Go beyond the textbook with Pearson Mathematics I

Pearson Integrated High School Mathematics I Common Core ©2014 provides teachers with a wealth of online resources uniquely suited for the needs of a diverse classroom. From extra practice to performance tasks, along with activities, games, and puzzles, Pearson is your one-stop shop for flexible Common Core teaching resources.

In this sampler, you will find all the online support available for select Mathematics I lessons from Chapter 4, illustrating the scope of resources available for the course. Pearson Mathematics I Teacher Resources help you help your students achieve success in mathematics!

Contents include:

- rigorous practice worksheets
- extension activities
- intervention and reteaching resources
- support for English Language Learners
- performance tasks
- activities and projects
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</table>
Think About a Plan

Employment A student with two summer jobs earns $10 per hour at a café and $8 per hour at a market. The student would like to earn at least $800 per month.
   a. Write and graph an inequality to represent the situation.
   b. The student works at the market for 60 h per month and can work at most 90 h per month. Can the student earn at least $800 each month? Explain how you can use your graph to determine this.

Understanding the Problem

1. What do you know about the student’s hourly rates?

2. What do you know about how much the student would like to earn each month?

3. What do you know about the number of hours the student can work each month?

Planning the Solution

4. What inequality represents the number of hours that the student can work each month? __________

5. What inequality represents the amount that the student can earn each month? __________

Getting an Answer

6. How can you use these two inequalities to find out if the student working 60 hours a month at the market can make $800 per month?

7. How can you determine the number of hours that the student should work each month? What are the number of hours the student should work at the market and at the café to make at least $800 per month?
Graph each linear inequality.

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

10. **Error Analysis** A student graphed \( y \leq -4x + 3 \) as shown. Describe and correct the student’s error.

11. **Writing** How do you decide which half-plane to shade when graphing an inequality? Explain.
4-5 Practice (continued)

Linear Inequalities

Determine whether the ordered pair is a solution of the linear inequality.

12. \(7x + 2y > -5\), \((-1, 1)\)  
13. \(x - y \leq 3\), \((2, -1)\)

14. \(y + 2x > 5\), \((4, 1)\)  
15. \(x + 4y \leq -2\), \((-8, -2)\)

16. \(y < x + 4\), \((-9, -5)\)  
17. \(y < 3x + 2\), \((3, 10)\)

18. \(x - \frac{1}{2}y > 3\), \((9, 12)\)  
19. \(0.3x - 2.4y > 0.9\), \((8, 0.5)\)

Write an inequality that represents each graph.

20. 

21. 

22. You and some friends have $30. You want to order large pizzas \((p)\) that are $9 each and drinks \((d)\) that cost $1 each. Write and graph an inequality that shows how many pizzas and drinks can you order?

23. Tickets to a play cost $5 at the door and $4 in advance. The theatre club wants to raise at least $400 from the play. Write and graph an inequality for the number of tickets the theatre club needs to sell. If the club sells 40 tickets in advance, how many do they need to sell at the door to reach their goal?

24. Reasoning Two students did a problem as above, but one used \(x\) for the first variable and \(y\) for the second variable and the other student used \(x\) for the second variable and \(y\) for the first variable. How did their answers differ and which one, if either, was incorrect?
Graph each linear inequality.

1. \( x \geq -7 \)
2. \( y < -5 \)
3. \( -x + y \geq 2 \)
4. \( -4x + 5y < -3 \)
5. \( x - y \geq 8 \)
6. \( 2x + 3y > 9 \)
7. \( y \geq x \)
8. \( 3x > y \)
9. \( x - 2y > -4 \)
10. \( 5x + 5y > -10 \)
11. \( 4x - \frac{1}{2}y < 3 \)
12. \( x \leq -3y \)
13. **Writing** How can you check to see that you have shaded the correct half of the coordinate plane after graphing a linear inequality? Explain.

Determine whether the ordered pair is a solution of the linear inequality.

14. $4x + 3y > -2$; $(-3, -1)$
15. $x + y > -3$; $(-2, 2)$
16. $y - 4x \leq 0$; $(1, 4)$
17. $2x - 4y > 5$; $(5, -1)$
18. $y \leq 2x - 3$; $(-1, -4)$
19. $y < -3x + 1$; $(3, 5)$

Write a linear inequality that represents each graph.

20. [Graph]
21. [Graph]

22. A friend has $75 to buy some new shirts and pants. Each shirt costs $11. Each pair of pants costs $19.
   a. Write and graph an inequality that shows how many shirts and pants your friend can buy.
   b. Which side of the boundary line should you shade?
   c. What inequality symbol did you use? Explain.

23. Admission to the movie theater costs $7.50 for adults and $3.50 for students. The theater must bring in at least $200 per movie. Write an inequality for the number of tickets the theater needs to sell to make a profit. If the theater sells 15 adult tickets, how many student tickets do they need to sell to make a profit?

24. Each child at the birthday party was given $5 to spend at the arcade on games and rides. Each game costs $0.25 and each ride costs $0.50. Write an inequality for the number of games and rides a child can enjoy for $5. What is the maximum number of games or rides each child can enjoy?
Multiple Choice

For Exercises 1–5, choose the correct letter.

