National HSMS Geometry
2020-2021 MATHia Enhancements

CARNEGIE LEARNING

	Textbook Module	Textbook Topic	MATHia Unit	MATHia Workspace	Description	Enhancements
1	**Reasoning with Shapes**	Topic 1: Using a Rectangular Coordinate System	From Informal to Formal Geometric Thinking	Introduction to Geometric Figures	Students watch an animation defining some of these basic geometric figures: point, line, line segment, ray, and angle. They identify these figures highlighted in a diagram. Students learn the symbols used to name these geometric figures. They analyze when these figures have more than one name.	NEW UNIT NAME: Formerly, *Lines, Rays, Segments, and Angles* NEW Concept Builder for 2020-2021
1		Topic 2: Composing and Decomposing Shapes	Using Circles to Make Conjectures	Introduction to Circles	Students watch an animation defining some of the terminology of circle parts. They then identify chords, tangents, points of tangency, and secants of circles. Next, students sort inscribed and central angles. Finally, they classify minor and major arcs as well as semicircles.	SPLIT UNIT: The unit formerly entitled *Properties of Circles* was split into two new units: *Using Circles to Make Conjectures* and *Conjectures about Quadrilaterals*.
				Exploring the Inscribed Angle Theorem	Students use an Explore Tool to determine the measures of major and minor arcs. They investigate the measure of inscribed angles whose sides intersect the endpoints of a circle's diameter. Students investigate the measure of inscribed angles that intercept the same arc. They investigate the measures of central angles and inscribed angles that have the same intercepted arc. Students use the Inscribed Angle Theorem and the Explore Tool to determine the measure of inscribed angles that intercept a given arc and the measure of an inscribed angle's intercepted arc.	NEW Concept Builder for 2020-2021

			Conjectures About Quadrilaterals	Using Circles to Draw Quadrilaterals	Students use an Explore Tool to investigate different quadrilaterals that can be drawn using two concentric circles. They answer questions about the diagonals of special quadrilaterals and use the relationship of the diagonals to draw a quadrilateral with a given diagonal. Students then complete tables determining whether or not special quadrilaterals have given properties.	NEW Concept Builder for 2020-2021
			Points of Concurrency	Points of Concurrency	Students watch animations about the points of concurrency and answer questions about these points. They analyze a table showing the point of concurrency for different types of triangles and complete a table identifying the location of a point of concurrency for each type of triangle.	NEW Concept Builder for 2020-2021 NEW Unit for 2020-2021
		Topic 3: Rigid Motions on a Plane	Geometric Components of Rigid Motions	Developing Definitions of Rigid Motions	Students learn the formal definitions for translation, reflection, and rotation as rigid motions. Students then apply these formal definitions to other situations involving mathematical transformations.	SPLIT UNIT: The *Rigid Motion* unit was split into two units: *Geometric Components of Rigid Motions* and *Reflectional and Rotational Symmetry.* The **Specifying a Sequence of Transformations** workspace was relocated to a later unit.
2	**Establishing Congruence**	Topic 1: Congruence Through Transformations	Formal Reasoning in Euclidean Geometry	Calculating and Justifying Angle Measures	Students calculate the measure of the sought angle by following a prescribed path of angle measures.	NEW UNIT NAME: Formerly, *Angle Properties* NEW LOCATION: This unit was formerly aligned to the *Justifying Line and Angle Relationships*

			Triangle Congruence Theorems	Introduction to Triangle Congruence	Students practice writing and identifying triangle congruency statements, as well as corresponding sides and angles, given a diagram of congruent triangles or a triangle congruency statement. They then watch a video that introduces the four theorems of triangle congruence--SAS, SSS, AAS, and ASA. Finally, students use a sorting tool to match images of pairs of triangles with congruency markings to the theorem by which they are proven congruent.	NEW UNIT NAME: Formerly *Triangle Congruence*
		Topic 2: Justifying Line and Angle Relationships	Forms of Proof	Introduction to Proofs	Students are introduced to proof by answering questions related to two animations demonstrating the Triangle Sum Theorem and the Vertical Angle Theorem.	NEW UNIT NAME: Formerly, *Introduction to Proofs with Segments and Angles*
			Proving Parallel Lines Theorems	Proving Parallel Lines Theorems	Students apply basic angle theorems to prove the alternate interior, alternate exterior, same side interior, and side side exterior parallel line theorems.	NEW UNIT NAME: Formerly, *Parallel Lines Theorems*
			Interior and Exterior Angles of Polygons	Proving Triangle Theorems	Students apply previously proved theorems to prove the triangle sum and exterior angle theorems.	NEW UNIT and LOCATION: The content was relocated from the *Using Triangle Congruence* unit.
			Proving Triangles Congruent	Proving Theorems using Congruent Triangles	Students use congruent triangle theorems to prove the perpendicular bisector theorem, isosceles triangle base angle theorem and its converse, and the angle bisector theorem.	NEW LOCATION: This workspace was formerly in the *Using Triangle Congruence* unit.

