MONTESSORI CURRICULUM TO STANDARDS ALIGNMENT

ELEMENTARY • 1ST–6TH GRADE

GEOMETRY

NATIONAL CENTER for
MONTESSORI in the PUBLIC SECTOR

Montessori Curriculum to Standards Alignment
Elementary • 1st–6th Grade
Geometry

National Center for Montessori in the Public Sector

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Assessment vocabulary drawn from Marzano Resources free online resource, Basic Vocabulary Terms (marzanoresources.com/media/documents/reproducibles/vocab-common-core/basic-terms-and-phrases.pdf)

CONTENTS

CHAPTER 1

FOUNDATIONS

HOW GEOMETRY GOT ITS NAME

SKILLS INVENTORY

Lower Elementary

Listens to stories about significant historical changes and is inspired to gather additional information to clarify or deepen understanding.

MONTESSORI LESSONS	PURPOSES
INITIAL SERIES	
How Geometry Got Its Name • The Story of the Babylonian Circle and 360 degrees **The Story of Area**	• To generate questions about individuals and groups who have shaped a significant historical change. • To inspire children to ask and answer questions about information that has been presented orally. • To inspire children to gather additional information to clarify comprehension or deepen understanding. • An introduction to Geometry in the form of a story.

ASSESSMENT VOCABULARY

INITIAL SERIES

answer
ask
detail
information
issue
media/medium
question
speaker
text
topic

Cognitive Verbs

answer
ask
clarify
describe
present
recount

ASSESSMENT CONSIDERATIONS

Students will not be assessed on the contents of the story of *How Geometry Got Its Name*.

COLLEGE, CAREER AND CIVIC LIFE (C3) FRAMEWORK FOR STATE SOCIAL STUDIES STANDARDS

HISTORY (D2.HIS)

CHANGE, CONTINUITY AND CONTEXT

His.3.K-2	Generate questions about individuals and groups who have shaped a significant historical change.
His.3.3-5	Generate questions about individuals and groups who have shaped significant historical changes and continuities.

COMMON CORE STATE STANDARDS (CCSS.ELA-LITERACY)

LANGUAGE: SPEAKING AND LISTENING (SL)

COMPREHENSION AND COLLABORATION

SL.1.2	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
SL.1.3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
SL.2.2	Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
SL.2.3	Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.

NOTES

CHAPTER 2

GEOMETRIC FIGURES

INVESTIGATION OF GEOMETRIC ELEMENTS AND FIGURES

SKILLS INVENTORY

Lower Elementary

Recognizes and composes two-dimensional shapes (rectangles, squares, trapezoids, triangles, circle, half-circles, quarter-circles, quadrilaterals, rhombus, pentagons, hexagons) and three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) based on their defining attributes.

Upper Elementary

Draws and identifies parts of lines (points, line segments, rays), lines and angles (right, acute obtuse), and classifies shapes by properties of their lines and angles.

MONTESSORI LESSONS	PURPOSES
INITIAL SERIES	
SENSORIAL EXPLORATION AND NOMENCLATURE OF GEOMETRIC FIGURES	
Geometric Cabinet: Plane Figures • Sensorial Exploration of Shapes • Plane Figures	• To review the names of the three shapes: triangle, square and circle in the demo tray. • To identify names of shapes (types of each plane figure) and types of angles through the etymology of the word.
Constructive Triangles • Rectangle Box • Blue Triangle Box • Exploration with Right-Angled Scalene Triangles • Triangular Box • Small Hexagonal Box • Large Hexagonal Box	• To understand that new shapes can be formed by joining together triangles. • To compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) to create a composite shape, and compose new shapes from the composite shape.

continues

MONTESSORI LESSONS	PURPOSES
SOLIDS	
Geometric Solids • Stereognostic Game • Bases • Nomenclature for Parts • Constructing Geometric Solids • Dimensions of Geometric Solids • Regular Prisms Transformation into Rectangular Prisms • Polyhedra	• To name and identify the geometric solids. • To compose three-dimensional shapes to create a composite shape, and compose new shapes from the composite shape.
POINT, LINE, SURFACE, SOLID	
Golden Beads • From a Solid to a Point • From a Point to Solid	• To introduce the terms solid, surface, line, and point and explore their qualities. • The idea that solids are limited by plane and curved surfaces. • The idea that surfaces are limited by straight and curved lines. • To understand that solids occupy space via three dimensions. • To experience the point as the constructor of the line, the line as the constructor of the surface, and the surface as the constructor of the solid. • Explore the relationships of squares and cubes.
LINES	
Box of Sticks • Concept of a Line • Parts of a Straight Line • Position of a Straight Line • Positions of Two Lines • Intersection of Two Straight Lines	• To provide the child with a sensorial impression of the concept of a line in geometric terms. • To provide the opportunities for the child to manipulate objects with the concept of line in mind. • To provide a sensorial impression of the parts of a straight line. • To learn nomenclature for a line, ray, and line segment, and their parts (i.e., origin and endpoint). • To reinforce that a true line has no ends. • To provide the child with sensorial impressions of the positions of a straight line. • To provide a sensorial impression of the positions of the two straight lines. • To introduce the nomenclature parallel, convergent and divergent. • To notice that lines can cross at different angles. • To emphasize the importance of perpendicular lines.