1. What point on the axes satisfies the inequality \( y < x \)?
   A. (0, 1)  
   B. (–1, 0)  
   C. (1, 0)  
   D. (0, 0)

2. For the graph of the inequality \( x - 2y \geq 4 \), what is a value of \( x \) for a point that is on the boundary line and the axes?
   F. 4  
   G. –2  
   H. 2  
   I. –4

3. If \( x \geq 0 \) and \( y \geq 0 \), then which quadrant holds the solutions?
   A. IV  
   B. III  
   C. I  
   D. II

4. Which is the \( y \)-value of a boundary point that is an intersecting point not on the axes for this region: \( x \geq 0 \), \( y \geq 0 \), \( x \leq 4 \) and \( y \leq 3 \)?
   F. 4  
   G. 0  
   H. 1  
   I. 3

5. How do you decide where to shade an inequality whose boundary does not go through the origin?
   A. For <, shade above the boundary.  
   B. If \((0, 0)\) is a solution, shade where \((0, 0)\) is.  
   C. For >, shade below the boundary.  
   D. If \((0, 0)\) is a solution, shade the boundary.

Short Response

6. A school fundraiser sells holiday cards and wrapping paper. They are trying to raise at least $400. They make a profit of $1.50 on each box of holiday cards and $1.00 on each pack of wrapping paper.
   a. What is an inequality for the profit the school wants to make for the fundraiser?
   b. If the fundraiser sells 100 boxes of cards and 160 packs of wrapping paper, will they reach their goal? Show your work.
Reteaching

Linear Inequalities

To graph an inequality, graph the line and find the solution region by substituting a test point. The point (0, 0) is a good one unless the line goes through the origin.

**Problem**

What is the graph of \( y > 2x - 3 \)?

Begin by graphing the line \( y = 2x - 3 \). Take random values for \( x \), find the corresponding \( y \) values, and create a table.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y = 2x - 3 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>-7</td>
</tr>
<tr>
<td>-1</td>
<td>-5</td>
</tr>
<tr>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

The ordered pairs are (-2, -7), (-1, -5), (0, -3), (1, -1), and (2, 1). You can graph the line using these points. The line should be dashed because the inequality symbol is >.

To determine which region to shade, substitute (0, 0) into the inequality to see if it is a solution.

\[
y > 2x - 3
\]

\[
0 > 2(0) - 3
\]

\[
0 > -3 \checkmark
\]

The point (0, 0) satisfies the inequality and is above the line. Therefore, shade the region above the line, which is the solution region.

**Exercises**

Graph each linear inequality.

1. \( y < x + 2 \)  
2. \( y > 3x - 4 \)  
3. \( x + y < -3 \)  
4. \( x - 2y > -1 \)
What is the inequality for the graph shown?

First look for the $y$-intercept for the boundary line. The $y$-intercept is the point $(0, 4)$.

Next determine the slope of the boundary line by finding a second point on the line, $(-4, 0)$. Use the slope formula to determine the slope:

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 4}{-4 - (-4)} = \frac{-4}{0} = -1.$$

Now you know that the slope is 1 and the $y$-intercept is 4 and can write an equation for the boundary line $y = x + 4$.

To find the inequality sign, notice that the line is solid. Then note that the shading is below the line, indicating “less than.” The inequality is $y \leq x + 4$.

Exercises

Determine the inequality for each graph shown.

5. [Graph of a line with shading below and a solid line at $y = x + 4$]

6. [Graph of a line with shading below and a solid line at $y = x - 4$]

7. [Graph of a line with shading above and a dashed line at $y = x - 4$]

8. [Graph of a line with shading above and a solid line at $y = x + 4$]
Complete the vocabulary chart by filling in the missing information.

<table>
<thead>
<tr>
<th>Word or Word Phrase</th>
<th>Definition</th>
<th>Picture or Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>boundary line</td>
<td>A boundary line is a line that separates the graph into regions.</td>
<td>![Boundary Line]</td>
</tr>
<tr>
<td>half-plane</td>
<td>1.</td>
<td>![Half-Plane]</td>
</tr>
<tr>
<td>horizontal line</td>
<td>A horizontal line goes across.</td>
<td>2.</td>
</tr>
<tr>
<td>linear inequality</td>
<td>3.</td>
<td>$y &lt; x + 5$</td>
</tr>
<tr>
<td>solution of an inequality</td>
<td>A solution of an inequality in two variables is an ordered pair that makes the inequality true.</td>
<td>4.</td>
</tr>
<tr>
<td>vertical line</td>
<td>5.</td>
<td>![Vertical Line]</td>
</tr>
</tbody>
</table>
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.
### Game: Above, On, or Below?

**Linear Inequalities**

Provide the host with the following questions and answers.

<table>
<thead>
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<th>Item Number</th>
<th>Item Description</th>
<th>Player 1 Points</th>
<th>Player 2 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>START</td>
<td></td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>1</td>
<td>$y - 2x &gt; 5$ and $(3, 1)$ below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$y = -2$ and $(-10, 3)$ above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$y = -x + 6$ and $(5, -1)$ below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>$y = 2x - 7$ and $(-3, -4)$ above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>$y = 5x + 3$ and $(2, 13)$ on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>$y = 0.5x + 7$ and $(4, 9)$ on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>$y = 7x - 1$ and $(10, 70)$ above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>$y = 6x - 30$ and $(5, -3)$ below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>$y = -x - 4$ and $(6, 10)$ above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>$y = -10x$ and $(-1, 1)$ below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>$y = 7x + 16$ and $(12, 100)$ on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>$y = 4x - 0.5$ and $(1, 4)$ above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>$y = 5x + 100$ and $(10, 120)$ below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>$y = -x - 100$ and $(-100, 0)$ on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>$y = 3x - 1.5$ and $(7, 20)$ above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>$y = 6x + 15$ and $(5, 50)$ below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>$y = 12x - 13$ and $(-2, -39)$ on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>$y = 9x - 100$ and $(10, 9)$ above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>$y = 5.5x - 1$ and $(4, 25)$ above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>$y = 2x - 11$ and $(-5, -13)$ below</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Game: Above, On, or Below?

