

Unit 1

Riding a Roller Coaster: Perimeter, Area, Graphing, and Equations

Standards

The student will:

- 1.4 Determine the slope and the x- and y-intercepts of given lines.
- 1.6 Graph linear equations in two variables.
- 1.7 Determine equations for lines from given conditions.
- 7.1 Use the Pythagorean Theorem and its converse to solve problems.
- 7.2 Find distances and midpoints between given points using the coordinate plane.
- 9.1 Solve problems related to area of polygons, including the area of triangles, squares, rectangles, parallelograms, and trapezoids.

Algebra I

The student will:

- 6.1 Simplify expressions involving exponents.
- 6.2 Add and subtract polynomials.
- 6.3 Multiply polynomials.

M/J Mathematics 1

The student will:

- 3.1 Recognize, classify, and analyze polygons.
- 5.1 Find area and perimeters of rectangular shapes and non-rectangular shapes.

Day 1 The Pythagorean Theorem

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Locate points on the coordinate grid. Find areas and perimeters of given rectangles. 	<ul style="list-style-type: none"> Explore and apply the Pythagorean Theorem. 	<ul style="list-style-type: none"> Solve problems related to the Pythagorean Theorem.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-10 minutes	<ul style="list-style-type: none"> Read PZI-5. Start on RC-1 with teacher. 	<ul style="list-style-type: none"> Discuss PZL-5. Remind students of guideline for study teams. Start on RC-1. 	
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete RC-1 with study team. 	<ul style="list-style-type: none"> Help students complete part (c) of RC-1. Use the corner of an index card for drawing the right angles for the squares. Students may want to use the calculator to approximate the square roots. Students may have time to start on RC-2 and RC-3. 	<ul style="list-style-type: none"> RC-1 may be demonstrated using the Geometer's SketchPad. Make sure the construction is completed prior to class. Do not spend time reviewing the simplification of radicals at this point. Use the calculator to find an approximation.

Steps	Student Activity	Teacher Support	Comment/Evaluation
Summarize 8-10 minutes	<ul style="list-style-type: none"> • Share results of RC-1 with class. 	<ul style="list-style-type: none"> • Select study teams to present results of RC-1 with class. 	
Homework	<ul style="list-style-type: none"> • RC-2 through RC-7. 		

Day 2
Introducing Area and Perimeter

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Find areas and perimeters for given rectangles. 	<ul style="list-style-type: none"> Find area and perimeter of non-rectangular figures. 	<ul style="list-style-type: none"> Solve problems relating to area and perimeter.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	<ul style="list-style-type: none"> Read PZL-6. Start RC-8 with teachers. 	<ul style="list-style-type: none"> Discuss PZL-6. Start work on RC-6 with class. 	
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete RC-8 through RC-10 with study team. 	<ul style="list-style-type: none"> The grid approach is used in finding the area for given figures. Discuss the change from linear to square measure. 	<ul style="list-style-type: none"> Students have encounter using the grid approach in finding area. The grid approach provides a good introduction to development of the usual formulas for area.
Summarize 8-10 minutes	<ul style="list-style-type: none"> Share completed RC-8 through RC-10. 	<ul style="list-style-type: none"> Discuss completed RC-8 through RC-10. 	

Steps	Student Activity	Teacher Support	Comment/Evaluation
Homework	<ul style="list-style-type: none"><li data-bbox="394 337 716 367">• RC-11 through RC-16.		

Day 3
Introducing Area and Perimeter

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Find area and perimeter of rectangular and non-rectangular figures. 	<ul style="list-style-type: none"> Use the grid approach to develop the usual area formulas for triangles and quadrilaterals. 	<ul style="list-style-type: none"> Solve problems involving triangles and quadrilaterals.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>8-10 minutes</p>	<ul style="list-style-type: none"> Read PZL-7. 	<ul style="list-style-type: none"> Discuss PZL-7. Continuation from previous lesson on using the grid approach to develop the usual area formulas for triangles and quadrilaterals. 	
<p>Explore</p> <p>20-25 minutes</p>	<ul style="list-style-type: none"> Complete RC-17 through RC-22 with study team. 	<ul style="list-style-type: none"> Check student responses for RC-19 to get an idea of what they think area is at this point. 	
<p>Summarize</p> <p>8-10 minutes</p>	<ul style="list-style-type: none"> Present completed RC-17 through RC-22 to class. 	<ul style="list-style-type: none"> Select study teams to present completed RC-17 through RC-22. 	

Steps	Student Activity	Teacher Support	Comment/Evaluation
Homework	<ul style="list-style-type: none"><li data-bbox="394 337 716 367">• RC-23 through RC-28.		

