNITS: The *Pythagorean Theorem* unit was spliced into 2 units: *The Pythagorean Theorem* and *Distances in a Coordinate System.* |
| | | | | Using the Pythagorean Theorem | Students increase their familiarity with using the Pythagorean Theorem by analyzing worked examples. | NEW Mastery workspace for 2020-2021. This replaces the *Applying the Pythagorean Theorem* Concept Builder. |
| **5** | **Applying Powers** | Topic 1: Exponents and Scientific Notation | Properties of Powers with Integer Exponents | Introduction to the Power Rules | Students analyze worked examples for the power rules, including the Product Rule, Quotient Rule, Power to a Power Rule, Zero Power, and Negative Exponent Rules. They then answer questions and derive a general formula for each rule. Finally, students practice applying the rules. | NEW NAME: Formerly *Properties of Whole Number Exponents* |
| | | Topic 2: Volume of Curved Figures | Volume of a Cylinder | Relating Volumes of Cylinders, Cones, and Spheres | Students analyze a cylinder and its circular bases to understand the volume formulas V = Bh and V = pi * r^2 for the cylinder. They watch an animation which shows filling a cone with liquid and pouring its volume into first a cylinder and then a hemisphere. Students infer the volume formulas for the cone and sphere. Finally, students solve mathematical problems related to the volumes of cylinders, cones, and spheres. | NEW UNITS: The *Volume* unit was spliced into 3 units: *Volume of a Cylinder, Volume of a Cone*, and *Volume of a Sphere.* |