Supporting Materials

Pearson Hall Algebra 1, Geometry, Algebra 2 Common Core Edition

*Pearson Algebra 1 Common Core Edition* provides teachers with a wealth of resources to meet the needs of a diverse classroom. From extra practice, to performance tasks, to activities, games, and puzzles, Pearson contains all new Common Core teaching resources.

The wealth and flexibility of resources will enable teachers to easily adapt to their classroom’s changing needs. This sampler takes one lesson from *Algebra 1 and* highlights the support available for that lesson and chapter, illustrating the scope of resources available for the program as a whole, and how they can help students achieve algebra success.

Inside this sampler you will find:

- overview of all technology components
- rigorous practice worksheets
- Common Core assessment resources
- extension activities
- intervention and reteaching resources
- support for English Language Learners
- leveled assessments
- activities and projects

Pearson

**Algebra 1, Geometry, Algebra 2**

*Technology Overview*

Log-on now to preview the online components: 
**PowerAlgebra.com** or **PowerGeometry.com**

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<tr>
<th><strong>User name:</strong> CommonCore2012</th>
<th><strong>Password:</strong> pearsonmath</th>
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*Type is case sensitive*

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<thead>
<tr>
<th><strong>TITLE</strong></th>
<th><strong>COMPONENT</strong></th>
<th><strong>DESCRIPTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>myPearsonTraining.com</strong></td>
<td><strong>myPearsonTraining.com</strong></td>
<td>Self-paced video tutorials and webinars help educators identify all program components and begin integrating the material into their classroom. The “go at your own pace” modules include: Program Overview, Teaching a Lesson, Orientation to the Digital Systems, The Digital Teacher’s and Student Editions, How Students Use Success Tracker, and much more. To view a program overview go to <a href="http://www.mypearsontraining.com">www.mypearsontraining.com</a> – no username or password required.</td>
</tr>
<tr>
<td><strong>PowerAlgebra.com and PowerGeometry.com</strong></td>
<td></td>
<td>PowerAlgebra.com and PowerGeometry.com serve as the portals into the digital world of Pearson Algebra 1, Geometry, Algebra 2. All online components are easily accessible in this one location. Online access includes a wealth of assets, such as the complete Student Edition with audio, complete Teacher’s Edition, editable worksheets, interactive online activities, My Math Videos, Virtual Nerd™ videos and online assessments with remediation.</td>
</tr>
</tbody>
</table>
| **MyMath Video** | | Student-Generated Chapter Opener Videos:  
  - Motivate students through real world connections  
  - Video illustrations of critical mathematics concepts and real-world applications  
  - YouTube®-style video relevant and engaging to today’s student population |
| **Interactive Lessons for Every Section** | | **Solve It:** Interactive Lesson Opening Problem  
**Dynamic Activity:** Digital Manipulatives for exploration, available for selected lessons where appropriate  
**Instruction:** All Lesson problems are stepped out with detailed instruction. To change to a different problem, click on the problem number in the black toolbar  
**Practice:** Lesson Exercise pages from the Student Text are available for view  
**Assessment:** A student self-check quiz with answers on the second screen  
**Vocabulary:** Interactive Glossary in English and Spanish with audio |
| **Math Tools** | | Math Tools help students explore and visualize concepts.  
- Online Graphing Utility  
- Interactive Number Line  
- Algebra Tiles  
- 2D Geometric Constructor  
- 3D Geometric Constructor |
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| **Virtual Nerd™ Videos** | Virtual Nerd interactive video tutorials provide:  
- Personalized interaction and control  
- Ability to drill down to more detailed explanations  
- Access to FAQs, terms, and definitions  
- Three viewing windows: Diagram, Step-by-Step, and Video |
| **MathXL® for School** | MathXL for School provides unlimited practice and remediation with tutoring and guided assistance for every chapter. Most problems are short answer problems that require students to actually “do the math’’.

There are three options once a problem is started:
1) Work through the problem and receive instant feedback.
2) “Help Me Solve This” – interactive tutorial supports the development of understanding. Once the tutorial is finished a new problem regenerates for additional support or independent practice.
3) “View an Example” – a similar problem is displayed with step-by-step instruction |
| **Online Classroom Management Resources for Teachers** | Content: Assign benchmark, diagnostic, and chapter tests; mid-chapter and lesson quizzes.
Planning: Online Lesson Planner allows you to drag and drop lessons to create detailed editable lesson plans correlated to the Common Core State Standards.
Report: Reports track student and class performance by mastery, item analysis, and benchmark.
Classes: Add students manually or import class rosters. Assign diagnostic tests for a course and edit settings for students based on results. |
| **Success Tracker™** | Pearson Success Tracker™ online assessment system provides instant analysis of student performance with assessments and reports correlated to the Common Core State Standards. Success Tracker™ includes built-in lesson level, chapter level, and progress monitoring assessments.
Success Tracker™ diagnoses student success, prescribes automatic remediation, and reports on student and class progress. The remediation provided is in multiple formats: video, tutorial, activity, worksheet, games, and audio. |
| **Common Core Standards Practice and Review** | Common Core Standards Practice and Review provides a clear path to adequate yearly progress through systematic testing and recommendations for remediation.
**Formative Assessments**  
- Screening Tests  
- Weekly Common Core Standards Practice
**Summative Assessments**  
- Common Core Readiness Assessments  
- Extended Constructed Response Assessments  
- Performance-Based Assessments  
- End of Course Assessment
**Standardized Support**  
- Test-Taking Strategies  
- ACT and SAT Practice Tests
**Assessment Support**  
- Reports  
- Answer and Bubble Sheets  
- Answer Keys |
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<tr>
<td>Student and Teacher eText</td>
<td></td>
<td>The Student Edition eText is available online and on the iPad® and Android™. eText features include: &lt;br&gt;• Audio voice over of stepped out problems &lt;br&gt;• Visual glossary with audio &lt;br&gt;• Highlighting and notetaking tools &lt;br&gt;• Access to student workbook pages</td>
</tr>
<tr>
<td>Online Multilingual Handbook</td>
<td></td>
<td>The Multilingual Handbook contains a table of glossary terms in 10 different languages and a glossary with visual representations for the following languages: &lt;br&gt;• English &lt;br&gt;• Cambodian &lt;br&gt;• Cantonese &lt;br&gt;• Haitian Creole &lt;br&gt;• Korean &lt;br&gt;• Spanish &lt;br&gt;• Vietnamese &lt;br&gt;• Hmong &lt;br&gt;• Filipino &lt;br&gt;• Mandarin</td>
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<tr>
<td>Online Teacher Resources (including editable worksheets and tests)</td>
<td></td>
<td>All teacher resources are also available online. Several resources, such as practice worksheets and tests, open in a Word document and are completely editable. The following resources are organized by chapter: &lt;br&gt;• Student Companion &lt;br&gt;• Common Core Implementation Guide &lt;br&gt;• Additional Vocabulary Support &lt;br&gt;• Think About a Plan &lt;br&gt;• Practice Forms G &amp; K &lt;br&gt;• Standardized Test Prep &lt;br&gt;• Extra Practice &lt;br&gt;• Find the Errors &lt;br&gt;• Enrichment &lt;br&gt;• Solve It &lt;br&gt;• Additional Practice &lt;br&gt;• Reteaching &lt;br&gt;• Homework Video Tutors &lt;br&gt;• Quiz Forms G &amp; K &lt;br&gt;• Chapter Test Forms G &amp; K &lt;br&gt;• Cumulative Reviews &lt;br&gt;• Performance Tasks &lt;br&gt;• Chapter Projects &lt;br&gt;• Activities, Games, and Puzzles &lt;br&gt;• Teaching with TI Technology</td>
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<tr>
<td>Homework Video Tutor (in English and Spanish)</td>
<td></td>
<td>Homework Video Tutors walk students through step-by-step explanations of every concept and sample homework exercises. Students are given opportunities to receive guided practice. Homework Video Tutors are great to use as a reteaching/remediation tool or for students who are absent from class.</td>
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<tr>
<td><a href="http://www.interactmath.com">www.interactmath.com</a></td>
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<td>Interactive step-by-step tutorials for problems similar to homework exercises. Each problem within Interactmath.com regenerates to a new problem, so students have UNLIMITED homework practice and help with this innovative program.</td>
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| Answers and Solutions CD-ROM |  | Easy access to all textbook answers AND solutions.  
• Choose formats for printing or for whiteboard display  
• Personalize and save answer files for all classes  
• Use at home or at school-transfer files onto USB drive |
| ExamView® Assessment Suite CD-ROM |  | The most powerful test generator available—with the most comprehensive test banks correlated to state standards.  
• QuickTest Wizard to build assessments in seconds  
• Correlated to the Common Core State Standards- easily create benchmarked assessments  
• Test items translated into Spanish  
• Support for modifying tests quickly and easily  
• Math Art Gallery to import images into your assessments  
• New Banks allow for editing and modifying existing practice worksheets and chapter assessments  
• Compatible with Classroom Performance Systems and Learning Management Systems  
• New features include: two-column formatting, publishing tests to the internet, updated style gallery, and much more. |
| TI-Nspire™ Lesson Support CD-ROM |  | For every lesson, three types of TI-Nspire documents guide students from interactive exploration through self-assessment: Content Explorations, Lesson Quiz, and Standardized Test Prep. |
| Teaching with TI Technology |  | Pearson and Texas Instruments co-developed this activity booklet and CD-ROM to effectively incorporate TI technology into the math classroom. Contains instructional activities, graphing calculator labs for the TI-83 and TI-84, StudyCards™, and data lists. |
| Teaching Resources DVD |  | The Teaching Resources DVD provides a wealth of resources, organized by chapter, to help teachers reach all of their students:  
• Student Companion  
• Additional Vocabulary Support  
• Think About a Plan  
• Practice Forms G & K  
• Standardized Test Prep  
• Enrichment  
• Reteaching  
• Homework Video Tutors  
• Quiz Forms G & K  
• Chapter Test Forms G & K  
• Cumulative Reviews  
• Performance Tasks  
• Chapter Projects  
• Activities, Games, and Puzzles  
• Teaching with TI Technology |
| Weekly Common Core Standards Practice |  | Five Common Core problems per week for 30 weeks, presented in the same format as Next-Generation Common Core Assessments; available as a PowerPoint file, SMART Notebook file, and Promethean Flipchart file. |
## Pearson Algebra 1, Geometry, Algebra 2 Common Core Edition