This is a game in which one student competes against another. Your teacher or a student can serve as the host.

Rules: The host randomly chooses an item number from the list below, and players have 30 seconds to decide whether the given point is above, on, or below the graph of the equation shown. Your teacher will give you a coordinate plane to sketch your lines. To the right of the item, write “above,” “on,” or “below.” Your teacher may decide to change the response time as needed.

All players begin with 50 points. Your opponent will check your answer and add or subtract points on the score sheet. If you are correct, you earn 5 points. If you are incorrect, you lose 5 points. Each of you will receive 10 questions.

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Item</th>
<th>Player 1 Points</th>
<th>Player 2 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>START</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>( y = 2x + 5 ) and ((3, 1))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>( y = -2 ) and ((-10, 3))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>( y = -x + 6 ) and ((5, -1))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>( y = 2x - 7 ) and ((-3, -4))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>( y = -5x + 3 ) and ((-2, 13))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>( y = 0.5x - 7 ) and ((-4, -9))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>( y = 7x - 1 ) and ((10, 70))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>( y = 6x - 30 ) and ((5, -3))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>( y = -x - 4 ) and ((6, 10))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>( y = -10x ) and ((-1, 1))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>( y = 7x + 16 ) and ((12, 100))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>( y = 4x - 0.5 ) and ((1, 4))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>( y = 5x + 100 ) and ((10, 130))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>( y = -x - 100 ) and ((-100, 0))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>( y = 3x - 1.5 ) and ((7, 20))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>( y = 8x + 15 ) and ((5, 50))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>( y = 13x - 13 ) and ((-2, -39))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>( y = -9x - 100 ) and ((-10, -9))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>( y = 5.5x + 1 ) and ((4, 25))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>( y = 2(x - 1) ) and ((-5, -13))</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4-5

Game: Above, On, or Below?

Linear Inequalities
A collection of systems of linear inequalities is given below. Your goal is to determine which system of inequalities has a square in its interior when graphed. Here are some clues to guide you:

- What is the relationship among the sides of a square?
- What is the relationship between two lines with the same slope?
- What is the relationship between two lines whose slopes have a product of $-1$?

Use the coordinate grid below to graph the system of inequalities you think is the solution to the puzzle. Explain your thinking on the lines provided.

*Note:* You do not need to graph each system. Use the clues and the process of elimination to narrow your choices. There is only one solution to this puzzle.

- $y \geq 2$
  - $y \leq 5$
  - $y \geq x + 3$
  - $y \leq x + 1$

- $y \geq 2$
  - $y \leq 5$
- $x \geq 0$
  - $x \leq 1$

- $y \geq x + 2$
  - $y \leq x + 3$

- $x \geq 0$
  - $x \leq 1$

- $y \geq 1$
  - $y \leq 6$
  - $y \geq 2x + 1$
  - $y \leq -x + 1$

- $y \geq 2$
  - $y \leq 7$
  - $x \geq -3$
  - $x \leq 2$

- $y \geq x + 1$
  - $y \leq -x + 1$
  - $x \geq -x + 2$
  - $x \leq 3$

- $y \geq x - 1$
  - $y \leq x + 5$
  - $y \geq -x$
  - $y \leq -x + 10$

- $y \geq x$
  - $y \leq 2x$
  - $x \geq 10$
  - $x \leq 2$

- $y \geq x + 1$
  - $y \leq 2x + 1$
  - $x \geq -1$
  - $x \leq 1$
Graphing Absolute Value Inequalities

Graphing absolute value inequalities is similar to graphing linear inequalities, but the boundaries are absolute value graphs.

**Problem**

**Graph** \( y \geq |x| \).

Graph the absolute value equation \( y = |x| \) first. Use a solid line because the inequality symbol is \( \geq \).

For the inequality part, the sign is \( \geq \). Use an arbitrary point, such as \((0, 4)\) to decide where to shade. You cannot use \((0, 0)\) as this point lies on the boundary. Because \((0, 4)\) is a solution of the inequality, shade the portion above the absolute value graph.

**Problem**

**Graph** \( y \leq |x + 2| \).

Graph the absolute value equation \( y = |x + 2| \). Use a solid line because the inequality symbol is \( \leq \).

Test \((0, 0)\) to decide where to shade. Because \((0, 0)\) is a solution of the inequality, shade the portion below the absolute value graph.

**Exercises**

Graph the following inequalities.

1. \( y \geq |x - 3| \)
2. \( |2x + 5| \geq y \)
3. \( y < |x + 5| \)
Linear Inequality Graphs

In this activity you practice graphing linear inequalities. After you graph each inequality by hand, use the Inequality Graphing App to check your work.

