



San Diego Unified School District

Instructional Module to Enhance the Teaching of

HARCOURT

Math

California Edition

Grade 5

Module 4 – Reorganized

Geometry

— WORK IN PROGRESS —

Instruction and Curriculum Division
MATHEMATICS CURRICULUM MAP - GRADE 5

MODULE 4 – GEOMETRY: PLANE AND SOLID FIGURES

Modules represent individual units of study that lead to essential learnings

THREADS THROUGHOUT THE YEAR- GRADE 5

The threads represent ongoing learning opportunities in which students should be actively engaged throughout all units of inquiry during the entire school year. These items should not be isolated to any one particular unit of inquiry.

Students will:

- Develop understanding of numbers and the number system and use their understanding to solve problems and recognize reasonable results.
- Develop understanding of and fluency in basic computation and procedural skills.
- Use mathematical reasoning to solve problems.
- Communicate their mathematical thinking by using words, numbers, symbols, graphs and charts and translate between different representations.
- Use equations and variables to express generalizations of patterns and relationships.
- Develop logical thinking to analyze evidence and build arguments to support or refute a hypothesis.
- Make connections among mathematical ideas and between other disciplines
- Develop and use strategies, skills, and concepts to solve problems.
- Use appropriate tools, including technology, as vehicles to learn mathematical concepts.

These are essential learnings that represent bigger ideas/concepts:

- *Students use ordered pairs to locate and describe locations on a 4-quadrant coordinate grid.*
- Students build their spatial sense through geometric experiences.
- Students transform shapes in a plane or in space and describe the changes as translations (slides), reflections (flips) and rotations (turns).
- Students visualize, and draw a three dimensional figure from two-dimensional views.
- Students test figures for rotational symmetry.
- Students estimate angle size using benchmark angles and use a protractor to measure angle size more accurately.
- Students test and generalize the number of degrees in the angles of a triangle.
- Students relate circumference of a circle to perimeter of polygons.
- Through measurement and observation, students determine the relationship between the radius and diameter of a circle.

These are essential questions that learners ask themselves in order to achieve the essential learnings:

- How do I describe the parts of a graph on a 4 quadrant coordinate plane, and then identify and plot ordered pairs of integers on the graph?
- *How can I identify, describe and classify plane and solid geometric figures by their properties, including angles and sides?*
- How can I use estimation and measurement with a protractor to classify angles?
- *How can I identify the parts of a circle and explain the relationship between radius and diameter?*
- *How do I identify similar and congruent figures?*
- *How do I identify and explain lines of symmetry in a polygon?*
- *How do I test a polygon for rotational symmetry?*
- How can I verify that the total number of degrees in the angles of any triangle is 180?
- How do I identify and draw solid figures from top, side and front views?
- ***Presented in previous grades***

Resources: Van de Walle: Chapters 19 & 20 (pp. 329-340 & pp. 360-376); *Mathematics Source Book*: (pp. 27-30 and pp. 109-114)

13 Days

Key Mathematical Concepts:

- Identify and graph ordered pairs of integers in four quadrants of the coordinate plane.
- Identify, describe and classify plane and solid geometric figures by their properties.
- Use the number of degrees in a triangle and quadrilateral to solve problems.
- Classify angles using estimation and measurement with a protractor.
- Identify and measure the parts of a circle.
- Identify similar and congruent figures.

<u>Day 1</u> Lesson 24.1 Graph Relationships	<u>Day 2</u> Lesson 24.2 Graph Integers on the Coordinate Plane	<u>Day 3</u> Lesson 24.3 Use an Equation to Graph	<u>Day 4</u> Lesson 25.1 Lines and Angles	<u>Day 5</u> Lesson 25.2 Measure and Draw Angles
<u>Day 6</u> Lesson 25.3 Angles and Polygons	<u>Day 7</u> Lesson 25.5 Circles	<u>Day 8</u> Lesson 25.5 Congruent and Similar Figures	<u>Day 9</u> Lesson 25.6 Symmetric Figures	<u>Day 10</u> Lesson 26.1 Classify Plane and Solid Figures
<u>Day 11</u> Lesson 26.2 Quadrilaterals	<u>Day 12</u> Lesson 26.4 Solid Figures	<u>Day 13</u> Lesson 26.5 Draw Solid Figures from Different Views		