Day 4
Introducing Area and Perimeter

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Find area and perimeter of rectangular and non-rectangular figures. 	<ul style="list-style-type: none"> Use the grid approach to develop the usual area formulas for triangles and quadrilaterals. 	<ul style="list-style-type: none"> Solve problems involving triangles and quadrilaterals.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>8-10 minutes</p>	<ul style="list-style-type: none"> Start RC-29 with teacher. 	<ul style="list-style-type: none"> Hand out resource page with rectangles, parallelograms, and triangle. DO NOT pass out the formula page. 	
<p>Explore</p> <p>20-25 minutes</p>	<ul style="list-style-type: none"> Complete RC-29 through RC-34 with study team. 	<ul style="list-style-type: none"> No formulas are given for finding areas. Use RC-29 through RC-32 to see how well students have grasped the ideas of developing the usual area formulas through explorations. 	
<p>Summarize</p>	<ul style="list-style-type: none"> Share and discuss solutions to RC-34. 	<ul style="list-style-type: none"> Select study teams to share solutions to RC-34. 	

Steps	Student Activity	Teacher Support	Comment/Evaluation
8-10 minutes		<ul style="list-style-type: none"> <li data-bbox="934 310 1461 423">• Start RC-35. Suggest that students identify the legs and the hypotenuse for each problem prior to setting up the equations. 	
Homework	<ul style="list-style-type: none"> <li data-bbox="388 492 716 521">• RC-35 through RC-40. 		

Day 5
Introducing Area and Perimeter

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Find area and perimeter of rectangular and non-rectangular figures. 	<ul style="list-style-type: none"> Use the grid approach to develop the usual area formulas for triangles and quadrilaterals. 	<ul style="list-style-type: none"> Solve problems involving triangles and quadrilaterals.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>8-10 minutes</p>	<ul style="list-style-type: none"> Complete RC-42 and RC-43 as entries for the tool kit. Start RC-41 with teacher. 	<ul style="list-style-type: none"> Introduce the geometry tool kit. Discuss the purpose of making and using the tool kit. Help students summarize new ideas with appropriate diagrams or examples. Start RC-41. 	<ul style="list-style-type: none"> Students from CPM Algebra I will have experience entries for the tool kit.
<p>Explore</p> <p>20-25 minutes</p>	<ul style="list-style-type: none"> Complete RC41 through RC-45 with study team. 	<ul style="list-style-type: none"> Emphasize the use of sub-problems for given problems. The index card is a good reminder for use in finding the height. 	<ul style="list-style-type: none"> Provide examples of how to use the index card for finding the height for triangles and quadrilaterals.
<p>Summarize</p>	<ul style="list-style-type: none"> Discuss RC-44 and RC-45. 	<ul style="list-style-type: none"> Select study teams to present RC-44 	<ul style="list-style-type: none"> Show examples of using the

Steps	Student Activity	Teacher Support	Comment/Evaluation
8-10 minutes		and RC-45.	index card for finding the heights for obtuse triangles.
Homework	<ul style="list-style-type: none">• RC-46 through RC-50.		

Day 6
Introducing Area and Perimeter

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Find area and perimeter of triangles and rectangles. 	<ul style="list-style-type: none"> Use sub-problems to solve given problems. Use dissection of figures to find specified areas. 	<ul style="list-style-type: none"> Solve problems relating to area and perimeter.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-10 minutes	<ul style="list-style-type: none"> Complete RC-51 with teacher. 	<ul style="list-style-type: none"> Continue to develop student proficiency with area, perimeter, and the Pythagorean Theorem. Start work on RC-51 with class. 	
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete RC-51 through RC-60 with study team. 	<ul style="list-style-type: none"> Emphasize dissecting given area into appropriate smaller section to complete given problem. No one method for the dissection. 	<ul style="list-style-type: none"> Demonstrate RC-51 using Geometer's SketchPad. Many FCAT like area problems.
Summarize 8-10 minutes	<ul style="list-style-type: none"> Present different methods of approaching the given problem through dissections or sub-problems. 	<ul style="list-style-type: none"> Show that there are many alternative methods to break a given problem up into sub-problems. 	

Steps	Student Activity	Teacher Support	Comment/Evaluation
		<ul style="list-style-type: none"> <li data-bbox="940 310 1444 368">• Show that the different dissection to a problem will give the same result. 	
Homework	<ul style="list-style-type: none"> <li data-bbox="394 431 716 459">• RC-61 through RC-65. 		