Follow this example to graph $y > x + 1$ using the Inequality Graphing App Inequal.

In the Y1= line of the Y= screen, select “=.” In the list of inequality signs at the screen bottom, note that “>” is above F4. Press [ALPHA] F4.

Enter Y1 > X + 1 and...

On graph paper, graph each inequality given below. Then use the Inequality Graphing App to draw each graph. Compare graphs. Describe how the screen graph distinguishes a “<” boundary line from a “≤” boundary line.

1. $y < 2x + 5$  
2. $y ≤ 7 − 3x$  
3. $y ≥ 3x − 6$  
4. $6x + 2y > 10$

Extension

5. Use the Inequality Graphing App to graph $Y1 = −3x + 4$ and $Y2 > 5x − 2$ on one screen. Press [ALPHA] F2 and experiment with the SHADES menu.

FILES NEEDED: Inequality Graphing App
Linear Inequality Graphs

Activity Objective

Students use the Inequality Graphing App to practice graphing linear inequalities.

Time

- 15–25 minutes

Materials/Software

- Inequality Graphing App
- Activity worksheet

Classroom Management

- Students can work individually or in pairs depending on the number of calculators available.

Notes

- Before using the Inequality Graphing App to draw each graph, students may wish to run DEFAULT to reset the App to its default values.

Answers

1–4. Answers may vary. Sample: A "<" boundary line shows distinct gaps compared to a "\( \leq \)" boundary line.

1. ![Graph 1](image1)

2. ![Graph 2](image2)

3. ![Graph 3](image3)

4. ![Graph 4](image4)

5. Check students’ work.
Lesson Quiz

Solving Systems Using Substitution

1. What is the solution of the system? Use substitution.
   
   \[ y = -3x \]
   \[ x + y = -4 \]

2. What is the solution of the system? Use substitution.
   
   \[ -4y - 3x = -11 \]
   \[ x - 2y = 17 \]

3. A movie theater charges $6.50 for matinee showings and $8.75 for evening showings. Yesterday the theater sold 378 tickets for a total revenue of $2,929.50. How many matinee tickets were sold?

4. **Do you UNDERSTAND?** How many solutions does the system \( y = -7x + 3 \) and \( y + 7x = 10 \) have? Explain.
Chapter 4 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. \( y = 2x + 5 \)  
2. \( y - 2x = 1 \)  
3. \( y + \frac{x}{2} = 8 \)  
4. \( 2x - 3y = 3 \)

\( y - 4x = -2 \)  
\( y = 2x + 6 \)  
\( 2y = -x + 16 \)  
\( x + 4y = -2 \)

Solve each system using substitution.

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

\( 2y = x - 1 \)  
\( y = x + 3 \)  
\( -2y = 1 - 3x \)  
\( 6x + 5y = 26 \)

Solve each system using elimination.

9. \( 3x + 4y = 31 \)  
10. \( 3x + 5y = 54 \)  
11. \( -14x + 9y = 46 \)  
12. \( 4x + 3y = 16 \)

\( 2x - 4y = -6 \)  
\( 6x + 4y = 72 \)  
\( 14x - 9y = 102 \)  
\( 7x - 5y = 69 \)

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.

Teaching Resources
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Chapter 4 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?
   \[
   \begin{align*}
   y & \geq 3x - 5 \\
   3 & \geq 3(1) - 5 \\
   3 & \geq -2
   \end{align*}
   \]

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?
Do you know HOW?

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

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

Solve each system using substitution.

4. \( 3x - 5y = -1 \)
   \( x - y = -1 \)
5. \( x + 2y = -1 \)
   \( 2x - 3y = 12 \)
6. \( 2x + 3y = 9 \)
   \( 3x + 4y = 5 \)
7. \( 7x = 2y + 1 \)
   \( 4y = -3x + 15 \)
8. \( x + \frac{y}{2} = 4 \)
   \( \frac{x}{3} + 2y = 5 \)
9. \( \frac{x}{2} + \frac{y}{4} = 3 \)
   \( 2x - y = 4 \)

Solve each system using elimination.

10. \( x + y = 4 \)
    \( x - y = 6 \)
11. \( -2x + 3y = 9 \)
    \( 2x - 2y = -4 \)
12. \( x + y = 7 \)
    \( 3x - 2y = 11 \)
13. \( 7x - 8y = 11 \)
    \( 8x - 7y = 7 \)
14. \( 0.4x + 0.3y = 1.7 \)
    \( 0.7x - 0.2y = 0.8 \)
15. \( 3x - 7y + 10 = 0 \)
    \( y - 2x - 3 = 0 \)

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?

\[
y \leq 2x - 3
\]
\[
1 \leq 2(1) - 3
\]
\[
1 \leq 1
\]
Chapter 4 Test

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

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. \( 4x + y \geq 1 \) \( 3x - y \leq 6 \)
17. \( x + 4y > -2 \) \( 5x + 3y < 7 \)

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.
Chapter 4 Find The Errors!