continues

MONTESSORI LESSONS	PURPOSES
ANGLES	
Box of Sticks • Introduction to Angles • Parts of Angles • Relationship of Two Angles in the Same Plane • Adjacent Angles • Complementary Angles • Supplementary Angles • Vertical Angles • Adjacent Complementary Angles • Adjacent Supplementary Angles	• To provide the child with an opportunity to manipulate objects with the concept "angle" in mind. • To learn nomenclature for an angle and its parts. • To continue the sensorial impression of types of angles. • To name angles based on their characteristics relative to right angles and straight lines. • To introduce to the child a variety of terms that are frequently encountered with reference to pairs of angles.
POLYGONS	
Geometric Cabinet • Types of Plane Geometric Figures • Types of Regular Polygons According to the Number of Sides • Types of Quadrilaterals • Types of Planar Simple Closed Curves	• To learn to classify common types of polygons. • To learn about the properties of different polygons. • To learn and consolidate nomenclature for polygons. • To distinguish between defining attributes versus non-defining attributes of shapes. • To build and draw shapes that possess defining attributes. • To recognize and draw shapes having specified attributes.
MIDDLE SERIES	
LINES	
Box of Sticks	• To draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. • To identify parts and types of lines in two-dimensional figures.
Line of Symmetry Teacher-Created Lessons	• To recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. • To identify line-symmetric figures and draw lines of symmetry.

continues

MONTESSORI LESSONS	PURPOSES
ANGLES	
Box of Sticks • Angles Made by a Transversal • Parallel Angles • Opposite Vertical Angles are Equal • Angle Bisector	• To introduce terms relevant to angles. • Sensorial exploration of three key results about parallel angles. • To recognize angles as geometric shapes that are formed wherever two rays share a common endpoint.
POLYGONS	
Box of Sticks: Triangles • Parts of a Triangle • Triangles According to Sides • Triangles According to Angles • Triangles According to Sides and Angles • Relationships between Length of Sides in Triangles	• To learn to classify common types of polygons. • To learn about the properties of different polygons. • To learn and consolidate nomenclature for polygons. • To demonstrate understanding that shapes in different categories may share attributes and that the shared attributes can define a larger category. • To classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines. • To classify two-dimensional figures based on the presence or absence of angles of a specified size. • To recognize right triangles as a category, and identify right triangles.
Box of Sticks: Quadrilaterals • Types of Quadrilaterals • Relationships Between Quadrilaterals • Altitude • The Family Tree of Quadrilaterals	• To learn to classify common types of polygons. • To learn about the properties of different polygons. • To learn and consolidate nomenclature for polygons. • To demonstrate understanding that shapes in different categories may share attributes and that the shared attributes can define a larger category. • To recognize rhombuses, rectangles, and squares as examples of quadrilaterals. • To draw examples of quadrilaterals that are not rhombuses, rectangles, and squares. • To understand that shapes in different categories may share attributes and that the shared attributes can define a larger category. • To recognize rhombuses, rectangles, and squares as examples of quadrilaterals. • To draw examples of quadrilaterals that are not rhombuses, rectangles, and squares. • To classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines. • To classify two-dimensional figures based on the presence or absence of angles of a specified size.

continues

MONTESSORI LESSONS	PURPOSES
CIRCLES	
Geometric Cabinet • Concept of a Circle • Parts of a Circle: Linear • Parts of a Circle: Surface • Relative Positions between a Straight Line and a Circumference • Relative Positions between Two Circumferences • Sensorial Calculation of Circumference	• To connect work done with polygons to the work which will be done with circles. • To provide definitions of a circle. • For children to become familiar with the linear parts of a circle. • For children to become familiar with the surface parts of a circle. • For children to become familiar with the terms external, externally tangent, secant, internally tangent, internal and concentric as they relate to circles. • For children to understand that pi relates to every circle. • For the children to derive the formula for a calculation of circumferences. • For the children to use the formula to calculate the circumferences of circles.
LATER SERIES	
POLYGONS	
Stick Material • Parts of a Polygon • Parts of a Rhombus & Parallelogram • Parts of a Trapezoid • Parts of a Regular Polygon • Diagonals of Polygons • Number of Diagonals for Stability • Number of Diagonals in a Polygon • Sum of Angles in a Polygon	• To reinforce the idea of diagonals. • For the children to become familiar with interior angles of polygons. • For children to practice measuring angles. • For children to see the pattern in determining the sum of the degrees of the interior angles of polygons. • To demonstrate understanding that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. • To classify two-dimensional figures in a hierarchy based on properties.