DAY 1
 Unit 7: Algebra and Geometry
 Chapter 24: Geometry
 LESSON 24.1, pp. 438-441

MATERIALS:	<ul style="list-style-type: none"> • Toothpicks or straws (36 per group) and mini-marshmallows, clay or gumdrops (24 per group). • TR43 44, 45 and 46: Grids to add to plastic cover for repeated use with dry erase pens during unit and the rest of the year. • Two sheets of consumable graph paper per student.
LESSON FOCUS:	Graph Relationships
CALIFORNIA STANDARDS:	<p>SDAP 1.4: Identify ordered pairs of data from a graph and interpret the meaning of the data in terms of the situation depicted by the graph.</p> <p>SDAP 1.5: Know how to write ordered pairs correctly; for example, (x,y).</p>
PURPOSE OF LESSON:	<ul style="list-style-type: none"> • To graph a relationship shown in a table. • To understand the input, x, and the output, y, from a function table can be written as ordered pairs. • To understand the first number of an ordered pair gives the horizontal movement. • $(x$-axis) and the second number gives the vertical movement (y-axis). • To learn that the intersection of the x-axis and the y-axis is called the origin.
LAUNCH: Introduce students to concepts.	<ul style="list-style-type: none"> • Groups of three build the three prisms on pages 438 and 439 using mini-marshmallows, clay or gumdrops and toothpicks. • Discuss the properties of prisms in relation to the three prisms they have built. (A prism is a polyhedron that has two congruent bases. All other faces are rectangles.) • Use the prisms to surface the meanings of congruent, face, base, and sides on the base. The edges are the toothpicks; the faces are the rectangles formed by the toothpicks; the vertices are represented by the marshmallows. (Vocabulary can be labeled and charted so students can refer to it.) • Students will use tables and graphs to analyze the relationship between the number of sides of the base of the prism and the number of vertices of the prism, and then, the number of sides of the base and the number of total faces on the prism. • Students label TR44 Grid while teacher models it on large graph paper. Display the table at top of Learn, page 438.

	<p>Learn, p. 438. Record Prism Patterns on board/overhead, and read with students.</p> <ul style="list-style-type: none"> • Model writing and graphing the first ordered pair with the students. Students write and graph the ordered pairs for the second two prisms. <p>Teach, p. 438, Guided Instruction bullets 1 & 2 to guide discussion.</p> <ul style="list-style-type: none"> • Students write and graph the ordered pairs that represent the relationship between the number of sides on the base and the number of faces on the prism. • Display the table on page 438. Students use their prisms to verify data for the Y values of the table. • Students copy the table, write the ordered pairs and complete the graph on TR 44 grid. (Dry erase or consumable) (Their graphs should look like those on p. 438. <p>Teach, p. 438, Guided Instruction bullet #3 to discuss.</p>
EXPLORE: Work with the concept. Focus on students “doing mathematics.	Alternative Teaching Strategy T.E. 438B Connect activity to graphing of prism properties.
PRACTICE: Focus on Communication and Representation.	Practice & Problem Solving, p. 439. Graph the ordered pairs for # 4 or 5. <ul style="list-style-type: none"> • Check with a partner. • Practice & Problem Solving, p. 439 #8 - 10
SUMMARIZE: Connect purpose to activities.	T.E. ASSESS, p. 439: DISCUSS T.E. ASSESS, p. 439: WRITE
HOMEWORK:	Practice & Problem Solving, p. 439 #6 Mixed Review, p. 439 <ul style="list-style-type: none"> • Try to write a rule for finding the number of nickels in any number of quarters or the perimeter of any square.

