

Analytic Geometry

Vocabulary

fractal
 Cartesian grid
 midpoint
 median
 equidistant
 right bisector
 altitude

Curriculum Expectations

Analytic Geometry

Solving Problems Involving Properties of Line Segments

By the end of this chapter, students will

AG2.01 develop the formula for the midpoint of a line segment, and use this formula to solve problems (e.g., determine the coordinates of the midpoints of the sides of a triangle, given the coordinates of the vertices, and verify concretely or by using dynamic geometry software);

AG2.02 develop the formula for the length of a line segment, and use this formula to solve problems (e.g., determine the lengths of the line segments joining the midpoints of the sides of a triangle, given the coordinates of the vertices of the triangle, and verify using dynamic geometry software);

AG2.03 develop the equation for a circle with centre $(0, 0)$ and radius r , by applying the formula for the length of a line segment;

AG2.04 determine the radius of a circle with centre $(0, 0)$, given its equation; write the equation of a circle with centre $(0, 0)$, given the radius; and sketch the circle, given the equation in the form $x^2 + y^2 = r^2$;

AG2.05 solve problems involving the slope, length, and midpoint of a line segment (e.g., determine the equation of the right bisector of a line segment, given the coordinates of the endpoints; determine the distance from a given point to a line whose equation is given, and verify using dynamic geometry software).

Chapter Problem

The Chapter Problem involving fractals is introduced in the Chapter 2 Opener. Students may be completely unfamiliar with fractals, so an Internet search for information may be a good starting point. Ask each student to print a fractal image that they find in their search. Creating a display of these images in the classroom will spark student interest and help them appreciate the diversity of fractals.

Have students complete the Chapter Problem revisits that occur throughout the chapter. These questions are designed to help students move toward the Chapter 2 Problem Wrap-Up on page 103.

Alternatively, assign the Chapter Problem only when students have completed the chapter. The Chapter Problem is a summative assessment.

Chapter 2 Planning Chart

Section Suggested Timing	Student Text Pages	Teacher's Resource Blackline Masters	Assessment	Tools
Chapter 2 Opener • 15 min	52–53			
Get Ready • 35–70 min	54–55	<ul style="list-style-type: none"> • G–1 Grid Paper • BLM 2–1 Get Ready 	<ul style="list-style-type: none"> • BLM 2–2 Get Ready Self-Assessment Checklist 	Tools <ul style="list-style-type: none"> • grid paper
2.1 Midpoint of a Line Segment • 70–90 min	56–69	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • T–4 <i>The Geometer's Sketchpad</i>® 3 • T–5 <i>The Geometer's Sketchpad</i>® 4 • BLM 2–3 Section 2.1 Practice Master 	<ul style="list-style-type: none"> • A–7 Thinking General Scoring Rubric 	Tools <ul style="list-style-type: none"> • grid paper Technology Tools <ul style="list-style-type: none"> • <i>The Geometer's Sketchpad</i>® • computer • Cabri® Jr. • graphing calculator • Internet access
2.2 Length of a Line Segment • 40–70 min	70–79	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • T–4 <i>The Geometer's Sketchpad</i>® 3 • T–5 <i>The Geometer's Sketchpad</i>® 4 • BLM 2–4 Section 2.2 Practice Master 	<ul style="list-style-type: none"> • BLM 2–5 Section 2.2 Achievement Check Rubric • A–4 Presentation Checklist • A–7 Thinking General Scoring Rubric 	Tools <ul style="list-style-type: none"> • grid paper Technology Tools <ul style="list-style-type: none"> • <i>The Geometer's Sketchpad</i>® • computer • Cabri® Jr. • graphing calculator • Internet access
2.3 Apply Slope, Midpoint, and Length Formulas • 60–75 min	80–91	<ul style="list-style-type: none"> • G–1 Grid Paper • G–2 Placemat • G–3 Coordinate Grids • G–4 Protractor • T–4 <i>The Geometer's Sketchpad</i>® 3 • T–5 <i>The Geometer's Sketchpad</i>® 4 • BLM 2–6 Section 2.3 Practice Master 	<ul style="list-style-type: none"> • BLM 2–7 Section 2.3 Achievement Check Rubric • A–8 Application General Scoring Rubric • A–17 Teamwork Self-Assessment 	Tools <ul style="list-style-type: none"> • grid paper • protractor Technology Tools <ul style="list-style-type: none"> • <i>The Geometer's Sketchpad</i>® • computer • Cabri® Jr. • graphing calculator
2.4 Equation for a Circle • 40–70 min	92–99	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • T–4 <i>The Geometer's Sketchpad</i>® 3 • T–5 <i>The Geometer's Sketchpad</i>® 4 • BLM 2–8 Section 2.4 Practice Master 	<ul style="list-style-type: none"> • A–9 Communication General Scoring Rubric • A–17 Teamwork Self-Assessment 	Tools <ul style="list-style-type: none"> • grid paper • compasses Technology Tools <ul style="list-style-type: none"> • <i>The Geometer's Sketchpad</i>® • computer
Chapter 2 Review • 60–75 min	100–103	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • T–4 <i>The Geometer's Sketchpad</i>® 3 • T–5 <i>The Geometer's Sketchpad</i>® 4 • BLM 2–9 Chapter 2 Review 		Tools <ul style="list-style-type: none"> • grid paper • compasses Technology Tools <ul style="list-style-type: none"> • <i>The Geometer's Sketchpad</i>® • computer • Cabri® Jr. • graphing calculator
Chapter 2 Problem Wrap-Up • 45–60 min	103	<ul style="list-style-type: none"> • G–1 Grid Paper • G–4 Protractor • T–4 <i>The Geometer's Sketchpad</i>® 3 • T–5 <i>The Geometer's Sketchpad</i>® 4 	<ul style="list-style-type: none"> • BLM 2–10 Chapter 2 Problem Wrap-Up Rubric 	Tools <ul style="list-style-type: none"> • grid paper • compasses • protractor • ruler • poster board Technology Tools <ul style="list-style-type: none"> • <i>The Geometer's Sketchpad</i>® • computer • Cabri® Jr. • graphing calculator • Internet access

