Contents

Notes to the Teacher iv

North Carolina Objectives Correlation, Geometry 1

Pre-Course Diagnostic Test 6
Pre-Course Skills Practice 11

Chapters 1–3
Chapter Standardized Tests 16
Building Test-Taking Skills 22
Practicing Test-Taking Skills 24
Cumulative Practice 25

Chapters 4–6
Chapter Standardized Tests 28
Building Test-Taking Skills 34
Practicing Test-Taking Skills 36
Cumulative Practice 37

Chapters 7–9
Chapter Standardized Tests 40
Building Test-Taking Skills 46
Practicing Test-Taking Skills 48
Cumulative Practice 49

Chapters 10–12
Chapter Standardized Tests 52
Building Test-Taking Skills 58
Practicing Test-Taking Skills 60
Cumulative Practice 61

Post-Course Test 64

Test-Taking Tips for Students 69
Answer Sheets for Practice Tests 71

End-of-Course Practice Test A 73
End-of-Course Practice Test B 85

Answers 97
Notes to the Teacher

Objectives Correlation  Presents the North Carolina objectives for Geometry and lists the items related to each objective that appear in the Pre-Course Diagnostic Test, Post-Course Test, and End-of-Course Practice Tests in this book.

Pre-Course Diagnostic Test  Covers the material from the upcoming textbook. It provides a baseline assessment that can help you plan your course to fit your students’ needs. Correlations of the items to the North Carolina objectives appear in the Answers.

Pre-Course Skills Practice  Includes practice with skills that students should have from previous courses.

Chapter Standardized Tests A and B  Two parallel versions of a standardized test are available for each chapter. Items are in multiple choice, short response, and extended response formats.

Building Test-Taking Skills  Presents worked-out examples of test-taking skills related to multiple choice, short response, context-based multiple choice, and extended response questions.

Practicing Test-Taking Skills  Offers students problems that they can use to practice the skills discussed on the preceding Building Test-Taking Skills pages.

Cumulative Practice  Includes material from several consecutive chapters and can be used to maintain and strengthen skills from earlier chapters.

Post-Course Test  Like the Pre-Course Diagnostic Test, this covers the entire course. Correlations of the items to the North Carolina objectives appear in the Answers.

Test-Taking Tips for Students  A summary of how to prepare for and take standardized tests.

End-of-Course Practice Tests A and B  Two parallel versions of a standardized test that covers all the North Carolina objectives for the course, presented in a format similar to the North Carolina End-of-Course Test.

Diagnostic Scoring Sheets  Answers to the Practice Tests A and B provide a tally column for you to record the number of students who answer an item incorrectly. The related North Carolina objective and associated textbook lesson are listed with each item.

If you wish, these scoring sheets may be given to students for self assessment. Students can use the tally column to note their correct and incorrect answers and see what objectives they need to work on.
## North Carolina Objectives Correlation, Geometry

<table>
<thead>
<tr>
<th>Competency Goal 1: The learner will perform operations with real numbers to solve problems.</th>
<th>Pre-Course Diagnostic Test Item</th>
<th>Post-Course Test Item</th>
<th>Practice Test A &amp; B Item</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.01</strong> Use the trigonometric ratios to model and solve problems involving right triangles.</td>
<td>36</td>
<td>28</td>
<td>52, 53</td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>29</td>
<td>54</td>
</tr>
<tr>
<td><strong>1.02</strong> Use length, area, and volume of geometric figures to solve problems. Include arc length, area of sectors of circles; lateral area, surface area, and volume of three-dimensional figures; and perimeter, area, and volume of composite figures.</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>43</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>47, 48</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>42</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Objectives Correlation, Geometry  continued

<table>
<thead>
<tr>
<th>Competency Goal 1: The learner will perform operations with real numbers to solve problems.</th>
<th>Pre-Course Diagnostic Test Item</th>
<th>Post-Course Test Item</th>
<th>Practice Test A &amp; B Item</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.03</strong> Use length, area, and volume to model and solve problems involving probability.</td>
<td>46</td>
<td>38</td>
<td>65, 66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competency Goal 2: The learner will use geometric and algebraic properties of figures to solve problems and write proofs.</th>
<th>Pre-Course Diagnostic Test Item</th>
<th>Post-Course Test Item</th>
<th>Practice Test A &amp; B Item</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.01</strong> Use logic and deductive reasoning to draw conclusions and solve problems.</td>
<td>1</td>
<td>4</td>
<td>1, 2, 7, 8, 9, 10, 11, 25, 30</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Objectives Correlation, Geometry continued

<table>
<thead>
<tr>
<th>Competency Goal 2: The learner will use geometric and algebraic properties of figures to solve problems and write proofs.</th>
</tr>
</thead>
</table>

2.02 Apply properties, definitions, and theorems of angles and lines to solve problems and write proofs.

<table>
<thead>
<tr>
<th>Pre-Course Diagnostic Test Item</th>
<th>Post-Course Test Item</th>
<th>Practice Test A &amp; B Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>13</td>
<td>7</td>
<td>14, 15</td>
</tr>
<tr>
<td>14</td>
<td>8</td>
<td>16, 17</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Objectives Correlation, Geometry continued**

<table>
<thead>
<tr>
<th>Competency Goal 2: The learner will use geometric and algebraic properties of figures to solve problems and write proofs.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Course Diagnostic Test Item</strong></td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>2.03 Apply properties, definitions, and theorems of two-dimensional figures to solve problems and write proofs:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>a) Triangles.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>b) Quadrilaterals.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>c) Other polygons.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>d) Circles.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2.04 Develop and apply properties of solids to solve problems.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
### Objectives Correlation, Geometry continued

<table>
<thead>
<tr>
<th>Competency Goal 3: The learner will transform geometric figures in the coordinate plane algebraically.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.01</strong> Describe the transformation (translation, reflection, rotation, dilation) of polygons in the coordinate plane in simple algebraic terms.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>40</td>
</tr>
<tr>
<td>42</td>
</tr>
<tr>
<td><strong>3.02</strong> Use matrix operations (addition, subtraction, multiplication, scalar multiplication) to describe the transformation of polygons in the coordinate plane.</td>
</tr>
</tbody>
</table>

*See Appendix 2.*
1. What is the next number in the pattern shown below?
   24, 18, 12, 6 . . .
   A 3   B 0   C –3   D –6

2. B is between A and D, C is between B and D, and D is between C and E. AE = 42,
   BD = 18, and AB = BC = CD. What is DE?
   A 9   B 12   C 15   D 27

3. In the diagram below, what is \( m \angle MNP \)?
   ![Diagram](MNP_diagram.png)
   A 82°   B 87°   C 90°   D 93°

4. A complement of \( \angle X \) measures 37°. What is the measure of a supplement of \( \angle X \)?
   A 143°   B 127°   C 53°   D 37°

5. The perimeter of a square is 48 centimeters. What is the length of each side?
   A 6 cm   B 12 cm   C 18 cm   D 24 cm

6. What is the inverse of the following conditional statement?
   If \( a = 9 \), then \( a^2 = 81 \).
   A If \( a^2 \neq 81 \), then \( a \neq 9 \).
   B If \( a \neq 9 \), then \( a^2 \neq 81 \).
   C If \( a^2 = 81 \), then \( a = 9 \).
   D If \( a^2 = 81 \), then \( a = -9 \).

7. If \( p \rightarrow q \) and \( q \rightarrow r \) are true, what conditional statement may you draw as a true conclusion?
   A \( p \rightarrow r \)   B \( q \rightarrow p \)
   C \( r \rightarrow p \)   D \( r \rightarrow q \)

8. Which property of congruence is represented by the statement below?
   If \( \angle 1 \cong \angle 2 \) and \( \angle 2 \cong \angle 3 \), then \( \angle 1 \cong \angle 3 \).
   A Reflexive Property of Congruence
   B Symmetric Property of Congruence
   C Transitive Property of Congruence
   D Transitive Property of Equality

9. Given that \( \overline{AX} \cong \overline{AY} \) and \( A \) is the midpoint of \( \overline{WY} \) in the figure below, which of the following statements cannot be proved?
   ![Diagram](WY_diagram.png)
   A \( \overline{AX} \cong \overline{AZ} \)
   B \( \triangle AXY \) is isosceles.
   C \( \overline{AW} \cong \overline{AY} \)
   D \( \overline{AW} \cong \overline{AX} \)

10. Which of the following statements is always true about vertical angles?
    A They are congruent.
    B They are complements.
    C They are supplements.
    D They form a linear pair.
Pre-Course Diagnostic Test  continued

In Exercises 11 and 12, use the figure below.

11. Which of the following represent a pair of corresponding angles?
   A) \( \angle 1 \) and \( \angle 8 \)  
   B) \( \angle 1 \) and \( \angle 5 \)  
   C) \( \angle 3 \) and \( \angle 6 \)  
   D) \( \angle 3 \) and \( \angle 5 \)

12. If \( p \parallel q \) and \( m \angle 1 = 130^\circ \), what is \( m \angle 7 \)?
   A) 30°  B) 40°  C) 50°  D) 130°

13. What is the slope of the line that passes through the points \((-7, 3)\) and \((0, 4)\)?
   A) \( \frac{1}{7} \)  B) 1  C) \( -\frac{1}{7} \)  D) -1

14. Lines \( m \) and \( n \) lie in the same plane. The slope of line \( m \) is \( -\frac{5}{3} \) and the slope of line \( n \) is \( \frac{3}{5} \). How are lines \( m \) and \( n \) related?
   A) Lines \( m \) and \( n \) coincide.  
   B) Lines \( m \) and \( n \) intersect but are not perpendicular.  
   C) Lines \( m \) and \( n \) are parallel.  
   D) Lines \( m \) and \( n \) are perpendicular.

15. In \( \triangle DEF \), \( m \angle D = 96^\circ \) and \( m \angle E = 44^\circ \). What is \( m \angle F \)?
   A) 40°  B) 46°  C) 52°  D) 84°

16. You are given that \( \overline{BA} \cong \overline{ED} \) and \( \overline{CB} \cong \overline{FE} \). You want to prove that \( \triangle ABC \cong \triangle DEF \) by using the SSS Congruence Postulate. Which additional piece of information do you need to know is true?
   A) \( \overline{AB} \cong \overline{DE} \)  
   B) \( \overline{AC} \cong \overline{DF} \)  
   C) \( \angle A \cong \angle D \)  
   D) \( \angle C \cong \angle F \)

17. What is the value of \( x \)?
   A) 32  B) 58  C) 60  D) 64

18. One vertex of a square whose sides are 9 units long has a vertex at \((3, -3)\). Which of the points below could be another vertex of the square?
   A) \((3, 3)\)  B) \((-3, 3)\)  C) \((3, 6)\)  D) \((3, -6)\)

19. In the figure below, \( \overline{AD} \) bisects \( \angle BAC \). Which of the following statements is not true?
   A) Point \( D \) is equidistant from \( B \) and \( C \).  
   B) \( m \angle BAD = m \angle CAD \)  
   C) \( DB = DC \)  
   D) \( AB = AD = AC \)
20. $\triangle FGH$ has median $\overline{FJ}$. If $GJ = 7$, what is $HJ$?  
- A 7  
- B 14  
- C 21  
- D 28

21. $\triangle RST$ has vertices with coordinates $R(-3, -4), S(-1, 4)$, and $T(5, -4)$. If midsegment $\overline{MN}$ is parallel to $\overline{RT}$ with $M$ along $\overline{RS}$ and with $N$ along $\overline{ST}$, what are the coordinates of $M$ and $N$?  
- A $M(0, -2); N(0, 2)$  
- B $M(-2, 0); N(2, 0)$  
- C $M(2, 4); N(-3, 4)$  
- D $M(4, 2); N(4, -3)$

22. Two sides of a triangle measure 3 feet and 6 feet. Which of the following could not represent the length of the third side?  
- A 4 ft  
- B 6 ft  
- C 8 ft  
- D 9 ft

23. In the figure below, what is the value of $x$?  
\[ \frac{(4x + 8)}{30} \]  
- A 30  
- B 32  
- C 34  
- D 43

24. If $WXYZ$ is a parallelogram, which of the following statements is never true?  
- A The consecutive angles of $WXYZ$ are complementary.  
- B Pairs of opposite sides are congruent.  
- C Pairs of opposite sides are parallel.  
- D The diagonals of $WXYZ$ bisect each other.