ASSESSMENT VOCABULARY

INITIAL SERIES	MIDDLE SERIES
angle attribute compose composite shape cone cube cylinder equal face half-circle hexagon number open shape orientation pentagon pyramid quadrilateral quarter-circle rectangle rectangular prism shape size square three dimensional trapezoid triangle two-dimensional **Cognitive Verbs** build compose create distinguish identify recognize	*In addition to previous vocabulary:* acute angle angle measure category four geometric large/larger line line of symmetry line segment match obtuse angle parallel lines part point ray rhombus right angle right triangle side shape two **Cognitive Verbs** classify define form match share understand

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to:

Polygons

- Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size) of shapes. (1.G.A.1)
- Build and draw shapes that possess defining attributes. (1.G.A.1)
- Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) to create a composite shape, and compose new shapes from the composite shape. (1.G.A.2)
- Compose three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. (1.G.A.2)
- Recognize and draw shapes having specified attributes (a given number of angles or a given number of equal faces). (2.G.A.1)
- Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. (2.G.A.1)

MIDDLE SERIES

Students will be asked to:

Lines

- Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. (4.G.A.1)
- Identify parts and types of lines in two-dimensional figures. (4.G.A.1)
- Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. (4.G.A.3)
- Identify line-symmetric figures and draw lines of symmetry. (4.G.A.3)

Angles

- Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint. (4.MD.C.5)

Polygons

- Demonstrate understanding that shapes in different categories may share attributes and that the shared attributes can define a larger category. (3.G.A.1)
- Recognize rhombuses, rectangles, and squares as examples of quadrilaterals. (3.G.A.1)
- Draw examples of quadrilaterals that are not rhombuses, rectangles, and squares. (3.G.A.1)
- Understand that shapes in different categories may share attributes and that the shared attributes can define a larger category. (3.G.A.1)
- Recognize rhombuses, rectangles, and squares as examples of quadrilaterals. (3.G.A.1)
- Draw examples of quadrilaterals that are not rhombuses, rectangles, and squares. (3.G.A.1)
- Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines. (4.G.A.2)
- Classify two-dimensional figures based on the presence or absence of angles of a specified size. (4.G.A.2)
- Recognize right triangles as a category, and identify right triangles. (4.G.A.2)

continues

ASSESSMENT CONSIDERATIONS

LATER SERIES

Students will be asked to:

Polygons

- Demonstrate understanding that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. (5.G.B.3)
- Classify two-dimensional figures in a hierarchy based on properties. (5.G.B.4)

COMMON CORE STATE STANDARDS (CCSS.MATH.CONTENT)

GEOMETRY (G)

REASON WITH SHAPES AND THEIR ATTRIBUTES

1.G.A.1	Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
1.G.A.2	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
2.G.A.1	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
3.G.A.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

DRAW AND IDENTIFY LINES AND ANGLES, AND CLASSIFY SHAPES BY PROPERTIES OF THEIR LINES AND ANGLES

4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
4.G.A.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

continues

COMMON CORE STATE STANDARDS (CCSS.MATH.CONTENT)

CLASSIFY TWO-DIMENSIONAL FIGURES INTO CATEGORIES BASED ON THEIR PROPERTIES

5.G.B.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
5.G.B.4	Classify two-dimensional figures in a hierarchy based on properties.

MEASUREMENT AND DATA (MD)

GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF ANGLE AND MEASURE ANGLES

4.MD.C.5	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.
4.MD.C.5.A	An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.

NOTES

RELATIONSHIPS OF GEOMETRIC FIGURES

SKILLS INVENTORY

Lower Elementary

Identifies congruent, similar and equivalent figures.

MONTESSORI LESSONS	PURPOSES
INITIAL SERIES	
Equivalent Figure Material • Congruent, Similar, Equivalent Figures **Congruency** • Similarity • Equivalence	• To differentiate between figures that are congruent, similar, and equivalent. • To provide a sensorial experience of congruency, similarity and equivalence. • To become familiar with the concept and nomenclature for congruency, similarity and equivalence.
Constructive Triangles • Congruency • Similarity • Equivalence • Single Figure • Two Figures • Combining Boxes • Equivalent Pictures • Equivalence Utilizing Addition • Equivalence of Two Key Triangles • Box of Blue Triangles	
Constructive Triangles and Metal Insets	

continues

MONTESSORI LESSONS	PURPOSES
MIDDLE SERIES	
Constructive Triangles • Reasoning • A Longer Chain of Reasoning	• To differentiate between figures that are congruent, similar, and equivalent. • To provide a sensorial experience of congruency, similarity and equivalence. • To become familiar with the concept and nomenclature for congruency, similarity and equivalence.
Metal Fraction Materials Cabinet • Equivalence at the Sensorial Level • Equivalence at the Reasoning Level	

ASSESSMENT VOCABULARY

Students will not be assessed on Congruence and Similarity.

ASSESSMENT CONSIDERATIONS

Students will not be assessed on Congruence and Similarity.

COMMON CORE STATE STANDARDS

Standards for Congruence and Similarity are found beginning in 8th grade.

NOTES

MEASUREMENT OF GEOMETRIC FIGURES

SKILLS INVENTORY

Lower Elementary

- Understands the concepts of area and perimeter and how they relate to addition and multiplication.
- Understands the concept of and angle and how to measure angles.

Upper Elementary

- Understands the concepts of area, surface area and volume and how to apply the formulas for finding area, perimeter and volume.

MONTESSORI LESSONS	PURPOSES
MIDDLE SERIES	
ANGLES	

Measuring Angles
• The Story of Angles
• Measurement of an Angle
  • Using the Montessori Protractor
  • Using a Protractor
• Adding and Subtracting Angles
	• To experience sensorially the measurement of various angles.
	• To introduce tools for measuring angles.
	• To understand concepts of angle measurement.
	• To measure angles in whole-number degrees using a protractor.
	• To sketch angles of specified measure.
	• To recognize that an angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
	• To relate the operations of addition and subtraction to the measurement of angles.
	• To recognize angle measure as additive, the angle measure of the whole is the sum of the angle measures of the parts.