### Teacher Resources: Print, DVD, and Online

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<td>Student Edition</td>
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<tr>
<td>Teacher’s Edition</td>
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<tr>
<td>Student Companion</td>
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<td>Student Companion, Foundations</td>
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<td>Student Companion Teacher’s Guides</td>
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<td>Think About a Plan (Editable)</td>
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<tr>
<td>Practice Form K (Editable)</td>
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<td>Standardized Test Prep</td>
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<td>Extra Practice (Editable)</td>
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<td>Find the Errors!</td>
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<td>Enrichment (Editable)</td>
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<td>Solve It! and Lesson Quiz</td>
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<td>Additional Problems</td>
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<td>Additional Vocabulary Support (Editable)</td>
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<td>Quizzes and Tests Form G (Editable)</td>
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*Go to [PowerAlgebra.com](http://PowerAlgebra.com) and [PowerGeometry.com](http://PowerGeometry.com) for access to the online Teaching Resources—see inside for access code.
6-4 Applications of Linear Systems

Vocabulary

Review

1. **Multiple Choice** Which equation shows what happens when you use substitution to solve this system of equations?

   - A) $2x - 1 - 4y = -14$
   - B) $3(2x - 1) - 4y = -14$
   - C) $3x - (2x - 1) = -14$
   - D) $3x - 4(2x - 1) = -14$

Vocabulary Builder

**intersection** (noun) **in tur sek shun**

**Definition:** An intersection is where two or more lines or roads meet.

**Math Usage:** For two lines, the point of intersection is a point in common where they intersect, or meet.

Use Your Vocabulary

2. The Ancient Spanish Monastery (shown by the star on map) in North Miami Beach, Florida, is thought to be the oldest building in the western hemisphere. Name two streets that intersect at the Ancient Spanish Monastery.

Write the ordered pair for the point of intersection. If there is no point of intersection, write none.

3. [Diagram]

4. [Diagram]

5. [Diagram]
Problem 1  Finding a Break-Even Point

Got It?  A puzzle expert wrote a new sudoku puzzle book. His initial costs are $864. Binding and packaging each book costs $.80. The price of the book is $2. How many copies must be sold to break even?

6. Complete the model below.

\[
\begin{align*}
\text{Relate} & \quad \text{expenses} = \$864 + \$0.80 \cdot \text{number of books sold} \\
\text{Define} & \quad \text{Let} \ x = \text{the number of books sold.} \\
\text{Let} & \quad y = \text{the number of books sold.} \\
\text{Write} & \quad y = \boxed{\phantom{0}} \\
\end{align*}
\]

7. Use substitution to solve the system of equations.

Start with the equation for expenses.
Substitute the income expression for $y$.
Subtract 0.8x from each side.
Divide each side by 1.2.

8. The puzzle expert must sell \boxed{\phantom{0}} books to break even.

Problem 2  Identifying Constraints and Viable Solutions

Got It?  The zoo has two water tanks that are leaking. One tank contains 10 gal of water and is leaking at a constant rate of 2 gal/h. The second tank contains 6 gal of water and is leaking at a constant rate of 4 gal/h. When will the tanks have the same amount of water? Explain.

9. How much water would leak from Tank 1 in 2 hours? \boxed{\phantom{0}} in 3 hours? \boxed{\phantom{0}}

How are you getting your answer?

_______________________________________________________________________

What algebraic expression could represent how much water is lost from Tank 1 in x hours?

What algebraic expression could represent how much water is lost from Tank 2 in x hours?

10. If there are 10 gallons in Tank 1, how much will be left in 2 hours? \boxed{\phantom{0}} in 3 hours? \boxed{\phantom{0}}

How are you getting your answer?

_______________________________________________________________________

_______________________________________________________________________
Problem 3  Solving a Wind or Current Problem

Got It? You row upstream at a speed of 2 mi/h. You travel the same distance downstream at a speed of 5 mi/h. What would be your rowing speed in still water? What is the speed of the current?

14. Complete the model below.

Define  Let \( a \) = speed of the boat in still water.

Let \( c \) = __________________________.

Relate  speed of the boat in still water + speed of the current = downstream speed

speed of boat in still water – speed of the current = upstream speed

Write \( a + c \) = ______ ,  \( a - c \) = ______

15. Now solve the system of equations.

16. Your rowing speed in still water is ___ mi/h.

The speed of the current is ___ mi/h.
Lesson Check  •  Do you UNDERSTAND?

Reasoning  Which method would you use to solve the following system? Explain.

\[ 3x + 2y = 9 \]
\[ -2x + 3y = 5 \]

17. Draw a line from each statement in Column A to the most appropriate method for solving a system of equations in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>One equation is already solved for one of the variables.</td>
<td>Substitution</td>
</tr>
<tr>
<td>A visual display of the equations is needed.</td>
<td>Elimination</td>
</tr>
<tr>
<td>The coefficients of one variable are able to be made the same or opposite.</td>
<td>Graphing</td>
</tr>
</tbody>
</table>

18. Circle the method you would use to solve the given system.

Graphing  Elimination  Substitution

19. Explain why you chose that method.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Math Success

Check off the vocabulary words that you understand.