25. In rhombus $PQRS$, $PQ = 3a + 7$ and $QR = 4a - 11$. What is the value of $a$?  
- A 4  
- B 9  
- C 12  
- D 18

26. Parallelogram $DEFG$ has a base of 12 centimeters and a height of 5 centimeters. What is the area of $DEFG$?  
- A 17 cm$^2$  
- B 34 cm$^2$  
- C 60 cm$^2$  
- D 120 cm$^2$

27. In the figure below, $\triangle DEF$ is the image of a reflection of $\triangle ABC$ in line $p$. Which two angles have the same measure?  
- A $\angle A$ and $\angle F$  
- B $\angle C$ and $\angle F$  
- C $\angle C$ and $\angle D$  
- D $\angle A$ and $\angle E$

28. What is the reflection of point $M(3, 2)$ in the x-axis?  
- A $(3, 2)$  
- B $(-3, -2)$  
- C $(-3, 2)$  
- D $(3, -2)$

29. A vector has initial point $R(2, -1)$ and terminal point $S(5, 2)$. What is the component form of the vector?  
- A $\langle 7, 1 \rangle$  
- B $\langle -7, -3 \rangle$  
- C $\langle 3, 3 \rangle$  
- D $\langle -3, -3 \rangle$

30. What are the coordinates of the image of $P(-1, -3)$ under the translation defined by $(x, y) \rightarrow (x + 10, y)$ followed by reflection in the x-axis?  
- A $P'(9, 3)$  
- B $P'(9, -3)$  
- C $P'(-9, -3)$  
- D $P'(-9, 3)$
31. What are the dimensions of a rectangle whose sides are 80% as long as those in a rectangle 15 meters by 20 meters?
   A 1.2 m by 1.6 m    B 18.75 m by 25 m
   C 12 m by 16 m     D 120 m by 160 m
32. What is the geometric mean of 2 and 32?
   A 32    B 17    C 14    D 8
33. In the figure below, \(\triangle MNR\) is similar to \(\triangle MPQ\). What is the value of \(x\)?
   \[\begin{array}{ccc}
   M & N & R \\
   21 & 12 & 15 \\
   \end{array} \]
   A 7.5    B 10    C 21    D 30
34. In the figure below, which of the following is always true?
   \[\begin{array}{ccc}
   U & W & Z \\
   r & s & t \\
   \end{array} \]
   A \(\frac{UW}{WY} = \frac{VX}{XZ}\)
   B \(\frac{UW}{UV} = \frac{WY}{WX}\)
   C \(UW = VX\)
   D \(UV = WX\)
35. A right triangle has legs 5 meters and 12 meters long. What is the length of the hypotenuse?
   A 4 m    B 6 m    C 11 m    D 13 m
36. What is \(\sin A\)?
   \[\begin{array}{cccc}
   A & 20 & 29 & 20 \\
   B & 20 & 21 & 20 \\
   C & 21 & 29 & 20 \\
   D & 29 & 30 & 20 \\
   \end{array} \]
37. \(\triangle PQR\) has a right angle at \(P\). In \(\triangle PQR\), \(QR = 10\) and \(RP = 8.4\). To the nearest whole number of degrees, what is \(m\angle Q\)?
   A 90°   B 57°   C 53°   D 9°
38. To the nearest tenth, what is the magnitude of the vector with initial point \(A(4, 0)\) and terminal point \(B(-3, 6)\)?
   A 14.0   B 9.2   C 7.0   D 6.1
39. In the figure below, \(\overline{NP}\) is a diameter of circle \(R\). What is the measure of \(\angle NM\)?
   \[\begin{array}{ccc}
   N & R & P \\
   73° & \_ & \_ \\
   \end{array} \]
   A 17°    B 73°    C 107°    D 180°
40. In the figure below, what is the value of \(x\)?
   \[\begin{array}{ccc}
   8 & 3 & x \\
   \_ & \_ & \_ \\
   \end{array} \]
   A 12    B 9    C 7    D 6
41. An equation of a circle is 
\((x - 3)^2 + (y + 6)^2 = 36\). What are the coordinates of its center \(Z\)?
- \(\text{A} Z(-6, 6)\)
- \(\text{B} Z(6, -6)\)
- \(\text{C} Z(-3, 6)\)
- \(\text{D} Z(3, -6)\)

42. Which equation describes the set of all points in a coordinate plane 3 units below the \(x\)-axis?
- \(\text{A} y = 3\)
- \(\text{B} y = -3\)
- \(\text{C} x = 3\)
- \(\text{D} x = -3\)

43. To the nearest tenth of a square inch, what is the area of an equilateral triangle with a side length of 6 inches?
- \(\text{A} 31.2 \text{ in.}^2\)
- \(\text{B} 18.0 \text{ in.}^2\)
- \(\text{C} 15.6 \text{ in.}^2\)
- \(\text{D} 12.7 \text{ in.}^2\)

44. To the nearest tenth of a centimeter, what is the circumference of a circle with a diameter of 15 centimeters?
- \(\text{A} 94.2 \text{ cm}\)
- \(\text{B} 71.7 \text{ cm}\)
- \(\text{C} 47.1 \text{ cm}\)
- \(\text{D} 23.6 \text{ cm}\)

45. To the nearest tenth of a square meter, what is the area of a circle with a diameter of 6 meters?
- \(\text{A} 28.3 \text{ m}^2\)
- \(\text{B} 37.7 \text{ m}^2\)
- \(\text{C} 56.5 \text{ m}^2\)
- \(\text{D} 113.0 \text{ m}^2\)

46. What is the probability that a point selected randomly on \(AD\) is on \(CD\)?
- \(\text{A} \frac{2}{7}\)
- \(\text{B} \frac{2}{5}\)
- \(\text{C} \frac{3}{7}\)
- \(\text{D} \frac{3}{5}\)

47. What is the surface area of the right rectangular prism?
- \(\text{A} 256 \text{ cm}^2\)
- \(\text{B} 295 \text{ cm}^2\)
- \(\text{C} 334 \text{ cm}^2\)
- \(\text{D} 512 \text{ cm}^2\)

48. To the nearest square inch, what is the surface area of a right cylinder with a radius of 4 inches and a height of 11 inches?
- \(\text{A} 138 \text{ in.}^2\)
- \(\text{B} 377 \text{ in.}^2\)
- \(\text{C} 553 \text{ in.}^2\)
- \(\text{D} 1520 \text{ in.}^2\)

49. To the nearest cubic meter, what is the volume of a sphere whose radius is 3 meters?
- \(\text{A} 113 \text{ m}^3\)
- \(\text{B} 127 \text{ m}^3\)
- \(\text{C} 254 \text{ m}^3\)
- \(\text{D} 339 \text{ m}^3\)

50. In the figure below, the solids are similar. What is their scale factor?
- \(\text{A} \frac{3}{5}\)
- \(\text{B} \frac{3}{4}\)
- \(\text{C} \frac{2}{3}\)
- \(\text{D} \frac{1}{4}\)
Pre-Course Skills Practice

Problem Solving (Skills Review, pp. 783–784)

Solve, if possible.

1. During the month of June, a store manager recorded the expenses and receipts shown at the right. At the end of the month, what was the net income or loss?

<table>
<thead>
<tr>
<th>Income</th>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>$665.44</td>
<td>$3766.58</td>
</tr>
<tr>
<td>$1378.90</td>
<td>$986.50</td>
</tr>
<tr>
<td>$2254.22</td>
<td>—</td>
</tr>
</tbody>
</table>

2. Booth space at a craft show costs $45. Suppose you plan to sell model ships that cost you $45 each. You plan to sell each one for $85. How many ships must you sell to make at least $1200 in profit?

3. In how many ways can a teacher choose one student from each of the groups shown at the right?

<table>
<thead>
<tr>
<th>Group</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ninth Grade</td>
<td>20</td>
</tr>
<tr>
<td>Tenth Grade</td>
<td>15</td>
</tr>
<tr>
<td>Eleventh Grade</td>
<td>13</td>
</tr>
</tbody>
</table>

4. A map distance of 1.25 inches represents 225 actual miles. What distance is represented by a 2 inch map distance?

5. Roger spent $100 on CDs and tapes. Used CDs cost $8 each, and tapes cost $6 each. How many CDs and how many tapes did he buy?

6. How many different three-digit numbers can be made using 1, 2, and 3?

7. Margaret can pour 125 cubic feet of water per minute to fill a pool. How long will it take her to fill a pool that is 20 feet wide and 75 feet long?

Numeric and Algebraic Expressions (Skills Review, pp. 785–787)

Add, subtract, multiply, or divide.

8. \((-2)(7)(6)\)
9. \(-14.3 + (-3.5)\)
10. \(-61 - 14\)
11. \(21 - 63\)
12. \((-4)(-3)(-1)\)
13. \(0 - (-7.23)\)
14. \(-36 ÷ (-6)\)
15. \(-(3 \cdot 12)\)
16. \(-8\left(-\frac{1}{8}\right)\)
17. \(-\frac{5}{6} + \left(-\frac{1}{6}\right)\)
18. \(-\frac{78}{13}\)
19. \(\frac{54}{-8}\)

Evaluate the expression.

20. \((3 - 5)^2 - 14 ÷ 2\)
21. \(\frac{2 - 5 \cdot 3}{-13 + 10}\)
22. \(75 - 5^2 + (-7)^2\)
23. \(3.6 ÷ (0.3 \cdot 1.2)\)
24. \(-9 + 3^3 - 2\)
25. \(-2 \cdot 6 - 4 ÷ 4\)
26. \(\frac{3 - 8}{2 - 5 \cdot 3}\)
27. \(5(8 - 3)^2\)
28. \(\frac{3}{8} \cdot 32 - 2^2 + 1\)
29. \(2.3(5.1 + 0.9)\)
30. \((-4)^2 + 3^2\)
31. \([3 - (-6 - 1)^2] ÷ 2\)
Pre-Course Skills Practice continued

Evaluate the expression when \( x = 6 \) and \( y = -5 \).

32. \( \frac{1}{3}y^2 \)  
33. \( 5y - \frac{18}{x} \)  
34. \( (x + 2)(3 + y) \)  
35. \( x^2 - y + 9 \)

36. \( 2(-y - x) \)  
37. \( \frac{xy}{3} \)  
38. \( y(y + 8) \)  
39. \( 12 - \frac{20}{y} \)

Evaluate the expression when \( x = -3 \) and \( y = 2 \).

40. \( 3xy \)  
41. \( x \div (7 - 4) \)  
42. \( (x^2)(y^2) \)  
43. \( \frac{x + 4}{2y} \)

44. \( (x + y)(x - y) \)  
45. \( \frac{7-x}{y} \)  
46. \( -2x^2 \)  
47. \( \frac{y + 3}{y - 3} \)

Use the distributive property to rewrite the expression without parentheses.

48. \( 2x(4x - 11y) \)  
49. \( -\frac{2}{3}(6a + 15) \)  
50. \( 5r(s + t) \)  
51. \( (-d)(-2d - 7e + 4) \)

52. \( -\frac{3}{4}r(2r + 6s - 4) \)  
53. \( (3 + c)(-d) \)  
54. \( 4p(-2p + 7q) \)  
55. \( (-6 + 2e)(e) \)

Simplify the expression.

56. \( r^2 + r(3s - 18) \)  
57. \( 2.7 - 0.5a + 4.1a \)  
58. \( -2 + (7r - 11) \)

59. \( 9a - 6 - 9a + 4.5 \)  
60. \( 7xy - 3x + 2y - 4xy \)  
61. \( 5 - (3j - 9) \)

62. \( 5(6a - 12) - 3 \)  
63. \( n(n - 7) + 2(n + 5) \)

Reciprocals and Ratios (Skills Review, p. 788)

Find the reciprocal of the number.

64. \( 0.61 \)  
65. \( -\frac{2}{11} \)  
66. \( 120 \)  
67. \( -0.3 \)

68. \( -0.25 \)  
69. \( -242 \)  
70. \( -\frac{5}{6} \)  
71. \( 14 \)

Simplify the ratio.

72. \( \frac{3 \text{ inches}}{2 \text{ feet}} \)  
73. \( \frac{50 \text{ cm}}{6 \text{ m}} \)  
74. \( \frac{4 \text{ ounces}}{1 \text{ pound}} \)  
75. \( \frac{4 \text{ kg}}{600 \text{ g}} \)

76. \( \frac{750 \text{ mL}}{2 \text{ L}} \)  
77. \( \frac{6 \text{ yards}}{12 \text{ feet}} \)  
78. \( \frac{6 \text{ quarts}}{2 \text{ gallons}} \)  
79. \( \frac{4 \text{ mi}}{2400 \text{ ft}} \)

Find the ratio of part-time employees to full-time employees, given the number of part-time employees and the total number of employees.

80. 11 part-time employees, 30 employees  
81. 28 part-time employees, 34 employees  
82. 6 part-time employees, 16 employees  
83. 14 part-time employees, 21 employees
Pre-Course Skills Practice  continued

Solving Equations and Inequalities  (Skills Review, pp. 790–791)

Solve the equation.
84. 49 = 7n  85. 3.11a = 31.1  86. 0.3s = 9  87. 12 = −20 + h
88. 11 + a = 8  89. 3d = −12  90. e − 11 = 42  91. 12 = −\frac{1}{3}x

Solve the equation.
92. 4 \cdot 0.75 \cdot g = 42  93. 16 = 6s − 9 − s  94. \frac{1}{4}(61 − 3j) = 25
95. 14k + (−11 + 2k) = 21  96. \frac{-14 + y}{2} = 5  97. 4(6n + 2) − 7n = 3(3n − 8)

Solve the inequality.
98. a < 12 + 24  99. h < −14 + 4  100. −2 + y > 31  101. k − 7k > 2k + 9
102. 2r − 5 > 4r − 2  103. s + 11.2 < 25.6  104. 4 + x > 11  105. 9p + 6 < 3p

Check whether the given number is a solution of the inequality.
106. 5t + 2 < 3t; 1  107. 4(x + 3) > 20; 2  108. 7 + m > 0; 5  109. 3p − 7 < p; 3
110. Name three solutions of (3a − 4) + (a − 2) > a + 11. Is a = 5 a solution? Explain.
111. Name three solutions of 41 + 8x < x − 15. Is x = −9.5 a solution? Explain.

Linear Equations  (Skills Review, pp. 792–796)

Give the coordinates of each of the following points.
120. J  121. K  122. M  123. N

Plot each point in a coordinate plane.
124. A(−2, 1)  125. B(2, −2)  126. C(0, −4)
127. D(2, 5)  128. E\left(\frac{1}{2}, 0\right)  129. F(−2, −1)
130. G(−5, −3)  131. H\left(4, −\frac{3}{2}\right)  132. J(−4, 5)
133. K(−5, 2)  134. M(3, 2)  135. N(1, 3)
Pre-Course Skills Practice  continued

Use a table of values to graph the equation.

136. \( y = 2x - 1 \) \hspace{1cm} 137. \( y = 0.5(x + 6) \) \hspace{1cm} 138. \( y = 5.5 + 1.5x \) \hspace{1cm} 139. \( 3x + y = -2 \)

Use the \( x \)-intercept and the \( y \)-intercept to graph the equation.