Section Suggested Timing	Student Text Pages	Teacher's Resource Blackline Masters	Assessment	Tools
Chapter 2 Practice Test • 45–70 min	104–105	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • G–4 Protractor • T–4 <i>The Geometer's Sketchpad</i>® 3 • T–5 <i>The Geometer's Sketchpad</i>® 4 • BLM 2–14 BLM Answers 	<ul style="list-style-type: none"> • BLM 2–11 Chapter 2 Practice Test • BLM 2–12 Chapter 2 Test • BLM 2–13 Chapter 2 Practice Test Achievement Check Rubric 	Tools <ul style="list-style-type: none"> • grid paper • compasses • protractor Technology Tools <ul style="list-style-type: none"> • <i>The Geometer's Sketchpad</i>® • computer • Cabri® Jr. • graphing calculator

Chapter 2 Blackline Masters Checklist

	BLM	Title	Purpose
Get Ready			
	G-1	Grid Paper	Student Support
	BLM 2-1	Get Ready	Practice
	BLM 2-2	Get Ready Self-Assessment Checklist	Student Self-Assessment
2.1 Midpoint of a Line Segment			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	T-4	<i>The Geometer's Sketchpad</i> ® 3	Technology
	T-5	<i>The Geometer's Sketchpad</i> ® 4	Technology
	BLM 2-3	Section 2.1 Practice Master	Practice
	A-7	Thinking General Scoring Rubric	Assessment
2.2 Length of a Line Segment			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	T-4	<i>The Geometer's Sketchpad</i> ® 3	Technology
	T-5	<i>The Geometer's Sketchpad</i> ® 4	Technology
	BLM 2-4	Section 2.2 Practice Master	Practice
	BLM 2-5	Section 2.2 Achievement Check Rubric	Assessment
	A-4	Presentation Checklist	Assessment
	A-7	Thinking General Scoring Rubric	Assessment
2.3 Apply Slope, Midpoint, and Length Formulas			
	G-1	Grid Paper	Student Support
	G-2	Placemat	Student Support
	G-3	Coordinate Grids	Student Support
	G-4	Protractor	Student Support
	T-4	<i>The Geometer's Sketchpad</i> ® 3	Technology
	T-5	<i>The Geometer's Sketchpad</i> ® 4	Technology
	BLM 2-6	Section 2.3 Practice Master	Practice
	BLM 2-7	Section 2.3 Achievement Check Rubric	Assessment
	A-8	Application General Scoring Rubric	Assessment
	A-17	Teamwork Self-Assessment	Student Self-Assessment
2.4 Equation for a Circle			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	T-4	<i>The Geometer's Sketchpad</i> ® 3	Technology