☐ intersection  ☐ system of linear equations

☐ substitution  ☐ elimination

Rate how well you can apply systems of equations.

Need to review  0  2  4  6  8  10  Now I get it!
Chemistry

In a chemistry lab, you have two vinegars. One is 5% acetic acid, and one is 6.5% acetic acid. You want to make 200 mL of a vinegar with 6% acetic acid. How many milliliters of each vinegar do you need to mix together?

Know

1. What types of vinegar do you have available?

2. What amount of mixed vinegar do you need?

3. What percentage of acetic acid do you want in the mixed vinegar?

Need

4. What do you need to find to solve the problem?

Plan

5. How will you define the two variables for this problem?

6. What is an equation for the total amount of vinegar you want to make?

7. What is an equation for the acetic acid content?

8. What method will you use to solve?

9. What is the solution of the system of equations?

10. How much of each type of vinegar should you mix together?
Solve each word problem.

1. The concession stand is selling hot dogs and hamburgers during a game. At halftime, they sold a total of 78 hot dogs and hamburgers and brought in $105.50. How many of each item did they sell if hamburgers sold for $1.50 and hot dogs sold for $1.25?

2. The sum of two numbers is 67. The smaller number is 3 less than the larger number. What are the two numbers?

3. There are two different jobs Jordan is considering. The first job will pay her $4200 per month plus an annual bonus of $4500. The second job pays $3100 per month plus $600 per month toward her rent and an annual bonus of $500. Which job should she take?

4. The perimeter of a rectangle is 66 cm and its width is half its length. What are the length and the width of the rectangle?

5. A chemist is mixing one solution that is 32% sodium and another solution that is 12% sodium. How many liters of each type should the chemist use to produce 50 liters of the solution that is 20% sodium?
6. A community sponsored a charity square dance where admission was $3 for adults and $1.50 for children. If 168 people attended the dance and the money raised was $432, how many adults and how many children attended the dance?
   a. What are the two systems of equations that you could write to solve this problem?
   b. What method would you use to solve the system? Why?
   c. How many adults and how many children attended the dance?

Solve each system. Explain why you chose the method you used.

7. \(3y = 4x + 1\)
   \(8x - 2y = 10\)

8. \(-2y = -4x - 2\)
   \(3x + 2y = 9\)

9. \(3x - 3y = -3\)
   \(-2x - 3y = 17\)

10. \(x - 2y = 9\)
    \(x + 3y = -1\)

11. Open-Ended Write a system of equations for which you would use substitution to solve.

12. A student invested $5000 in two different savings accounts. The first account pays an annual interest rate of 3%. The second account pays an annual interest rate of 4%. At the end of one year, she had earned $185 in interest. How much money did she invest in each account?
Solve each word problem

1. You have $6000 to invest in two stock funds. The first fund pays 5% annual interest and the second account pays 9% annual interest. If after a year you have made $380 in interest, how much money did you invest in each account?

2. During a sale at the local department store, you buy three sweatshirts and two pairs of sweatpants for $85.50. Later you return to the same store and buy three more sweatshirts and four more pairs of sweatpants for $123. What is the sale price of each sweatshirt and each pair of sweatpants?

3. The sum of two numbers is 27. The larger number is 3 more than the smaller number. What are the two numbers?

4. One plane at 520 feet is ascending at a rate of 40 feet per minute, while another plane at 3800 feet is descending at a rate of 120 feet per minute. How long will it take the two planes to be at the same altitude?

5. The perimeter of a rectangle is 24 in. and its length is 3 times its width. What are the length and the width of the rectangle?

6. You are getting ready to move and have asked some friends to help. For lunch, you buy the following sandwiches at the local deli for $30: six tuna sandwiches and six turkey sandwiches. Later at night, everyone is hungry again and you buy four tuna sandwiches and eight turkey sandwiches for $30.60. What is the price of each sandwich?

7. You have a cable plan that costs $39 a month for a basic plan plus one movie channel. Your friend has the same basic plan plan plus two movie channels for $45.50. What is the basic plan charge that you both pay?

8. At an all-you-can-eat barbeque fundraiser that you are sponsoring, adults pay $6 for a dinner and children pay $4 for a dinner. 212 people attend and you raise $1128. What is the total number of adults and the total number of children attending?
   a. What is a system of equations that you can use to solve this problem?
   b. What method would you use to solve the system? Why?
Solve each system. Explain why you chose the method you used.

9. \[ \begin{align*} 2y &= x + 1 \\ -2x - y &= 7 \end{align*} \]

10. \[ \begin{align*} 6x - 4y &= 54 \\ -9x + 2y &= -69 \end{align*} \]

11. \[ \begin{align*} 3x - 2y &= 8 \\ 2x - 2y &= 5 \end{align*} \]

12. \[ \begin{align*} 2x - y &= 4 \\ 3x - y &= 2 \end{align*} \]

13. \[ \begin{align*} 2x - 3y &= 13 \\ y &= \frac{1}{2} x - \frac{7}{2} \end{align*} \]

14. \[ \begin{align*} -x - 3y &= -3 \\ 2x + 3y &= 5 \end{align*} \]

15. **Open-Ended** What are three differences between an inconsistent system and a consistent and independent system? Explain.

16. **Reasoning** One number is 4 less than 3 times a second number. If 3 more than two times the first number is decreased by two times the second, the result is 11. What are both numbers?

17. **Error Analysis** In Exercise 16, what kind of errors are likely to occur when solving the problem?

18. A plane leaves Chicago and flies 750 miles to New York. If it takes 2.5 hours to get to New York flying against the wind, but only 2 hours to fly back to Chicago, what is the plane’s rate of speed and what is the wind speed?

19. A coin bank has 250 coins, dimes and quarters, worth $39.25. How many of each type of coin are there?

20. In 4 years, a mother will be 5 times as old as her daughter. At present, the mother is 9 times as old as the daughter. How old are the mother and the daughter today?
Additional Vocabulary Support
Applications of Linear Systems

Use the list below to complete the diagram.

<table>
<thead>
<tr>
<th>Use when you want a visual display of the equations</th>
<th>Use when it is easy to solve for one of the variables</th>
<th>Use when you want an estimation of the solution</th>
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<tbody>
<tr>
<td>Use when one equation is already solved for one of the variables</td>
<td>Use when the coefficients of one variable are the same or opposites</td>
<td>Use when it is not convenient to use graphing or substitution</td>
</tr>
</tbody>
</table>

Choosing a Method for Solving Linear Systems

Graphing

Substitution

Elimination
6-4  
Applications of Linear Systems

You can solve systems of linear equations by graphing, substitution, or elimination. Deciding which method to use depends on the exactness needed and the form of the equations.

Problem

You just bought a coffee shop for $153,600. The prior owner had an average monthly revenue of $8600 and an average monthly cost of $5400. If your monthly costs and revenues remain the same, how long will it take you to break even?

Write equations for revenue and costs, including the price you paid for the shop, after \( t \) months. Then solve the system by graphing.

\[
\begin{align*}
y &= 8600 \, t \quad \text{Equation for revenue} \\
y &= 5400 \, t + 153,600 \quad \text{Equation for cost}
\end{align*}
\]

It appears that the point of intersection is where \( t \) is equal to 48 months. Substitute \( t = 48 \) into either equation to find the other coordinate \( (y) \), which is 412.8. Therefore, your breakeven point is after you have run the shop for 48 months, at which point your revenue and cost are the same: $412,800.