Sensorial Calculation of Circumference	• To recognize that an angle is measured with reference to a circle with its center at the common endpoint of the rays. • To demonstrate understanding that an angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
Problem Solving • Teacher-Created or Purchased Cards • Experiences in the Classroom	• To solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems.

continues

MONTESSORI LESSONS	PURPOSES
AREA OF PLANE FIGURES	
Equivalent Figure Material and Yellow Area Material • Concept of Area • Area of a Rectangle • Perimeter	• To recognize area as an attribute of plane figures. • To understand concepts of area measurement. • To describe that a square with side length 1 unit, called "a unit square," is said to have "one square unit" of area. • To demonstrate that "a unit square" can be used to measure area. • To describe that a plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of *n* square units. • To measure areas by counting unit squares. • To find the area of a rectangle with whole-number side lengths by tiling it. • To find rectangles with the same perimeter and different areas or with the same area and different perimeter. • To find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts.
Formula for Area	• To relate area to the operations of multiplication and addition. • To show that the area found by tiling is the same as the area that would be found by multiplying the side lengths. • To represent whole-number products as rectangular areas in mathematical reasoning. • To use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. • To use area models to represent the distributive property in mathematical reasoning. • To recognize area as additive.
Problem Solving • Teacher-Created or Purchased Cards • Experiences in the Classroom	• To multiply side lengths to find areas of rectangles in the context of solving real world and mathematical problems. • To solve real world and mathematical problems involving perimeters of polygons. • To solve real world and mathematical problems involving finding the unknown side-length of a perimeter of a polygon. • To solve real world and mathematical problems exhibiting rectangles with the same perimeter and different areas. • To solve real world and mathematical problems exhibiting rectangles with the same perimeter with the same area and different perimeters. • To apply the area and perimeter formulas for rectangles in real world and mathematical problems.

continues

MONTESSORI LESSONS	PURPOSES
LATER SERIES	
AREA OF PLANE FIGURES	
Equivalent Figure Material and Yellow Area Material • Area of a Rectangle • Area of a Parallelogram • Area of a Triangle: Double the Area • Area of a Triangle: Bisect the Base • Area of a Triangle: Bisect the Height • Area of a Trapezoid • Area of a Rhombus • Area of a Decagon • Area of a Pentagon • Area of a Circle	• To find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths. • To show that the area of a rectangle found by tiling is the same as would be found by multiplying the side lengths. • To multiply fractional side lengths to find areas of rectangles. • To represent fraction products as rectangular areas. • To find the area of triangles by composing into rectangles or decomposing into triangles and other shapes. • To find the area of special quadrilaterals by composing into rectangles or decomposing into triangles and other shapes. • To find the area of polygons by composing into rectangles or decomposing into triangles and other shapes. • To provide a sensorial foundation for calculating the area of the circle. • For the children to use the formula to calculate the area of circles. • For the children to derive the formula for calculation of area of a circle.
Problem Solving • Teacher-Created or Purchased Cards • Experiences in the Classroom	• To offer an opportunity to apply the knowledge of area of plane figures to real-life situations.
AREA OF SOLIDS	

Geometric Solids
• Surface Area
  • Polyhedra
  • Cylinder
  • Cone
	• To provide a sensorial approach to discovering the formulas for surface area.
	• To represent three-dimensional figures using nets made up of rectangles and triangles.
	• To use the nets to find the surface area of these three-dimensional figures.

Problem Solving • Teacher-Created or Purchased Cards • Experiences in the Classroom	• To solve real-world and mathematical problems of right triangles, other triangles, special quadrilaterals, and polygons by applying the techniques for composing into rectangles or decomposing into triangles and other shapes. • To solve real-world and mathematical problems by representing three-dimensional figures using nets made up of rectangles and triangles, using the nets to find the surface area of these figures.

continues

MONTESSORI LESSONS	PURPOSES
VOLUME	
Box of Cubes and Volume Material • Concept of Volume • Volume of a Right Rectangular Prism • Volume of a Non-rectangular Right Prism • Volume of a Pyramid • Volume of a Cylinder • Volume of a Cone • Volume of a Sphere	• To recognize volume as an attribute of solid figures and understand concepts of volume measurement. • To explain that a cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. • To describe that a solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. • To measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. • To find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes. • To find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts.
Formula for Volume	• To relate volume to the operations of multiplication and addition. • To represent threefold whole-number products as volumes (represent the associative property of multiplication). • To explain that the volume found using unit cubes is the same as when found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. • To apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths. • To recognize volume as additive. • To apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths. • To find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism.
Problem Solving • Teacher-Created or Purchased Cards • Experiences in the Classroom	• To solve real world and mathematical problems involving volume. • To solve real world and mathematical problems by applying the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths. • To solve real world problems by finding volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts. • To solve real world and mathematical problems by applying the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths

ASSESSMENT VOCABULARY

MIDDLE SERIES

add
additive
angle
angle measure
area
area formula
area model
attribute
center
circle
circular arc
count
decompose/decomposition
degree
diagram
distributive property
equation
fraction
geometric
intersection/intersecting
mathematical problem
measurement
multiply
one-degree angle
part
perimeter
perimeter formula
plane figure
point
polygon
product
protractor
ray
real-world problem
rectangle
rectilinear figure
represent
shape
side length
sketch
square centimeter (cm^2)
square foot (ft^2)
square inch (in^2)
square meter (m^2)
subtraction
sum
symbol
two
unit
unknown
whole
whole number

Cognitive Verbs

apply
decompose
measure
recognize
represent
solve
understand
consider
decompose
diagram
form
measure
recognize
share
solve
understand

LATER SERIES

In addition to previous vocabulary:
associative property
attribute
base
compose
count
cubic centimeter (cm^3)
cubic foot (ft^3)
cubic inch (in^3)
cubic meter (m^3)
edge length
equivalent
formula
height
multiplication
net
operation
prism
rectangular prism
right triangle
solid
special quadrilateral
surface area
three dimensional
triangle
unit cube
unit fraction
volume

Cognitive Verbs

compose
relate

ASSESSMENT CONSIDERATIONS

MIDDLE SERIES

Students will be asked to:

Area of Plane Figures

- Recognize area as an attribute of plane figures and understand concepts of area measurement. (3.MD.C.5)
- Describe that a square with side length 1 unit, called "a unit square", is said to have "one square unit" of area. (3.MD.C.5.A)
- Demonstrate that "a unit square" can be used to measure area. (3.MD.C.5.A)
- Describe that a plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units. (3.MD.C.5.B)
- Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). (3.MD.C.6)
- Relate area to the operations of multiplication and addition. (3.MD.C.7)
- Find the area of a rectangle with whole-number side lengths by tiling it. (3.MD.C.7.A)
- Show that the area found by tiling is the same as the area that would be found by multiplying the side lengths. (3.MD.C.7.A)
- Represent whole-number products as rectangular areas in mathematical reasoning. (3.MD.C.7.B)
- Find rectangles with the same perimeter and different areas or with the same area and different perimeters. (3.MD.D.8)
- Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. (3.MD.C.7.C)
- Use area models to represent the distributive property in mathematical reasoning. (3.MD.C.7.C)
- Recognize area as additive. (3.MD.C.7.D)
- Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. (3.MD.C.7.D)

Measurement of Angles

- Understand concepts of angle measurement. (4.MD.C.5)
- Recognize that an angle is measured with reference to a circle with its center at the common endpoint of the rays. (4.MD.C.5.A)
- Recognize that an angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. (4.MD.C.5.B)
- Measure angles in whole-number degrees using a protractor. (4.MD.C.6)
- Sketch angles of specified measure. (4.MD.C.6)
- Recognize angle measure as additive, the angle measure of the whole is the sum of the angle measures of the parts. (4.MS.C.7)
- Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems. (4.MS.C.7)

continues

ASSESSMENT CONSIDERATIONS

Word Problems

- Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems. (3.MD.C.7.B)
- Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. (3.MD.D.8)
- Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor. (4.MD.A.3)

LATER SERIES

Area of Plane Figures

- Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. (5.NF.B.4.B)
- Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. (5.NF.B.4.B)
- Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes. (6.G.A.1)

Area of Solids

- Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. (6.G.A.4)

Volume

- Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5.MD.C.3)
- Explain that a cube with side length 1 unit, called a "unit cube", is said to have "one cubic unit" of volume, and can be used to measure volume. (5.MD.C.3.A)
- Describe that a solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. (5.MD.C.3.B)
- Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. (5.MD.C.4)
- Relate volume to the operations of multiplication and addition. (5.MD.C.5)
- Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes. (5.MD.C.5.A)
- Explain that the volume found using unit cubes is the same as when found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. (5.MD.C.5.A)
- Represent threefold whole-number products as volumes (represent the associative property of multiplication). (5.MD.C.5.A)
- Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths. (5.MD.C.5.B)
- Recognize volume as additive. (5.MD.C.5.C)
- Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts. (5.MD.C.5.C)

continues

ASSESSMENT CONSIDERATIONS

- Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. (6.G.A.2)
- Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths. (6.G.A.2)

Word Problems

- Solve real world and mathematical problems involving volume. (5.MD.C.5)
- Solve real world and mathematical problems by applying the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths. (5.MD.C.5.B)
- Solve real world problems by finding volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts. (5.MD.C.5.C)
- Solve real world and mathematical problems by applying the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths. (6.G.A.2)
- Solve real-world and mathematical problems of right triangles, other triangles, special quadrilaterals, and polygons by applying the techniques for composing into rectangles or decomposing into triangles and other shapes. (6.G.A.1)
- Solve real-world and mathematical problems by representing three-dimensional figures using nets made up of rectangles and triangles, using the nets to find the surface area of these figures. (6.G.A.4)

COMMON CORE STATE STANDARDS (CCSS.MATH.CONTENT)

MEASUREMENT AND DATA (MD)

GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF AREA AND RELATE AREA TO MULTIPLICATION AND TO ADDITION

3.MD.C.5	Recognize area as an attribute of plane figures and understand concepts of area measurement.
3.MD.C.5.A	A square with side length 1 unit, called "a unit square", is said to have "one square unit" of area, and can be used to measure area.
3.MD.C.5.B	A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of n square units.
3.MD.C.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
3.MD.C.7	Relate area to the operations of multiplication and addition.
3.MD.C.7.A	Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

continues

COMMON CORE STATE STANDARDS (CCSS.MATH.CONTENT)	
3.MD.C.7.B	Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
3.MD.C.7.C	Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.
3.MD.C.7.D	Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.
GEOMETRIC MEASUREMENT: RECOGNIZE PERIMETER	
3.MD.D.8	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
SOLVE PROBLEMS INVOLVING MEASUREMENT AND CONVERSION OF MEASUREMENTS	
4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.
GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF ANGLE AND MEASURE ANGLES	
4.MD.C.5	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.
4.MD.C.5.A	An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
4.MD.C.5.B	An angle that turns through n one-degree angles is said to have an angle measure of n degrees.
4.MD.C.6	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
4.MD.C.7	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

continues

COMMON CORE STATE STANDARDS (CCSS.MATH.CONTENT)	
GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF VOLUME	
5.MD.C.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
5.MD.C.3.A	A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
5.MD.C.3.B	A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.
5.MD.C.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
5.MD.C.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
5.MD.C.5.A	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
5.MD.C.5.B	Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
5.MD.C.5.C	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
GEOMETRY (G)	
SOLVE REAL-WORLD AND MATHEMATICAL PROBLEMS INVOLVING AREA, SURFACE AREA, AND VOLUME	
6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
6.G.A.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

continues

COMMON CORE STATE STANDARDS (CCSS.MATH.CONTENT)

NUMBER AND OPERATIONS: FRACTIONS (NF)

APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF MULTIPLICATION AND DIVISION

5.NF.B.4.B	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas

NOTES

CHAPTER 3

THEOREMS AND CONSTRUCTIONS

THEOREMS

SKILLS INVENTORY

Upper Elementary

Understands how theorems are used in geometry.

MONTESSORI LESSONS	PURPOSES
LATER SERIES	
Theorem of Pythagoras • Triangles with the Same Base and Height are Equivalent • The Story of Pythagoras • Pythagorean Theorem: Plate I • Pythagorean Theorem: Plate II • Pythagorean Theorem: Plate III • Pythagorean Theorem Applied to Other Figures	• To demonstrate that Pythagoras was a real person, which may inspire further research. • To provide a sensorial impression of the Pythagorean theorem. • To explore the numerical relationships in the Pythagorean Theorem. • To prepare for learning the Pythagorean Theorem in its full algebraic form. • To apply the Pythagorean Theorem to plane figures other than squares.

ASSESSMENT VOCABULARY

Students will not be assessed on Theorems.

ASSESSMENT CONSIDERATIONS

Students will not be assessed on Theorems.

COMMON CORE STATE STANDARDS

Standards for Theorems are found beginning in 8th grade.

NOTES

GEOMETRIC CONSTRUCTIONS

SKILLS INVENTORY

Lower Elementary

Uses a variety of tools (ruler, compass, protractor, set-square) to create composite geometric shapes.

Upper Elementary

Follows given instructions for geometric constructions using knowledge of geometric tools and concepts.

MONTESSORI LESSONS	PURPOSES
INITIAL SERIES	
Basic Skills • How to Zero a Ruler • How to Use Compass • How to Use a Protractor • How to Use a Set-square	• To become familiar with geometric tools. • To connect the areas of geometry and art.
Design with Metal Fraction Materials	• To solve the puzzle of geometric constructions. • To compose two-dimensional shapes to create a composite shape. • To compose new shapes from a composite shape.
MIDDLE AND LATER SERIES	
Design with Compass and Straight Edge	• To encourage the child's aesthetic sensibility. • To learn to read and follow complex instructions. • To give the child tools for artistic expression. • To connect the areas of Geometry and Art.

ASSESSMENT VOCABULARY

INITIAL SERIES

compose
composite shape
cone
cube
cylinder
half-circle
pyramid
quarter-circle
rectangle
rectangular prism
shape
square
three dimensional
trapezoid
triangle
two-dimensional

Cognitive Verbs

compose
create

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to:

- Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) to create a composite shape, and compose new shapes from the composite shape. (1.G.A.2)

MIDDLE AND LATER SERIES

Students will not be assessed on Geometric Constructions.

COMMON CORE STATE STANDARDS (CCSS.MATH.CONTENT)

GEOMETRY (G)

REASON WITH SHAPES AND THEIR ATTRIBUTES

1.G.A.2	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.

NOTES

CHAPTER 4

COORDINATE SYSTEMS

COORDINATE SYSTEM

SKILLS INVENTORY

Later Series

Accurately places paired coordinates (positive and negative) in all four quadrants of a coordinate plane.

