Go beyond the textbook with Pearson Mathematics II

Pearson Integrated High School Mathematics II 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 II lessons from Chapter 6, illustrating the scope of resources available for the course. Pearson Mathematics II 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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6-2 Think About a Plan

Sports Choose a scale and make a scale drawing of a rectangular soccer field that is 110 yd by 60 yd.

1. What is a scale drawing? How does a figure in a scale drawing relate to an actual figure?

________________________________ ________________________________ __________________
________________________________ ________________________________ __________________

2. What is a scale? What will the scale of your drawing compare? Write a ratio to represent this.

________________________________ ________________________________ __________________
________________________________ ________________________________ __________________

3. To select a scale you need to choose a unit for the drawing. Assuming you are going to make your drawing on a typical sheet of paper, which customary unit of length should you use? __________________

4. You have to choose how many yards each unit you chose in Step 3 will represent. The soccer field is 110 yd long. What is the least number of yards each unit can represent and still fit on an 8.5 in.-by-11 in. sheet of paper? Explain. Does this scale make sense for your scale drawing?

________________________________ ________________________________ __________________
________________________________ ________________________________ __________________
________________________________ ________________________________ __________________

5. Choose the scale of your drawing._______________________________________________

6. How can you use the scale to write a proportion to find the length of the field in the scale drawing? Write and solve a proportion to find the length of the soccer field in the scale drawing.

________________________________ ________________________________ __________________
________________________________ ________________________________ __________________

7. Write and solve a proportion to find the width of the soccer field in the scale drawing.

8. Use a ruler to create the scale drawing on a separate piece of paper.
6-2 Practice

Similar Polygons

List the pairs of congruent angles and the extended proportion that relates the corresponding sides for the similar polygons.

1. \(ABCD \sim WXYZ\)

2. \(\Delta MNO \sim \Delta RST\)

3. \(NPOM \sim TQRS\)

Determine whether the polygons are similar. If so, write a similarity statement and give the scale factor. If not, explain.

4. \(\text{...}\)

5. \(\text{...}\)

6. \(\text{...}\)

Determine whether the polygons are similar.

7. an equilateral triangle with side length 6 and an equilateral triangle with side length 15

8. a square with side length 4 and a rectangle with width 8 and length 8.5

9. a triangle with side lengths 3 cm, 4 cm, and 5 cm, and a triangle with side lengths 18 cm, 19 cm, and 20 cm

10. a rhombus with side lengths 8 and consecutive angles 50° and 130 °, and a rhombus with side lengths 13 and consecutive angles 50 ° and 130 °
11. An architect is making a scale drawing of a building. She uses the scale 1 in. = 15 ft.
   a. If the building is 48 ft tall, how tall should the scale drawing be?
   b. If the building is 90 ft wide, how wide should the scale drawing be?

12. A scale drawing of a building was made using the scale 15 cm = 120 ft. If the scale
drawing is 45 cm tall, how tall is the actual building?

Determine whether each statement is always, sometimes, or never true.

13. Two squares are similar.

14. Two hexagons are similar.

15. Two similar triangles are congruent.

16. A rhombus and a pentagon are similar.

Algebra Find the value of $y$. Give the scale factor of the polygons.

17. $ABCD \sim TSVU$

18. The scale factor of $RSTU$ to $VWXYZ$ is 14 : 3. What is the scale factor of $VWXYZ$ to $RSTU$?

In the diagram below, $\triangle PRQ \sim \triangle DEF$. Find each of the following.

19. the scale factor of $\triangle PRQ$ to $\triangle DEF$

20. $m\angle D$

21. $m\angle R$

22. $m\angle P$

23. $DE$

24. $FE$

25. Writing Explain why all isosceles right triangles are similar, but not all
scalene right triangles are similar.
List the pairs of congruent angles and the extended proportion that relates the corresponding sides for the similar polygons.

1. \(ABCD \sim WXYZ\)
2. \(\triangle GHI \sim \triangle KJL\)

\[
\begin{align*}
\angle A & \cong \angle W \\
\angle B & \cong \angle G \\
\angle C & \cong \angle H \\
\angle D & \cong \angle I
\end{align*}
\]

\[
\begin{align*}
\frac{AB}{WX} & = \frac{BC}{XY} = \frac{CD}{YZ} = \frac{DA}{ZW} \\
\frac{GH}{KJ} & = \frac{HI}{LJ} = \frac{IJ}{KJ}
\end{align*}
\]

Determine whether the polygons are similar. If so, write a similarity statement and give the scale factor. If not, explain.

3. 

4. 

5. 

6. 

Algebra The polygons are similar. Find the value of each variable.

7. 

8.
9. You want to enlarge a 3 in.-by-5 in. photo. The paper you will print on is 8.5 in.-by-14 in. What is the largest size the photo can be?

10. For art class, you need to make a scale drawing of the Parthenon using the scale 1 in. = 5 ft. The Parthenon is 228 ft long. How long should you make the building in your scale drawing?

11. Ella is reading a map with a scale of 1 in. = 20 mi. On the map, the distance Ella must drive is 4.25 in. How many miles is this?

**Algebra** Find the value of $z$. Give the scale factor of the polygons.

12. $\triangle JKL \sim \triangle QRS$

13. The scale factor of $ABCD$ to $EFGH$ is 7 : 20. What is the scale factor of $EFGH$ to $ABCD$?

**In the diagram below, $\triangle NOP \sim \triangle WXY$. Find each of the following.**

14. the scale factor of $\triangle NOP$ to $\triangle WXY$

15. $m\angle X$

16. $m\angle Y$

17. $\frac{NP}{WY}$

18. $WX$

19. $NP$

20. A company makes rugs. Their smallest rug is a 2 ft-by-3 ft rectangle. Their largest rug is a similar rectangle. If one side of their largest rug is 18 ft, what are the possible dimensions of their largest rug?
Multiple Choice

For Exercises 1–5, choose the correct letter.

1. You make a scale drawing of a tree using the scale 5 in. = 27 ft. If the tree is 67.5 ft tall, how tall is the scale drawing?
   - A 10 in.
   - B 11.5 in.
   - C 12 in.
   - D 12.5 in.

2. You make a scale drawing of a garden plot using the scale 2 in. = 17 ft. If the length of a row of vegetables on the drawing is 3 in., how long is the actual row?
   - E 17 ft
   - F 25.5 ft
   - G 34 ft
   - H 42.5 ft

3. The scale factor of \( \triangle RST \) to \( \triangle DEC \) is 3 : 13. What is the scale factor of \( \triangle DEC \) to \( \triangle RST \)?
   - A 3 : 13
   - B 1 : 39
   - C 39 : 1
   - D 13 : 3

4. \( \triangle ACB \sim \triangle FED \). What is the value of \( x \)?