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

1. A company offers two different plans for high-speed video transfers. Plan A charges a $10 monthly fee plus 5 cents per transfer. Plan B charges a $25 monthly fee plus 2.5 cents per transfer. After how many transfers does the second plan become less money for that month?

```
Relate
Total cost is plus monthly fee times number of transfers

Define
Let \( c \) = total cost
Let \( n \) = number of transfers

Write
Plan A: \( c = 10 + 5n \)
Plan B: \( c = 25 + 2.5n \)

The lines intersect at (6, 40).
After 6 transfers, Plan B is less money.
```

2. What is the solution of the system? \(-3x + y = 8\) \(2y + 5x = 27\)

```
Step 1 Solve one of the equations for one of the variables.
\(-3x + y = 8\)
\(-3x + y + 3x = 8 + 3x\)
\(y = 3x + 8\)

Step 2 Substitute 3\(x\) + 8 for \(y\) in either equation.
\(-3x + (3x + 8) = 8\)
\(-3x + 3x + 8 = 8\)
\(8 = 8\)

Step 3 Substitute 8 for \(x\) in either equation and solve for \(y\).
\(2y + 5(8) = 27\)
\(2y = -13\)
\(y = -6.5\)

The solution is (8, -6.5).
```

3. What is the solution of the system? \(y = 3x - 4\) \(15x - 5y = 20\)

```
Substitute 3\(x\) - 4 for \(y\) in the other equation.
\(15x - 5(3x - 4) = 20\)
\(15x - 15x + 20 = 20\)
\(20 = 20\)

Since \(x\) has been eliminated, there is no solution.
```
Chapter 4 Find The Errors!

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

1. What is the solution of the system? \[2x - 2y = 8\]
   \[3x + 5y = 24\]
   Step 1 Eliminate one variable. Step 2 Solve for the eliminated variable.
   \[\begin{align*}
   2x - 2y = 8 & \quad \text{Multiply by 3.} \\
   6x - 6y = 24 & \\
   3x + 5y = 24 & \quad \text{Multiply by 2.} \\
   6x + 10y = 48 & \\
   \hline
   \end{align*}\]
   \[\begin{align*}
   2x - 2(1) = 8 & \\
   2x = 10 & \\
   x = 5 & \\
   \end{align*}\]
   \[\begin{align*}
   -16y = -16 & \\
   y = 1 & \\
   \end{align*}\]
   The solution is \((5, 1)\).

2. What is the solution of the system? \[5x + 2y = 12\]
   \[4x - 2y = 6\]
   Step 1 Eliminate one variable. Step 2 Solve for the eliminated variable.
   \[\begin{align*}
   5x + 2y = 12 & \\
   4x - 2y = 6 & \quad \text{Multiply by 3.} \\
   x + 0 = 6 & \quad \text{Add.} \\
   \end{align*}\]
   \[\begin{align*}
   5(6) + 2y = 12 & \\
   2y = -18 & \\
   y = -9 & \\
   \end{align*}\]
   The solution is \((6, -9)\).

3. One drink contains 5% fruit juice and another contains 50% fruit juice. How many gallons of each type should be combined to make 5 gallons of a drink that contains 40% fruit juice?

   Step 1 Let \(x\) = the number of gallons of 5% juice drink, and \(y\) = the number of gallons of 50% juice drink.
   Total gallons: \(x + y = 5\) Amount of juice: \(0.05x + 0.5y = 0.4\)

   Step 2 Solve one equation for \(y\). Step 3 Substitute and solve for \(x\). Step 4 Substitute and solve for \(y\).
   \[\begin{align*}
   x + y &= 5 \\
   y &= 5 - x \\
   0.05x + 0.5(5 - x) &= 0.4 \\
   0.05x + 2.5 - 0.5x &= 0.4 \\
   -0.45x &= -2.1 \\
   x &= 4\frac{2}{3} \\
   \end{align*}\]
   \[\begin{align*}
   4\frac{2}{3} \text{ gallons of 5% juice drink and } &\frac{1}{3} \text{ gallon of 50% juice drink.} \\
   \end{align*}\]
Chapter 4 Find The Errors!

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

1. Is \((-5, -1)\) a solution of \(y > -x + 3\)?

\[
y > -x + 3
\]

\[
-1 > -5 + 3
\]

\[
-1 > -2
\]

\[
-5 > 4 \quad \text{true} \quad (-5, -1) \text{ is a solution.}
\]

2. Walnuts cost $6 per pound and macadamia nuts cost $2 per pound. You have $20 to spend on nuts for baking. What are three possible combinations of walnuts and macadamia nuts you can buy?

Let \(x\) = pounds of walnuts

Let \(y\) = pounds of macadamia nuts

\[
6x + 2y \leq 20
\]

\[
2y \geq -6x + 20
\]

\[
y \geq -3x + 10
\]

The graph only makes sense in the first quadrant.

Three possible combinations are:

1 pound of walnuts and 10 pounds of macadamia nuts

3 pounds of walnuts and 5 pounds of macadamia nuts

4 pounds of walnuts and 10 pounds of macadamia nuts

3. What is the graph of the system? \(y < 8x + 2\)

\[
x + y > 4
\]

Graph \(y < 8x + 2\) and \(x + y > 4\).

The system's solutions lie in the shaded region where the graphs overlap.
Performance Tasks
Chapter 4

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.

- \( a. \, y = 3x + 5 \quad b. \, 9x + 4y = -17 \quad c. \, 5x - 7y = -21 \)
  
- \( 2y - 6x = 4 \quad 12y = -3 - 3x \quad 14y - 5x = 22 \)

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.
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

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

Graph the system to show all possible solutions.
Chapter 4 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.
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 $x \geq 200$ 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 $x \geq 200$ 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.
Looking Back
In earlier grades, students found the median and mean of a set of data (6.SP.5.c). They also learned how to create histograms (6.SP.4).