MONTESSORI LESSONS	PURPOSES
LATER SERIES	

Coordinate Planes and Ordered Pairs
• Teacher-Created Lessons
  • Axis/Axes
  • Coordinates
  • Signed Numbers
  • Rational/Absolute Numbers
	• To use a pair of perpendicular number lines (axes) to define a coordinate system.
	• To understand the intersection of the lines in a coordinate system is the origin and is arranged to coincide with the 0 on each perpendicular line.
	• To place a given point in the plane which is located by using an ordered pair of numbers (coordinates).
	• To understand that the first number in a coordinate system indicates how far to travel from the origin. in the direction of one axis (x-axis) and the second number indicates how far to travel in the direction of the second axis (y-axis).
	• To recognize the convention that the names of the two axes and the coordinates correspond (x-axis and x-coordinate, y-axis and y-coordinate).
	• To interpret coordinate values of points on a coordinate plane.
	• To understand a rational number as a point on the number line.
	• To extend number line diagrams and coordinate axes to represent points on the line and in the plane with negative number coordinates.
	• To understand that the signs of numbers in ordered pairs indicate locations in quadrants of the coordinate plane.
	• To recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
	• To use coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

continues

MONTESSORI LESSONS	PURPOSES
Graphing • Polygons • Four Quadrants • Linear Equations	• To draw polygons in the coordinate plane using the coordinates for the vertices. • To use coordinates to find the length of a side of a polygon joining points with the same first coordinate or the same second coordinate.
Problem Solving • Teacher-Created or Purchased Cards • Experiences in the Classroom	• To understand coordinate values in the context of a real-world or mathematical problem. • To represent real-work and mathematical problems by graphing points in the first quadrant of a coordinate plane. • To apply knowledge about polygons on coordinate planes to real world and mathematical situation. • To graph points in all four quadrants of the coordinate plane to solve real-world and mathematical problems.

ASSESSMENT VOCABULARY

LATER SERIES

absolute value
axis/axes
coordinate
coordinate axes
coordinate plane
coordinate system
direction
distance
first
first coordinate
first quadrant
four
graph
intersection/intersecting
length
line
mathematical problem
negative
number
number line
one
ordered pair
origin
pair
plane
point
polygon
quadrant
rational number
real-world problem
reflection
represent
second (ordinal number)
second coordinate
side
signed number
travel
two
vertex/vertices
x-axis
x-coordinate
y-axis
y-coordinate
zero

Cognitive Verbs

apply
arrange
define
graph
interpret
locate
recognize
relate
represent
solve
understand

ASSESSMENT CONSIDERATIONS

LATER SERIES

Students will be asked to:

Coordinate plane and ordered pairs

- Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. (5.G.A.1)
- Understand that the first number in a coordinate system indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate). (5.G.A.1)
- Interpret coordinate values of points on a coordinate plane. (5.G.A.2)
- Understand a rational number as a point on the number line. (6.NS.C.6)
- Extend number line diagrams and coordinate axes to represent points on the line and in the plane with negative number coordinates. (6.NS.C.6)
- Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane. (6.NS.C.6.B)
- Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. (6.NS.C.6.B)
- Use coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. (6.NS.C.8)

Polygons

- Draw polygons in the coordinate plane given coordinates for the vertices. (6.G.A.3)
- Use coordinates to find the length of a side of a polygon by joining points with the same first coordinate or the same second coordinate. (6.G.A.3)

Word Problems

- Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane. (5.G.A.2)
- Solve real-world and mathematical problems by applying the techniques of drawing polygons in coordinate planes. (6.G.A.3)
- Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. (6.NS.C.8)

COMMON CORE STATE STANDARDS (CCSS.MATH.CONTENT)

GEOMETRY (G)

GRAPH POINTS ON THE COORDINATE PLANE TO SOLVE REAL-WORLD AND MATHEMATICAL PROBLEMS

5.G.A.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
5.G.A.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
6.G.A.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

THE NUMBER SYSTEM (NS)

APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF NUMBERS TO THE SYSTEM OF RATIONAL NUMBERS

6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
6.NS.C.6.B	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
6.NS.C.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

NOTES

INDEXES

STANDARDS TO MONTESSORI INDEX

COLLEGE, CAREER AND CIVIC LIFE (C3) FRAMEWORK FOR STATE SOCIAL STUDIES STANDARDS		
HISTORY (D2.HIS)		
CHANGE, CONTINUITY AND CONTEXT		
His.3.K-2	Generate questions about individuals and groups who have shaped a significant historical change.	**Foundations** • How Geometry Got its Name
His.3.3-5	Generate questions about individuals and groups who have shaped significant historical changes and continuities.	

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS CCSS.ELA.LITERACY		MONTESSORI CHAPTERS AND SECTIONS
SPEAKING AND LISTENING (SL)		
COMPREHENSION AND COLLABORATION		
SL.1.3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.	**Foundations** • How Geometry Got Its Name
SL.1.2	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.	
SL.2.3	Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.	
SL.2.2	Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.	

continues

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS CCSS.MATH.CONTENT		MONTESSORI CHAPTERS AND SECTIONS
MEASUREMENT AND DATA (MD)		
GEOMETRIC MEASUREMENT: RECOGNIZE PERIMETER		
3.MD.D.8	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	**Geometric Figures** • Measurement of Geometric Figures
RELATE ADDITION AND SUBTRACTION TO LENGTH		
3.MD.C.5	Recognize area as an attribute of plane figures and understand concepts of area measurement.	**Geometric Figures** • Measurement of Geometric Figures
3.MD.C.5.A	A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.	
GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF AREA AND RELATE AREA TO MULTIPLICATION AND TO ADDITION		
3.MD.C.5.B	A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.	**Geometric Figures** • Measurement of Geometric Figures
3.MD.C.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	
3.MD.C.7	Relate area to the operations of multiplication and addition.	
3.MD.C.7.A	Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.	
3.MD.C.7.B	Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.	