5. \( MNOP \sim QRST \) with a scale factor of 5 : 4. \( MP = 85 \text{ mm} \). What is the value of \( QT \)?
   - A 60 mm
   - B 68 mm
   - C 84 mm
   - D 106.25 mm

Short Response

6. Are the triangles at the right similar? Explain.
Similar polygons have corresponding angles that are congruent and corresponding sides that are proportional. An extended proportion can be written for the ratios of corresponding sides of similar polygons.

**Problem**

Are the quadrilaterals at the right similar? If so, write a similarity statement and an extended proportion.

Compare angles: \( \angle A \cong \angle X \), \( \angle B \cong \angle Y \), \( \angle C \cong \angle Z \), \( \angle D \cong \angle W \)

Compare ratios of sides: \( \frac{AB}{XY} = \frac{6}{3} = 2 \), \( \frac{BC}{YZ} = \frac{8}{4} = 2 \), \( \frac{CD}{ZW} = \frac{9}{4.5} = 2 \), \( \frac{DA}{WX} = \frac{4}{2} = 2 \)

Because corresponding sides are proportional and corresponding angles are congruent, \( ABCD \sim XYZW \).

The extended proportion for the ratios of corresponding sides is:

\[
\frac{AB}{XY} = \frac{BC}{YZ} = \frac{CD}{ZW} = \frac{DA}{WX}
\]

**Exercises**

If the polygons are similar, write a similarity statement and the extended proportion for the ratios of corresponding sides. If the polygons are not similar, write not similar.

1. 

2. 

3. 

4.
6-2  Reteaching (continued)

Similar Polygons

Problem

\( \triangle RST \sim \triangle UVW \). What is the scale factor?

What is the value of \( x \)?

Identify corresponding sides: \( RT \) corresponds to \( UW \), \( TS \) corresponds to \( WV \), and \( SR \) corresponds to \( VU \).

\[
\frac{RT}{UW} = \frac{TS}{WV} \quad \text{Compare corresponding sides.}
\]
\[
\frac{4}{2} = \frac{7}{x} \quad \text{Substitute.}
\]
\[4x = 14 \quad \text{Cross Products Property}
\]
\[x = 3.5 \quad \text{Divide each side by 4.}
\]

The scale factor is \( \frac{4}{2} = \frac{7}{3.5} = 2 \). The value of \( x \) is 3.5.

Exercises

Give the scale factor of the polygons. Find the value of \( x \). Round answers to the nearest tenth when necessary.

5. \( \triangle ABCD \sim \triangle NMPO \)

6. \( \triangle XYZ, \triangle EFD \)

7. \( \triangle LMNO \sim \triangle RQTS \)

8. \( \triangle OPQRST \sim \triangle GHIJKL \)

For review purposes only. Not for sale or resale.
There are two sets of note cards below that show how to solve for $x$, given $LMNO \sim WXYZ$, in the diagram at the right. The set on the left explains the thinking and the set on the right shows the steps. Write the thinking and the steps in the correct order.
Activity: Similarity Investigation

Similar Polygons

Construct

Construct parallelogram $ABCD$ whose diagonals intersect at $E$. Measure its sides and angles. Construct the midpoints of $AE$, $BE$, $CE$, and $DE$ called $P$, $Q$, $R$, and $S$, respectively.

Construct a quadrilateral $PQRS$ and measure its sides and angles.

Investigate

1. Drag the vertices of $ABCD$ and observe the effect on $PQRS$. Classify $PQRS$ as specifically as possible.
2. Explain why this classification holds.
3. Comparing corresponding angles and sides, verify that $ABCD$ and $PQRS$ are similar.
4. Find the similarity ratio. Without measuring, make a conjecture about the ratio of the areas of the two figures. Test your conjecture by measuring.
5. Do you think the results in Exercises 1 through 4 are true for quadrilaterals that are not parallelograms? Test your answer by constructing and measuring.

Extend

Step 1

Construct quadrilateral $ABCD$ with point $V$ not on $ABCD$. Construct line segments from each vertex of $ABCD$ to $V$. Construct the midpoints of $AV$, $BV$, $CV$, and $DV$, called $M$, $N$, $O$, and $P$, respectively. Point $V$ is called the vanishing point.

Step 2

Draw segments connecting the corresponding vertices of $ABCD$ to $MNOP$. Then hide the segments joining the vertices of $ABCD$ to $V$. The three dimensional object that results is an example of a drawing in one point perspective.

6. Measure the sides and angles of $ABCD$ and $MNOP$ and verify that the quadrilaterals are similar.
### Game: Proportions Relay

Proportions in Triangles

Photocopy the following sets of relay questions (one copy for each team of four students). Instruct students to sit in rows of four. Cut the questions apart and give A1 to the first student, A2 to the second, and so on.

#### A1. Find \( w \).

![Diagram A1](image1)

#### A2. Find \( x \).

![Diagram A2](image2)

#### A3. Given that \( JK = 16.25 \), find \( y \).

![Diagram A3](image3)

#### A4. Find \( z \).

![Diagram A4](image4)

#### B1. Find \( w \).

![Diagram B1](image5)

#### B2. Find \( x \).

![Diagram B2](image6)

#### B3. Find \( y \).

![Diagram B3](image7)

#### B4. Find \( z \).

![Diagram B4](image8)

#### C1. Given that \( \triangle ABC \sim \triangle DFE \), find \( w \).

![Diagram C1](image9)

#### C2. Find \( x \).

![Diagram C2](image10)

#### C3. Given that \( LN = (TNWYWR) \), find \( y \).

![Diagram C3](image11)

#### C4. Given that \( \triangle RSQ \sim \triangle RPT \), find \( z \).

![Diagram C4](image12)
6-5 Game: Proportions Relay
Proportions in Triangles

Setup
Your teacher will divide the class into teams of four. Sit in a row with your teammates. Each team member will receive a problem on a slip of paper. Leave the problem face down until your teacher instructs you to begin. The first person in your team will have enough information to solve their problem. Subsequent players will have problems that contain a measurement labeled (TNWYWR) for “The Number Which You Will Receive.”

Game Play
When your teacher tells you to begin, turn your paper over. The first person on each team completes the problem, writes the answer only on the first line of your team’s answer slip, and passes the slip to the second person. The second person replaces the (TNWYWR) in his/her problem with the answer from the first person. Then, the second problem can be solved and the answer passed to the third person, and so on. When the fourth person has completed his/her problem, he/she raises the answer slip in the air. If you pass an answer and then later realize it was incorrect, you may write the corrected answer on a new answer slip and pass it. Then, subsequent players must revise their answers based on the new information. While you wait for the answer from the player(s) before you, set up the problem.