			Solving Problems with Congruence	Using Triangle Theorems	Students apply angle, parallel line, and triangle theorems to prove relationships between elements in more complex diagrams.	NEW UNIT: This workspace was relocated from the *Using Triangle Congruence* unit.
			Angle Relationships Inside and Outside Circles	Determining Interior and Exterior Angles in Circles	Students calculate the measure of an arc or an angle using Interior Angles of a Circle Theorem and Exterior Angles of a Circle Theorem.	NEW UNIT NAME: Formerly, *Angles and Circles*
		Topic 3: Using Congruence Theorems	Properties of Quadrilaterals	Understanding Parallelograms	Students are given the properties of parallelograms and use the information to determine the side parallel to a given side of a parallelogram as well as the sides or angles that are congruent to a given side or angle of a parallelogram. They then determine a missing statement to prove a quadrilateral is a parallelogram using the Parallelogram/Congruent-Parallel Side Theorem. Finally, students identify quadrilaterals by properties of their sides, angles, and diagonals.	NEW UNIT NAME: Formerly, *Properties of Parallelograms*
3	**Investigating Proportionality**	Topic 1: Similarity	Dilating Figures to Create Similar Figures	Understanding Similarity	Students watch an animation which demonstrates that when figures are similar, a series of rigid motions and dilations can transform one figure on top of the other to match exactly. Students recall that similar figures have corresponding side lengths that are proportional and congruent corresponding angles. Students identify similar figures and determine corresponding side lengths and corresponding angle measures, given similar figures.	SPLIT UNIT: The *Similarity* unit was split into 4 units: *Dilating Figures to Create Similar Figures, Theorems About Proportionality, Application of Similar Triangles,* and *Partitioning Segments in Given Ratios*

				Specifying a Sequence of Transformations	Students select multiple transformations from translation, rotation, dilation, and reflection about any line to match a pre-image to a target image, given a reference point.	NEW LOCATION: This workspace was formerly in the *Geometric Components of Rigid Motion* (formerly *Rigid Motion*) unit.
			Theorems About Proportionality	Proofs Using Similar Triangles	Students use the AA Similarity Postulate, SSS Similarity Theorem, and SAS Similarity Theorem to prove the parallel segment proportionality theorem and triangle midsegment theorem.	NEW LOCATION: The **Proofs Using Similar Triangles** and **Calculating Corresponding Parts of Similar Triangles** workspaces were transposed.
		Topic 2: Trigonometry		Relating Sines and Cosines of Complementary Angles	Students use the interactive unit circle trig ratio Explore Tool to explore complementary angles and to see that the sine of an angle is equal to the cosine of its complement, and vice versa.	NEW LOCATION: This workspace was previously the last workspace in this unit.
4	**Connecting Geometric and Algebraic Descriptions**	Topic 1: Circles and Volume	Similarity Relationships in Circles	Relating Arc Length and Radius	Students explore the difference between the degree measure of an arc and the length of an arc. They then practice calculating the fraction of a circle's circumference that an arc occupies and writing an expression that can be used to calculate an arc's length. Students then calculate the arc length given the radius or diameter of the circle. Next, they relate the arc length to the circle's radius and are introduced to the units radians and the theta symbol. Finally, students practice determining different measurements of a circle using the formula theta = s/r.	NEW UNIT NAME: Formerly, *Arc Length*

			Surface Area	Introduction to Formulas for the Surface Area of Solids	Students use the faces of a cylinder, square pyramid, and cone to determine surface area formulas for the solids rewritten in different ways. They use the formulas to determine the surface area of each solid.	NEW Concept Builder for 2020-2021 NEW Unit for 2020-2021
				Calculating Surface Area of Solids	Students use mathematical and real-world objects to determine the surface areas of cylinders, pyramids, cones, and spheres.	NEW Mastery Workspace for 2020-2021
		Topic 2: Conic Sections	Cross-Sections	Visualizing Cross Sections of Three-Dimensional Shapes	Students watch an animation showing two different intersections of a plane and a solid. They then describe cross-sections of different solids given the intersection of a plane. Finally, students identify the solid from a given cross-section.	NEW UNIT NAME: Formerly, *Three-Dimensional Shapes*
5	**Making Informed Decisions**	Topic 2: Computing Probabilities	Computing Probabilities	Calculating Compound Probabilities from Two-Way Tables	Students determine probabilities of compound events from two-way frequency tables via the Addition Rule.	NEW NAME: Formerly, Calculating Compound Probabilities
				Conditional Probability	Students use an interactive Explore Tool to explore probability using area and random points. Students then explore the idea of conditional probability, using the interactive tool to visualize the conditional probability formula $P(A \mid B) = P(A \text{ and } B) / P(B)$. Students apply what they know about conditional probability to make predictions and check for independence of events using the Explore Tool.	NEW LOCATION: Formerly in the Independence and Conditional Probability unit.

				Recognizing Concepts of Conditional Probability	Students investigate conditional probabilities using two-way frequency tables. They apply the concept of conditional probability in a variety of different situations involving a change in the sample space as a result of an event occurring.	NEW LOCATION: Formerly the 2nd workspace in this unit.