

Linear Systems

Vocabulary

linear system
point of intersection
method of substitution
equivalent linear equations
equivalent linear systems
method of elimination

Curriculum Expectations**Analytic Geometry*****Using Linear Systems to Solve Problems***

By the end of this chapter, students will

AG1.01 solve systems of two linear equations involving two variables, using the algebraic method of substitution or elimination;

AG1.02 solve problems that arise from realistic situations described in words or represented by linear systems of two equations involving two variables, by choosing an appropriate algebraic or graphical method.

Chapter Problem

The Chapter Problem is introduced in the Chapter 1 Opener. Have students discuss their understanding of the topic. Ask students about other situations in which they might need to make this type of decision, such as planning for a wedding reception, a charity event, a school function, and so on. Have students complete the Chapter Problem revisits that occur throughout the chapter. These questions are designed to help students move toward the Chapter 1 Problem Wrap-Up on page 49.

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

Chapter 1 Planning Chart

Section Suggested Timing	Student Text Page (s)	Teacher's Resource Blackline Masters	Assessment	Tools
Chapter 1 Opener • 10 min	2–3			
Get Ready • 25–50 min	4–7	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • T–7 The Computer Algebra System (CAS) on the TI-89 Calculator • BLM 1–1 Get Ready 	<ul style="list-style-type: none"> • BLM 1–2 Get Ready Self-Assessment Checklist 	Tools <ul style="list-style-type: none"> • grid paper Technology Tools <ul style="list-style-type: none"> • graphing calculator • TI-89 calculator
1.1 Connect English With Mathematics and Graphing Lines • 60–80 min	8–19	<ul style="list-style-type: none"> • G–1 Grid Paper • G–2 Placemat • G–3 Coordinate Grids • T–4 <i>The Geometer's Sketchpad</i>® 3 • T–5 <i>The Geometer's Sketchpad</i>® 4 • BLM 1–3 Section 1.1 Practice Master 	<ul style="list-style-type: none"> • A–9 Communication General Scoring Rubric 	Tools <ul style="list-style-type: none"> • placemat or sheet of paper Technology Tools <ul style="list-style-type: none"> • graphing calculator • <i>The Geometer's Sketchpad</i>® • computer
1.2 The Method of Substitution • 60–80 min	20–28	<ul style="list-style-type: none"> • T–7 The Computer Algebra System (CAS) on the TI-89 Calculator • BLM 1–4 Section 1.2 Practice Master 	<ul style="list-style-type: none"> • BLM 1–5 Section 1.2 Achievement Check Rubric • A–6 Knowledge/Understanding General Scoring Rubric • A–9 Communication General Scoring Rubric 	Technology Tools <ul style="list-style-type: none"> • TI-89 calculator
1.3 Investigate Equivalent Linear Relations and Equivalent Linear Systems • 60–80 min	29–33	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • BLM 1–6 Section 1.3 Practice Master 		Tools <ul style="list-style-type: none"> • grid paper Technology Tools <ul style="list-style-type: none"> • graphing calculator • geometry software
1.4 The Method of Elimination • 60–80 min	34–41	<ul style="list-style-type: none"> • T–7 The Computer Algebra System (CAS) on the TI-89 Calculator • BLM 1–7 Section 1.4 Practice Master 	<ul style="list-style-type: none"> • BLM 1–8 Section 1.4 Achievement Check Rubric 	Technology Tools <ul style="list-style-type: none"> • TI-89 calculator
1.5 Solve Problems Using Linear Systems • 60–80 min	42–47	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • BLM 1–9 Section 1.5 Practice Master 	<ul style="list-style-type: none"> • A–5 Problem Solving Checklist • A–11 Group Work Assessment Recording Sheet • A–12 Group Work Assessment General Scoring Rubric • A–18 My Progress as a Problem Solver 	Tools <ul style="list-style-type: none"> • grid paper • ruler
Chapter 1 Review • 60 min	48–49	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • BLM 1–10 Chapter 1 Review 	<ul style="list-style-type: none"> • A–14 Self-Assessment Recording Sheet • A–15 Self-Assessment Checklist 	Tools <ul style="list-style-type: none"> • grid paper Technology Tools <ul style="list-style-type: none"> • graphing calculator
Chapter 1 Problem Wrap-Up • 20–60 min	49	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids 	<ul style="list-style-type: none"> • BLM 1–11 Chapter 1 Problem Wrap-Up Rubric 	Tools <ul style="list-style-type: none"> • grid paper Technology Tools <ul style="list-style-type: none"> • graphing calculator
Chapter 1 Practice Test • 60 min	50–51	<ul style="list-style-type: none"> • G–1 Grid Paper • G–3 Coordinate Grids • BLM 1–15 BLM Answers 	<ul style="list-style-type: none"> • BLM 1–12 Chapter 1 Practice Test • BLM 1–13 Chapter 1 Test • BLM 1–14 Chapter 1 Practice Test Achievement Check Rubric 	Tools <ul style="list-style-type: none"> • grid paper