Ending the Game
Each round lasts a maximum of six minutes. When your teacher indicates that time is up, your team must submit its answer slip immediately. Your team earns a point for each correct answer. If your team correctly answers all four problems in under 3 minutes, you earn 2 bonus points. After 3 rounds, the team with the most points wins.

<table>
<thead>
<tr>
<th>Team:</th>
<th>Team:</th>
<th>Team:</th>
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<tbody>
<tr>
<td>Round:</td>
<td>Round:</td>
<td>Round:</td>
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<td>1.</td>
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<td>2.</td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
<td>4.</td>
<td>4.</td>
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</tbody>
</table>

Points earned: Points earned: Points earned:
Search for similar triangles in the diagram below. Justify each similarity statement with a theorem.

1. \( \triangle ABC \sim \) _______ by _______
2. \( \triangle NIM \sim \) _______ by _______
3. \( \triangle CDE \sim \) _______ by _______
4. \( \triangle IKH \sim \) _______ by _______
5. \( \triangle CIE \sim \) _______ by _______
6. \( \triangle CHI \sim \) _______ by _______
Floor Plans

Architects, engineers, and other professionals make scale drawings to design or present building plans. A floor plan of the second floor of a house is shown below. Use the scale to find the actual dimensions of each room.

1. playroom
2. library
3. master bedroom
4. bathroom
5. closet

Someone who wants to rearrange a room can make use of a scale drawing of the room that includes furniture. Two-dimensional shapes can represent the objects that sit on the floor in the room.

Make a scale drawing of a room in which you spend a lot of time, such as your classroom or bedroom, including any objects that take up floor space.

6. Choose an appropriate scale so the drawing covers most of an 8.5 in.-by-11 in. piece of paper. What scale did you choose?

7. What shape is the room? Measure the dimensions of the room and draw the shape to represent the room’s outline.

8. List three objects that take up floor space. Measure the dimensions of each object, then determine their dimensions in the scale drawing. You can round to the nearest millimeter or quarter of an inch.

<table>
<thead>
<tr>
<th>Object</th>
<th>Actual Dimensions</th>
<th>Scale Factor</th>
<th>Dimensions on Drawing</th>
</tr>
</thead>
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<td></td>
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</table>

9. Complete the scale drawing. Remember to measure the distance between objects so that this is accurately represented in the drawing.
Parallel Segments in Triangles

Given: In GL85A, \( \overline{DE} \) is parallel to side \( \overline{AC} \) of \( \triangle ABC \) with point \( D \) on \( \overline{AB} \) and point \( E \) on \( \overline{BC} \).

Explore: the ratios of the lengths of the divided sides

1. Install lengths \( AD \), \( DB \), \( CE \), and \( EB \) on your screen. Drag point \( D \) to four different locations on \( \overline{AB} \). For each location record the four lengths in the table below.

<table>
<thead>
<tr>
<th>Length</th>
<th>( AD )</th>
<th>( DB )</th>
<th>( CE )</th>
<th>( EB )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( AD )</td>
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<td></td>
</tr>
<tr>
<td>( DB )</td>
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</tr>
<tr>
<td>( CE )</td>
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<td></td>
</tr>
<tr>
<td>( EB )</td>
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</tbody>
</table>

2. For each column in the table, find the ratios \( \frac{AD}{DB} \) and \( \frac{CE}{EB} \) to the nearest tenth. Record the values in the last two rows of the table.

3. Study the data in the table. Complete the following conjecture about the relationship between \( \frac{AD}{DB} \) and \( \frac{CE}{EB} \).

If \( \overline{DE} \) is parallel to side \( \overline{AC} \) of \( \triangle ABC \) with \( D \) on \( \overline{AB} \) and \( E \) on \( \overline{BC} \), then \( \frac{AD}{DB} = \frac{CE}{EB} \).

4. Generalize your conjecture from Question 3.

If a line is parallel to one side of a triangle and intersects the other two sides, then \( \frac{AD}{DB} = \frac{CE}{EB} \).

Extension

5. Drag point \( C \) until \( \triangle ABC \) is an isosceles triangle with \( AB = CB \). What kind of triangle is \( \triangle DBE \)? Explain your answer.

6. Draw \( \overline{GH} \) parallel to \( \overline{AC} \) of \( \triangle ABC \) with point \( G \) on \( \overline{AD} \) and point \( H \) on \( \overline{EC} \). Make a conjecture about the ratio \( AG:GD:DB \).
Parallel Segments in Triangles

Activity Objective
Students use Cabri® Jr. to explore the properties of parallel segments in triangles.

Time
• 20–30 minutes

Materials/Software
• App: Cabri® Jr.
• AppVar: GL85A
• Activity worksheet

Skills Needed
• install a measure
• drag an object

Classroom Management
• Students can work individually or in pairs depending on the number of calculators available.
• Use TI Connect™ software, TI-GRAPH LINK™ software, the TI-Navigator™ system, or unit-to-unit links to transfer GL85A to each calculator.

Answers
1-2. Check students’ work.

3. \[ \frac{AD}{DB} = \frac{CE}{EB} \]

4. the line divides the two sides proportionally

5. \( \triangle DBE \) is isosceles; If \( \frac{AD}{DB} = \frac{CE}{EB} \), then \( \frac{AD}{DB} \cdot \frac{DB}{DB} = \frac{CE}{EB} \), or \( \frac{AB}{DB} = \frac{CB}{EB} \). When \( AB = CB \), it follows that \( DB = EB \), so \( \triangle DBE \) is isosceles.

6. \[ AG \cdot GD \cdot DB = CH \cdot HE \cdot EB \]
Angle Bisectors in Triangles II

Given: In $\triangle ABC$, $AD$ bisects $\angle CAB$ and intersects side $\overline{CB}$ in point $D$.

Explore: the ratio of the lengths of the divided side

1. Install lengths $CA$, $AB$, $CD$, and $DB$ on your screen. Drag point $B$ to form four different triangles. For each triangle record the four lengths in the table below.

| Length $CA$ |   |   |
| Length $AB$ |   |   |
| Length $CD$ |   |   |
| Length $DB$ |   |   |

2. For each column in the table, find the ratios $\frac{CA}{AB}$ and $\frac{CD}{DB}$ to the nearest tenth. Record the values in the last two rows of the table.

