1.5 Solve Problems Using Linear Systems

Teaching Suggestions

Investigate
• Have the students work in groups for this section. Use **A–11 Group Work Assessment Recording Sheet** and/or **A–12 Group Work Assessment General Scoring Rubric** to assist you when assessing students. (15 min)

Examples
• Discuss the **Examples**. (20 min)
• In **Example 1**, students may wonder if they may isolate c. In this example, either variable can be isolated easily. Demonstrate the other method to allow students to see the same final result.
• **Example 2** is well set up to show students how to tackle a problem where there are many factors involved. Encourage students to use a chart such as the one provided in cases like this one.
• The two equations in **Example 3** can be solved in various ways. Some students might appreciate that they can multiply equation ② by 20 to get $f + 2t = 400$, then substitute $f = 250 - t$ into equation ① to solve for t.

Key Concepts
• When reviewing the **Key Concepts**, discuss the second bullet in detail.
• Allow students to give suggestions on why they think a particular method is best in a given situation.

Communicate Your Understanding
• Students elaborate on method selection in these questions.
• Encourage students to make a guide with examples of the methods and a situation in which they would use each. Students could do this as a review and study guide for this unit. (10–15 min)
• Use **A–5 Problem Solving Checklist** to assist you when assessing students. Alternatively, have students use **A–18 My Progress as a Problem Solver** as a self-assessment tool.
• Use **BLM 1–9 Section 1.5 Practice Master** for remediation or extra practice.

- Some students may have difficulty deciding which method is the most efficient to use in a given question.

R_x Have students choose a method that works well for them, and recommend they use that method if in doubt. This often helps to ensure success.

Accommodations

Gifted and Enrichment—Give students opportunities to create their own distance, speed, and time problems, and their own mixture problems.

Visual—Encourage students to draw diagrams and create tables to organize the information given in the questions.

Motor—Let students work with an educational assistant who will act as a scribe once the student completes the questions.

Language—Provide students with opportunities to orally describe the solutions to the problems in this section.

Memory—Encourage students to use more than one method to solve the systems of equations.

ESL—Encourage students to use their translators and dictionaries when working through the questions in this section.

Investigate Answers (page 42–43)

1.a)–c)

Intersection
X=4   Y=13

2. a)–c)

Intersection
X=1   Y=100
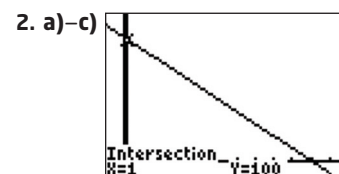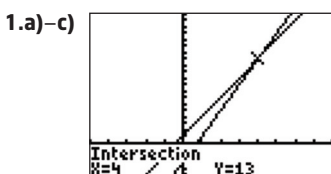
3. The numbers are small in the equations in step 1, so it is easy to graph the lines and find the exact point of intersection. In step 2, it is difficult to find an appropriate scale because the numbers are larger and the second line is almost vertical. The point of intersection is very close to the vertical axis, so it is almost impossible to read on a hand-drawn graph.

4. a) (4, 13) **b)** yes
5. a) (4, 13) **b)** yes
6. a) (1, 100) **b)** yes
7. a) (1, 100) **b)** yes
8. a) Substitution, because the equations already have y isolated, so it is easy to substitute from one equation into the other.
   b) Elimination, because if you add the two equations y is eliminated right away.
9. Answers will vary. For example:
   a) Choose graphing when the equations are in the form $y = mx + b$, because the values of m and b are easy to graph and whole number answers are expected.
   b) Choose substitution when one equation already has one variable isolated, so the expression involving the other variable can be substituted directly into the other equation.
   c) Choose elimination when you can see that adding or subtracting will eliminate one of the variables.

Communicate Your Understanding Responses (page 46)

C1. Answers may vary. For example: You could solve by graphing if the equations were easy and you needed to decide when it would be better to choose one company over another.
C2. Answers may vary. For example: You could solve by substitution if the equations were easy to solve algebraically.
C3. Answers may vary. For example: You could solve by elimination if the equations were in standard form and it was not easy to isolate one variable to solve by substitution.
C4. Answers will vary.

Practise

- At this point students should be comfortable with the methods available to them and the situations in which one method is preferred over another. For **questions 1** through **6**, have students work in groups of three to complete the questions using each of the three methods for each question. Students could use the graphing calculators and/or CAS.
- For **questions 7** and **8**, be sure to direct students to the chart form used in **Example 2**. This chart will help them to set up the equations.
- For **questions 9** through **16**, students could again work in groups of three so they can see all the methods. This often promotes discussion among the students as to which method is the most useful in a situation.
- For **question 17**, be sure to direct students to the chart form to help in setting up this solution.
- For **question 19**, have a student do some research into what weights of gold (in karats) are the most common. If there is a jeweller in your town, you could invite him/her in as a guest speaker.

Literacy Connections

In question 13, the granola is made up of a combination of items that are expressed as a percent of the total mass. Have students research what types of products are shown in percents by mass.

Mathematical Processes Integration

The table shows questions that provide good opportunities for students to use the mathematical processes.

Process Expectations	Selected Questions
Problem Solving	17–20
Reasoning and Proving	5, 6
Reflecting	5
Selecting Tools and Computational Strategies	1–3, 6, 7, 9–20
Connecting	1–3, 7, 9–20
Representing	1–3, 7, 9–20
Communicating	5

Ongoing Assessment

- Communicate Your Understanding questions can be used as quizzes to assess students' communication skills.