continues

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
3.MD.C.7.C	Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.	**Geometric Figures** • Measurement of Geometric Figures
3.MD.C.7.D	Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	
SOLVE PROBLEMS INVOLVING MEASUREMENT AND ESTIMATION		
4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.	**Geometric Figures** • Measurement of Geometric Figures
GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF ANGLE AND MEASURE ANGLES		
4.MD.C.5	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:	**Geometric Figures** • Investigation of Geometric Elements and Figures • Measurement of Geometric Figures
4.MD.C.5.A	An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.	

continues

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
4.MD.C.5.B	An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	**Geometric Figures** • Measurement of Geometric Figures
4.MD.C.6	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	
4.MD.C.7	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	
GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF VOLUME		
5.MD.C.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.	**Geometric Figures** • Measurement of Geometric Figures
5.MD.C.3.A	A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.	
5.MD.C.3.B	A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.	
5.MD.C.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	
5.MD.C.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.	
5.MD.C.5.A	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.	

continues

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
5.MD.C.5.B	Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.	**Geometric Figures** • Measurement of Geometric Figures
5.MD.C.5.C	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	
GEOMETRY (G)		
REASON WITH SHAPES AND THEIR ATTRIBUTES		
1.G.A.1	Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.	**Geometric Figures** • Investigation of Geometric Elements and Figures
1.G.A.2	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.1	**Geometric Figures** • Investigation of Geometric Elements and Figures **Theorems and Constructions** • Geometric Constructions
2.G.A.1	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.1 Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	**Geometric Figures** • Investigation of Geometric Elements and Figures
3.G.A.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	

continues

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
DRAW AND IDENTIFY LINES AND ANGLES, AND CLASSIFY SHAPES BY PROPERTIES OF THEIR LINES AND ANGLES		
4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	**Geometric Figures** • Investigation of Geometric Elements and Figures
4.G.A.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	
4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	
GRAPH POINTS ON THE COORDINATE PLANE TO SOLVE REAL-WORLD AND MATHEMATICAL PROBLEMS		
5.G.A.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	**Coordinate Systems** • Coordinate Systems
5.G.A.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	

continues

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
CLASSIFY TWO-DIMENSIONAL FIGURES INTO CATEGORIES BASED ON THEIR PROPERTIES		
5.G.B.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.	**Geometric Figures** • Investigation of Geometric Elements and Figures
5.G.B.4	Classify two-dimensional figures in a hierarchy based on properties.	
SOLVE REAL-WORLD AND MATHEMATICAL PROBLEMS INVOLVING AREA, SURFACE AREA, AND VOLUME		
6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	**Geometric Figures** • Measurement of Geometric Figures
6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	
6.G.A.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	**Coordinate Systems** • Coordinate Systems
6.G.A.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	**Geometric Figures** • Measurement of Geometric Figures

continues

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
NUMBER AND OPERATIONS: FRACTIONS (NF)		
APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF MULTIPLICATION AND DIVISION		
5.NF.B.4.B	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	**Geometric Figures** • Measurement of Geometric Figures **Also aligned in Mathematics: Fractions** • Multiplication
THE NUMBER SYSTEM (NS)		
APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF NUMBERS TO THE SYSTEM OF RATIONAL NUMBERS		
6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.	**Coordinate Systems** • Coordinate Systems
6.NS.C.6.B	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	
6.NS.C.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	

MONTESSORI TO STANDARDS INDEX

CHAPTER AND SECTION	CCSS.MATH.CONTENT STANDARDS ALIGNED	
FOUNDATIONS		
Geometry Stories	**D2.His**	**History*** • Change, Continuity and Context * C3 Framework
	SL	**Speaking and Listening*** • Comprehension and Collaboration * CCSS.ELA-Literacy
GEOMETRIC FIGURES		
Investigation of Geometric Elements and Figures	**G**	**Geometry** • Reason with shapes and their attributes • Draw and identify lines and angles, and classify shapes by properties of their lines and angles • Classify two-dimensional figures into categories based on their properties
	MD	**Measurement and Data** • Geometric measurement: understand concepts of angle and measure angles
Relationships of Geometric Figures		**No Standards aligned.**

continues

CHAPTER AND SECTION	CCSS.MATH.CONTENT STANDARDS ALIGNED	
Measurement of Geometric Figures	**G**	**Geometry** • Solve real-world and mathematical problems involving area, surface area, and volume
	MD	**Measurement and Data** • Solve real-world and mathematical problems involving area, surface area, and volume • Geometric measurement: recognize perimeter • Solve problems involving measurement and conversion of measurements • Geometric measurement: understand concepts of angle and measure angles • Geometric measurement: understand concepts of volume
	NF	**Number and Operations: Fractions** • Apply and extend previous understandings of multiplication and division
Theorems		Standards for Theorems are found beginning in 8th grade.
Geometric Constructions	**G**	**Geometry** • Graph points on the coordinate plane to solve real-world and mathematical problems.