	BLM	Title	Purpose
	T-5	<i>The Geometer's Sketchpad</i> ® 4	Technology
	BLM 2-8	Section 2.4 Practice Master	Practice
	A-9	Communication General Scoring Rubric	Assessment
	A-17	Teamwork Self-Assessment	Student Self-Assessment
Chapter 2 Review			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	T-4	<i>The Geometer's Sketchpad</i> ® 3	Technology
	T-5	<i>The Geometer's Sketchpad</i> ® 4	Technology
	BLM 2-9	Chapter 2 Review	Practice
Chapter 2 Problem Wrap-Up			
	G-1	Grid Paper	Student Support
	G-4	Protractor	Student Support
	T-4	<i>The Geometer's Sketchpad</i> ® 3	Technology
	T-5	<i>The Geometer's Sketchpad</i> ® 4	Technology
	BLM 2-10	Chapter 2 Problem Wrap-Up Rubric	Summative Assessment
Chapter 2 Practice Test			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	G-4	Protractor	Student Support
	T-4	<i>The Geometer's Sketchpad</i> ® 3	Technology
	T-5	<i>The Geometer's Sketchpad</i> ® 4	Technology
	BLM 2-11	Chapter 2 Practice Test	Diagnostic Assessment
	BLM 2-12	Chapter 2 Test	Summative Assessment
	BLM 2-13	Chapter 2 Practice Test Achievement Check Rubric	Assessment
	BLM 2-14	BLM Answers	Answers

Get Ready

Student Text Pages

54–55

Suggested Timing

35–70 min

Tools

- grid paper

Related Resources

- G–1 Grid Paper
- BLM 2–1 Get Ready
- BLM 2–2 Get Ready Self-Assessment Checklist

TI-Navigator™

Go to www.mcgrawhill.ca/books/principles10 and follow the links to the file for this section.

Common Errors

- Some students may make errors when rearranging equations in the form $y = mx + b$.
- R_x** Remind students that the opposite operations must be performed to both sides of the equation in order to isolate the variable y .
- When calculating the slope of a line, some students may make sign errors or may interchange the rise and the run.
- R_x** Have students write the formula each time they calculate a slope. This will help reinforce their skills.
- Students may forget to use the negative reciprocal slope when dealing with perpendicular lines.
- R_x** Point out that the product of the slopes of perpendicular lines is -1 .

Accommodations

Visual—Let students use highlighters to colour-code to relate and interpret the **rise** in the formula for slope, $m = \frac{\text{rise}}{\text{run}}$, to the $y_2 - y_1$ in the formula, and the **run** in the formula for slope, $m = \frac{\text{rise}}{\text{run}}$, to the $x_2 - x_1$ in the formula.

Perceptual—Encourage students to use graphing calculators to graph “families of lines” that have the same slope and different y -intercepts. Then, describe how the lines are alike and how the lines are different.

Memory—Provide students with visual clues or cue cards showing the formula for determining the slope of a line given two points on the line.

Teaching Suggestions

- Have students work in pairs or small groups on the Get Ready material. A jigsaw approach for the five sections in the Get Ready could be used effectively here.
- Use **BLM 2–1 Get Ready** for remediation or extra practice.

Assessment

Assess student readiness to proceed by informal observation as students are working on the exercises. A formal test would be inappropriate since this material is not part of the grade 10 curriculum for this chapter. Student self-assessment is also an effective technique; students can place a check mark beside topics in the Get Ready with which they feel confident of having the necessary skills. Use **BLM 2–2 Get Ready Self-Assessment Checklist** as a self-assessment for students. Remedial action can be taken in small groups or with a whole class skill review.