Problem

A perfume is made from \( t \) ounces of 15\% scented Thalia and \( b \) ounces of 40\% Thalia. You want to make 60 oz of a perfume that has a 25\% blend of the Thalia. How many ounces of each concentration of Thalia are needed to get 60 oz of perfume that is 25\% strength of Thalia?

Write your systems of equations:

\[
\begin{align*}
60(0.25) &= 0.15t + 0.4b \\
60 &= t + b
\end{align*}
\]

Solve the system by using substitution:

\[
\begin{align*}
60(0.25) &= 0.15t + 0.4b & \text{Solve the second equation for } t \text{ and substitute in the first equation.} \\
15 &= 0.15(60 - b) + 0.4b & \text{Substitute } 60 - b \text{ for } t \text{ in the first equation.} \\
15 &= 9 - 0.15b + 0.4b & \text{Distributive property} \\
24 &= b & \text{Solve for } b.
\end{align*}
\]

Substitute 24 for \( b \) in second equation to find that \( t = 36 \). The answer is (36, 24). The blend requires 36 oz of the 15\% perfume and 24 oz of the 25\% perfume.
Exercises

1. You have a coin bank that has 275 dimes and quarters that total $51.50. How many of each type of coin do you have in the bank?

2. **Open-Ended** Write a break-even problem and use a system of linear equations to solve it.

3. You earn a fixed salary working as a sales clerk making $11 per hour. You get a weekly bonus of $100. Your expenses are $60 per week for groceries and $200 per week for rent and utilities. How many hours do you have to work in order to break even?

4. **Reasoning** Find $A$ and $B$ so that the system below has the solution $(1, -1)$.
   \[
   Ax + 2By = 0 \\
   2Ax - 4By = 16
   \]

5. You own an ice cream shop. Your total cost for 12 double cones is $24 and you sell them for $2.50 each. How many cones do you have to sell to break even?

6. **Multi-Step** A skin care cream is made with vitamin C. How many ounces of a 30% vitamin C solution should be mixed with a 10% vitamin C solution to make 50 ounces of a 25% vitamin C solution?
   - Define the variables.
   - Make a table or drawing to help organize the information.

7. Your hot-air balloon is rising at the rate of 4 feet per second. Another aircraft nearby is at 7452 feet and is losing altitude at the rate of 30 feet per second. In how many seconds will your hot-air balloon be at the same altitude as the other aircraft?
The general form of the linear equation with three variables is
\[ Ax + By + Cz = D \]
where \( A, B, C \) and \( D \) are real numbers and do not equal 0.

**Example**

Solve the system of equations below.

\[
\begin{align*}
  x + 2y - 3z &= 1 \quad \text{Equation (1)} \\
  2x - 3y + 5z &= 11 \quad \text{Equation (2)} \\
  x - y + 4z &= 14 \quad \text{Equation (3)}
\end{align*}
\]

**Solution**

\[
\begin{align*}
  x + 2y - 3z &= 1 \\
  x - y + 4z &= 14 \\
  \underline{\hspace{2cm}} &\quad \text{Subtract equation (3) from equation (1).} \\
  3y - 7z &= 13 \\
  2x - 2y + 8z &= 28 \quad \text{Multiply equation (3) by 2 and subtract equation (2).} \\
  2x - 3y + 5z &= 11 \quad \text{Equation (5)} \\
  y + 3z &= 17 \quad \text{Multiply equation (5) by 3 and subtract equation (4).} \\
  3y + 9z &= 51 \\
  3y - 7z &= -13 \quad \text{Solve for } z. \\
  16z &= 64 \\
  z &= 4 \\
  y + 3(4) &= 17 \quad \text{Substitute } 4 \text{ for } z \text{ in equation (5) and solve for } y. \\
  y &= 5 \\
  x + 2y - 3z &= 1 \quad \text{Substitute } 5 \text{ for } y \text{ and } 4 \text{ for } z \text{ in equation (1) and solve for } x. \\
  x + 2(5) - 3(4) &= 1 \\
  x &= 3
\end{align*}
\]

The solution of the given system is \( x = 3, y = 5 \) and \( z = 4 \).

**Practice**

Solve each system of equations.

1. \[
\begin{align*}
  3x - y + 2z &= 4 \\
  x + 2y - 3z &= -1 \\
  5x + 3y + z &= 6
\end{align*}
\]

2. \[
\begin{align*}
  -2x + 5y - 3z &= 7 \\
  4x - 3y + 2z &= 4 \\
  -3x - y - 4z &= -7
\end{align*}
\]
Work with a partner in this activity.

A community theater is putting on a performance.

- An adult ticket sells for $a$ dollars.
- A child’s ticket sells for $c$ dollars.
- The manager needs to collect $5000 in revenue to cover the theater’s expenses.
- The theater can seat 800 people, and the manager expects the show to sell out.
- The manager wants to price the adult ticket at three times the cost of a child’s ticket.

The manager wants to find the break-even point where the theater’s income equals its expenses. Your teacher will assign you one of the four systems below. You need to determine the price of each ticket given the number of tickets sold.

1. Write a system of equations that models your situation. Let $a$ equal the price of an adult ticket and let $c$ equal the price of a children’s ticket.

2. Now solve your system and find the price of an adult ticket and a children’s ticket. Round to the nearest cent. Record your answers in the table.

3. Discuss your findings with the rest of the class. Use the table to record the results from the other groups. Do all four systems satisfy the manager’s conditions? If so, which system should the manager choose? Explain.
Multiple Choice

For Exercises 1–5, choose the correct letter.

1. You solved a linear system with two equations and two variables and got the equation \(-6 = -6\). How many solutions does the system of equations have?
   A. no solution
   B. infinitely many solutions
   C. exactly 1 solution
   D. 2 solutions

2. The sum of two numbers is 12. The difference of the same two numbers is 4. What is the larger of the two numbers?
   F. 4
   G. 5
   H. 7
   I. 8

3. You solved a linear system and got the equation \(-6 = 0\). How many solutions does the system of equations have?
   A. no solution
   B. infinitely many solutions
   C. exactly 1 solution
   D. 2 solutions

4. What is the solution of the system of equations?
   \[
   \begin{align*}
   y + 3x &= 6 \\
   y &= -6x + 12
   \end{align*}
   \]
   F. \((-2, 0)\)
   G. \((0, -2)\)
   H. \((2, 0)\)
   I. \((0, 2)\)

5. A kayaker paddles upstream for 1.5 hours, then turns his kayak around and returns to his tent in 1 hour. He travels 3 miles each way. What is the rate of the river’s current?
   A. 0.5 mi/h
   B. 2 mi/h
   C. 1 mi/h
   D. 1.5 mi/h

Short Response

6. Rectangle \(EFGH\) has a perimeter of 24 inches, and triangle \(BCD\) has a perimeter of 18 inches.

   a. What is a system of equations for the perimeters of the figures?
   b. Without solving, what method you would use to solve the system? Explain.
Do you know HOW?

Solve each system by graphing. Tell whether the system has one solution, infinitely many solutions, or no solution.

1. \( y = 3x - 7 \)  
   \( y = 2x - 6 \)

2. \( y - 3x = -2 \)

3. \( y = 3x + 5 \)
   \( x + \frac{1}{3}y = 4 \)

Solve each system using substitution.

4. \( x = 2y - 2 \)
   \( 3y = x + 6 \)

5. \( y = 2x + 9 \)
   \( y = x + 6 \)

6. \( 2x = y - 4 \)
   \( -3y = x - 5 \)

Solve each system using elimination.