DAY: 2
 Unit 7: Algebra and Geometry
 Chapter 24: Geometry
 LESSON 24.2, pp. 440-444

MATERIALS:	<ul style="list-style-type: none"> • TR43, 44, 45 and 46: Grids to add to plastic cover for repeated use with dry erase pens during unit and the rest of the year. • One sheet of consumable graph paper per student
LESSON FOCUS:	Graph Integers on the Coordinate Plane
CALIFORNIA STANDARDS:	<p>SDAP 1.4: Identify ordered pairs of data from a graph and interpret the meaning of the data in terms of the situation depicted by the graph.</p> <p>SDAP 1.5: Know how to write ordered pairs correctly; for example, (x,y).</p> <p>AF 1.4: Identify and graph ordered pairs in the four quadrants of the coordinate plane.</p>
PURPOSE OF LESSON:	<ul style="list-style-type: none"> • To identify and graph integers on a coordinate plane • To understand that when plotting points, begin at origin (0,0), and move horizontally first, then vertically. • To learn the four sections of the coordinate plane are called quadrants. • To understand the coordinates can be positive, negative or zero.
<p>LAUNCH: Introduce students to concepts.</p> <p>TR 45 for each student.</p>	<p>Number of the Day 24.2, T.E. p. 440A Display transparency of TR46:</p> <ul style="list-style-type: none"> • Students determine how this grid is different from the one used in the last lesson. <p>Learn, p. 440. Write Mapping History on the board/overhead.</p> <p>TEACH, T.E. Pg. 440. Guided Instruction questions to guide discussion.</p> <ul style="list-style-type: none"> • Emphasize use of correct vocabulary (origin, ordered pairs, coordinate plane, quadrants, negative direction, positive direction, x-axis, y-axis) • Continue with Graphing Ordered Pairs, p. 441. Discuss with questions top margin TE p. 441. <p>Check, p. 441 #2 – 4. Discuss. Then, #18 – 20. Discuss.</p> <ul style="list-style-type: none"> • Use direction clues from ELL Strategy on T.E. p. 440B if your students need the assistance.
EXPLORE: Work with the concept. Focus on students doing mathematics.	<p>Practice & Problem Solving, p.442 #41 – 46. Students work with partners. Discuss.</p> <p>Then, #47 – 51. Discuss</p>
PRACTICE: Focus on Communication and Representation.	<p>Link Up to Geometry: Pg. 443: Optional: Allow students to identify how the new locations were found (rotation, reflected, translation).</p>
SUMMARIZE: Connect purpose to activities.	<p>Practice & Problem Solving, p. 442 #52. Discuss.</p> <p>T.E. ASSESS, p. 443: WRITE. Share.</p>
HOMEWORK:	Mixed Review and Test Prep: Pg. 443

DAY: 3
 Unit 7: Algebra and Geometry
 Chapter 24: Algebra Integers
 LESSON 24.3, pp. 444-447

MATERIALS:	TR46
LESSON FOCUS:	Use an Equation to Graph
CALIFORNIA STANDARDS:	<p>AF 1.5: Solve problems involving linear functions with integer values; write the equation; and graph the resulting ordered pairs of integers on a grid.</p> <p>SDAP 1.5: Know how to write ordered pairs correctly; for example, (x,y).</p> <p>AF 1.4: Identify and graph ordered pairs in the four quadrants of the coordinate plane.</p>
Purpose of Lesson:	<ul style="list-style-type: none"> • To use an equation to graph the relationship between numbers. • To understand speed is a rate of movement. • To understand the equation of a straight line is in the form $y = a X x$, where “a” is a constant.
LAUNCH: Introduce students to concepts.	<p>Number of the Day 24.3, T.E. p. 444A</p> <ul style="list-style-type: none"> • Modify by clarifying problem: 1 week = 7 days (1,7) • Discuss the labels for a graph of the data. (x = weeks; y = days) • “Can you predict the ordered pair for number of days in 10 weeks?” • “How will the graph change for each week?” <p>Alternative Teaching Strategy, T.E. p. 444B Learn, p. 444. Write “Slow Start” on board/overhead. Read with students. Teach, p. 444, Guided Instruction questions to guide discussion.</p> <ul style="list-style-type: none"> • Continue with More Graphing, p. 445. • Discuss using bullets top margin, p. T.E. p.445.
EXPLORE: Work with the concept. Focus on students doing mathematics.	<p>Alternative Teaching Strategy: T.E. Pg.446 Practice & Problem Solving, p. 446 #20 - 25</p>
PRACTICE: Focus on Communication and Representation.	<p>Science Connection: T.E. 444B</p> <ul style="list-style-type: none"> • Students create a table and a graph to plot the snail’s progress. • Predict the distance traveled in one hour. • Discuss equivalent ways of describing the graph with an equation: $D = m + m$; $D = m \times 2$; $D = 2m$
SUMMARIZE: Connect purpose to activities.	<ul style="list-style-type: none"> • Discuss representations for a couple of problems in Practice. <p>T.E. Assess, p. 447: DISCUSS T.E. Assess, p. 447: WRITE</p>
HOMEWORK:	Mixed Review and Test Prep: Pg. 447