Chapter 1 Blackline Masters Checklist

	BLM	Title	Purpose
Get Ready			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	T-7	The Computer Algebra System (CAS) on the TI-89 Calculator	Technology
	BLM 1-1	Get Ready	Practice
	BLM 1-2	Get Ready Self-Assessment Checklist	Student Self-Assessment
1.1 Connect English With Mathematics and Graphing Lines			
	G-1	Grid Paper	Student Support
	G-2	Placemat	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 1-3	Section 1.1 Practice Master	Practice
	A-9	Communication General Scoring Rubric	Assessment
1.2 The Method of Substitution			
	T-7	The Computer Algebra System (CAS) on the TI-89 Calculator	Technology
	BLM 1-4	Section 1.2 Practice Master	Practice
	BLM 1-5	Section 1.2 Achievement Check Rubric	Assessment
	A-6	Knowledge/Understanding General Scoring Rubric	Assessment
	A-9	Communication General Scoring Rubric	Assessment
1.3 Investigate Equivalent Linear Relations and Equivalent Linear Systems			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	BLM 1-6	Section 1.3 Practice Master	Practice
1.4 The Method of Elimination			
	T-7	The Computer Algebra System (CAS) on the TI-89 Calculator	Technology
	BLM 1-7	Section 1.4 Practice Master	Practice
	BLM 1-8	Section 1.4 Achievement Check Rubric	Assessment
1.5 Solve Problems Using Linear Systems			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	BLM 1-9	Section 1.5 Practice Master	Practice
	A-5	Problem Solving Checklist	Assessment
	A-11	Group Work Assessment Recording Sheet	Assessment
	A-12	Group Work Assessment General Scoring Rubric	Assessment
	A-18	My Progress as a Problem Solver	Student Self-Assessment

	BLM	Title	Purpose
Chapter 1 Review			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	BLM 1-10	Chapter 1 Review	Practice
	A-14	Self-Assessment Recording Sheet	Student Self-Assessment
	A-15	Self-Assessment Checklist	Student Self-Assessment
Chapter 1 Problem Wrap-Up			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	BLM 1-11	Chapter 1 Problem Wrap-Up Rubric	Summative Assessment
Chapter 1 Practice Test			
	G-1	Grid Paper	Student Support
	G-3	Coordinate Grids	Student Support
	BLM 1-12	Chapter 1 Practice Test	Diagnostic Assessment
	BLM 1-13	Chapter 1 Test	Summative Assessment
	BLM 1-14	Chapter 1 Practice Test Achievement Check Rubric	Assessment
	BLM 1-15	BLM Answers	Answers

Get Ready

Student Text Pages

4–7

Suggested Timing

25–50 min

Tools

- grid paper

Technology Tools

- graphing calculator
- TI-89 calculator

Related Resources

- G–1 Grid Paper
- G–3 Coordinate Grids
- T–7 The Computer Algebra System (CAS) on the TI-89 Calculator
- BLM 1–1 Get Ready
- BLM 1–2 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 distribute negative terms improperly, particularly in the middle of a long expression.

R_x Remind students that the sign to the left of the coefficient gets distributed with the coefficient.

Accommodations

Visual—Encourage students to use different colours when adding like terms. For example:

$$3x + 5y + 2x + 4y = 5x + 9y$$

Let students use graphing calculators to check their answers as they work through the Get Ready questions.

Perceptual—Let students use algebra tiles when multiplying algebraic expressions.

Spatial—Allow students to use algebraic number lines when adding and subtracting like terms.

Memory—Remind students to use concrete examples, such as money, when adding like terms. For example: $\$2 + \$3 = \$5$ and $\$1 + \$5 = \$6$

Teaching Suggestions

- Use the Get Ready as a diagnostic tool to see where the students need help to do the work in this chapter. Have the students work in pairs to check each other's work.
- Stress that for questions 5 through 8 students must use grid paper, not just draw freehand.
- Use **T–7 The Computer Algebra System (CAS) on the TI-89 Calculator** to support the CAS topics.
- Demonstrate how to use the Solve function of the CAS to rearrange an equation to solve for y directly. This may save time in some situations.
 - Turn on your TI-89 calculator. If the CAS does not start, press **HOME**. Access the **F6** menu, and select **2:NewProb** to clear the CAS.
 - From the **F2** menu, select **1:solve(**. Enter the equation as shown. Press

ENTER.

The calculator screen shows the CAS menu with 'NewProb' selected. The command 'solve(5*x + 2*y - 3 = 0, y)' is entered. The result is displayed as $y = \frac{-(5 \cdot x - 3)}{2}$.

- If you want the result in the more common format, use the up arrow key to highlight the new form. **Copy** and **Paste** this form into the command. Then, from the **F2** menu, use the **Expand** function.

The calculator screen shows the 'expand' function being applied to the result from the solve function. The command is 'expand(y = -(5*x - 3)/2)'. The result is displayed as $y = 3/2 - \frac{5 \cdot x}{2}$.

- Point out the Did You Know? feature about alloys. This may spark a discussion and can lead to a cross-curricular aspect to the Get Ready. You could speak to the Science teacher before beginning the course to see if your school has any posters or other information about alloys.
- Use **BLM 1–1 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 1–2 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.