3. Study the data in the table. Complete the following conjecture about the relationship between $\frac{CD}{DB}$ and $\frac{CA}{AB}$:

If $AD$ bisects $\angle CAB$ of $\triangle ABC$ and intersects side $\overline{CB}$ in point $D$, then $\frac{CD}{DB}$ is proportional to $\frac{CA}{AB}$.

4. Generalize your conjecture from Question 3.

A line that bisects an angle of a triangle divides the side opposite that angle into two segments whose lengths are proportional to $\frac{CA}{AB}$.

Extension

5. Drag point $B$ to make $CD = DB$. What kind of triangle is $\triangle ABC$? Explain your answer.

6. Explain how, without measuring any angle, you could locate a point $E$ on $\overline{AC}$ so that $BE$ bisects $\angle ABC$.

FILES NEEDED: Cabri® Jr.
AppVar: GL85B
Angle Bisectors in Triangles II

Activity Objective

Students use Cabri® Jr. to explore the properties of angles bisectors in triangles.

Time
- 20–30 minutes

Materials/Software
- App: Cabri® Jr.
- AppVar: GL85B
- Activity worksheet

Skills Needed
- install a measure
- drag an object

Classroom Management
- Students can work individually or in pairs depending on the number of calculators available.
- Use TI Connect™ software, TI-GRAPH LINK™ software, the TI-Navigator™ system, or unit-to-unit links to transfer GL85B to each calculator.

Answers
1-2. Check students’ work.
3. \( \frac{CD}{DB} = \frac{CA}{AB} \)
4. the lengths of the sides of the angle
5. isosceles; If \( CD = DB \), then \( \frac{CA}{AB} = 1 \), and \( CA = AB \).
6. If \( BE \) bisects \( \angle ABC \), \( \frac{AE}{EC} \) must equal \( \frac{BA}{BC} \). Install lengths \( AE, EC, BA, \) and \( BC \). Locate \( E \) so that \( AE = EC \cdot \frac{BA}{BC} \). Then \( \frac{AE}{EC} = \frac{BA}{BC} \).
Lesson Quiz

Similarity in Right Triangles

1. What similarity statement can you write relating the three triangles in the diagram?

![Diagram of triangles]

2. What is the geometric mean of 6 and 16?

3. Do you UNDERSTAND? What are the values of x and y?

![Diagram with numbers 36 and 20]
Chapter 7 Quiz 1

Do you know HOW?

1. The lengths of two sides of a polygon are in the ratio 2 : 3. Write expressions for the measures of the two sides in terms of the variable $x$.

2. $\Delta HJK \sim \Delta RST$. Complete each statement. $\angle K \cong \square$ and $\frac{IK}{ST} = \square$.

Solve each proportion.

3. $\frac{z}{15} = \frac{45}{75}$

4. $\frac{5}{8} = \frac{x + 2}{5}$

5. To the nearest inch, a door is 75 in. tall and 35 in. wide. What is the ratio of the width to the height?

In Exercises 6–9, are the triangles similar? If yes, write a similarity statement and explain how you know they are similar. If not, explain.

Do you UNDERSTAND?

10. **Vocabulary** What is a proportion that has means 9 and 10 and extremes 6 and 15?

11. **Reasoning** To prove that any two isosceles triangles are similar you only need to show that the vertex angles are congruent or a pair of corresponding base angles is congruent. Explain.
Chapter 7 Quiz 1

Do you know HOW?

1. Twyla’s pet cat weighs 8 lb. Her pet hamster weighs 12 ounces. What is the ratio of her cat’s weight to her hamster’s weight?

2. The non-right angles of a right triangle are in the ratio 1 : 5. Write an equation that could be used to find the measure of each angle.

3. Are the quadrilaterals similar? If so, write a similarity statement and give the scale factor. If not, explain.

4. What is the value of $x$ in the proportion $\frac{2}{5} = \frac{10}{x}$?

5. If $QRST \sim DEFG$, what would make the proportion $\frac{ST}{FG} = \frac{RS}{true}$ true?

6. $\triangle ABC \sim \triangle WXY$. What is the value of $x$?

7. Are the triangles at the right similar? If yes, write a similarity statement and explain how you know. If not, explain.

Do you UNDERSTAND?

8. **Vocabulary** Explain how similar triangles can be used to measure an object indirectly. Give a specific example.

9. **Compare and Contrast** What is the difference between proving that a set of quadrilaterals are similar and proving that a set of triangles are similar?

10. **Reasoning** Are all parallelograms similar? Are any types of parallelograms always similar? Explain.
Chapter 7 Test

Do you know HOW?

Algebra Solve each proportion.

1. \( \frac{y}{4} = \frac{15}{20} \)
2. \( \frac{6}{z-3} = \frac{8}{5} \)

3. Determine whether the polygons at the right are similar. If so, write a similarity statement and give the scale factor. If not, explain.

Algebra The polygons are similar. Find the value of each variable.

4.

5.

Determine whether the triangles are similar. If so, write a similarity statement and name the postulate or theorem you used. If not, explain.

6.

7.

Find the geometric mean of each pair of numbers.

8. 8 and 12
9. 20 and 6

10. Coordinate Geometry Plot \( A(0, 0), B(1, 0), C(1, 2), D(2, 0), \) and \( E(2, 4) \). Then sketch \( \triangle ABC \) and \( \triangle ADE \). Use SAS \( \sim \) to prove \( \triangle ABC \sim \triangle ADE \).
11. **Reasoning** Name two different pairs of whole numbers that have a geometric mean of 4. Name a pair of positive numbers that are not whole numbers that have a geometric mean of 4. How many pairs of positive numbers have a geometric mean of 4? Explain.

**Algebra** Find the value of $x$.

12.  

13.  

14.  

15.  

**Do you UNDERSTAND?**

16. **Reasoning** $\triangle ABC \sim \triangle HJK$ and $\triangle HJK \sim \triangle XYZ$. Furthermore, the ratio between the sides of $\triangle ABC$ and $\triangle HJK$ is $a : b$. Finally, the ratio of the sides between $\triangle HJK$ and $\triangle XYZ$ is $b : a$. What can you conclude about $\triangle ABC$ and $\triangle XYZ$? Explain.

17. **Compare and Contrast** How are Corollary 1 to Theorem 7-3 and Corollary 2 to Theorem 7-3 alike? How are they different?

18. **Error Analysis** A student says that since all isosceles right triangles are similar, all isosceles triangles that are similar must be right triangles. Is the student right? Explain.

**Determine whether each statement is always, sometimes, or never true.**

19. Two equilateral triangles are similar.

20. The angle bisector of a triangle divides the triangle into two similar triangles.

21. A rectangle is similar to a rhombus.
Chapter 7 Test

Do you know HOW?