7. \( 3x + 2y = -6 \)
   \( -x - 2y = 10 \)

8. \( x + 2y = 9 \)
   \( 2x - 5y = -27 \)

9. \( 3x + 5y = -18 \)
   \( 4x - 10y = -24 \)

Write a system of equations to model the situation. Solve by any method.

10. A piggy bank contains 100 coins consisting of nickels and dimes. The total value of the coins is $8.50. How many coins of each type does the bank contain?

Do you UNDERSTAND?

11. Writing Explain how you know if a system of equations has one solution, no solutions, or infinitely many solutions.

12. Reasoning If two lines have the same \( y \)-intercept but different slopes, what can you conclude about the solution of the system? Explain.
Chapter 6 Quiz 1

Do you know HOW?

Solve each system by graphing. Tell whether the system has one solution, infinitely many solutions, or no solution.

1. \( y = 2x + 5 \)  
   \( y - 4x = -2 \)
2. \( y - 2x = 1 \)  
   \( y = 2x + 6 \)
3. \( \frac{x}{2} = 8 \)  
   \( 2y = -x + 16 \)
4. \( 2x - 3y = 3 \)  
   \( x + 4y = -2 \)

Solve each system using substitution.

5. \( x = y + 2 \)  
   \( 2y = x - 1 \)
6. \( y = 3x + 5 \)  
   \( y = x + 3 \)
7. \( 3x = y + 2 \)  
   \( -2y = 1 - 3x \)
8. \( \frac{y}{2} = 1 \)  
   \( 6x + 5y = 26 \)

Solve each system using elimination.

9. \( 3x + 4y = 31 \)  
   \( 2x - 4y = -6 \)
10. \( 3x + 5y = 54 \)  
   \( 6x + 4y = 72 \)
11. \( -14x + 9y = 46 \)  
   \( 14x - 9y = 102 \)
12. \( 4x + 3y = 16 \)  
   \( 7x - 5y = 69 \)

13. John paid $34 for two algebra and three geometry books. He paid $36 for three algebra and two geometry books. What is the cost of each book?

14. The sum of two numbers is 14. If one of the numbers is doubled, the sum will become 22. What are the numbers?

15. Peter invested $450 in insurance and stocks. He put $50 more in insurance than stocks. How much did he invest in each?

16. The measure of one of two supplementary angles is three times the measure of the other angle. What are the measures of the angles?

Do you UNDERSTAND?

17. **Reasoning** If a system of linear equations has no solution, what does that tell you about the slopes and \( y \)-intercepts of the graphs of the equations?

18. **Open-Ended** Write a system of linear equations that has no solution and a system of equations that has infinitely many solutions.
Chapter 6 Quiz 2

Do you know HOW?

Graph each inequality in the coordinate plane.

1. \( y < x - 4 \)
2. \( y \geq -2x + 3 \)
3. \( 6 \geq 3x - 3y \)

Solve each system of inequalities by graphing.

4. \( -2x + 3y \leq 0 \)
   \( 4x - 2y \geq 8 \)
5. \( -3x - 5y < -3 \)
   \( x + 2y \geq 2 \)
6. \( -3x \leq 3y + 3 \)
   \( 4y < -5y - 2 \)

7. Shari is working two jobs to save at least $500 for her trip. She earns $8 per hour at the first job and $10 per hour at her second job. What is the inequality that can help Shari know how many hours she needs to work at each job to save the money? Graph the inequality.

Do you UNDERSTAND?

8. Error Analysis A student determined that (3, 1) is one of the solutions of the linear inequality \( y \geq 3x - 5 \), as given below. What error did the student make?
   \[ y \geq 3x - 5 \]
   \[ 3 \geq 3(1) - 5 \]
   \[ 3 \geq -2 \]

9. Reasoning A point lies on the dashed line of the graph of an inequality. Is the point part of the solution? Why or why not?
Chapter 6 Quiz 2
Lessons 6-5 through 6-6

Do you know HOW?

Graph each inequality in the coordinate plane.

1. \( y < x + 3 \)  
2. \( y > 3x - 5 \)  
3. \( 3x + y \leq -4 \)  
4. \( 9 \geq 7x - 2y \)

Solve each system of inequalities by graphing.

5. \(-x + 7y > 16\)  
6. \(2x + 5y \leq 6\)  
7. \(3y < \frac{x}{3} - 1\)  
8. \(3x \geq 5y - 4\)  
   \(11x - y \leq 12\)  
   \(5x - 3y \geq 9\)  
   \(2y \leq 2x + 1\)  
   \(-2y < 4x - 1\)

Do you UNDERSTAND?

9. **Writing** How do you decide what region to shade when graphing a system of linear inequalities? Explain with an example and graph.

10. **Open-Ended** When do you use a dashed line or a solid line when graphing inequalities? What do you know about the points on the dashed or solid line?

11. **Reasoning** When can you not use \((0, 0)\) as a point to determine the area to be shaded? How would you choose a point?
Do you know HOW?

Solve each system by graphing. Tell whether the system has one solution, infinitely many solutions, or no solution.

1. \[ y = \frac{1}{2}x + 4 \]
   \[ y = -2x - 1 \]

2. \[ y = x + 2 \]

3. \[ x + y = 2 \]

Solve each system using substitution.

4. \[ x + y = 1 \]
   \[ 2x + 3y = -4 \]

5. \[ x - 4y = 11 \]
   \[ 2y - x = -7 \]

6. \[ 2x + y = 1 \]
   \[ x - 2y = 23 \]

Solve each system using elimination.

7. \[ 2x + 3y = 10 \]
   \[ 2x - y = -14 \]

8. \[ x + y = -6 \]
   \[ x - y = 6 \]

9. \[ 3x = -2y - 5 \]
   \[ 2y = -5x + 5 \]

Solve each problem.

10. The sum of two numbers is 23. If one of the numbers is halved, the sum will become 17. What are the numbers?

11. The perimeter of a rectangle is 60 cm. The length is four times the width. What are the length and the width of the rectangle?

Write a system of equations to model each situation. Solve by any method.

12. Sarah is 25 years older than her son Gavin. In ten years, Sarah will be twice Gavin’s age. How old are Sarah and Gavin now?

13. A chemist is mixing a solution that is 2% acid and another solution that is 8% acid. She needs to make 75 mL of a solution that is 5% acid. How much of each solution should she use?
Graph each inequality in the coordinate plane.

14. \[ x + 2y \leq 10 \]
15. \[ 4x - 2y \geq 3 \]

Solve each system of inequalities by graphing.

16. \[ \begin{align*}
4x + y & \geq 1 \\
3x - y & \leq 6
\end{align*} \]
17. \[ \begin{align*}
x + 4y & > -2 \\
5x + 3y & < 7
\end{align*} \]

18. For a work banquet, Jack can spend no more than $200 on dessert. Fruit pies cost $9 each and cakes cost $20 each. Write the linear inequality that models the situation. Graph the inequality.

Do you UNDERSTAND?

19. **Writing** How do you check to see if an ordered pair satisfies a system of inequalities graphically?

20. **Open-Ended** Write a system of inequalities in which the shaded region is below both lines. Graph the system.

21. **Open-Ended** Write a system of linear equations that has no solution.
Do you know HOW?
Solve each system by graphing. Tell whether the system has one solution, infinitely many solutions, or no solution.

1. \(x - 2y = 3\) \quad 2. \(x + y = 3\) \quad 3. \(2x = -4y + 10\)
   \[y = -2x + 6\] \quad \[3x - 2y = 4\] \quad \[6y = -3x + 12\]

Solve each system using substitution.