Mathematics of the Week
Students use histograms to show the frequencies of related data. Students find the measures of central tendency and use the best measure to describe the set of data.

Looking Ahead
In a future course, students will analyze the variance of real world data using standard deviation (S.ID.4).

COMMON CORE CONTENT STANDARDS

S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).

S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Also, N.Q.1, N.Q.2

Common Core Mathematical Practice Standards: 1, 2, 6, 7

TEACHING NOTES

Selected Response
1. Error Analysis: Students show understanding of vocabulary about the shape of data. If a student selects answer choice A, have the student compare choices A and C and choose the better of the two choices. If a student selects answer choices B or D, the student does not understand the term “uniform.”

Constructed Response
2. The students find the mean, median, mode, and range of data and determine whether mean, median, or mode best describes the data. For part (a), ask students to define each term. You can suggest that students use a graphing calculator to find the mean and to organize the data. For part (b), ask students to justify their choice.

Extended Response
3. Students will make a line plot and use it to find the mean, median, mode, and range. They also have to explain what would happen to the mean and median if the top 2 scores were not in the data set. Remind students to explain thoroughly.
Common Core Standards Practice

Week 15

Selected Response
1. Which histogram is uniform?

A

B

C

D

Constructed Response
2. The hours that a school band practiced per week are listed below.

7 5 9 7 4 6 10 8 5 7 8 7 3 12 15 13 8

a. What are the mean, median, mode, and range of their practice times?

b. Which measure of central tendency best describes their practice times? Justify your answer.

Extended Response
3. The list below shows the scores of a 10-point quiz of 20 students in an Algebra class.

6, 8, 9, 9, 10, 7, 8, 8, 9, 10, 9, 8, 7, 7, 7, 6, 5, 4, 9

a. Make a line plot of the data.

b. Find the mean, median, mode, and range of the data.

c. If the top two scores in the class were not included in the data, leaving 18 scores, explain how the mean and median would change.
**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.
Performance Task: Choosing a Movie-Rental Plan (continued)

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 1 Scoring Rubric

Choosing a Movie-Rental Plan

The Scoring Rubric proposes a maximum number of points for each of the parts that make up the Performance Task. The maximum number of points is based on the complexity and difficulty level of the sub-task. For some parts, you may decide to award partial credit to students who may have shown some understanding of the concepts assessed, but may not have responded fully or correctly to the question posed.

<table>
<thead>
<tr>
<th>Task Parts</th>
<th>Maximum Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. $A(x) = 1.50x$;</td>
<td>2</td>
</tr>
<tr>
<td>$B(x) = 10; $</td>
<td></td>
</tr>
<tr>
<td>$C(x) = 5 + 2x$</td>
<td></td>
</tr>
<tr>
<td>b. It makes sense to choose Plan B over Plan A only if you rent 7 or more movies per month. Note that $A(1) = 1.50$ while $B(1) = 10$, $A(2) = 1.50(2) = 3$ while $B(2) = 10$, etc. Plan A is less expensive until you rent 7 movies: $A(7) = 1.50(7) = 10.50$ while $B(7) = 10$, $A(8) = 1.50(8) = 12$ while $B(8) = 10$, etc.</td>
<td>4</td>
</tr>
<tr>
<td>c. It makes sense to choose Plan C over Plan B only if you rent 2 or fewer movies per month. Note that $C(0) = 5 + 2(0) = 5$ while $B(0) = 10$; also $C(1) = 5 + 2(1) = 7$ while $B(0) = 10$; also $C(2) = 5 + 2(2) = 9$ while $B(2) = 10$. So Plan C is less expensive until you rent 3 movies: $C(3) = 5 + 2(3) = 11$ while $B(3) = 10$.</td>
<td>4</td>
</tr>
<tr>
<td>d. Plan A is always more cost-effective than Plan C, because each movie costs $1.50$ rather than $2. This does not mean that Plan A is a better choice than Plan C for everyone, because someone might value convenience and selection more than cost.</td>
<td>4</td>
</tr>
<tr>
<td>e. Sample Answer: I would choose Plan A, because I rent only a few movies per year. The cost is the least with this plan, and there would be plenty of selection for me.</td>
<td>4</td>
</tr>
</tbody>
</table>

Total points 18
1. Which shape is not matched with its correct net?

A

B

C

D

2. What is the distance between points $A(1, 9)$ and $B(4, -2)$?

F $\sqrt{58}$

G 58

H $\sqrt{130}$

J 130

3. In the figure below, you cannot assume that ___.

$\angle XPT$ and $\angle ZPW$ are vertical angles.

B $m\angle YPW = 110$

C Points $T$, $P$, and $Z$ are collinear.

D $\overrightarrow{XW}$ and $\overrightarrow{TZ}$ intersect in point $P$.

4. Given the diagram below, which of the following statements is NOT true?

$\overrightarrow{PR}$ and $\overrightarrow{SQ}$ intersect in point $T$.

$\overrightarrow{PT}$ and $\overrightarrow{TQ}$ are both rays.

$\overrightarrow{ST}$ and $\overrightarrow{PR}$ are both segments.

$\overrightarrow{PT}$ and $\overrightarrow{TQ}$ are opposite rays.