140. \( 2x + y = -4 \) \hspace{1cm} 141. \( y = -3x + 3 \) \hspace{1cm} 142. \( x - y = 2.75 \) \hspace{1cm} 143. \( 2y + 6x = 8 \)

Use the slope and the \( y \)-intercept to graph the equation.

144. \( y = -0.5x + 3 \) \hspace{1cm} 145. \( 2x = 4 - y \) \hspace{1cm} 146. \( 3y = -2x - 6 \)

147. Graph the equation \( y = -1 \). Explain why the graph has zero slope and no \( x \)-intercept.

Write an equation in slope-intercept form of the line that passes through the given point and has the given slope.

148. \((2, -7), m = 1\) \hspace{1cm} 149. \((-8, 8), m = 3\) \hspace{1cm} 150. \((-6, -5), m = -2\)

151. \((0, 3), m = 5\) \hspace{1cm} 152. \((-3, 1), m = \frac{2}{3}\) \hspace{1cm} 153. \(\left(\frac{1}{2}, -\frac{3}{2}\right), m = 6\)

154. \((-1, 0), m = -7\) \hspace{1cm} 155. \((14, -2), m = \frac{1}{2}\)

Write an equation in slope-intercept form of the line that passes through the given points.

156. \((2, -1), (1, 3)\) \hspace{1cm} 157. \((-1, -5), (6, 2)\) \hspace{1cm} 158. \((0, 2), (-5, 1)\)

159. \((6, -11), (4, 1)\) \hspace{1cm} 160. \((1, -2), (-1, 2)\) \hspace{1cm} 161. \((3, 0), (2, 9)\)

162. \((0, -7), (-8, 0)\) \hspace{1cm} 163. \((14, -20), (-6, -40)\)

Use substitution to solve the system of linear equations.

164. \(2x - 3y = 13\) \hspace{1cm} 165. \(3x + 2y = 20\) \hspace{1cm} 166. \(2x - y = 8\)

\[ y = x - 6 \]
\[ 6x - y = 5 \]
\[ 5x - 3y = -16 \]
\[ -4x - 2y = -16 \]

Use linear combinations to solve the system of linear equations.

168. \(2x - 3y = -7\) \hspace{1cm} 169. \(x + 2y = 11\) \hspace{1cm} 170. \(3x - y = 8\)

\[ 3x + 3y = 12 \]
\[ -2x + 5y = 5 \]
\[ -7x + 4y = -2 \]
\[ 4x + 3y = 29 \]

Properties of Exponents  \(\text{(Skills Review, p. 797)}\)

Simplify the expression. The simplified expression should have no negative exponents.

172. \(a^6 \cdot a^2\) \hspace{1cm} 173. \((4 \cdot y^2)^3\) \hspace{1cm} 174. \((k^3)^7\) \hspace{1cm} 175. \((x^{-5})^2\)

176. \(\frac{8^8}{s^3}\) \hspace{1cm} 177. \((ab)^0\) \hspace{1cm} 178. \(\frac{1}{g^{11}}\) \hspace{1cm} 179. \(\left(\frac{x^3}{x^7}\right)^5\)
Name ________________________________ Date ________________

**Pre-Course Skills Practice continued**

**Multiplying and Squaring Binomials** *(Skills Review, p. 798)*

Simplify.

180. \((n + 3)(n - 3)\) 181. \((5g + 2)(g - 7)\) 182. \((1 - 2c)(c + 4)\) 183. \((f - 0.3)(2f - 19)\)

184. \((4r + 1)(r + 4)\) 185. \((h - 3)(h - 13)\) 186. \((m + 7)(4m - 5)\) 187. \((12 - 5p)(2p + 9)\)

Find the product by squaring the binomial.

188. \((\frac{m}{10})^2\) 189. \((\frac{x}{11})^2\) 190. \((r + 0.5)^2\) 191. \((9 - e)^2\)

192. \((\frac{y - 5.5}{2})^2\) 193. \((n - 2)^2\) 194. \((q - 3)^2\) 195. \((f - 21)^2\)

**Solving Quadratic Equations** *(Skills Review, pp. 799–801)*

Find all square roots of the number or write *no square roots*. Check the results by squaring each root.

196. \(\frac{1}{25}\) 197. \(-49\) 198. \(256\) 199. \(0.16\)

Simplify the expression. Give the exact value in simplified form.

200. \(\sqrt{17 - 4}\) 201. \(\sqrt{4 + 4}\) 202. \(\sqrt{(-3)^2 + 8^2}\) 203. \(\sqrt{16 + 4}\)

204. \(\sqrt{4} \cdot \sqrt{7}\) 205. \(\frac{5}{\sqrt{25}}\) 206. \(\frac{\sqrt{23}}{\sqrt{9}}\) 207. \(\frac{3}{\sqrt{2}}\)

208. \(\sqrt{0}\) 209. \(\sqrt{(64)(4)}\) 210. \(-2\sqrt{36}\) 211. \(\sqrt{169} \cdot \sqrt{10}\)

Solve the equation or write *no solution*. Round solutions to the nearest hundredth.

212. \(9 - 2x^2 = 17\) 213. \(\frac{1}{3}k^2 + 11 = 23\) 214. \(r^2 = 289\) 215. \(2m^2 + 3 = 3\)

216. \(23p^2 = 23\) 217. \(a^2 + 7a = -10\) 218. \(s^2 - 7 = 20\) 219. \(y^2 + 17 = 1\)

Use the quadratic formula to solve each equation. Round solutions to the nearest hundredth.

220. \(h^2 + 16 = 9h\) 221. \(m^2 - 5 = 4m\) 222. \(3c^2 - c - 2 = 0\) 223. \(5h^2 = 1 + 5h\)

**Solving Formulas** *(Skills Review, p. 802)*

Solve the formula for the indicated variable.

224. Perimeter of a parallelogram:

\[ P = 2(a + b) \text{. Solve for } b. \]

225. Area of a rectangle:

\[ A = \ell w \text{. Solve for } \ell. \]

226. Area of a regular polygon:

\[ A = \frac{1}{2}aP \text{. Solve for } a. \]

227. Volume of a pyramid:

\[ V = \frac{1}{3}Bh \text{. Solve for } B. \]
1. What is the next number in the sequence?  
-75, -71, -63, -47, . . .
- **A** -15  
- **B** -29  
- **C** -33  
- **D** -39

2. X is between W and V, Z is between W and X, and Y is between X and V. Also WZ = 9, ZV = 25, and WZ = XY = YV. What is the length of ZX?
- **A** 6  
- **B** 7  
- **C** 9  
- **D** 14

3. If \( \overrightarrow{BD} \) bisects \( \angle ABC \), what is the measure of \( \angle ABC \)?
- **A** 85°  
- **B** 87°  
- **C** 90°  
- **D** 94°

4. If \( \angle 1 \) and \( \angle 2 \) are supplementary and \( m\angle 2 = 75^\circ \), what is \( m\angle 1 \)?
- **A** 15°  
- **B** 45°  
- **C** 75°  
- **D** 105°

5. The midpoint of \( \overline{XY} \) is \( M(2, -7) \). One endpoint is \( Y(-6, -11) \). What are the coordinates of \( X \)?
- **A** (-4, -18)  
- **B** (10, -3)  
- **C** (14, -24)  
- **D** (12, -77)

6. Which of the following statements is false?
- **A** A, B, and C are collinear.  
- **B** E, B, and F are collinear.  
- **C** B, C, and D are coplanar.  
- **D** E, B, D, and C are coplanar.

**Short Response**
7. Two angles are complementary. One of the two angles has a measure that is \( \frac{1}{2} \) the measure of the other angle. What is the measure of the smaller angle?

**Extended Response**
8. The diagram below shows two pulleys firmly linked by a belt. The larger pulley has radius 27 centimeters and the smaller one has radius 9 centimeters. For each full turn of the larger pulley, how many times does the smaller pulley turn? Explain your answer.
Chapter Standardized Test 1B

1. What is the next number in the sequence? 
   \(-11, -17, -15, -21, \ldots\)
   \(\text{A} -11\)
   \(\text{B} -13\)
   \(\text{C} -19\)
   \(\text{D} -23\)

2. \(R\) is between \(Q\) and \(U\), \(T\) is between \(Q\) and \(R\), and \(S\) is between \(R\) and \(U\). Also \(QU = 37, RU = 12,\) and \(TR = RS = SU\). What is the length of \(QT\) ?
   \(\text{A} 6\)
   \(\text{B} 13\)
   \(\text{C} 18\)
   \(\text{D} 19\)

3. If \(\overline{ZW}\) bisects \(\angle XYZ\), what is the measure of \(\angle XYZ\)?

4. If \(\angle 3\) and \(\angle 4\) are complementary and \(m\angle 3 = 41^\circ\), what is \(m\angle 4\)?
   \(\text{A} 41^\circ\)
   \(\text{B} 49^\circ\)
   \(\text{C} 82^\circ\)
   \(\text{D} 139^\circ\)

5. The midpoint of \(\overline{RS}\) is \(M(13, -13)\). One endpoint is \(R(-4, 9)\). What are the coordinates of \(S\)?
   \(\text{A} (30, -35)\)
   \(\text{B} (17, -22)\)
   \(\text{C} (-22, 26)\)
   \(\text{D} (4, -9)\)

6. Which of the following statements is true?
   \(\text{A} \ X, \ Y, \text{ and } \ Z \text{ are collinear.}\)
   \(\text{B} \ W, \ X, \ Y, \text{ and } \ Z \text{ are coplanar.}\)
   \(\text{C} \ U, \ X, \text{ and } \ Y \text{ are collinear.}\)
   \(\text{D} \ U, \ X, \ Y, \text{ and } \ Z \text{ are coplanar.}\)

Short Response

7. Two angles are supplementary. One of the two angles has a measure that is 2 times the measure of the other angle. What is the measure of the smaller angle?

Extended Response

8. Imagine that you are caring for a large lawn. It takes you one hour to mow an area that is roughly circular with a radius of 30 meters. Now, you want to expand the area you mow to a radius of 40 meters. Explain how you would estimate the time it will take you to mow the larger area. What is your estimate?
Chapter Standardized Test 2A

1. Two angles \( \angle ABC \) and \( \angle ABD \) form a linear pair. If \( m\angle ABC = 121^\circ \), what is \( m\angle ABD \)?
   \[ \begin{align*}
   \text{A} & \quad 31^\circ \\
   \text{B} & \quad 59^\circ \\
   \text{C} & \quad 121^\circ \\
   \text{D} & \quad 239^\circ
   \end{align*} \]

2. In the diagram, \( \overline{QR} \cong \overline{ST} \). What is the length of \( \overline{QS} \)?
   \[ \overline{Q} \quad 5a - 6 \quad R \quad 4a - 1 \quad S \quad a + 2 \quad T \]
   \[ \begin{align*}
   \text{A} & \quad 3 \\
   \text{B} & \quad 11 \\
   \text{C} & \quad 15 \\
   \text{D} & \quad 20
   \end{align*} \]

3. What is the converse of “If the team won on Friday, then the team qualified for the tournament”?
   \[ \begin{align*}
   \text{A} & \quad \text{If the team qualified for the tournament, then the team won on Friday.} \\
   \text{B} & \quad \text{If the team did not win on Friday, then the team did not qualify for the tournament.} \\
   \text{C} & \quad \text{If the team won on Friday, then the team did not qualify for the tournament.} \\
   \text{D} & \quad \text{If the team did not qualify for the tournament, then the team did not win on Friday.}
   \end{align*} \]

4. In the diagram below, which of the following must be true?
   \[ \begin{align*}
   \text{A} & \quad m\angle 1 - m\angle 2 = 0 \\
   \text{B} & \quad \angle 2 \text{ and } \angle 4 \text{ are complementary.} \\
   \text{C} & \quad \angle 3 \text{ and } \angle 4 \text{ are supplementary.} \\
   \text{D} & \quad \angle 3 \equiv \angle 4
   \end{align*} \]

5. In \( ABCD \), \( AB \parallel DC \) and \( AD \parallel BC \). What is the value of \( x \)?
   \[ \begin{align*}
   \text{A} & \quad 2 \\
   \text{B} & \quad 4 \\
   \text{C} & \quad 12 \\
   \text{D} & \quad 17
   \end{align*} \]

Short Response

6. Sketch a pair of vertical angles that are also complementary. What is the measure of the acute angles?

Extended Response

7. Write a true conditional statement that has a false converse. Supply a counterexample that shows the converse is false.
Chapter Standardized Test 2B

1. Two angles \( \angle XYZ \) and \( \angle XYW \) form a linear pair. If \( m\angle XYZ = 45^\circ \), what is \( m\angle XYW \)?
   \[ \begin{align*}
   \text{A} & : 45^\circ \\
   \text{B} & : 90^\circ \\
   \text{C} & : 135^\circ \\
   \text{D} & : 315^\circ \\
   \end{align*} \]

2. In the diagram, \( \overline{WX} \cong \overline{YZ} \). What is the length of \( \overline{WZ} \)?
   \[ 2x - 1 \quad 3x - 2 \quad 4x - 11 \]
   \[ W \quad X \quad Y \quad Z \]
   \[ \text{A} : 2 \\
   \text{B} : 5 \\
   \text{C} : 15 \\
   \text{D} : 31 \]

3. What is the contrapositive of “If there is more than ten inches of snow, then school is cancelled”?
   \[ \begin{align*}
   \text{A} & : \text{If there is not more than ten inches of snow, then school is cancelled.} \\
   \text{B} & : \text{If school is not cancelled, then there is not more than ten inches of snow.} \\
   \text{C} & : \text{If school is cancelled, then there is more than ten inches of snow.} \\
   \text{D} & : \text{If there is not more than ten inches of snow, then school is not cancelled.} \\
   \end{align*} \]

4. In the diagram below, which of the following cannot be true?
   \[ \begin{align*}
   \text{A} & : \angle 1 \text{ and } \angle 2 \text{ are complementary.} \\
   \text{B} & : \angle 3 \text{ and } \angle 4 \text{ are supplementary.} \\
   \text{C} & : m\angle 1 - m\angle 2 = 0 \\
   \text{D} & : \angle 2 \cong \angle 4 \\
   \end{align*} \]

5. In \( \overline{WXYZ} \), \( \overline{WX} \parallel \overline{ZY} \) and \( \overline{XY} \parallel \overline{WZ} \). What is the value of \( a \)?
   \[ W \quad X \quad Y \quad Z \]
   \[ 5a - 13 \quad a + 3 \\
   Z \quad \quad \quad \quad Y \]
   \[ \text{A} : 6 \\
   \text{B} : 7 \\
   \text{C} : 14 \\
   \text{D} : 22 \]

Short Response

6. Sketch an intersection of two lines forming a linear pair of angles that are also congruent. What is the measure of each of these congruent angles?