4. \(3x - 5y = -1\) \quad 5. \(x + 2y = -1\) \quad 6. \(2x + 3y = 9\)
   \[x - y = -1\] \quad \[2x - 3y = 12\] \quad \[3x + 4y = 5\]

7. \(7x = 2y + 1\) \quad 8. \(x + \frac{y}{2} = 4\) \quad 9. \(\frac{x}{3} + 2y = 5\)
   \[4y = -3x + 15\] \quad \[\frac{x}{2} + y = 5\] \quad \[2x - y = 4\]

Solve each system using elimination.

10. \(x + y = 4\) \quad 11. \(-2x + 3y = 9\) \quad 12. \(x + y = 7\)
    \[x - y = 6\] \quad \[2x - 2y = -4\] \quad \[3x - 2y = 11\]

13. \(7x - 8y = 11\) \quad 14. \(0.4x + 0.3y = 1.7\) \quad 15. \(3x - 7y + 10 = 0\)
    \[8x - 7y = 7\] \quad \[0.7x - 0.2y = 0.8\] \quad \[y - 2x - 3 = 0\]

Write a system of equations to model each situation. Solve by any method.

16. Ten years from now, A will be twice as old as B. Five years ago, A was three times as old as B. What are the present ages of A and B?

17. The ratio of incomes of two persons is 9:7. The difference in their weekly incomes is $200. What are their weekly incomes?

18. A change purse contains a total of 100 nickels and dimes. The total value of the coins is $7. How many coins of each type does the purse contain?
Graph each inequality in the coordinate plane.

19. \(2x + 3y \leq 6\)  
20. \(2x - y \geq 1\)  
21. \(-3x + 2y < 5\)

Solve each system of inequalities by graphing.

22. \(2x + 3y \leq 6\) \(3x + 2y \leq 6\)  
23. \(x + y \geq 9\) \(3x + y \geq 12\)  
24. \(5x + y > 10\) \(2x + y < 15\)

25. For a party, you can spend no more than $20 on cakes. Egg cake cost $4 and cream cake cost $2. Write the linear inequality that models the situation. Graph the inequality.

Do you UNDERSTAND?

26. Open-Ended Write a system of linear equations that has infinitely many solutions.

27. Error Analysis A student determined that \((1, 1)\) is one of the solutions of the linear inequality \(y \leq 2x - 3\), as shown below. What error did the student make?

\[
\begin{align*}
y &\leq 2x - 3 \\
1 &\leq 2 \cdot (1) - 3 \\
1 &\leq 1
\end{align*}
\]
Performance Tasks

Chapter 6

Give complete answers. Show all your work.

Task 1

Explain which method (graphing, substitution, or elimination) would be most appropriate for solving the given systems of linear equations. Then solve each system of linear equations using your chosen method.

a. \( y = 3x + 5 \)
   \( 2y - 6x = 4 \)

b. \( 9x + 4y = -17 \)
   \( 12y = -3 - 3x \)

c. \( 5x - 7y = -21 \)
   \( 14y - 5x = 22 \)

Task 2

Two students disagree about how to solve a problem and have asked you for help. They have 220 ft of ribbon to enclose a rectangular space in the gym for a dance floor. The dance floor has to be at least 70 ft long to accommodate the anticipated number of dancers.

a. Write a system of inequalities. Then draw a graph that shows all of the possible dimensions of the dance floor.

b. Write two possible solutions to the problem that would be appropriate dimensions for a dance floor. Compare your solutions and determine which would offer more dancing space. Explain your reasoning.
Performance Tasks (continued)

Chapter 6

Task 3

You and a friend are starting a computer repair business. You estimate that your expenses are $500 per week.

a. Select a reasonable average number of dollars you would expect to spend (expense) on replacement parts for each computer you repair. Then decide on an average fee that you will charge for each computer you repair (income). Let \( x \) represent the number of computers you repair each week. Write a linear equation that describes your total weekly expenses, and a second linear equation that describes your weekly income.

b. Graph the equations that represent your weekly expenses, weekly income, and break-even point on the same coordinate plane.

c. Explain why the intersection of the two lines on your graph represents the break-even point. Determine the coordinates of the break-even point for your graph and explain what these numbers indicate about your business.

Task 4

Write a detailed solution to the system

\[
\begin{align*}
x + 3y & \leq 9 \\
y & \leq -2x + 6, \text{ where } x \geq 0 \text{ and } y \geq 0.
\end{align*}
\]

Graph the system to show all possible solutions.
Chapter 6 Project Teacher Notes: Let’s Dance

About the Project
Students will assume the roles of student council members planning a dinner dance. They use systems of equations to analyze costs and make decisions about dinner and bands. Then students write reports detailing costs of catering and bands, and make recommendations for ticket prices.

Introducing the Project
- Have students work with partners or in small groups. Have each group brainstorm factors to consider when organizing a school dinner dance, such as the band, dinner, ticket prices, decorations, and venue.
- Ask the groups to consider how the cost of the band and dinner might affect the ticket price. They should understand that the higher the cost of the band and dinner, the higher the ticket cost will need to be.
- Challenge students to research costs to hire a typical band and caterer. Have them create spreadsheets to show their results.

Activity 1: Graphing
Students write linear equations to compare the costs of Bands A and B. Then they graph each equation to find the number of tickets that would need to be sold so that the cost of hiring the two bands would be equal.

Activity 2: Calculating
Students calculate the fixed cost and the cost per person served based on the information supplied.

Activity 3: Writing
Students use the information they previously calculated to write reports recommending a band and a ticket price. In their reports, they list their choices assuming both 200 and 300 attendees.

Activity 4: Graphing
Students use the ticket prices they calculated in Activity 3 to graph a system of linear inequalities that shows the total amount received for the tickets.

Finishing the Project
You may wish to plan a project day on which students share their completed projects. Encourage groups to explain their processes as well as their results. Have students review their project work and update their folders.
Chapter 6 Project: Let’s Dance

Beginning the Chapter Project
Suppose you are the student council member that is responsible for planning a student dinner dance. Plans include hiring a band and buying and serving dinner. You want to keep the ticket price as low as possible to encourage student attendance.

As you work through the following activities, you will use systems of equations to analyze costs and make decisions. You will write a report detailing your choice of band, the cost of a catering service, and your ticket price recommendation.

List of Materials
- Calculator
- Graph paper

Activities

Activity 1: Graphing
Band A charges $600 to play for the evening. Band B charges $350 plus $1.25 for each ticket sold.
- Write a linear equation for the cost of each band.
- Graph each equation and find the number of tickets for which the cost of the two bands would be equal.

Activity 2: Calculating
A caterer charges a fixed cost for preparing a dinner plus an additional cost for each person served. You know that the cost for 100 students will be $750 and the cost for 150 students will be $1050. Find the caterer’s fixed cost and the cost per student served.

Activity 3: Writing
Use your information from Activities 1 and 2. Assume that 200 students attend the dance.
- Write a report listing which band you would choose and the cost per ticket that you need to charge to cover expenses.
- Repeat the process assuming that 300 students attend.
Chapter 6 Project: Let's Dance (continued)

**Activity 4: Graphing**

In Activity 3, you found two ticket prices. Each price covers the cost of the dinner dance under certain conditions. Plan for between 200 and 300 people, that is $x > 200$ and $x < 300$.

- If your objective is to keep the ticket price as low as possible, even at the risk of not covering your costs, which ticket price would you select? Based on this choice, write a linear equation that gives the total amount collected for ticket sales. Change your equation to an inequality to indicate that this represents the least amount of money you expect to collect from ticket sales.

- If your objective is to be sure that you are able to cover the cost of the dinner dance, which ticket price would you select? Based on this choice, write a linear equation that gives the total amount collect for ticket sales. Change your equation to an inequality to indicate that this represents the greatest amount of money you expect to collect from ticket sales.