1. An adult female panda weighs 200 lb. Its newborn baby weighs only \( \frac{1}{4} \) lb. What is the ratio of the weight of the adult to the weight of the baby panda?

2. An animal shelter has 104 cats and dogs. The ratio of cats to dogs is 5 : 3. How many cats are at the shelter?

3. The sides of a triangle are in the extended ratio of 3 : 2 : 4. If the length of the shortest side is 6 cm, what is the length of the longest side?

Solve each proportion.

4. \( \frac{12}{x} = \frac{4}{7} \)

5. \( \frac{x}{10} = \frac{7}{20} \)

6. \( \frac{x}{x+5} = \frac{5}{7} \)

7. Are the polygons similar? If they are, write a similarity statement and give the scale factor. If not, explain.

8. The scale of a map is 1 in. = 25 mi. On the map, the distance between two cities is 5.25 in. What is the actual distance?

9. \( ABCD \sim JKLM \). What is the value of \( x \)?

Determine whether the triangles are similar. If so, write the similarity statement and name the postulate or theorem you used. If not, explain.

10.

11.

12.

13.

14. A person 2 m tall casts a shadow 5 m long. At the same time, a building casts a shadow 24 m long. How tall is the building?
Find the geometric mean of each pair of numbers.

15. 9 and 25
16. 10 and 12

17. A pie shop sold a total of 117 pies one day. The pies were apple, cherry, and blueberry. The ratio of apple pies sold to cherry pies to blueberry pies was 6 : 2 : 5. How many cherry pies were sold?

18. Write a similarity statement relating the three triangles in the diagram.

19. \( \frac{DE}{AB} = \frac{？}{？} \)
20. \( \frac{EF}{DE} = \frac{？}{AB} \)

Find the value of \( x \).

21.
22.

Do you UNDERSTAND?

Find the values of the variables.

23.
24.

25. Find the length of the altitude to the hypotenuse of a right triangle whose sides have lengths 6.8 and 10. The altitude to the hypotenuse separates the hypotenuse into two parts. The smaller part is 3.8. Round your answer to the nearest tenth.
Performance Tasks

Chapter 6

Task 1
Prove three different pairs of triangles are similar using the following postulates and theorems. Sketch each pair of triangles on your own paper in your explanations.

a. Postulate 7-1 Angle-Angle (AA ~) Similarity Postulate
b. Theorem 7-1 Side-Angle-Side Similarity (SAS ~) Theorem
c. Theorem 7-2 Side-Side-Side Similarity (SSS ~) Theorem

Task 2
There are three claims made about the right triangles below. Evaluate each claim. Use the sketches at the right of each claim to help you.

a. The altitude to the hypotenuse forms similar triangles. In the drawing at the right, is \( \triangle ABC \sim \triangle ACD \sim \triangle CBD \)?

b. The angle bisector of the right angle forms triangles with pairs of proportionate sides. In the drawing at the right, is \( \triangle ACE \sim \triangle BCE \)?

c. The midsegment connecting the legs forms a triangle similar to the original triangle. In the drawing at the right, is \( \triangle CFG \sim \triangle CAB \)?
Performance Tasks (continued)

Chapter 6

Task 3
The drawing at the right shows two docks on opposite sides of a lake. You want to find the distance across the lake between the two docks, but you can only measure distances on land. Use indirect measurement and similar triangles to find the distance.

a. Devise and explain your plan for finding the distance.

b. Describe the indirect measurements you need to take.

c. Sketch the similar triangles you need.

d. Find the distance.

e. Devise and explain another way to find the distance.

Task 4
When Sarah was 6 months old, she was 21 in. tall and her head had a diameter of 4.5 in. Now, at 20 years old, she is 6 ft 1 in. tall and her head has a diameter of 7.65 in. If Sarah is typical, should a person at 20 years of age be considered “similar” to herself at 6 months of age?

a. Find the ratio of height-to-head diameter for Sarah at 6 months old. If the ratio were the same when she was 20 years old, what diameter would her head have?

b. Find the ratio of height-to-head diameter for Sarah at 20 years old. If the ratio were the same when she was 6 months old, how tall would she be at 6 months?

c. How close are the two ratios you found in Part (a) and Part (b)?

d. If Sarah were taller or shorter either at 6 months of age or 20 years of age, would this make her more or less “similar” at those two ages? Explain.
Chapter 6 Project Teacher Notes: Miami Models

About the Project
Students will investigate proportionality of scale models using a representation of a satellite image of downtown Miami to create model buildings. They may also use actual satellite images found on the Internet. A city other than Miami can be substituted.

Introducing the Project
- Ask students where they have seen scale models of three-dimensional objects (museums, toy stores, etc.).
- Ask students what objects they have seen modeled and how they compare to the buildings they will be modeling.

Activity 1: Height
Discuss how present-day Miami may differ from the map.

Activity 2: Area
Students will use geometric formulas to approximate the area of the footprint, or base, of each building.

Activity 3: Modeling
Students should build their models of these buildings using sturdy materials. With the class, determine a scale that everyone will use to allow their projects to be displayed in your classroom.

Finishing the Project
You may wish to have students display their completed three-dimensional models in your classroom. Students may be interested in making some additional models to make the miniature city look more lively (miniature trees, cars, roads, beach, smaller buildings, etc.). Ask students to share any insights they gained while building their models.
Chapter 6 Project: Miami Models

Beginning the Chapter Project

Miami, Florida, has one of the largest skylines in the world. Through the early 2000s the city has built more skyscrapers than just about anywhere else in the United States. As of 2008, Miami had 56 buildings over 400 ft and another eight buildings projected to be higher than 400 ft when completed.

In your project for this chapter, you will use similarity to find the height and location of individual buildings, and to build a model of one of these buildings, helping your class recreate the Miami skyline.

Activities

Activity 1: Height

The map on page 65 shows 15 of the tallest buildings in Miami.

The table beside the map lists the names of the buildings in the image, and some of their heights and labels.

Use the shadows of the buildings to find the height and the name of each building on the map.

Activity 2: Area

The map shows the aerial view of these downtown buildings. If the footprint of a building is the amount of land it covers, what is the area of each footprint?

Measure carefully and round your answer to the nearest 1000 ft².