Extended Response

7. Write a true biconditional statement. Then write the equivalent of this statement as a conditional statement and its converse.
Chapter Standardized Test 3A

1. In the diagram, which two angles are alternate exterior angles?

\[ \triangle 1 \text{ and } \triangle 5 \]
\[ \triangle 2 \text{ and } \triangle 7 \]
\[ \triangle 2 \text{ and } \triangle 8 \]
\[ \triangle 3 \text{ and } \triangle 8 \]

2. Which equation represents the line that has a slope of 5 and passes through \((-3, -2)\)?

\[ A \ y = 5x + 13 \]
\[ B \ y = 5x - 13 \]
\[ C \ y = -5x + 13 \]
\[ D \ y = -5x - 13 \]

3. Which of the following equations represents a line parallel to \(4x + y = 7\)?

\[ A \ x + y = \frac{7}{4} \]
\[ B \ x + 4y = 7 \]
\[ C \ y = -4x + 3 \]
\[ D \ y = 4x - 3 \]

4. In the diagram, how many lines can be drawn through points \(A\) and \(B\) parallel to line \(k\)?

\[ A \ 0 \]
\[ B \ 1 \]
\[ C \ 2 \]
\[ D \ 3 \]

5. Line \(r\) has the equation \(-2x + y = 11\).
   Line \(s\) has the equation \(y = -\frac{1}{2}x + 11\).
   How are lines \(r\) and \(s\) related?
   \[ A \text{ The lines are skew.} \]
   \[ B \text{ The lines are perpendicular.} \]
   \[ C \text{ The lines are parallel.} \]
   \[ D \text{ The lines are not related.} \]

6. In the diagram, \(m \parallel n\). What is the value of \(x\)?

\[ A \ 3 \]
\[ B \ 6 \]
\[ C \ 28 \]
\[ D \ 54 \]

Short Response

7. Two parallel lines are intersected by a transversal. One of the exterior angles measures 137°. What is the measure of the adjacent interior angle?

Extended Response

8. The relationship between temperature in degrees Fahrenheit and temperature in degrees Celsius is a linear function. Use the values in the table below to write an equation for this function. At 0°F what is the temperature in degrees Celsius to the nearest degree?

<table>
<thead>
<tr>
<th>Degrees Fahrenheit (°F)</th>
<th>32</th>
<th>212</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees Celsius (°C)</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>
Chapter Standardized Test 3B

1. In the diagram, which two angles are alternate interior angles?

![Diagram of parallel lines with angles labeled]

(A) \( \angle 1 \) and \( \angle 3 \)
(B) \( \angle 2 \) and \( \angle 8 \)
(C) \( \angle 4 \) and \( \angle 7 \)
(D) \( \angle 5 \) and \( \angle 8 \)

2. Which equation represents a line that has a slope of \(-2\) and passes through \((-1, 4)\)?

(A) \( y = 2x - 2 \)
(B) \( y = 2x + 2 \)
(C) \( y = -2x - 2 \)
(D) \( y = -2x + 2 \)

3. Which of the following equations represents a line parallel to \( y = 2x - 3 \)?

(A) \( -2x + y = 8 \)
(B) \( 2x + y = 8 \)
(C) \( 3y = -2x + 8 \)
(D) \( y = -\frac{1}{2}x + 4 \)

4. In the diagram, how many lines can be drawn through point \( R \) perpendicular to line \( s \)?

![Diagram of a line with a point and a line]

(A) 0
(B) 1
(C) 2
(D) 3

5. Line \( m \) has the equation \( 7x + y = -3 \).
Line \( n \) has the equation \( y = -7x + 3 \).
How are lines \( m \) and \( n \) related?

(A) The lines are skew.
(B) The lines are perpendicular.
(C) The lines are parallel.
(D) The lines are not related.

6. In the diagram, \( k \parallel j \). What is the value of \( a \)?

![Diagram of two parallel lines with angles labeled]

(A) 12
(B) 16
(C) 35
(D) 73

Short Response

7. Two parallel lines are intersected by a transversal. One of the interior angles measures \(66^\circ\). What is the measure of one of the obtuse angles formed by the three lines?

Extended Response

8. At a certain point \( P \) where a straight roadway begins, the elevation above sea level is 1200 feet. The elevation 16,000 feet farther along the road is 2000 feet. Assume that the road surface is modeled by a straight line. Write a linear equation in two variables for elevation in terms of horizontal distance from point \( P \). How high above sea level is the road surface 2 miles horizontally from point \( P \)?

(1 \text{ mi} = 5280 \text{ ft})
Building Test-Taking Skills
For use after Chapters 1–3

Strategies for Answering Multiple Choice Questions

The strategies below can help you answer a multiple choice question. You can also use these strategies to check whether your answer to a multiple choice question is reasonable.

Strategy: Estimate the Answer

Problem 1
The table shows how many pennies you save each day. If the pattern continues, what is the first day you will save more than ten dollars worth of pennies?

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennies</td>
<td>$2^1 = 2$</td>
<td>$2^2 = 4$</td>
<td>$2^3 = 8$</td>
</tr>
</tbody>
</table>

A. Day 8
B. Day 9
C. Day 10 Estimate: $2^8$ is a little more than 250, so $2^9 > 500$ and $2^{10} > 1000$. The correct answer is C.
D. Day 11

Strategy: Use Visual Clues

Problem 2
How many feet of fencing do you need to enclose the square garden shown?

The garden's area is 900 square feet. Use the Guess, Check, and Revise strategy to find the length of one side of the garden. Each side of the garden is 30 feet long.

A. 30 ft
B. 60 ft
C. 90 ft
D. 120 ft

Multiply the side length by 4 to find the total amount of fencing needed. To enclose the garden, you need 120 feet of fencing. The correct answer is D.
Building Test-Taking Skills  continued
For use after Chapters 1–3

Strategy: Use Number Sense

Problem 3

When multiplying a positive integer by a negative integer, the product is _____.

A. greater than the positive integer  
B. greater than the negative integer  
C. less than or equal to the negative integer  
D. less than the negative integer

Eliminating Unreasonable Choices  The strategies used to find the correct answers for Problems 1–3 are the same strategies you can use to eliminate answer choices that are unreasonable or obviously incorrect.

Problem 4

The average body temperature of a polar bear is 37°C. Use the formula \( F = 1.8C + 32 \) to find the temperature in degrees Fahrenheit.

A. 34°F  
B. 69°F  
C. 74.95°F  
D. 98.6°F

Explain why the selected answer choice is unreasonable.

1. Two times a number plus 7 is –21. What is the number?
   A. –14  B. –7  X C. 7  D. 14

2. Your school earns $1.50 for every T-shirt sold. Find the minimum number of T-shirts you must sell in order to raise $500.
   A. 333  B. 334  C. 500  X D. 750

Watch Out!  Some answers that appear correct at first glance may be incorrect. Be aware of common errors.
Practicing Test-Taking Skills
For use after Chapters 1–3

Multiple Choice

1. Which represents the length of $AB$?

- [ ] A $7x$
- [ ] B $8x$
- [ ] C $13x$
- [ ] D $16x$

2. Given only the markings on the figure, which may you not conclude?

- [ ] A $m \angle 1 = m \angle 3$
- [ ] B $m \angle 1 + m \angle 2 = 180^\circ$
- [ ] C $\angle 1$ and $\angle 4$ are supplementary.
- [ ] D $m \angle 1 + m \angle 3 = 90^\circ$

3. Angles 1 and 2 are complementary. The measure of angle 1 is four times the measure of angle 2. Which statement is true?

- [ ] A $m \angle 1 = 40^\circ$
- [ ] B Angles 1 and 2 are both right angles.
- [ ] C $m \angle 1 + 4(m \angle 2) = 90^\circ$
- [ ] D $m \angle 1 = 72^\circ$

4. Which expression represents the area outside the circle but inside the rectangle?

- [ ] A $4 \cdot 10 + 2^2 \pi$
- [ ] B $4 \cdot 10 - 22 \pi$
- [ ] C $4 \cdot 10 - \pi$
- [ ] D $4 \cdot 10 + \pi$

5. In the figure below, $Q$ is the midpoint of $PR$. What is $PS$?

- [ ] A 4
- [ ] B 17
- [ ] C 34
- [ ] D 38

6. In this figure, $CD$ and $EF$ are parallel and $m \angle 1 = m \angle 2 = 144^\circ$. What is $m \angle 3$?

- [ ] A 54°
- [ ] B 72°
- [ ] C 108°
- [ ] D 118°

7. The perimeter of rectangle $PQRS$ is 96 inches. What is the perimeter, in inches, of a rectangle whose length and width are one half the length and width of rectangle $PQRS$?

- [ ] A 24
- [ ] B 48
- [ ] C 96
- [ ] D 192

8. The statement below is true. Which of the statements below it is also true?

If $A$, $B$, and $C$ are collinear with $B$ between $A$ and $C$, then $AC - BC = AB$.

- [ ] A $AC - AB = BC$
- [ ] B $AB - BC = AC$
- [ ] C $AB + AC = BC$
- [ ] D $AC = 2(AB)$

9. The sides of square A are twice as long as the sides of square B. Which represents the total area of A and B?

- [ ] A $\frac{1}{2} s^2$
- [ ] B $3s^2$
- [ ] C $4s^2$
- [ ] D $5s^2$
Cumulative Practice
For use after Chapters 1–3

Chapter 1
Multiple Choice In Exercises 1–6, choose the letter of the correct answer.

1. Suppose your house has coordinates \( A(900, 1120) \) and your school has coordinates \( B(-700, -80) \). If you could walk a straight line between your house and your school, which of the following is the distance you would walk? \((Lesson 1.3)\)
   \(\text{A} \) 200 units  \(\text{B} \) 1200 units  \(\text{C} \) 1600 units  \(\text{D} \) 2000 units

2. Which of the following statements is not true? \((Lesson 1.2)\)
   \(\text{A} \) Point \( B \) lies on line \( m \).
   \(\text{B} \) Points \( A, B, C, \) and \( D \) are collinear.
   \(\text{C} \) Points \( B, C, \) and \( D \) are coplanar.
   \(\text{D} \) \( BD \) intersects \( BC \).

3. If \( 0^\circ < m\angle A < 90^\circ \), which of the following is true? \((Lesson 1.4)\)
   \(\text{A} \) The angle is a right angle.
   \(\text{B} \) The angle is straight.
   \(\text{C} \) The angle is acute.
   \(\text{D} \) The angle is obtuse.

4. What are the coordinates of the midpoint of a segment with endpoints \((-21, 38)\) and \((7, -8)\)? \((Lesson 1.5)\)
   \(\text{A} \) \((-7, 15)\)  \(\text{B} \) \((14, 30)\)  \(\text{C} \) \((7, 15)\)  \(\text{D} \) \((17, 1)\)

5. The ray \( FH \) bisects \( \angle EFG \). What is the value of \( x \)? \((Lesson 1.5)\)

6. A rug has a green rectangular area that measures 15 feet by 20 feet. It is surrounded by a brown border that is 2 feet wide. What is the area of the rug including the border? \((Lesson 1.7)\)
   \(\text{A} \) 374 \text{ ft}  \(\text{B} \) 374 \text{ ft}^2  \(\text{C} \) 456 \text{ ft}^2  \(\text{D} \) 456 \text{ ft}

7. Short Response One angle in a linear pair measures 133°. What is the measure of the other angle in this linear pair? \((Lesson 1.6)\)

8. Extended Response The coordinates of the three vertices of a triangle are \( A(-1, 1), B(2, 5), \) and \( C(5, 1) \). Find the area and perimeter of the triangle. \((Lesson 1.7)\)
Cumulative Practice continued
For use after Chapters 1–3

Chapter 2
Multiple Choice In Exercises 9–13, choose the letter of the correct answer.

9. Which of the following conditional statements together with the one below will make a true biconditional statement? (Lesson 2.2)
   If \( x = 5 \), then \( 2x = 10 \).
   \( \text{A} \) If \( x = 5 \) and \( 2x = 10 \)
   \( \text{B} \) If \( x \neq 5 \), then \( 2x \neq 10 \).
   \( \text{C} \) If \( x = 5 \) and \( 2x = 10 \).
   \( \text{D} \) If \( 2x = 10 \), then \( x = 5 \).

10. In the figure below, \( WX \equiv XY \) and \( XY \equiv YZ \). What is the value of \( a \)? (Lesson 2.5)

11. Which of the following statements represents the Symmetric Property of Angle Measure? (Lesson 2.6)
   \( \text{A} \) If \( \angle ABC = \angle DEF \), then \( \angle DEF = \angle ABC \).
   \( \text{B} \) If \( \angle ABC = \angle DEF \), then \( \angle ABC + \angle DEF = \angle DEF + \angle ABC \).
   \( \text{C} \) If \( \angle ABC = \angle DEF \) and \( \angle DEF = \angle GHJ \), then \( \angle ABC = \angle GHJ \).
   \( \text{D} \) If \( \angle ABC = \angle DEF \) and \( \angle DEF = \angle GHJ \), then \( \angle ABC \) and \( \angle GHJ \) are complementary angles.