- The two inequalities you have written, along with $x > 200$ and $x < 300$, form a system of linear inequalities. Graph this system to show the total amount received from ticket sales.

**Finishing the Project**

The answer to the four activities should help you complete your project. Your report should include your analysis of the cost for dinner and each band, depending on how many people buy tickets. Include your recommended ticket price and note any conditions under which this ticket price leads to a loss for the event. Illustrate your reasoning with graphs of linear equations and inequalities.

**Reflect and Revise**

Present your analysis of this data to a small group of classmates. After you have heard their analyses and presented your own, check to see that your work is complete, clear, and convincing. If necessary, make changes to improve your presentation.

**Extending the Project**

Consider other expenses you could expect to have in planning and holding this dinner dance. Estimate the additional expenses and change your recommended ticket price as necessary.
Chapter 6 Project Manager: Let’s Dance

Getting Started
Read the project. As you work on the project, you will need a calculator, materials on which you will record your calculations, and materials to make accurate and attractive graphs. Keep all of your work for the project in a folder.

Checklist
☐ Activity 1: graphing equations
☐ Activity 2: finding fixed and per-person costs
☐ Activity 3: writing a report
☐ Activity 4: graphing linear inequalities
☐ cost analysis

Suggestions
☐ Consider what scales to use for the graph and look for the point of intersection.
☐ Write two equations and use elimination to solve the system.
☐ Consider all expenses.
☐ Check the accuracy of your graph by calculating actual ticket prices.
☐ Does your analysis show clear and convincing evidence that hiring one of the two bands would be more cost-effective than hiring the other? How might your conclusions change if it is determined that only 100 students will attend the dinner dance? What if 500 students attend?

Scoring Rubric
3 The report demonstrates sound reasoning and includes a detailed analysis of the cost for dinner and each band based on the number of tickets sold. The student writes accurate linear equations and inequalities. The graphs are neat and have the appropriate scales and labels. All calculations are correct.
2 The report demonstrates sound reasoning but needs more detail. There are minor errors in the linear equations and inequalities. Graphs and calculations are mostly correct.
1 The report lacks essential details. Linear equations and inequalities have some problems. Graphs and calculations lack accuracy.
0 Major elements of the project are incomplete or missing.

Your Evaluation of Project Evaluate your work, based on the Scoring Rubric.

Teacher’s Evaluation of the Project
Cumulative Review
Chapters 1–6

Multiple Choice

For Exercises 1–10 choose the correct letter.

1. A train moving at a constant speed travels 180 mi in 4 h. How far does the train travel in 7 h?
   A. 360 mi  B. 315 mi  C. 280 mi  D. 420 mi

2. Which is a solution of \(-8x + 5 \geq 11\)?
   F. \(-\frac{1}{2}\)  G. 3  H. 0.25  I. \(-1\)

3. Which two quadrants contain all of the solutions to the following system?
   \[y > 4x - 2\]
   \[y > -3x + 5\]
   A. I and II  B. II and III  C. III and IV  D. I and IV

4. Which of the following equations represents a horizontal line through (5, -3)?
   F. \(x = -3\)  G. \(y = 5\)  H. \(y = -3\)  I. \(x = 5\)

5. The graphs of the two lines \(4x = 3y + 23\) and \(4y + 3x = -19\)
   A. do not intersect.  C. intersect at \((-2, 5)\).
   B. are identical.  D. are perpendicular.

6. What is the slope of the line with equation \(4x + 2y = 8\)?
   F. \(-2\)  G. \(-0.5\)  H. 0.5  I. 2

7. Which of the following is the solution of \(-4(5 - 2x) = 8\)?
   A. 3.5  B. 2.5  C. \(-4\)  D. 1.5

8. To solve the following system of equations by elimination, which operation would you perform first?
   \[234x + 65y = 219\]
   \[1225x + 65y = -427\]
   F. addition  G. subtraction  H. multiplication  I. division
Cumulative Review (continued)

Chapters 1–6

9. Which of the following points are not solutions of \(2y - 5x > 6\)?
   I. \((-3, 4)\)   II. \((5, -\frac{5}{3})\)   III. \(\left(\frac{3}{4}, 5\right)\)   IV. \((2.6, 5)\)
   A. I and II   B. III only   C. II and IV   D. III and IV

10. Find the slope of each line.
    a. A line that is parallel to the graph of \(y = \frac{1}{2}x + 7\).
    b. A line that is perpendicular to the graph of \(y = -2x - 3\).

11. Find the \(x\)-intercept of the graph of each equation.
    a. \(3x + 2y = 7\)
    b. \(2x + 3y = 7\)

12. Find the number of solutions to each system.
    a. \(4x - y + 1 = 0\)
       \(4x - y + 3 = 0\)
    b. \(2x - y + 4 = 0\)
       \(4x - 2y + 8 = 0\)

13. Open-Ended Write a question that can be solved using a system of linear equations.

14. Solve the following system of equations by graphing.
    \(y = x + 3\)
    \(y = -2x - 3\)

15. Suppose your office gives you $200 to buy binders. Small binders cost $7 each. Large binders cost $8 each. Write the inequality that describes how many of each kind of binder you can buy.

16. Write the set of inequalities that defines the trapezoid shown at the right.

17. Write an equation of the line with a \(y\)-intercept of \(-4\) that is parallel to \(6x - 2y = 13\).

18. A company’s sales of garden tractors increased about 106% from 2007 to 2008. The number of tractors sold in 2007 was 347. How many tractors were sold in 2008?

19. Southside Bowling Alley charges $3 for the first game and $0.50 for each additional game. Eastside Bowling Alley charges $1 per game. How many games would you have to bowl to make Southside the less expensive choice?
About Performance-Based Assessments

Starting in the 2014–2015 school year, students will likely be taking a new assessment that will assess their mastery of their state standards and determine their readiness for college or career work. This new assessment is expected to include Performance-Based Assessments or Performance Tasks.

With the Performance-Based Assessments, students will be expected to show not only their mastery of mathematical concepts and skills that they have learned up through Algebra 1, but also their proficiency with the Standards for Mathematical Practice, including their skills at making sense of problems and developing a solution plan to solve them, at reasoning abstractly and quantitatively, and at developing mathematical models to represent problem situations. These real-world problems will be multi-part, complex tasks.

Students will be given two (or more) class periods to complete these tasks that will require students to analyze given information, and based on their analysis, students will be expected to make decisions about options presented, develop mathematical or visual models to represent problem situations, and present and defend solutions to the problem situation presented. Students should expect to be asked to defend their decisions and justify their models. Writing will be an important element of these tasks.

You will find four (4) practice Performance Tasks to help your students begin to prepare for these new assessments. For each Performance Task, you will find a scoring rubric in the Answers section that you can use to evaluate students’ work.
Performance Task: Choosing a Movie-Rental Plan

Complete this performance task in the space provided. Fully answer all parts of the performance task with detailed responses. You should provide sound mathematical reasoning to support your work.

You are considering three different ways to rent movies.

**Plan A:** Rent DVDs from a kiosk in a nearby grocery store for $1.50 each. The selection of movies is limited.

**Plan B:** Stream unlimited movies to your computer or TV for $10 per month. The selection of movies is good.

**Plan C:** Rent DVDs by mail for a $5 monthly fee plus $2 per movie. The selection of movies is outstanding.

**Task Description**

Choose the movie-rental plan that you think is best. Consider the cost of each plan, the selection offered, and how you like to receive and watch movies.

a. Write functions $A(x)$, $B(x)$, and $C(x)$ that give the cost to rent $x$ movies per month for Plans A, B, and C, respectively.
b. If you consider only cost, under what condition does it make sense to choose Plan B over Plan A?

c. If you consider only cost, under what condition does it make sense to choose Plan C over Plan B?

d. Show that Plan A is always more cost-effective than Plan C. Does that mean that Plan A is a better choice than Plan C for everyone? Explain.

e. Which movie-rental plan would you choose? Justify your answer.
Performance Task: Expanding a Parking Lot

Complete this performance task in the space provided. Fully answer all parts of the performance task with detailed responses. You should provide sound mathematical reasoning to support your work.