DAY: 4
 Unit 7: Geometry
 Chapter 25: Plane Figures
 LESSON 25.1: Pg. 454-457

MATERIALS:	For each student: Ruler and Polygon Worksheet, two toothpicks or Popsicle sticks or straws, poster size paper; markers; magazines per group, one copy of TR56.
LESSON FOCUS:	Lines and Angles
CALIFORNIA STANDARDS:	MG 2.1: Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools. MG 2.3: Use a variety of methods, such as works, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
PURPOSE OF LESSON:	<ul style="list-style-type: none"> • Identify different kinds of angle and line relationships. • Understand properties of lines such as: lines in the same plane intersect or are parallel.
LAUNCH: Introduce students to concepts. <i>Literature Connection:</i> <u>Flatland (T.E. 454B)</u>	Learn, Pg. 454: What's the Angle? Teach, Pg. 454: Guided Instruction questions to guide discussion. SE Pg. 454, bottom. <ul style="list-style-type: none"> • Use toothpicks to form angles and move them to show acute, obtuse, right and straight angles. • Students might also use them to model intersecting, perpendicular and parallel lines.
EXPLORE: Work with the concept. Focus on student's "doing mathematics." TR56	Alternative Teaching Strategy: T.E. Pg. 456 Activity, Pg. 455. <ul style="list-style-type: none"> • Students work individually, but discuss in pairs as they work. • Emphasize proper labeling. • Check, Pg. 456 #1. • Discuss.
PRACTICE: Focus on Communication and Representation.	Practice & Problem Solving, Pg. 456 #19-22. Practice & Problem Solving, Pg. 456-457 #29 – 36. <ul style="list-style-type: none"> • Students work in pairs. • Share thinking and solutions.

SUMMARIZE: Connect purpose to activities.	ASSESS, TE Pg. 457: DISCUSS ASSESS, TE Pg. 457: WRITE
HOMEWORK:	Link up to Science, Pg. 457. See margin TE Pg. 457 to prepare students for assignment. Mixed Review and Test Prep, Pg. 457 #42-44.

ROUTINES:

- Choose from:
 - Routines in Harcourt Training and Routines already introduced.
 - Include ordering positive and negative integers when using a blank number line.
 - Include addition and subtraction of integers using models or mental math.
 - Use tables from Lesson 24.3 and Function Tables from Pg. 437 for patterns and equations.

DAY: 5
 Unit 7: Geometry
 Chapter 25: Plane Figures
 LESSON 25.2, Pg. 458-459

MATERIALS:	Protractor for each student;
LESSON FOCUS:	Measure and Draw Angles
CALIFORNIA STANDARDS:	MG 2.0: Students identify, describe, and classify the properties of, and relationships between, plane and solid geometric figures. MG 2.1: Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools.
PURPOSE OF LESSON:	<ul style="list-style-type: none"> • Use a protractor to measure angles. • Understand the attributes of acute, right and obtuse angles. • Understand the length of the ray of an angle does not change the measure of the angle.
<p>LAUNCH: Introduce students to concepts.</p> <p>List mathematical terms that you want students to use when describing their procedures or thinking. Model use of the terms and encourage students to refer to charts when writing and speaking.</p>	<ul style="list-style-type: none"> • Ask students to discuss types of angles with a partner. • Share responses whole group. • Introduce the protractor as a mathematical tool. <p>Explore, Pg. 458. Teach, Pg. 458, Guided Instruction questions to guide discussion.</p> <ul style="list-style-type: none"> • Students do Try It, bottom Pg. 458. • Be sure students name angles as well as measure them.
<p>EXPLORE: Work with the concept. Focus on student's "doing mathematics."</p>	<p>Alternative Teaching Strategy, TE Pg. 458B Connect, top SE Pg. 459.</p> <ul style="list-style-type: none"> • Review, practice, discuss with students. • Model using a protractor to draw angles of a given number of degrees. • Students construct angles of: 40, 125, 95, and 35 degrees.