Activity 3: Models

- With a partner, choose one of the 15 buildings in the map as the basis for your three-dimensional model.
- Use your answers from Activities 1 and 2 to help you determine the amount of material you will need to build your model.
- Do research to find more images of your building and to check your measurements so that your model will look like the actual building.
- Decide with your partner what you will use to build the model, and then build it according to the scale that your class and your teacher determine will work best.
- Take the time to work with your partner to build the model to scale and decorate it to look like the actual building.
Chapter 6 Project: Miami Models (continued)

<table>
<thead>
<tr>
<th>Name Label</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank of America Tower</td>
<td>625 ft</td>
</tr>
<tr>
<td>Epic</td>
<td>G</td>
</tr>
<tr>
<td>Espirito Santo Plaza</td>
<td>487 ft</td>
</tr>
<tr>
<td>Four Seasons Hotel &amp; Tower</td>
<td>N</td>
</tr>
<tr>
<td>Icon Brickell North Tower</td>
<td>H</td>
</tr>
<tr>
<td>Icon Brickell South Tower</td>
<td>586 ft</td>
</tr>
<tr>
<td>Infinity at Brickell</td>
<td>O</td>
</tr>
<tr>
<td>Jade at Brickell Bay</td>
<td>528 ft</td>
</tr>
<tr>
<td>Miami Center</td>
<td>F</td>
</tr>
<tr>
<td>Mint at Riverfront</td>
<td>631 ft</td>
</tr>
<tr>
<td>Plaza on Brickell Tower I</td>
<td>K</td>
</tr>
<tr>
<td>Plaza on Brickell Tower II</td>
<td>J</td>
</tr>
<tr>
<td>The Ivy</td>
<td>B</td>
</tr>
<tr>
<td>Wachovia Financial Center</td>
<td>764 ft</td>
</tr>
<tr>
<td>Wind</td>
<td>C</td>
</tr>
</tbody>
</table>

Finishing the Project
Write how you found the dimensions you used for this project, and provide a copy of any images (or tell exactly where you found the images) that you used, other than the one on this page.

Reflect and Revise
Measure your model carefully and make sure that it matches the measurements you intended. Make your model as sturdy as possible.

Extending the Project
Find another building in Miami (or somewhere else) that you would like to model. Research its dimensions and its appearance. Build a model using the same scale your class is using for the Miami buildings.
Chapter 6 Project Manager: Miami Models

Getting Started
Read about the project. As you work on it, you will need a calculator, a ruler, and building materials for your model. Keep all of your work for the project together along with this Project Manager.

Checklist
☐ Activity 1: Height
☐ Activity 2: Area
☐ Activity 3: Modeling

Suggestions
☐ Measure and draw carefully.
☐ Estimate area using triangles and rectangles.
☐ Use sturdy building materials.

Scoring Rubric
4 All elements of the project are clearly and accurately presented. Your models are well constructed and your explanations are clear and use geometric language appropriately.
3 Your models and estimations are adequate. Some elements of the project are unclear or inaccurate.
2 Significant portions of the project are unclear or inaccurate.
1 Major elements of the project are incomplete or missing.
0 Project is not handed in or shows no effort.

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

Teacher’s Evaluation of Project
OVERVIEW

<table>
<thead>
<tr>
<th>Looking Back</th>
<th>Mathematics of the Week</th>
<th>Looking Ahead</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Mathematics I students used formulas to find perimeters and areas of plane figures (G.GPE.7). In this chapter they learned to solve problems using trigonometric ratios (G.SRT.7, G.SRT.8).</td>
<td>Students apply trigonometry to solve problems involving angles of depression and elevation. They also use trigonometry to find the areas of regular polygons.</td>
<td>In Mathematics III students will extend their study of trigonometry. They will find the measure of sides and angles in triangles that are not right triangles (G.SRT.10, G.SRT.11).</td>
</tr>
</tbody>
</table>

COMMON CORE MATHEMATICAL CONTENT STANDARDS

A.SSE.1.b Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $P$.

G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

G.MG.1 Use geometric shapes, their measures, and their properties to describe objects.

Common Core Mathematical Practice Standards: 1, 2, 4, 6, 7

TEACHING NOTES

Selected Response

1. Error Analysis: Students identify the angle of depression when given a real-world situation. If a student selects answer choice A, he or she found the tangent ratio, not an angle. If he or she selects answer choice C, he or she identified the complement of the angle of depression instead of the actual angle of depression. Students who selected answer choice D should reread the problem and explain what they are asked to find.

Constructed Response

2. Students use trigonometric ratios to find the height of a triangle. Encourage students to label the opposite and adjacent sides on the diagram. Discuss whether or not their answers make sense in terms of the problem.

Extended Response

3. Students describe two methods for finding the area of a hexagon. Invite a brief class discussion to review how to provide clear explanations. Elicit from the class the importance of using precise mathematical terminology and, if necessary, the value of writing step-by-step instructions. Students will need to find the apothem of the hexagon. Then they should use the formula for area given the perimeter. If students have difficulty seeing the second method of using the area of one equilateral triangle and multiplying it by 6, remind them that they may find a hint by studying the drawing, which shows one equilateral triangle. If students use the first method, make sure they first find the perimeter instead of simply substituting the length of one side in the formula.
Selected Response

1. The diagram shows the relative locations of a forest ranger's lookout tower and a wildfire. What is the angle of depression of the fire?

![Diagram of lookout tower and wildfire with angle of depression labeled as 3°.]

- A \( \frac{1}{19} \approx 0.05 \)
- B 3°
- C 87°
- D 1902 feet

Constructed Response

2. A picnic is 2,500 feet from the base of a waterfall. The angle of elevation from the picnic area to the waterfall is 17°. To the nearest foot, how high is the waterfall?

![Diagram of picnic area and waterfall with angle of elevation labeled as 17° and distance labeled as 2500 feet.]

Extended Response

3. a. Describe two different methods for finding the area of the floor of a stage that is shaped like the regular hexagon ABCDEF.

b. What is the area?
Performance Task: Urban Planning

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.

Students are designing a new town as part of a social studies project on urban planning. They want to place the town’s high school at point $A$ and the middle school at point $B$. They also plan to build roads that run directly from point $A$ to the mall and from point $B$ to the mall. The average cost to build a road in this area is $550,000 per mile.

![Diagram of the town with points A, B, and the mall labeled.]