12. What is the contrapositive of the following statement? (Lesson 2.3)
   If \( |x| < 1 \), then \( x^2 < 1 \).
   \( \text{A} \) If \( x^2 \geq 1 \), then \( |x| \geq 1 \).
   \( \text{B} \) If \( x^2 < 1 \), then \( |x| < 1 \).
   \( \text{C} \) If \( |x| \geq 1 \), then \( x^2 \geq 1 \).
   \( \text{D} \) If \( x^2 \geq 1 \), then \( |x| < 1 \).

13. In the figure below, \( \angle PBA \) and \( \angle PBC \) are a linear pair of angles. What is the value of \( k \)? (Lesson 2.6)

14. Short Response Is it possible for points \( A, B, \) and \( C \) to lie in more than one plane? Justify your response. Is this possible if \( AB \perp AC \)? (Lesson 2.2)

15. Extended Response Is it possible for a conditional statement to be true while its converse is not? Is it possible for a conditional statement to be true while its contrapositive is not? If so in each case, give an example. (Lesson 2.1)
Cumulative Practice
For use after Chapters 1–3

Chapter 3
Multiple Choice In Exercises 16–20, choose the letter of the correct answer.

16. In the figure below, \( m \parallel n \). Which of the following is not true? (Lesson 3.1)

\[
\begin{align*}
\text{(A) } & \angle 2 \cong \angle 6 \\
\text{(B) } & \angle 4 \cong \angle 6 \\
\text{(C) } & \angle 1 \cong \angle 7 \\
\text{(D) } & m\angle 2 + m\angle 6 = 180^\circ
\end{align*}
\]

17. In the figure below, what value of \( x \) would make line \( a \) and line \( b \) parallel? (Lesson 3.3)

\[
\begin{align*}
\text{(A) } & -35 \\
\text{(B) } & \frac{1}{4} \\
\text{(C) } & 7 \\
\text{(D) } & 14
\end{align*}
\]

18. Line \( m \) has the equation \( 3x + 2y = 7 \) and line \( n \) has the equation \( 2x - 3y = 3 \). How are lines \( m \) and \( n \) related? (Lesson 3.7)

\[
\begin{align*}
\text{(A) } & \text{Lines } m \text{ and } n \text{ are parallel.} \\
\text{(B) } & \text{Lines } m \text{ and } n \text{ are perpendicular.} \\
\text{(C) } & \text{Lines } m \text{ and } n \text{ intersect but are not perpendicular.} \\
\text{(D) } & \text{Lines } m \text{ and } n \text{ are skew.}
\end{align*}
\]

19. What is the slope of the line that passes through the points \((18, 5)\) and \((-6, 11)\)? (Lesson 3.6)

\[
\begin{align*}
\text{(A) } & \frac{1}{4} \\
\text{(B) } & \frac{1}{4} \\
\text{(C) } & 4 \\
\text{(D) } & -4
\end{align*}
\]

20. Which of the following is an equation of a line with slope \( -\frac{4}{9} \) and \( y \)-intercept \(-6\)? (Lesson 3.6)

\[
\begin{align*}
\text{(A) } & -\frac{4}{9}y = x - 6 \\
\text{(B) } & y = -\frac{4}{9}x - 6 \\
\text{(C) } & y = 6x - \frac{4}{9} \\
\text{(D) } & 6y = -\frac{4}{9}x - 9
\end{align*}
\]

21. Short Response Write a biconditional statement combining the Alternate Interior Angles Theorem with the Alternate Interior Angles Converse. (Lesson 3.3)

22. Extended Response Describe each statement as \textit{always true, sometimes true}, or \textit{never true}. If the statement is sometimes true, describe the condition that would make the statement true. (Lesson 3.5)

\[
\begin{align*}
\text{a. } & \text{If two lines are perpendicular to a third line, then the lines are parallel.} \\
\text{b. } & \text{If two lines are perpendicular to a third line, then they are perpendicular to each other.} \\
\text{c. } & \text{If two lines are parallel to a third line, then they are parallel to each other.}
\end{align*}
\]
Chapter Standardized Test 4A

Multiple Choice
1. In the figure below, what is the measure of \( \angle A \)?

\[ A \triangle ABC \]

A. 138°  
B. 48°  
C. 42°  
D. 30°

2. In the figure below, what is the measure of \( \angle JKM \)?

\[ \triangle JKL \]

A. 150°  
B. 135°  
C. 138°  
D. 120°

3. In the figure below, which postulate or theorem can be used to prove that \( \triangle PQT \cong \triangle SRT \)?

\[ \triangle PQR \]

A. SSS  
B. SAS  
C. ASA  
D. HL

4. You are given the following information about \( \triangle ABC \) and \( \triangle DEF \).

I. \( \angle A \cong \angle D \)  
II. \( \angle B \cong \angle E \)  
III. \( \angle C \cong \angle F \)  
IV. \( AC \cong DF \)

Which combination of statements cannot be used to prove that \( \triangle ABC \cong \triangle DEF \)?

A. I, II, and III  
B. I, II, and IV  
C. I, III, and IV  
D. II, III, and IV

5. A right triangle has vertices at (0, 0), (3, 0), and (3, 4). What is the length of its hypotenuse?

A. \( \sqrt{2} \)  
B. 2  
C. 4  
D. 5

Short Response
6. Sketch two triangles that are not congruent but whose corresponding angles are congruent.

Extended Response
7. Given \( \overline{DE} \cong \overline{DG} \) and \( \overline{EH} \cong \overline{HG} \), prove \( \triangle EDF \cong \triangle GDF \).
Chapter Standardized Test 4B

Multiple Choice

1. What is the measure of $\angle R$?

\[
\begin{align*}
\text{(A) } 32^\circ & \quad \text{(B) } 48^\circ \\
\text{(C) } 58^\circ & \quad \text{(D) } 108^\circ
\end{align*}
\]

2. What is the measure of $\angle ADE$?

\[
\begin{align*}
\text{(A) } 25^\circ & \quad \text{(B) } 30^\circ \\
\text{(C) } 45^\circ & \quad \text{(D) } 60^\circ
\end{align*}
\]

3. Which postulate or theorem can be used to prove that $\triangle HJK \cong \triangle KJL$?

\[
\begin{align*}
\text{(A) } \text{SSS} & \quad \text{(B) } \text{SAS} \\
\text{(C) } \text{ASA} & \quad \text{(D) } \text{AAS}
\end{align*}
\]

4. You are given the following information about $\triangle QST$ and $\triangle WXY$.

\[
\begin{align*}
\text{I. } QS & \cong WX \\
\text{II. } ST & \cong XY \\
\text{III. } QT & \cong WY \\
\text{IV. } \angle T & \cong \angle Y
\end{align*}
\]

Which combination of statements cannot be used to prove that $\triangle QST \cong \triangle WXY$?

\[
\begin{align*}
\text{(A) } \text{I, II, and IV} & \quad \text{(B) } \text{II, III, and IV} \\
\text{(C) } \text{I, II, and III} & \quad \text{(D) } \text{All of these combinations can be used to prove } \triangle QST \cong \triangle WXY.
\end{align*}
\]

5. A right triangle has vertices at $(2, 3)$, $(10, 3)$, and $(10, 9)$. What is the length of its hypotenuse?

\[
\begin{align*}
\text{(A) } 10 & \quad \text{(B) } 12 \\
\text{(C) } 8 & \quad \text{(D) } 6
\end{align*}
\]

Short Response

6. In the figure below, name a pair of angles that are not right angles but are congruent.

Extended Response

7. Make a sketch showing how it is possible for two corresponding sides and one corresponding angle of two triangles to be congruent in triangles that are not congruent. Explain your reasoning.
Chapter Standardized Test 5A

Multiple Choice

1. Which of the following statements is always true about circumcenter \( Z \) of a triangle?
   
   \[ \textbf{A} \] Point \( Z \) is the midpoint of each segment drawn from a vertex to the midpoint of the opposite side.
   
   \[ \textbf{B} \] Point \( Z \) is two thirds of the way along each segment drawn from a vertex to the midpoint of the opposite side.
   
   \[ \textbf{C} \] Point \( Z \) is equidistant from the vertices of the triangle.
   
   \[ \textbf{D} \] Point \( Z \) exists only in right triangles.

2. Use the figure below to determine which of the following correctly lists the sides in order from shortest to longest.

   \[ \textbf{A} \\ LM < MK < LK \]
   
   \[ \textbf{B} \\ LK < MK < LM \]
   
   \[ \textbf{C} \\ MK < LK < LM \]
   
   \[ \textbf{D} \\ MK < LM < LK \]

3. Using the figure below, determine which of the following statements is not true.

   \[ \textbf{A} \\ m\angle D > m\angle E \]
   
   \[ \textbf{B} \\ m\angle DFE > m\angle E \]
   
   \[ \textbf{C} \\ m\angle DFG > m\angle E \]
   
   \[ \textbf{D} \\ m\angle DFE > m\angle D \]

4. A triangle has two sides that have lengths of 12 centimeters and 19 centimeters. Which of the following lengths could not represent the length of the third side?
   
   \[ \textbf{A} \] 7 centimeters
   
   \[ \textbf{B} \] 14 centimeters
   
   \[ \textbf{C} \] 15 centimeters
   
   \[ \textbf{D} \] 19 centimeters

5. Using the figure below, determine which of the following theorems supports the argument that \( JM \) bisects \( \angle KJL \).

   \[ \textbf{A} \] Midsegment Theorem
   
   \[ \textbf{B} \] Hinge Theorem
   
   \[ \textbf{C} \] Angle Bisector Theorem
   
   \[ \textbf{D} \] Converse of the Angle Bisector Theorem

Short Response

6. Is the orthocenter of an obtuse triangle located inside, on, or outside the triangle?

Extended Response

7. A triangle has vertices located at coordinates \((1, 4), (-1, -2), \) and \((3, -2)\). What are the coordinates of the centroid of this triangle? Give equations for each of the three lines containing the medians of this triangle.
Chapter Standardized Test 5B

Multiple Choice

1. Which of the following statements is always true about centroid $J$ of a triangle?
   - A) Point $J$ is the midpoint of each segment drawn from a vertex to the midpoint of the opposite side.
   - B) Point $J$ is two thirds of the way along each segment drawn from a vertex to the midpoint of the opposite side.
   - C) Point $J$ is equidistant from the vertices of the triangle.
   - D) Point $J$ exists only in right triangles.

2. Use the figure below to determine which of the following correctly lists the sides in order from shortest to longest.

   - A) $BC < AB < AC$
   - B) $AC < BC < AB$
   - C) $AC < AB < BC$
   - D) $AB < BC < AC$

3. Using the figure below, determine which of the following statements is always true.

   - A) $AC > DF$
   - B) $AC = DF$
   - C) $m\angle A > m\angle D$
   - D) $m\angle C > m\angle F$

4. A triangle has two sides that have lengths of 6 feet and 14 feet. Which of the following lengths could not represent the length of the third side?
   - A) 9 feet
   - B) 12 feet
   - C) 14 feet
   - D) 21 feet

5. Using the figure below, determine which of the following theorems supports the argument that $ZY = XY$.

   - A) Hinge Theorem
   - B) Converse of the Hinge Theorem
   - C) Angle Bisector Theorem
   - D) Converse of the Angle Bisector Theorem

Short Response

6. Is the orthocenter of a right triangle located inside, on, or outside the triangle?

Extended Response

7. A triangle has vertices located at coordinates $(-2, 4)$, $(-2, -4)$, and $(1, 0)$. What are the coordinates of the centroid of this triangle? Give equations for each of the three lines containing the medians of this triangle.
Chapter Standardized Test 6A

Multiple Choice

1. What type of quadrilateral has exactly one pair of parallel sides?
   A  trapezoid  B  kite  
   C  parallelogram  D  rhombus

2. What is the value of x?
   \[(12x - 18)^\circ \quad (10x + 16)^\circ \quad (2x + 9)^\circ \]
   A  -3  B  3  
   C  12  D  28

3. A trapezoid has height 5, one base has length 7, and the other base has length equal to the height. What is the area of the trapezoid?
   A  5  B  12  
   C  30  D  35

4. If trapezoid \(DEFG\) is isosceles, which statements are always true?
   \[\triangle GDE \cong \triangle DEF \quad \triangle GFE \cong \triangle DGF\]
   I. \(\angle GDE \cong \angle DEF\) and \(\angle GFE \cong \angle DGF\)
   II. \(\overline{DF} \cong \overline{EG}\)
   III. \(\overline{DG} \cong \overline{EF}\)
   A  I only  B  II only  
   C  III only  D  I, II, and III

5. In the parallelogram \(QRST\), \(\angle T = 82^\circ\). What is \(m\angle S\)?
   A  41°  B  82°  
   C  98°  D  139°

6. What special type of quadrilateral has the vertices \(M(1, 3), N(5, 3), P(1, -1),\) and \(Q(5, -1)\)?
   A  kite  B  trapezoid  
   C  rectangle  D  square

7. Which statement is true about the diagonals of a rhombus?
   A  They are congruent.  B  They are perpendicular.  
   C  They are parallel.  D  They create complementary angles.