PRACTICE: Focus on Communication and Representation.	Practice, Pg. 459 #1 – 4. Discuss with students. Practice, Pg. 459 #12, 13, 14. Share thinking.
SUMMARIZE: Connect purpose to activities.	ASSESS, TE Pg. 459: DISCUSS ASSESS, TE Pg. 459: WRITE
HOMEWORK:	Mixed Review and Test Prep: Pg. 459 #17-20 Trace angles of different sizes from household objects. Classify the angles.

ROUTINES:

- Choose from:
 - Routines in Harcourt Training and Routines already introduced.
 - Include ordering positive and negative integers when using a blank number line.
 - Include addition and subtraction of integers using models or mental math.
 - Tables from Lesson 24.3 and Function Tables from Pg. 437.

DAY: 6
 Unit 7: Geometry
 Chapter 25: Plane Figures
 LESSON 25.3, Pg. 460-463

MATERIALS:	Square and triangle dot paper: TR49 and TR50
LESSON FOCUS:	Angles and Polygons
CALIFORNIA STANDARDS:	MG 2.1: Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools. MG 2.2: Know that the sum of the angles of any triangle is 180 degrees and the sum of the angles of any quadrilateral is 360 degrees and use this information to solve problems.
PURPOSE OF LESSON:	<ul style="list-style-type: none"> • Use angles to classify and measure polygons • Understand polygons have the same number of angles as sides. • Understand regular polygons have all sides the same length, such as a square.
LAUNCH: Introduce students to concepts. Square dot paper	Quick Review: Pg. 460 Learn, Pg. 460: Sign of the Times. <ul style="list-style-type: none"> • Put empty chart on board/overhead. • Ask students to copy chart. • Fill in as shapes are discussed and have students fill their charts in at the same time. Teach, Pg. 460. Guided Instruction questions to guide discussion. Activity 1, bottom Pg. 460. Discuss.
EXPLORE: Work with the concept. Focus on student's "doing mathematics."	Guiding Question: Challenge groups to determine the sum of the number of degrees of the interior angles in a rectangle and in a triangle. <i>"How could we prove it?"</i> One Way: Activity 2, top SE Pg. 461. <ul style="list-style-type: none"> • Demonstrate activity as students work through the steps. • See bullets top margin TE Pg. 461 to guide discussion. • Emphasize Math Idea. Another way to test the number of degrees in the interior angles of a polygon: <ul style="list-style-type: none"> • Discuss what the students discovered about the sum of the angles in triangles. • Sketch several quadrilaterals on the board and ask students to sketch some of their own. • Draw a diagonal in one quadrilateral to form two triangles. Students determine the total degrees in the quadrilateral using what they know about triangles. • Connect conclusions to Activity 2 results.

PRACTICE: Focus on Communication and Representation.	Practice & Problem Solving, Pg. 462 #10 – 13. • Do together & discuss. Practice & Problem Solving, Pg. 462 – 463 #21-22, 26-27, 31-32. • Students work with partner. • Discuss whole group.
SUMMARIZE: Connect purpose to activities.	ASSESS, TE Pg. 463: DISCUSS ASSESS, TE Pg. 463: WRITE
HOMEWORK:	Practice & Problem Solving, Pg. 462: Draw 14-17 on dot paper. Mixed Review and Test Prep, Pg.. 463

ROUTINES:

- Choose from:
 - Routines in Harcourt Training and Routines already introduced.
 - Include ordering positive and negative integers when using a blank number line.
 - Include addition and subtraction of integers using models or mental math.