5. $\angle TUV$ and $\angle VUW$ are adjacent complementary angles. If $m\angle TUV = 80$, what is $m\angle VUW$?

A 10

B 80

C 90

D 100
6. Q is the midpoint of PR. What are the coordinates of point R?

   ![Graph showing Q on the coordinate plane]

   - F (6, 5)
   - H (4, 5)
   - G (5, 6)
   - J (2, 5)

7. A rectangular picture has an area of 30 square inches. The length of the picture is 1 inch more than the width. What is the perimeter of the picture?

   - A 5 in.
   - B 6 in.
   - C 11 in.
   - D 22 in.

8. Given that the figure below is a quarter of a circle, which of the formulas could be used to find the length of the curved part?

   ![Quarter of a circle]

   - F \(\frac{\pi r}{4}\)
   - H \(\pi r\)
   - G \(\frac{\pi r}{2}\)
   - J \(\frac{\pi r^2}{2}\)

9. Identify the correct orthographic drawing for the isometric drawing below. Assume there are no hidden cubes.

   ![Isometric drawing of a building]

   - A
   - B
   - C
   - D

10. In the figure below, if \(m\angle AXC = 10y\), then \(m\angle BXD = \_\_\_\_\_\_\_.\)

   ![Triangle XBD]

   - F 10y
   - H 90 – 10y
   - G 360 – 10y
   - J 180 – 10y
11. Find the value of $x$.

$$3x^\circ \quad (x + 28)^\circ$$

A $x = 7$  C $x = 9.3$
B $x = 14$  D $x = 4.7$

12. Name pairs of congruent angles in the figure.

I. $\angle EIF$ and $\angle GIH$
II. $\angle GIF$ and $\angle GIH$
III. $\angle EIF$ and $\angle GIF$
IV. $\angle EIG$ and $\angle FIH$

F I and IV
G II and III
H I and II
J I only

13. The vertices of $\triangle JKL$ are $J(-1, 8)$, $K(3, 5)$, and $L(6, -9)$. What are the vertices of the $T_{<4,-2>}(JKL)$?

A $J'(-1, 8)$, $K'(3, 5)$, $L'(6, -9)$
B $J'(4, -2)$, $K'(3, 5)$, $L'(6, -9)$
C $J'(3, 6)$, $K'(7, 3)$, $L'(10, -11)$
D $J'(-3, 12)$, $K'(1, 9)$, $L'(4, -5)$

14. Describe a single transformation of $\triangle ABC$ that is a composition of the following pair of transformations: $T_{<-5,-3>}(ABC)$ followed by $T_{<-4,-2>}(A'B'C')$.

F $T_{<-1,-5>}(ABC)$
G $T_{<-9,-5>}(ABC)$
H $T_{<-9,-1>}(ABC)$
J $T_{<-1,-1>}(ABC)$

15. $T_{<a,b>}(ABCD) = (A'B'C'D')$. If $A$ is $(6, -8)$, $A'$ is $(-2, 4)$, and $B$ is $(4, -6)$, what are the coordinates of $B'$?

A $(-4, -12)$
B $(-8, -4)$
C $(-4, 6)$
D $(-2, -12)$

16. What are the coordinates of $R_{<y-axis>}(B)$?

F $(2, -2)$
G $(-2, -2)$
H $(-2, 2)$
J $(2, 2)$

17. $G'$ is the reflection of $G$ across the line $x = 6$. If the coordinates of $G'$ are $(-3, 7)$, what are the coordinates of $G$?

A $(-3, -7)$
B $(3, 7)$
C $(7, 15)$
D $(15, 7)$

Common Core Readiness Assessment (page 3 of 6)
18. What is the image of \( E(3, 2) \) after being reflected across \( x = -1 \) and then being reflected across the \( x \)-axis?

\[ \begin{align*}
F & \quad (-5, 2) \\
G & \quad (-5, -2) \\
H & \quad (5, 2) \\
J & \quad (5, -2)
\end{align*} \]

19. If \( \overline{AB} \) is rotated \( 90^\circ \) clockwise around \( A \), what would be the coordinates of Point \( A' \)?

\[ \begin{align*}
A & \quad (-1, 0) \\
B & \quad (0, 0) \\
C & \quad (0, -1) \\
D & \quad (2, -1)
\end{align*} \]

20. Which of the following mappings of \( \text{OPEN} \) is NOT the result of just a single rotation?

\[ \begin{align*}
F & \quad \text{not pictured} \\
G & \quad \text{OPEN} \\
H & \quad \text{OPEN} \\
J & \quad \text{OPEN}
\end{align*} \]

21. For \( \triangle XYZ \), find the angle of counterclockwise rotation about point \( C \) that maps point \( X \) to point \( Z \).

\[ \begin{align*}
& \quad \text{A} 30^\circ \\
& \quad \text{B} 60^\circ \\
& \quad \text{C} 120^\circ \\
& \quad \text{D} 180^\circ
\end{align*} \]

22. What is being constructed?

\[ \begin{align*}
& \quad \text{F} \quad \text{perpendicular bisector} \\
& \quad \text{G} \quad \text{parallel lines} \\
& \quad \text{H} \quad \text{circle} \\
& \quad \text{J} \quad \text{copy of an angle}
\end{align*} \]
23. Which diagram shows the construction of an angle bisector?