Short Response

8. A square has perimeter 4 units. What is the area of the square?

Extended Response

9. Prove that if the diagonals of a parallelogram are perpendicular, then the parallelogram is a rhombus. Make a sketch to support your proof.
Chapter Standardized Test 6B

Multiple Choice

1. If all the sides of a quadrilateral are congruent and none of its interior angles measure 90°, what type of quadrilateral is it?
   - A rectangle  
   - B trapezoid
   - C rhombus
   - D square

2. What is the value of \( a \)?
   \[
   \begin{align*}
   (10a + 7)° & \quad (14a - 19)° \\
   83° & \quad (6a + 19)°
   \end{align*}
   \]
   - A 9
   - B 10
   - C 15
   - D 33

3. A triangle has an area of 24 and a base length of 6. What is the height of the triangle?
   - A \(-12\)
   - B 4
   - C 6
   - D 8

4. If \( \overline{AB} \) is the midsegment of trapezoid \( WXYZ \), which statements are always true?
   \[
   \begin{align*}
   &I. \overline{AB} \parallel \overline{WX} \text{ and } \overline{AB} \parallel \overline{ZY} \\
   &II. \overline{AB} = \frac{1}{2}(\overline{ZY} + \overline{WX}) \\
   &III. \overline{WZ} \cong \overline{XY}
   \end{align*}
   \]
   - A I only
   - B II only
   - C III only
   - D I and II only

5. In parallelogram \( ABCD \), \( \angle D = 102°. \) What is \( m \angle C \)?
   - A 5°
   - B 39°
   - C 78°
   - D 102°

6. What special type of quadrilateral has the vertices \( L(-3, 1), M(0, 1), N(-4, -3) \), and \( P(2, -3) \)?
   - A kite
   - B trapezoid
   - C rectangle
   - D rhombus

7. Which statement is true about a heptagon?
   - A It has five sides.
   - B It has six sides.
   - C It has seven sides.
   - D It has congruent sides.

Short Response

8. One side of a rectangle measures 4 units, and its perimeter is 14 units. What is the area of the rectangle?

Extended Response

9. Make a sketch to show how a diagonal divides an isosceles trapezoid into two triangles. Indicate congruent sides and angles on your sketch. Which pair of sides is not congruent? If two triangles have two pairs of sides and one pair of angles (SSA) congruent, are the triangles congruent? Use your sketch to explain.
Building Test-Taking Skills
For use after Chapters 4–6

Strategies for Answering
Short Response Questions

Problem
You work for your uncle this summer. He pays you $20 on your first day. Each day after that, you will get a raise. You can choose from 2 payment plans. With Plan A, you earn a $5 raise each day. With Plan B, you earn a 20% raise each day. Which plan is a better deal?

Full credit solution
Plan B is a better deal if you work more than 5 days.

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan A pay</td>
<td>20.00</td>
<td>25.00</td>
<td>30.00</td>
<td>35.00</td>
<td>40.00</td>
<td>45.00</td>
</tr>
<tr>
<td>Plan A total</td>
<td>20.00</td>
<td>45.00</td>
<td>75.00</td>
<td>110.00</td>
<td>150.00</td>
<td>195.00</td>
</tr>
<tr>
<td>Plan B pay</td>
<td>20.00</td>
<td>24.00</td>
<td>28.80</td>
<td>34.56</td>
<td>41.47</td>
<td>49.76</td>
</tr>
<tr>
<td>Plan B total</td>
<td>20.00</td>
<td>44.00</td>
<td>72.80</td>
<td>107.36</td>
<td>148.83</td>
<td>198.59</td>
</tr>
</tbody>
</table>

Plan A is better if you work 5 days or less, but Plan B is better if you work more than 5 days. By day 6, the pay with a 20% increase is more than the pay with a $5 raise, so it will continue to be the better plan.

Partial credit solution
I think Plan B is better than Plan A.

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan A</td>
<td>20.00</td>
<td>25.00</td>
<td>30.00</td>
<td>35.00</td>
<td>40.00</td>
<td>45.00</td>
</tr>
<tr>
<td>Plan B</td>
<td>20.00</td>
<td>24.00</td>
<td>28.80</td>
<td>34.56</td>
<td>41.47</td>
<td>49.76</td>
</tr>
</tbody>
</table>

The first 4 days, Plan A is better. The next 2 days, Plan B is better. By day 5 Plan B pays you more money, so it is the better plan.
Partial credit solution

The data does not include information past Day 4. So, the answer is incorrect.

Plan A is better. The table shows that over the first four days, Plan A pays out $2.64 more than Plan B.

<table>
<thead>
<tr>
<th>Day</th>
<th>Plan A</th>
<th>Plan B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td>2</td>
<td>25.00</td>
<td>24.00</td>
</tr>
<tr>
<td>3</td>
<td>30.00</td>
<td>28.00</td>
</tr>
<tr>
<td>4</td>
<td>35.00</td>
<td>34.56</td>
</tr>
</tbody>
</table>

No credit solution

The answer is incorrect.

Plan A is better.

<table>
<thead>
<tr>
<th>Day</th>
<th>Plan A</th>
<th>Plan B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td>2</td>
<td>25.00</td>
<td>24.00</td>
</tr>
<tr>
<td>3</td>
<td>30.00</td>
<td>28.00</td>
</tr>
<tr>
<td>4</td>
<td>35.00</td>
<td>34.56</td>
</tr>
</tbody>
</table>

Your turn now

Score each solution to the short response question below as full credit, partial credit, or no credit. Explain your reasoning.

Watch Out! Be sure to explain your reasoning clearly.

Problem

The Spiff travels 226.8 miles on 14 gallons of gas. The Flyte travels 280 miles on 17.5 gallons of gas. Which car is more fuel efficient?

1. The Spiff is the more fuel efficient car because it gets 16.2 miles per gallon. The Flyte gets 16 miles per gallon.

2. The Flyte gets 16 miles per gallon, because $280 \div 17.5 = 16$. The Spiff gets 16.2 miles per gallon, because $226.8 \div 14 = 16.2$. The more fuel efficient car gets a greater number of miles per gallon. Because 16.2 is greater than 16, the Spiff is more fuel efficient.
Practicing Test-Taking Skills
For use after Chapters 4–6

Short Response

1. X is the midpoint of CE, and Y is the midpoint of CD. What are the values of n and m? What is the length of XY?

2. In the figure below, △ABC is an isosceles triangle with base AC. K and L are midpoints of the sides of △ABC as shown. What is the value of a? What is the area of trapezoid AKLC?

3. Two students cut out isosceles triangles from construction paper. The triangles are congruent. Which three quadrilaterals may be formed by these triangles if they are joined so that one side of one coincides with one side of the other? Justify your reasoning.

4. Quadrilateral PXTU is a rectangle, and quadrilateral UCXD is a rhombus. By how much does the area of the rectangle exceed the area of the rhombus? Show your work.

5. The area of trapezoid FJKT is 240 square meters. One base of the trapezoid is 2 times as long as the other base. What is the length of each base? Show your work.

6. A hiker starts at camp O and walks according to the following compass directions and distances.
   1. east 6 miles, then north 4 miles to A
   2. east 6 miles to B
   3. south 4 miles, then west 6 miles to C
   4. west 6 miles to O

   Graph quadrilateral OABC on a coordinate plane. Use the origin for O, the positive y-axis to represent points north and the positive x-axis to represent points east. Show that quadrilateral OABC is a parallelogram. Give reasons for your steps.

7. Kiara wants to make a kite. She wants it to be 36 inches along its longer diagonal and 18 inches along its shorter diagonal. She also wants XM to be one quarter of XY.

   Classify the four smaller triangles in the kite.

   What is the total area of the kite?
Cumulative Practice
For use after Chapters 4–6

Chapter 4
Multiple Choice In Exercises 1–5, choose the letter of the correct answer.

1. In the figure below, what is the value of $a$? \( \text{(Lesson 4.1)} \)

\[
\triangle \text{ABC}
\]

- A $43^\circ$
- B $54^\circ$
- C $83^\circ$
- D $97^\circ$

2. In the figure below, if $\triangle RST \cong \triangle YXZ$, which of the following statements is not true? \( \text{(Lesson 4.2)} \)

\[
\triangle \text{ABC}
\]

- A $m\angle Y = 63^\circ$
- B $k = 29$
- C $m\angle T = m\angle Z$
- D $RS \cong YX$

3. In the figure below, what are the values of $x$, $y$, and $z$? \( \text{(Lesson 4.6)} \)

\[
\triangle \text{ABC}
\]

- A $x = 60$, $y = 120$, and $z = 30$
- B $x = 60$, $y = 100$, and $z = 45$
- C $x = 45$, $y = 135$, and $z = 225$
- D $x = 45$, $y = 120$, and $z = 30$

4. A right triangle with legs 5 units and 6 units long has one vertex at $(4, -2)$ and another vertex at $(-1, -2)$. Which of the following are possible coordinates of the third vertex? \( \text{(Lesson 4.7)} \)

- A $(4, 3)$
- B $(4, -7)$
- C $(-1, 4)$
- D $(-2, -7)$

5. Given $\angle B \cong \angle E$ and $\overline{CB} \cong \overline{FE}$, which of the following would \textit{not} allow you to prove that $\triangle ABC \cong \triangle DEF$ using the indicated postulate? \( \text{(Lesson 4.4)} \)

- A If $\angle C \cong \angle F$, the ASA Congruence Postulate can be used.
- B If $\overline{AB} \cong \overline{DE}$, the SAS Congruence Postulate can be used.
- C If $\angle A \cong \angle D$, the AAS Congruence Postulate can be used.
- D If $\overline{AC} \cong \overline{DF}$, the SSS Congruence Postulate can be used.

6. Short Response One of the acute angles of a right triangle has a measure seven times the measure of the other acute angle. What are the measures of the two acute angles? \( \text{(Lesson 4.1)} \)

7. Extended Response Given $\triangle OAB$ with $\overline{OA} \cong \overline{AB}$ and altitude $\overline{AP}$, plan and carry out a coordinate proof to show that $P$ is the midpoint of $\overline{OB}$. \( \text{(Lesson 4.7)} \)
Chapter 5

Multiple Choice In Exercises 8–12, choose the letter of the correct answer.

8. What is the circumcenter of a triangle? (Lesson 5.2)
   A. The point of concurrency of the angle bisectors of the angles of the triangle.
   B. The point of concurrency of the perpendicular bisectors of the sides of the triangle.
   C. The point of concurrency of the three medians of the triangle.
   D. The point of concurrency of the altitudes of the triangle.

9. In the figure below, \( \overrightarrow{AD} \) bisects \( \angle BAC \). Which of the following statements is not true? (Lesson 5.1)

   \[ \overrightarrow{AD} \] is a perpendicular bisector of both \( BD \) and \( CD \).
   B. Point \( D \) is equidistant from \( B \) and \( C \).
   C. \( m\angle BAD = m\angle CAD \)
   D. \( DB = DC \)

10. A triangle has sides measuring 3 meters, 7 meters, and \( k \) meters. Which of the following statements is true? (Lesson 5.5)
    A. \( k = 10 \)
    B. \( k = \sqrt{58} \)
    C. \( 4 < k < 10 \)
    D. \( 3 < k < 7 \)

11. In the figure below, \( P \) is the centroid of \( \triangle STU \). What is the value of \( x \)? (Lesson 5.3)

   \[ \begin{align*}
   3x - 3 &= 2x - 4 \\
   A &= 3 \quad B &= 5 \quad C &= 7.5 \quad D &= 12
   \end{align*} \]

12. For \( \triangle ABC \) and \( \triangle XYZ \), \( XY \cong AB \), \( YZ \cong BC \), and \( XZ > AC \). Which theorem states that \( m\angle Y > m\angle B \)? (Lesson 5.6)
    A. The Hinge Theorem
    B. Triangle Sum Theorem
    C. ASA Congruence Postulate
    D. Converse of the Hinge Theorem

13. Short Response What are the coordinates of the points where one midsegment of \( \triangle ABC \) intersects \( AB \) and \( AC \)? (Lesson 5.4)

14. Extended Response The vertices of \( \triangle HJK \) are \( H(0, 0) \), \( J(10, 0) \), and \( K(4, 4) \). (Lesson 5.2)
    a. What are equations for the three lines that contain the perpendicular bisectors of \( \triangle HJK \)?
    b. What are the coordinates of the circumcenter of \( \triangle HJK \)?
Cumulative Practice continued
For use after Chapters 4–6

Chapter 6
Multiple Choice In Exercises 15–19, choose the letter of the correct answer.

15. In the figure below, $ML$ is the midsegment of trapezoid $DEFG$. What is the value of $x$? (Lesson 6.5)

![Diagram of trapezoid with midsegment $ML$]

- A $3$
- B $6$
- C $18$
- D $24$

16. Which of the following conditions must be met for a plane figure to be a polygon? (Lesson 6.1)

I. The figure is formed by three or more segments.
II. No two sides with a common endpoint are collinear.
III. Each side intersects exactly two other sides, one at each endpoint.

- A I and II
- B II and III
- C I and III
- D I, II, and III

17. Which of the following statements is always true? (Lesson 6.4)

- A A rhombus is a rectangle.
- B A rhombus is a parallelogram.
- C A parallelogram is a rectangle.
- D A rectangle is a square.