Task Description

What is the difference in the cost of the roads built to the mall from the two schools?

a. Find the measure of each acute angle of the right triangle shown.

b. Find the length of the hypotenuse. Also find the length of each of the three congruent segments forming the hypotenuse.
c. Draw the road from point $A$ to the mall and find its length.

d. Draw the road from point $B$ to the mall and find its length.

e. How much farther from the mall is point $B$ than point $A$? How much more will it cost to build the longer road?
**Performance Task 2 Scoring Rubric**

**Urban Planning**
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. Downtown angle: (\tan^{-1}\left(\frac{5}{12}\right) = 22.6^\circ). Town Pool angle: (\tan^{-1}\left(\frac{12}{5}\right) = 67.4^\circ).</td>
<td>2</td>
</tr>
<tr>
<td>b. Hypotenuse (h^2 = 5^2 + 12^2 = 25 + 144 = 169), so (h = 13). Length of each of the three congruent segments = (\frac{13}{3}) mi, or about 4.3 mi.</td>
<td>4</td>
</tr>
<tr>
<td>c. Let (a = ) length of the road from point (A) to the mall. Use the Law of Cosines: (a^2 = 5^2 + \left(\frac{13}{3}\right)^2 - 2(5)\left(\frac{13}{3}\right)\cos 67.4^\circ), so (a = 5.2) mi.</td>
<td>4</td>
</tr>
<tr>
<td>d. Let (b = ) length of the road from point (B) to the mall. Use the Law of Cosines: (b^2 = 12^2 + \left(\frac{13}{3}\right)^2 - 2(12)\left(\frac{13}{3}\right)\cos 22.6^\circ), so (b = 8.2) mi.</td>
<td>4</td>
</tr>
<tr>
<td>e. Since (8.2 - 5.2 = 3), point (B) is about 3 miles further from the mall than point (A) is. At $550,000 per mile, the cost to build the longer road is 3($550,000) = $1,650,000 more.</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Points</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>
1. What is the simplified form of \((27x^3)^{2/3}\)?
   - A 3x
   - B 18x^2
   - C 9x^2
   - D 9x

2. A water tank is in the shape of a sphere with a radius of 24 feet. What is the total volume of the tank in terms of \(\pi\)?
   - F \(55,296\pi\) ft^3
   - G \(27,648\pi\) ft^3
   - H \(18,432\pi\) ft^3
   - J \(2304\pi\) ft^3

3. Which of the following arguments shows why \(\sqrt{x}\) may be rewritten in the form \(x^{1/2}\)?
   - A Recall that \(2\sqrt{x} = x^{1}\). Since \(2x^{1/2} = x^{2(1/2)}\) also equals \(x^{1}\), \(\sqrt{x}\) must be equal to \(x^{1/2}\).
   - B Recall that \((\sqrt{x})^2 = x^{1}\). Since \((x^{1/2})^2 = x^{1/2+1/2}\) is also equal to \(x^{1}\), \(\sqrt{x}\) must be equal to \(x^{1/2}\).
   - C Recall that \((\sqrt{x})^2 = x^{1}\). Since \(\frac{x}{2} = x^{1/2}\), the sum \(x^{1/2} + x^{1/2}\) is also equal to \(x^{1}\). Therefore, \(\sqrt{x}\) must be equal to \(x^{1/2}\).
   - D Recall that \(\sqrt{x} + \sqrt{x} = x^{1}\). Since \(x^{1/2} + x^{1/2}\) also equals \(x^{1}\), \(\sqrt{x}\) must be equal to \(x^{1/2}\).

4. Which of the following formulas does not involve the area of a circle?
   - F Surface area of a cylinder
   - G Surface area of a cone
   - H Volume of a pyramid
   - J Volume of a cylinder

5. A cylindrical hot tub has a depth of 3.5 feet and a diameter of 8 feet. One cubic foot is approximately 7.5 gallons. How many gallons are needed to fill the hot tub completely?
   - A 5275 gallons
   - B 1319 gallons
   - C 703 gallons
   - D 176 gallons
6. Which of the following statements is never true?
   F All quadratic trinomials can be written as the product of two binomial factors.
   G Some quadratic trinomials can be written as the product of two binomial factors.
   H Some quadratic trinomials have a greatest common factor.
   J Some quadratic trinomials have binomial factors that are the same.

7. What is the simplified form of \( \frac{(6m^3n^{-4})^2 \cdot 16n^{17}}{9m^{21}} \)?
   A \( \frac{52n}{9m^{12}} \)
   B \( \frac{32n^{15}}{3m^{16}} \)
   C \( \frac{22n^{33}}{m^{12}} \)
   D \( \frac{64n^9}{m^{15}} \)

8. The area of a rectangle is \( 10r^2 - 11r - 6 \). The width is \( 2r - 3 \). What is the length?
   F \( 8r - 3 \)
   G \( 5r + 2 \)
   H \( 5r + 3 \)
   J \( 5r - 2 \)

9. What is the width of the rectangle shown below?

\[
A = 10x^2 - 13x - 3
\]
   A \( x - 3 \)
   B \( 2x - 5 \)
   C \( 2x - 3 \)
   D \( 2x - 1 \)

10. What is the simplified form of \( 5x + 6 - 4x^2 + 3x \)?
    F \( 4x^2 + 8x + 6 \)
    G \( 4x^2 + 2x + 6 \)
    H \( -4x^2 + 8x + 6 \)
    J \( -4x^2 + 2x + 6 \)

11. Add:
    \((7x^2 - 8x^3 + 4) + (9x^3 + 2x^2 + 7)\)
    A \( -x^3 + 9x^2 + 11 \)
    B \( 16x^5 - 6x + 11 \)
    C \( x^3 + 9x^2 + 11 \)
    D \( x^3 + 9x^2 - 3 \)

12. Subtract:
    \((x^2 + 6x - 8) - (-3x^2 + 2x - 9)\)
    F \( 4x^2 + 4x + 1 \)
    G \( -2x^2 + 4x + 1 \)
    H \( 4x^2 + 4x + 17 \)
    J \( 4x^2 + 8x + 17 \)
13. What is the factored form of 
   \(16x^2 - 40xy + 25y^2\)?
   A \((4x + 5y)^2\)
   B \((4x - 5y)^2\)
   C \((4x + 5y)(4x - 5y)\)
   D cannot be factored

14. What is the simplified form of 
   \((-5a^2 + 6a + 2) - (3a^2 - 4a - 5)\)?
   F \(-8a^2 + 10a + 7\)
   G \(-8a^2 + 2a + 7\)
   H \(-2a^2 + 10a + 7\)
   J \(-8a^2 + 10a - 3\)

15. What is the simplified form of 
   \((3b^2 - 8) + (5b + 9) - (b^2 + 6b - 4)\)?
   A \(4b^2 + 11b - 13\)
   B \(4b^2 - b + 5\)
   C \(2b^2 - b + 5\)
   D \(2b^2 + b - 13\)

16. The width of a box is 1 cm less than its length. The height of the box is 9 cm greater than the length. The dimensions can be represented by \(x, x - 1, \) and \(x + 9\). Multiply the dimensions and find the greatest common factor of the terms.
   F \(x^4\)
   G \(x^3\)
   H \(x^2\)
   J \(x\)