A high school has a rectangular parking lot that measures 600 ft long by 400 ft wide. The school board wants to double the area of the lot by increasing both its length and width by the same amount, $x$ ft. The board also wants to build a fence around the new lot. The cost to expand the lot is estimated to be $2 per square foot of new space. The cost to fence the lot is estimated to be $30 per foot of fencing. Costs include materials and labor.

Task Description
Estimate the total cost of expanding and fencing in the lot.

a. Draw a diagram of the situation. Your diagram should show both the original parking lot and what the lot will look like after it has been expanded. Label all dimensions.

b. Write an equation that you can use to find $x$. Solve the equation for $x$. 
Performance Task: Expanding a Parking Lot (continued)

c. What is the area of the new portion of the parking lot that needs to be built? What is the perimeter of the new parking lot?

d. What is the estimated cost of expanding and fencing in the lot?

e. The school has only enough money to pay for half the estimated cost from part (d). The school board plans to raise the remaining funds by selling parking stickers for $100 to students and $200 to faculty. How many student stickers and how many faculty stickers must the school sell? Is there only one possible answer? Explain.
Performance Task: Projectile Motion

Complete this performance task in the space provided. Fully answer all parts of the performance task with detailed responses. You should provide sound mathematical reasoning to support your work.

Suppose an object is launched at an angle of 45° with respect to horizontal. The object’s height \( y \) (in feet) after it has traveled a horizontal distance of \( x \) feet is given by the equation

\[
y = \frac{-g}{v^2} x^2 + x + y_0
\]

where \( v \) is the object’s initial speed (in feet per second), \( y_0 \) is the object’s initial height (in feet), and \( g \approx 32 \text{ ft/s}^2 \) is the acceleration due to gravity.

Task Description

You throw a baseball at a 45° angle to your friend standing 100 ft away. Your friend holds her glove 5 ft above the ground to catch the ball. At what initial height, and with what initial speed, should you release the ball so that your friend can catch it without moving her glove?

a. Suppose you release the baseball with an initial height of 6 ft and an initial speed of 50 ft/s. Write and graph an equation that represents the ball’s path. Does the ball land in your friend’s glove? Explain.
b. If your friend catches the ball, what point must lie on the graph of the ball’s path? (Assume you are standing at the point (0, 0).)

c. Use your answer to part (b) to write an equation that describes the initial heights and initial speeds for which your friend catches the ball. Explain why there is more than one initial height and initial speed that work.

d. Find an initial height and an initial speed for which your friend catches the ball. How can you check your answer?
Performance Task: Calculating Inflation

Complete this performance task in the space provided. Fully answer all parts of the performance task with detailed responses. You should provide sound mathematical reasoning to support your work.

The inflation rate for an item (such as a carton of eggs) measures how rapidly the price of the item has changed over time. If an item’s price changes from $p_1$ to $p_2$ over a period of $n$ years, then the annual inflation rate $r$ (expressed as a decimal) is given by this equation:

$$ r = \left( \frac{p_2}{p_1} \right)^{\frac{1}{n}} - 1 $$

For example, if the price of an item increases from $2 to $3 over 5 years, then the annual inflation rate is:

$$ r = \left( \frac{3}{2} \right)^{\frac{1}{5}} - 1 \approx 1.084 - 1 = 0.084 = 8.4\% $$

The table below shows the average retail prices of several foods in the United States for the years 2000 and 2009.

<table>
<thead>
<tr>
<th>Food</th>
<th>Price in 2000</th>
<th>Price in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread (1 lb)</td>
<td>$0.99</td>
<td>$1.39</td>
</tr>
<tr>
<td>Butter (1 lb)</td>
<td>$2.80</td>
<td>$2.67</td>
</tr>
<tr>
<td>Cheddar cheese (1 lb)</td>
<td>$3.76</td>
<td>$4.55</td>
</tr>
<tr>
<td>Eggs, large (1 dozen)</td>
<td>$0.96</td>
<td>$1.77</td>
</tr>
<tr>
<td>Ground beef (1 lb)</td>
<td>$1.63</td>
<td>$2.19</td>
</tr>
<tr>
<td>Oranges (1 lb)</td>
<td>$0.62</td>
<td>$0.93</td>
</tr>
<tr>
<td>Peanut butter (1 lb)</td>
<td>$1.96</td>
<td>$2.10</td>
</tr>
<tr>
<td>Meat cutlets (1 lb)</td>
<td>$3.46</td>
<td>$3.29</td>
</tr>
<tr>
<td>Tomatoes (1 lb)</td>
<td>$1.57</td>
<td>$1.96</td>
</tr>
</tbody>
</table>

Task Description

Identify the foods in the table with the least and greatest annual rates of inflation for the period 2000–2009. Then predict the cost in 2015 of the groceries in a basket containing one of each food item from the table.
Performance Task: Calculating Inflation (continued)

a. Find the annual inflation rate for each food in the table for the period 2000–2009. Round your answers to the nearest tenth of a percent.

b. Which food had the least inflation rate? Which had the greatest inflation rate?

c. Which foods, if any, had a negative annual inflation rate? What does a negative annual inflation rate mean?

d. Can you add the percentages of each item to determine the inflation rate for a basket of groceries? Explain.

e. What was the annual inflation rate for a basket of all the food items for the period 2000–2009?

f. Predict the cost of the groceries in the basket in 2015. Explain how you determined your prediction.
Selected Response

1. Which ordered pair is NOT a solution of \( y > 3x + 4 \)?
   
   \[ \text{A.REI.3, Lesson 6-5} \]
   
   A (2, 12)
   B (0, 5)
   C (−2, 1)
   D (1, 7)

Extended Response

3. The Movers scored a total of 80 points in their game last night against the Shakers. The Movers made no one-point shots a total of 35 two-point and three-point shots.

   a. How many two-point shots did the Movers make? How many three-point shots did the Movers make? Write and solve a system of equations that can be used to solve this problem.

   b. Graph the system of equations.
   
   \[ \text{A.REI.6, A.CED.3, Lesson 6-4} \]
Selected Response

1. What is the solution to the following system of equations?
   \[ A.REI.6, \text{ Lesson 6-2} \]
   \[
   \begin{align*}
   3y - 2x &= 11 \\
   y + 2x &= 9
   \end{align*}
   \]
   \[ A \quad (2, 5) \]
   \[ B \quad (5, 2) \]
   \[ C \quad (2, -5) \]
   \[ D \quad (2, 5) \]

Constructed Response

2. Solve the following system of equations by using elimination. Show your work.
   \[ A.REI.5, A.REI.6, \text{ Lesson 6-3} \]
   \[
   \begin{align*}
   x + 2y &= 3 \\
   4x - 2y &= 7
   \end{align*}
   \]

Extended Response

3. Antonio loves to go to the movies. He goes both at night and during the day. The cost of a matinee is $6. The cost of an evening show is $8. Antonio went to see a total of 5 movies and spent $36.

   a. How many of each type of movie did he attend? Write a system of equations and solve by graphing.

   b. Why is the intersection of the graphs of the linear equations the solution?
   \[ A.REI.6, A.REI.11, \text{ Lesson 6-4} \]