A

B

C

D

24. To find the midpoint of \( \overline{PQ} \), what is the correct first step?

F Put the compass point on point \( P \) and draw a long arc. Be sure the opening is equal to \( \frac{1}{2}AB \).

G Put the compass point on point \( P \) and draw a short arc. Be sure the opening is equal to \( \frac{1}{2}AB \).

H Put the compass point on point \( P \) and draw a long arc. Be sure the opening is greater than \( \frac{1}{2}AB \).

J Put the compass point on point \( P \) and draw a short arc. Be sure the opening is less than \( \frac{1}{2}AB \).

25. Which construction is shown in the diagram below?

A Bisecting \( \angle BAC \)

B Copying \( \angle BAC \)

C Copying \( \overline{JK} \)

D Bisecting \( \overline{JK} \)

26. The proof that vertical angles 1 and 3 are congruent is started below.

\[
\begin{align*}
\text{Statement} & \quad \text{Reason} \\
m\angle 1 + m\angle 2 &= 180 & \text{Angles 1 and 2 are supplementary angles.} \\
m\angle 2 + m\angle 3 &= 180 & \text{Angles 2 and 3 are supplementary angles.}
\end{align*}
\]

Which statement should be next?

F \( m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3 \)

G \( m\angle 3 + m\angle 4 = 180 \)

H \( m\angle 1 + m\angle 2 = m\angle 2 + m\angle 1 \)

J \( m\angle 3 + m\angle 4 = 180 \)
27. What is proven below?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $m\angle 1 + m\angle 2 = 90$</td>
<td>1. Given</td>
</tr>
<tr>
<td>2. $m\angle 2 + m\angle 3 = 90$</td>
<td>2. Given</td>
</tr>
<tr>
<td>3. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$</td>
<td>3. Transitive Property of Equality</td>
</tr>
<tr>
<td>4. $m\angle 1 = m\angle 3$</td>
<td>4. Subtraction Property of Equality</td>
</tr>
<tr>
<td>5. $\angle 1 \cong \angle 3$</td>
<td>5. Angles with the same measure are congruent.</td>
</tr>
</tbody>
</table>

A Angles 1 and 3 are congruent when angle 2 is complementary to both angles 1 and 3.
B Angles 1 and 3 are congruent when angle 2 is supplementary to both angles 1 and 3.
C Angles 1 and 3 are congruent when angle 2 is adjacent to both angles 1 and 3.
D Angles 1, 2, and 3 are right angles.

28. In the proof below, what reason is missing?

Given: $\angle 1$ and $\angle 2$ are right angles.
Prove: $\angle 1 \cong \angle 2$

<table>
<thead>
<tr>
<th>Statement</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $\angle 1$ and $\angle 2$ are right angles.</td>
<td>1. Given</td>
</tr>
<tr>
<td>2. $m\angle 1 = 90$ and $m\angle 2 = 90$</td>
<td>2. Definition of a right angle.</td>
</tr>
<tr>
<td>3. $m\angle 1 = m\angle 2$</td>
<td>3. ?</td>
</tr>
<tr>
<td>4. $\angle 1 \cong \angle 2$</td>
<td>4. Angles with the same measure are congruent.</td>
</tr>
</tbody>
</table>

F Subtraction Property of Equality
G Addition Property of Equality
H Transitive Property of Equality
J Angles with the same measure are congruent.

29. $\overline{AB}$ has endpoints $A(2, 4)$ and $B(8, y)$. If $AB$ is 10, what could be the value of $y$?

A 8  B 12  C 64  D 100

30. Identify the step that is justified by an incorrect reason.

1. $m\angle CBA = 180^\circ$; Given
2. $m\angle CBD + m\angle ABD = \angle CBA$; ($\angle$ Add. Post.)
3. $2x + 5 + x - 2 = 180$; (Subst. Prop. Of Eq.)
4. $3x + 3 = 180$; (Distr. Prop)
5. $3x = 177$; (Add. Prop. Of Eq.)
6. $x = 59$; (Div. Prop. Of Eq.)
7. $m\angle ABD = x - 2$; given
8. $m\angle ABD = 59 - 2$; (Trans. Prop. of Congruence)
9. $m\angle ABD = 57$; simplify

F. step 3  G. step 2  H. step 5  J. step 8
## Common Core Readiness Assessment 3 Report

<table>
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<tr>
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<th>Proficient? Yes or No</th>
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<td><strong>Geometry</strong></td>
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<tr>
<td>G.C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of the sector.</td>
<td>10</td>
<td>Extension content</td>
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<tr>
<td>G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.</td>
<td>1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 29</td>
<td>7-1, 7-2, 7-3, 7-4, 7-5</td>
<td></td>
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<tr>
<td>G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).</td>
<td>13, 14, 15, 16, 17, 18</td>
<td>8-1, 8-2, 8-3, 8-4</td>
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<tr>
<td>G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.</td>
<td>16, 19</td>
<td>8-1, 8-2, 8-3</td>
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<tr>
<td>G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.</td>
<td>20, 21</td>
<td>8-1, 8-2, 8-3, 8-4</td>
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<tr>
<td>G.CO.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.</td>
<td>26, 27, 28, 30</td>
<td>Extension content</td>
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<tr>
<td>G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</td>
<td>22, 23, 24, 25,</td>
<td>Extension content</td>
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Student Comments:


Parent Comments:


Teacher Comments:


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