18. In the figure below, $ABCD$ is a parallelogram. What are the values of $x$ and $y$? (Lesson 6.2)

![Diagram of parallelogram $ABCD$]

- A $x = 3.5, y = 5.5$
- B $x = 3, y = 7$
- C $x = 2, y = 1$
- D $x = 1, y = 5$

19. Trapezoid $TRAP$ has an area of 75 square inches. The top base is 17 inches and the bottom base is 13 inches. What is the height of $TRAP$? (Lesson 6.7)

- A 5 inches
- B 8 inches
- C 12.5 inches
- D 37.5 inches

20. Short Response Suppose that you are given four points in the coordinate plane and that these points are the vertices of a quadrilateral. How would you use slope, the distance formula, or both to see if the quadrilateral is a parallelogram? (Lesson 6.3)

21. Extended Response The coordinates of quadrilateral $WXYZ$ are $W(-1, 3)$, $X(5, 1)$, $Y(-1, -1)$, and $Z(-3, 1)$. (Lessons 6.3, 6.6)

a. Is $WXYZ$ a parallelogram? Justify your answer.

b. What kind of quadrilateral is $WXYZ$? Justify your answer.
Chapter Standardized Test 7A

Multiple Choice

1. What are the coordinates of the reflection of $K(6, 11)$ in the $x$-axis?
   - A $K'(11, 6)$
   - B $K'(-6, -11)$
   - C $K'(6, 11)$
   - D $K'(6, -11)$

2. The vertices of $\triangle OXY$ have coordinates $O(0, 0), X(0, 6),$ and $Y(7, 0)$. What are the coordinates of $\triangle OX'Y'$, the image of $\triangle OXY$, under a $180^\circ$ rotation?
   - A $O(0, 0), X'(6, 0),$ and $Y'(0, 7)$
   - B $O(0, 0), X'(-6, 0),$ and $Y'(0, 7)$
   - C $O(0, 0), X'(0, -6),$ and $Y'(-7, 0)$
   - D $O(0, 0), X'(0, 6),$ and $Y'(-7, 0)$

3. What are the images of $A(3, 4)$ and $B(5, 2)$ after the pair of transformations defined below?
   - Translation: 5 units to the right followed by Reflection: in the $y$-axis
   - A $A''(-4, -8)$ and $B''(-2, -10)$
   - B $A''(-8, -4)$ and $B''(-10, -2)$
   - C $A''(8, 4)$ and $B''(10, 2)$
   - D $A''(-8, 4)$ and $B''(-10, 2)$

4. $RS$ has initial point $R(2, 1)$ and terminal point $S(3, 7)$. What is the component form of the vector?
   - A $(5, 8)$
   - B $(-5, -8)$
   - C $(1, 6)$
   - D $(-1, -6)$

5. The image of quadrilateral $DEFG$ under an isometry is quadrilateral $HJRK$. What are the values of the variables?

6. Which of these isometries maps the pattern of letters shown below onto itself?
   - I. $180^\circ$ rotation
   - II. glide reflection
   - III. reflection in a line
   - A I only
   - B I and II only
   - C II and III only
   - D I, II, and III

Short Response

7. How many different lines of symmetry are there in a square?

Extended Response

8. The endpoints of $\overline{PQ}$ are $P(-3, -6)$ and $Q(0, -8)$. Under some composition of transformations, the image $\overline{P''Q''}$ has endpoints $P''(5, -3)$ and $Q''(2, -5)$. Describe a composition of transformations that accomplishes this.


**Chapter Standardized Test 7B**

**Multiple Choice**

1. What are the coordinates of the reflection of \( M(7, 3) \) in the line \( y = 3 \)?
   - **A** \( M'(3, 7) \)
   - **B** \( M'(7, 3) \)
   - **C** \( M'(7, -3) \)
   - **D** \( M'(-7, -3) \)

2. The vertices of \( \triangle OPQ \) have coordinates \( O(0, 0) \), \( P(0, 6) \), and \( Q(7, 0) \). What are the coordinates of \( \triangle OP'Q' \), the image of \( \triangle OXY \), under a 90° clockwise rotation?
   - **A** \( O(0, 0) \), \( P'(-6, 0) \), and \( Q'(0, 7) \)
   - **B** \( O(0, 0) \), \( P'(0, -6) \), and \( Q'(-7, 0) \)
   - **C** \( O(0, 0) \), \( P'(0, 6) \), and \( Q'(-7, 0) \)
   - **D** \( O(0, 0) \), \( P'(6, 0) \), and \( Q'(0, 7) \)

3. What are the images of \( F(2, -1) \) and \( G(5, -4) \) after the pair of transformations defined below?
   - **Reflection:** in the \( x \)-axis
   - **Translation:** 3 units to the left
     - **A** \( F''(-1, -1) \) and \( G''(2, -4) \)
     - **B** \( F''(-1, 1) \) and \( G''(2, 4) \)
     - **C** \( F''(-2, 1) \) and \( G''(-5, 4) \)
     - **D** \( F''(-1, -1) \) and \( G''(-2, -4) \)

4. \( \overline{AB} \) has initial point \( A(5, -3) \) and terminal point \( B(1, -2) \). What is the component form of the vector?
   - **A** \( \langle 4, 1 \rangle \)
   - **B** \( \langle -4, 1 \rangle \)
   - **C** \( \langle 6, -5 \rangle \)
   - **D** \( \langle 3, -2 \rangle \)

5. The image of quadrilateral \( RSTQ \) under an isometry is quadrilateral \( XYWZ \). What are the values of the variables?
   - \( x = 8, y = 2, z = 5 \)
   - \( x = -22, y = 2, z = 3 \)
   - \( x = 6, y = -8, z = 11 \)
   - \( x = 11, y = 8, z = 6 \)

6. Which of these isometries maps the pattern of letters shown below onto itself?
   - **I.** 180° rotation
   - **II.** glide reflection
   - **III.** reflection in a line
     - **A** I only
     - **B** I and II only
     - **C** II and III only
     - **D** I, II, and III

**Short Response**

7. How many different lines of symmetry are there in an equilateral triangle?

**Extended Response**

8. The endpoints of \( \overline{PQ} \) are \( P(-3, -6) \) and \( Q(0, -8) \). Under some composition of transformations, the image \( P''Q'' \) has endpoints \( P''(3, 6) \) and \( Q''(0, 4) \). Describe a composition of transformations that accomplishes this.
Chapter Standardized Test 8A

Multiple Choice

1. Which of the following pairs of numbers has a geometric mean of 12?
   A 4 and 16
   B 6 and 18
   C 8 and 18
   D 10 and 22

2. The two parallelograms shown are similar. What are the values of \(x\) and \(y\)?
   A \(x = 92\) and \(y = 4\)
   B \(x = 92\) and \(y = 9\)
   C \(x = 88\) and \(y = 4\)
   D \(x = 88\) and \(y = 9\)

3. The endpoints of \(O\) and \(P\) are the origin and \(P(5, 4)\). Suppose \(P\) under a dilation with center at the origin and scale factor 2. What are the coordinates of \(P''\)?
   A \(P'(10, 4)\)
   B \(P'(2.5, 2)\)
   C \(P'(-10, -8)\)
   D \(P'(10, 8)\)

4. \(\triangle ABC \sim \triangle XYZ\). Which of the following is true?
   A \(m_\angle X = k(m_\angle A), m_\angle Y = k(m_\angle B),\) and \(m_\angle Z = k(m_\angle C)\) for \(k > 1\)
   B \(XY = 2AB, YZ = 2BC,\) and \(XZ = 2AC\)
   C \(\frac{AB}{BC} = \frac{XZ}{YZ} = \frac{AC}{XZ}\)
   D \(\frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}\)

5. In the figure below, what is the perimeter of \(\triangle VWY\)?
   A 49
   B 56
   C 60
   D 64

6. In the figure below, what is \(EA\)?
   A 4.8
   B 4.0
   C 3.7
   D 3.0

Short Response

7. Both \(\angle D\) and \(\angle E\) are congruent to \(\angle DFE\), and \(DE \parallel GH\) in the figure below. What are \(DF, EF, FH,\) and \(GH\)?

Extended Response

8. The scale figure below shows the locations of several deliveries made by a delivery driver in order from point \(A\) to point \(F\). Each grid block is a square representing a square 3.47 kilometers on a side. To the nearest tenth of a kilometer, find the distance between each delivery and the total distance of the trip.
Chapter Standardized Test 8B

Multiple Choice

1. Which of the following pairs of numbers has a geometric mean of 8?
   - A 2 and 32
   - B 2 and 64
   - C 4 and 12
   - D 6 and 64

2. The two trapezoids shown are similar. What are the values of \(a\) and \(b\)?
   - A \(a = 6\) and \(b = 48\)
   - B \(a = 6\) and \(b = 51\)
   - C \(a = 4\) and \(b = 68\)
   - D \(a = 4\) and \(b = 51\)

3. The endpoints of \(OR\) are the origin and \(R(-7, -8)\). Suppose \(R'(x, y)\) is the image of \(R\) under a dilation with center at the origin and scale factor 0.5. What are the coordinates of \(R'\)?
   - A \(R'(-3.5, -4)\)
   - B \(R'(3.5, 4)\)
   - C \(R'(-14, -16)\)
   - D \(R'(-8, -7)\)

4. \(\triangle KLM \sim \triangle RST\). Which of the following is true?
   - A \(m\angle R = m\angle K, m\angle S = m\angle L\), and \(m\angle T = m\angle M\)
   - B \(RS = 2KL, ST = 2LM\), and \(RT = 2KM\)
   - C \(RS = KL, ST = LM\), and \(RT = KM\)
   - D \(KL \over RS = LM \over ST = RT \over KM\)

5. In the figure below, what is the perimeter of \(\triangle ABC\)?
   - A 18
   - B 25
   - C 36
   - D 72

6. In the figure below, what is \(XV\)?
   - A 9
   - B 12
   - C \(13\frac{3}{4}\)
   - D \(14\frac{1}{2}\)

Short Response

7. In the figure below, \(VW \parallel YZ\). Find \(YZ\).

Extended Response

8. The scale figure below shows the locations of several deliveries made by a delivery driver in order from point \(A\) to point \(F\). The total distance of the trip was 75.2 kilometers. What is the scale, grid distance to kilometers? To the nearest tenth of a kilometer, what is the actual distance from one stop to the next?
Multiple Choice

1. In the figure below, what is the value of $x$?

![Diagram of a triangle with sides 3, 12, and unknown x]

- A) 4
- B) 6
- C) 9
- D) $\sqrt{15}$

2. Let $\vec{a} = \langle 14, -6 \rangle$ and $\vec{b} = \langle -8, 11 \rangle$. What is the sum, $\vec{a} + \vec{b}$?

- A) 5
- B) 6
- C) $\langle 3, -2 \rangle$
- D) $\langle 6, 5 \rangle$

3. A diagonal of rectangle $WXYZ$ divides the rectangle into two $30^\circ$-$60^\circ$-$90^\circ$ triangles. The length of the diagonal is 6 feet. What are the dimensions of the rectangle?

- A) $3\sqrt{3}$ ft by $3\sqrt{3}$ ft
- B) 3 ft by $3\sqrt{3}$ ft
- C) 3 ft by $\frac{3}{\sqrt{3}}$
- D) 3 ft by $3\sqrt{2}$ ft

4. To the nearest tenth of a centimeter, what is the perimeter of parallelogram $WXYZ$?

![Diagram of a parallelogram with sides 15 cm, 13 cm, 4 cm, and 12 cm]

- A) 65.0 cm
- B) 66.8 cm
- C) 72.0 cm
- D) 84.2 cm

5. The base of an isosceles triangle is 22 inches in length. The altitude to the base is 8 inches. To the nearest whole number, what is the measure of a base angle of the triangle?

- A) $36^\circ$
- B) $43^\circ$
- C) $47^\circ$
- D) $54^\circ$

6. To the nearest tenth, what is the value of $x$?

![Diagram of a triangle with sides 20 ft, 12 ft, and unknown x]

- A) 10.7
- B) 11.2
- C) 11.6
- D) 19.8

Short Response

7. In the figure below, $\triangle ABC$ is similar to $\triangle BDC$. Find $AB$ and $BD$.

![Diagram of two similar triangles with sides labeled]

Extended Response

8. In the figure below, a surveyor used $87.2^\circ$ as her estimate of the measure of $\angle S$. A second surveyor used $88.2^\circ$ as his estimate of the measure of $\angle S$. If $b = 1.5$ meters, by how much do the calculations of $d$ differ? By what percent is one measurement greater than the other? Explain your reasoning.

![Diagram of a triangle with sides 1.5 m and 1.5 m, and unknown d]
Chapter Standardized Test 9B

Multiple Choice

1. In the figure below, what is the value of $a$?

![Diagram](image1)

A 4  
B 8  
C 12  
D $\sqrt{20}$

2. Let $\vec{r} = (21, -5)$ and $\vec{s} = (-12, -19)$. What is the sum, $\vec{r} + \vec{s}$?

A 15  
B $(-252, 95)$  
C $(33, 4)$  
D $(9, -24)$

3. A diagonal of square $ABCD$ divides the square into two 45°-45°-90° triangles. The length of the diagonal is 9 meters. What are the dimensions of the square?

A $4.5\sqrt{2}$ m by $4.5\sqrt{2}$ m  
B $9\sqrt{2}$ m by $9\sqrt{2}$ m  
C $4.5\sqrt{2}$ m by $4.5\sqrt{2}$ m  
D $3$ m by $3\sqrt{3}$

4. To the nearest tenth, what is the perimeter of parallelogram $ABCD$?

![Diagram](image2)

A 30 cm  
B 32.7 cm  
C 34.5 cm  
D 37.2 cm

5. The base of an isosceles triangle is 19 inches. The altitude to the base is 11 inches. What is the approximate measure of the vertex angle of this triangle?

A $40.8^\circ$  
B $81.6^\circ$  
C $122.4^\circ$  
D $139.2^\circ$

6. In the figure below, what is the value of $c$ to the nearest tenth?

![Diagram](image3)

A 22.5  
B 25.0  
C 41.0  
D 45.0

Short Response

7. In the figure below, $\triangle ZWX$ is similar to $\triangle ZXY$. To the nearest tenth, find $XY$, $XW$, and $WZ$.

![Diagram](image4)

Extended Response

8. In the figure at right, a surveyor used 84.7° as her estimate of the measure of $\angle M$. A second surveyor used 83.7° as his estimate of the measure of $\angle M$. By how much do the calculations of $h$, the height of a building, differ? By what percent is one measurement greater than the other? Explain your reasoning.
Strategies for Answering
Context-Based Multiple Choice Questions

Some of the information you need to solve a context-based multiple choice question may appear in a table, a diagram, or a graph.