17. What is the factored form of 
   \(49x^2 - 20y^2\)?
   A \((7x + 4y)^2\)
   B \((7x - 4y)^2\)
   C \((7x + 4y)(7x - 4y)\)
   D cannot be factored

18. What is the factored form of 
   \(5d^2 + 6d - 8\)?
   F \((5d - 2)(d + 4)\)
   G \((5d + 4)(d + 2)\)
   H \((5d - 4)(d + 2)\)
   J \((5d - 4)(d - 2)\)
19. What is the factored form of $49b^2 - 56b + 16$?
   A $(4b - 7)^2$
   B $(7b - 4)^2$
   C $(7b - 8)(7b - 2)$
   D $(8b - 7)(2b - 7)$

20. The function $b(h)$ models the percent of a certain wildflower that blooms during months in which the average daily sunlight is $h$ hours. Name the most appropriate domain for this function.
   F Integers, $h \leq 24$
   G Integers, $0 \leq h \leq 24$
   H Real numbers, $0 \leq h \leq 24$
   J Whole numbers, $h \leq 24$

21. What is the simplified form of $(c^{-2}d^5)^{0}$?
   A 0
   B 1
   C $c^{-2}d^4$
   D $c^{-2}d^6$

22. What is the missing value in $x^3y^{10} \cdot x^4y^\square = x^7y^2$?
   F -8
   G -5
   H 5
   J 8

23. What is the simplified form of $\frac{12x^2y^{-3}}{9x^{-3}y^5}$?
   A $\frac{4x}{3y^2}$
   B $\frac{4x^3}{3y^8}$
   C $\frac{4x^5}{3y^8}$
   D $\frac{4y^8}{3x^5}$

24. What is the factored form of $x^2 + 3x - 70$?
   F $(x + 7)(x - 10)$
   G $(x + 15)(x - 4)$
   H $(x - 7)(x + 10)$
   J $(x + 7)(x - 4)$

25. Make an equation to represent the area of a square whose sides are given by the expression $x + y$.
   A $A = 2x + 2y + 2xy$
   B $A = x^2 + 2xy + y^2$
   C $A = 2(x^2 + y^2)$
   D $A = x^2 + y^2$
26. Factor $10x^2 + 19x + 6$ by grouping.
   - **F** $(5x + 2)(2x + 3)$
   - **G** $(x + 2)(10x + 3)$
   - **H** $2(x + 1)(5x + 3)$
   - **J** $2(5x + 1)(x + 3)$

27. If the perimeter of a triangle is $10x + 5y$ and two of the sides are $3x + 4y$ and $5x - y$, which is the third side?
   - **A** $2x + 2y$
   - **B** $2x + y$
   - **C** $-2x + 2y$
   - **D** $x + 2y$

28. Which expressions can represent the dimensions of a rectangular prism with a volume of $12y^3 + 62y^2 + 80y$?
   - **F** $2y, 2y + 8, 3y + 5$
   - **G** $2y, 2y + 4, 3y + 10$
   - **H** $y, 2y + 5, 3y + 8$
   - **J** $2y, 2y + 5, 3y + 8$

29. A circle’s area is represented by $A = \pi(x^2 - 22x + 121)$. What expression represents the radius of the circle?
   - **A** $x + 11$
   - **B** $x - 11$
   - **C** $x - 22$
   - **D** $x + 22$

30. Which of the following results in a rational number?
   - **F** the product of two rational numbers
   - **G** the product of a nonzero rational number and an irrational number.
   - **H** the sum of a rational number and an irrational number
   - **J** none of these

31. Find the volume of the sphere to the nearest tenth.
   - **A** $67.0 \text{ cm}^3$
   - **B** $200.9 \text{ cm}^3$
   - **C** $267.9 \text{ cm}^3$
   - **D** $803.8 \text{ cm}^3$
32. The circumference of a cylindrical can is 26 inches and its height is 10 inches. What is the volume rounded to the nearest cubic inch?
   - F 130 in³
   - G 264 in³
   - H 538 in³
   - J 2163 in³

33. What is the volume of the cylinder in terms of π?
   - A $6\pi$ m³
   - B $19\pi$ m³
   - C $28\pi$ m³
   - D $56\pi$ m³

34. A cylinder and cone have the same base area and the same height. If the volume of the cone is 120 cu. ft., what is the volume of the cylinder?
   - F 40 cu. ft.
   - G 60 cu. ft.
   - H 240 cu. ft.
   - J 360 cu. ft

35. A square pyramid has a base that is 12 inches by 12 inches. It is placed in a cubic box for shipping as shown. The box is 4 inches taller than the pyramid. What percent of space is free in the box?
   - A 17%
   - B 50%
   - C 67%
   - D 78%
## Common Core Readiness Assessment 2 Report

<table>
<thead>
<tr>
<th>Common Core State Standards</th>
<th>Test Items</th>
<th>Number Correct</th>
<th>Proficient? Yes or No</th>
<th>Mathematics II Lesson(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number and Quantities</strong></td>
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<tr>
<td>N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $\sqrt[3]{3} = \frac{1}{2}$ to be the cube root of 5 because we want $(\sqrt[3]{5})^3 = 5^\frac{1}{3}$ to hold, so $\sqrt[3]{5}^{1/3}$ must equal 5.</td>
<td>3, 21, 22, 23</td>
<td></td>
<td>10-1, 10-2, 10-3</td>
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<tr>
<td>N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.</td>
<td>1</td>
<td></td>
<td>10-4</td>
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<tr>
<td>N.RN.3 Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.</td>
<td>30</td>
<td></td>
<td>AL10-4</td>
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<tr>
<td><strong>Geometry</strong></td>
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<tr>
<td>G.GMD.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri’s principle, and informal limit arguments.</td>
<td>4, 34, 35</td>
<td></td>
<td>AL9-1, 9-3, AL9-4, 9-4</td>
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<tr>
<td>G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.</td>
<td>2, 5, 31, 32, 33</td>
<td></td>
<td>9-3, 9-4, 9-5</td>
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<tr>
<td><strong>Algebra</strong></td>
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<tr>
<td>A.SSE.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $r$.</td>
<td>8, 9, 28</td>
<td></td>
<td>11-5, 11-6, 11-7, 11-8</td>
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<tr>
<td>A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.</td>
<td>13, 17, 26, 29</td>
<td></td>
<td>11-5, 11-6, 11-7, 11-8</td>
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<td>A.APR.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.</td>
<td>6, 7, 10, 11, 12, 14, 15, 16, 18, 19, 20, 24, 25, 27</td>
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<td>11-1, 11-2, 11-3, 11-4</td>
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**Student Comments:**

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**Parent Comments:**

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**Teacher Comments:**

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