Day 7
Linear Equations

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Plot points on the coordinate grid. 	<ul style="list-style-type: none"> Graph linear equations in two variables using a table. Find the y-intercept for given linear equations. 	<ul style="list-style-type: none"> Find slopes of given linear equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>8-10 minutes</p>	<ul style="list-style-type: none"> Follow teacher led activity. Read PZL-8 	<ul style="list-style-type: none"> Complete teacher led activity from Teacher Text page 31. 	
<p>Explore</p> <p>20-25 minutes</p>	<ul style="list-style-type: none"> Complete RC-66 through RC-68 with study team. 	<ul style="list-style-type: none"> Start work on RC-66 with class. Encourage students to make a table for the specified coordinates. The sentence in the doubled lined box at the end of RC-67 should read “The y-coordinate where the graph crosses the y-axis is called the y-intercept.” The answer for RC-68, part (a) should be 5, not (0, 5). 	<ul style="list-style-type: none"> A vertical tables such as $x \quad y$ is easier for student to identify the ordered pairs.

Steps	Student Activity	Teacher Support	Comment/Evaluation
			<ul style="list-style-type: none"> In RC-67, the second column in the table should read “the y-coordinate” not the “coordinates.”
Summarize 8-10 minutes	<ul style="list-style-type: none"> Share solutions of RC-66 through RC-68. 	<ul style="list-style-type: none"> Select study teams to present RC-66 through RC-68. 	
Homework	<ul style="list-style-type: none"> RC-69 through RC-72. 		

Day 8
Finding Slope

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Graph linear equations in two variables. 	<ul style="list-style-type: none"> Determine the slope between two given points. 	<ul style="list-style-type: none"> Determine the slope for given linear equations in two variables.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>10-15 minutes</p>	<ul style="list-style-type: none"> Complete RC-73 with teacher. 	<ul style="list-style-type: none"> Complete work on RC-73 with class. Steeper slopes have relatively larger numbers. Flatter slopes have smaller numbers. Horizontal lines have a slope of 0. Downhill slopes might be described as negatives. 	
<p>Explore</p> <p>20-25 minutes</p>	<ul style="list-style-type: none"> Complete RC-74 through RC-78 with study team. 	<ul style="list-style-type: none"> Explain the use of the slope triangle. Show the vertical change in a difference in the y-coordinate and the horizontal change as the difference in x-coordinates. Monitor arithmetic errors. 	

Steps	Student Activity	Teacher Support	Comment/Evaluation
Summarize 8-10 minutes	<ul style="list-style-type: none"> • Present and discuss RC-77. 	<ul style="list-style-type: none"> • Select study teams to present RC-77. • Monitor students' understanding on all parts of RC-77. 	<ul style="list-style-type: none"> • Students need to have a good understanding of the questions from RC-77 and not just the memorization of rules.
Homework	<ul style="list-style-type: none"> • RC-79 through rC-84. 		

Day 9 Finding Slope

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Determine slope between two given points. 	<ul style="list-style-type: none"> Determine the midpoint of given segments. 	<ul style="list-style-type: none"> Write linear equations when given the slope and a point on the line.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	<ul style="list-style-type: none"> Complete RC-85 with teacher. 	<ul style="list-style-type: none"> Show that slope between any two points on a given line is the same. 	
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete RC-86 through RC-89 with study team. 	<ul style="list-style-type: none"> Encourage students to notice the pattern for finding midpoints rather than giving student rules. 	<ul style="list-style-type: none"> How can students show that a point is the midpoint of a given segment?
Summarize 8-10 minutes	<ul style="list-style-type: none"> Present RC-86 through RC-89. 	<ul style="list-style-type: none"> Select study teams to present RC-86 through RC-89. 	
Homework	<ul style="list-style-type: none"> RC-90 through RC-95. 		

Day 10
Unit and Tool Kit Review

Connection

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Find area and perimeter of given geometric figures using grid approach or dissection. Graph linear equations in two variables. Find slope between two points. Find midpoints for given segments. 	<ul style="list-style-type: none"> Find area and perimeter of given geometric figures using grid approach or dissection. Graph linear equations in two variables. Find slope between two points. Find midpoints for given segments. 	<ul style="list-style-type: none"> Solve problems relating to area and perimeter. Determine linear equations in two variables from given conditions.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 5-8 minutes	<ul style="list-style-type: none"> Prepare for review. 	<ul style="list-style-type: none"> Assign review problems for study team. 	<ul style="list-style-type: none"> Review problems may be used as a team quiz.
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete assigned problems from RC-96 through RC-108 with study team. 	<ul style="list-style-type: none"> Study team members should be responsible for doing the review. Students should present solutions of assigned problems to the class. RC-99 reviews the entire unit. 	
Summarize	<ul style="list-style-type: none"> Present selected assignment to class 	<ul style="list-style-type: none"> Facilitate review by selecting study 	

Steps	Student Activity	Teacher Support	Comment/Evaluation
8-10 minutes	for discussion and review.	teams to present solutions to class for discussion.	
Homework	<ul style="list-style-type: none"> • Read PZL-9. • Complete tool kit checkup. 		