Problem 1
Ali plants a flower garden in a circle around a tree. The outer edge of the garden has twice the radius of the inner edge. Find the area of the flower garden.

A. 12.56 ft²  B. 25.12 ft²  C. 37.68 ft²  D. 50.24 ft²

Solution

1) You know that the radius of the inner circle is 2 feet and the radius of the outer circle is double the radius of the inner circle, or 4 feet.

2) Area of inner circle:  Area of outer circle:
\[ A = \pi r^2 \]
\[ = \pi \cdot 2^2 \]
\[ = 4\pi \]
\[ A = \pi r^2 \]
\[ = \pi \cdot 4^2 \]
\[ = 16\pi \]

3) Area of garden = Area of outer circle − Area of inner circle
\[ A = 16\pi - 4\pi \]
\[ = 12\pi \]
\[ \approx 12 \times 3.14 \]
\[ = 37.68 \]

The area of the flower garden is about 37.68 ft².

The correct answer is C.

4) Estimate that 16\pi is about 48 and 4\pi is about 12.

Because 48 – 12 = 36, C is the most reasonable choice.
Building Test-Taking Skills  continued
For use after Chapters 7–9

Problem 2
Jim walks diagonally across a field. Martha walks along its length and width. The rectangular field is 300 feet wide and 400 feet long. How many feet less does Jim walk than Martha?

A. 1200 feet  B. 700 feet  C. 500 feet  D. 200 feet

Solution

1) Use the information in the problem to make a sketch.

2) Use the Pythagorean theorem to find the length of Jim’s path. Add to find the length of Martha’s path.

3) Martha’s distance — Jim’s distance

= 700 — 500

= 200

Jim walks 200 feet less than Martha. The correct answer is D.

Watch Out! Be sure that you know what question you are asked to answer. Some choices given may be intended to distract you.

Your turn now

1. In Problem 2, Jim and Martha both walk at the rate of 250 ft/min. How many minutes less does Jim walk than Martha?
   A. 0.2 min  B. 0.25 min  C. 0.8 min  D. 1.25 min

In Exercises 2–3, use the diagram.

2. What is the height of the building?
   A. 10 feet  B. 16 feet
   C. 20 feet  D. 40 feet

3. How long will the person’s shadow be when the building’s shadow is 14 feet long?
   A. 3 feet  B. 3.5 feet
   C. 4 feet  D. 7 feet
Practicing Test-Taking Skills
For use after Chapters 7–9

Multiple Choice

1. In \( \triangle ABC \), \( \angle C \) is a right angle, \( AC = 5 \) meters, and \( m \angle A = 40^\circ \). Which equation can be used to find \( BC \), the height of the flagpole?

   \( \text{A} \) \( \cos 40^\circ = \frac{x}{5} \)  
   \( \text{B} \) \( \tan 40^\circ = \frac{5}{x} \)  
   \( \text{C} \) \( \tan 40^\circ = \frac{x}{5} \)  
   \( \text{D} \) \( \sin 40^\circ = \frac{x}{5} \)

2. Which are the coordinates of the vertices of the square’s image under a dilation with a scale factor of 2 and center of dilation at the origin?

   \( \text{A} \) \( K(2, 1), L'(3, 1), M'(2, 2), \) and \( N'(3, 2) \)  
   \( \text{B} \) \( K(8, 4), L'(12, 4), M'(8, 8), \) and \( N'(12, 8) \)  
   \( \text{C} \) \( K'(4, -2), L'(6, -2), M'(4, -4), \) and \( N'(6, -4) \)  
   \( \text{D} \) \( K'(-4, 2), L'(-6, 2), M'(-4, 4), \) and \( N'(-6, 4) \)

3. Two triangular sheets of metal are similar: \( \triangle PQR \sim \triangle XYZ \). Which represents the distance around the smaller sheet of metal?

   \( \text{A} \) \( \frac{2}{3}(4 + 6 + 7) \)  
   \( \text{B} \) \( \frac{2}{3}(4 \times 6 \times 7) \)  
   \( \text{C} \) \( \frac{3}{2}(4 + 6 + 7) \)  
   \( \text{D} \) \( \frac{2}{3}(4^2 + 6^2 + 7^2) \)

4. A rectangular park and the base of a stone monument in the park are similar. What is the area of the space remaining inside the large grassy rectangular park and outside the smaller stone rectangle?

   \( \text{A} \) \( 30 \text{ m}^2 \)  
   \( \text{B} \) \( 60 \text{ m}^2 \)  
   \( \text{C} \) \( 180 \text{ m}^2 \)  
   \( \text{D} \) \( 204 \text{ m}^2 \)

5. Rectangle \( PQRS \) is reflected in the \( y \)-axis and then translated to the other rectangle shown. What is the component form of the vector of translation?

   \( \text{A} \) \( \langle -3, 1 \rangle \)  
   \( \text{B} \) \( \langle 3, 1 \rangle \)  
   \( \text{C} \) \( \langle 0, -3 \rangle \)  
   \( \text{D} \) \( \langle 1, 3 \rangle \)
Cumulative Practice
For use after Chapters 7–9

Chapter 7
Multiple Choice In Exercises 1–4, choose the letter of the correct answer.

1. Which of the following statements is true about the isometry illustrated in the figure below? (Lesson 7.1)

I. The isometry is a reflection in the y-axis.
II. The isometry is a rotation about point C.
III. \( \triangle ABC \) is congruent to its image.

A I and II only  
B I and III only  
C II and III only  
D I, II, and III

2. If a figure can be mapped onto itself by a rotation of \( 180^\circ \) or less, what do you know is always true about the figure? (Lesson 7.3)

A It has at least one pair of parallel sides.  
B It is a frieze pattern.  
C It has less than four lines of symmetry.  
D It has rotational symmetry.

3. The vertices of \( \triangle ABC \) have coordinates \( A(2, 4), B(1, 1), \) and \( C(4, -1) \). The vector \( \langle -6, -7 \rangle \) is used to translate \( \triangle ABC \). Which of the following are the coordinates of the image \( \triangle A'B'C' \)? (Lesson 7.4)

A \( A'(4, 3), B'(5, 6), \) and \( C'(2, 8) \)  
B \( A'(-4, -3), B'(-5, -6), \) and \( C'(-2, -8) \)  
C \( A'(8, 9), B'(7, 8), \) and \( C'(10, 6) \)  
D \( A'(-8, -9), B'(-7, -8), \) and \( C'(2, 8) \)

4. Which isometries map the following frieze pattern onto itself? (Lesson 7.6)

\[ \downarrow \quad \downarrow \quad \downarrow \]

A translation and \( 180^\circ \) rotation  
B translation and vertical line reflection  
C translation, horizontal line reflection, and horizontal glide reflection  
D translation, \( 180^\circ \) rotation, horizontal line reflection, vertical line reflection, and horizontal glide reflection

5. Short Response Write the component form of the vector whose initial point is \( A(-5, 14) \) and whose terminal point is \( B(12, -11) \). (Lesson 7.4)

6. Extended Response Segment \( JK \) has endpoints with coordinates \( J(7, -4) \) and \( K(3, -3) \). (Lesson 7.5)

a. Explain how you would find the coordinates of the image under a \( 90^\circ \) counterclockwise rotation about the origin followed by a reflection in the y-axis.

b. Find the coordinates of the final image.
Name ______________________ Date ________________

Cumulative Practice continued
For use after Chapters 7–9

Chapter 8
Multiple Choice In Exercises 7–12, choose the letter of the correct answer.

7. In the dilation illustrated below, what is the scale factor, and does the dilation perform an enlargement or a reduction? (Lesson 8.7)

\[ \text{scale factor } \frac{1}{4}; \text{ reduction} \]

8. You receive two standard postcards from your friend while she is on summer vacation. The first postcard is 5 inches long and 3.5 inches high. The second postcard is 6 inches long and 4.25 inches high. Which of the following statements is true? (Lesson 8.3)

\[ \text{The postcards are congruent rectangles.} \]

9. Which of the following is the solution to the proportion \( \frac{2}{3a} = \frac{4}{a + 7} \)? (Lesson 8.1)

\[ \text{A } \frac{5}{7} \quad \text{B } \frac{7}{5} \quad \text{C } 5 \quad \text{D } 7 \]

10. The lengths of the sides of \( \triangle ABC \) are 4, 5, and 6. Which set of numbers gives the lengths of the sides of a triangle similar to \( \triangle ABC \)? (Lesson 8.5)

\[ \text{A } 6, 7, \text{ and } 8 \quad \text{B } 6, 7.5, \text{ and } 9 \quad \text{C } 8, 9.5, \text{ and } 11 \quad \text{D } 8, 11, \text{ and } 14 \]

11. In the figure below, \( \overline{YZ} \) is the bisector of \( \angle WYX \). What is the value of \( a \)? (Lesson 8.6)

\[ \text{A } 3 \quad \text{B } 6 \quad \text{C } 10 \quad \text{D } 18 \]

12. What is the geometric mean of 3 and 75? (Lesson 8.2)

\[ \text{A } 15 \quad \text{B } 25 \quad \text{C } 38 \frac{1}{2} \quad \text{D } 39 \]

13. Short Response The perimeter of rectangle \( QRST \) is 56 inches. The ratio of \( QR : RS \) is 5 : 2. What are the length and width of the rectangle? (Lesson 8.1)

14. Extended Response Prove or disprove each statement. (Lesson 8.3)

a. All 45°-45°-90° triangles are similar.

b. All rectangles are similar.
Cumulative Practice  continued
For use after Chapters 7–9

Chapter 9
Multiple Choice  In Exercises 15–20, choose the letter of the correct answer.

15. In the figure below, what is the value of $a$? (Lesson 9.1)

![Diagram of a triangle with sides labeled $QR = 15$, $RS = 4$, and $QS = 16$.]

(A) $2\sqrt{11}$  (B) $2\sqrt{15}$  (C) 30  (D) 60

16. Which set of numbers could be the lengths of the sides of a right triangle? (Lesson 9.2)

(A) 25, 36, and 49  
(B) 16, 81, and 100  
(C) 35, 84, and 91  
(D) 23, 196, and 256

17. What is always true about two equal vectors? (Lesson 9.7)

(A) They have the same magnitude and direction.  
(B) They have the same magnitude and opposite directions.  
(C) They have the same terminal point.  
(D) They always begin at the same point.

18. In right triangle $\triangle PQR$, $m\angle P = 30^\circ$, $m\angle Q = 90^\circ$, and $PR = 21$. To the nearest tenth, what are the lengths of the other sides? (Lesson 9.4)

(A) $PQ \approx 14.8$ and $QR \approx 14.8$  
(B) $PQ \approx 14.8$ and $QR \approx 18.2$  
(C) $PQ = 10.5$ and $QR = 18.2$  
(D) $PQ \approx 18.2$ and $QR = 10.5$

19. Which of the following gives $JL$ to the nearest tenth of a unit? (Lesson 9.6)

![Diagram of a triangle with sides labeled $JL = 32$, $KL = 12$, and $JK = 40$.]

(A) 10.2  
(B) 7.5  
(C) 6.4  
(D) 6.0

20. Which of the following sets of side lengths represents an acute triangle? (Lesson 9.3)

I. 7, 13, 14  
II. 14, 19, 23  
III. 20, 20, 28

(A) I and II only  
(B) II and III only  
(C) I and III only  
(D) I, II, and III

21. Short Response  What are $m\angle A$ and $m\angle C$ in the figure below? (Lesson 9.4)

![Diagram of a triangle with angle $B$ and side $AC$.]

22. Extended Response  In $\triangle ADC$, $m\angle DAC = 25^\circ$, $m\angle C = 90^\circ$, and $AD = 13$. Also, $B$ is the midpoint of $\overline{AC}$. (Lesson 9.6)

(a) Draw a sketch of $\triangle ADC$ and $\overline{DB}$.

(b) To the nearest tenth of a degree, find $m\angle DBC$. 

---

North Carolina Standards Test Preparation and Practice
Chapter Standardized Test 10A

Multiple Choice

1. A circle is represented by \((x - 4)^2 + (y + 7)^2 = 36\). What are the coordinates of the center of the circle and what is the length of the radius?
   - (A) center: \((-4, 7)\); radius: 6
   - (B) center: \((4, -7)\); radius: 6
   - (C) center: \((20, -13)\); radius: 36
   - (D) center: \((-20, 13)\); radius: 36

2. In the figure below, \(\overline{RS}\) is a diameter in circle \(M\). What is the measure of \(ST\) with center \(M\)?
   - (A) 21°
   - (B) 36°
   - (C) 42°
   - (D) 45°

3. Which equation represents the set of all points in the coordinate plane 7 units below the x-axis?
   - (A) \(x = 7\)
   - (B) \(x = -7\)
   - (C) \(y = 7\)
   - (D) \(y = -7\)

4. If a tangent and a chord intersect at a point on a circle, what do you know must be true about the measures of the two angles that are formed?
   - (A) They each measure one half the difference of the measures of their intercepted arcs.
   - (B) Their measures are one half the measures of their vertical angles.
   - (C) They are supplementary.
   - (D) Their measures equal the measures of their intercepted arcs.

5. In the figure below, what is the value of \(a\)?

   - (A) 9
   - (B) 12
   - (C) 12.75
   - (D) 13.5

6. \(\overrightarrow{AB}\) is tangent to a circle at \(A\), and chord \(\overline{XY}\) is parallel to \(\overrightarrow{AB}\). The distance between \(\overrightarrow{AB}\) and \(\overline{XY}\) is 4.5 centimeters. The diameter of the circle is 102.5 centimeters. What is the length of \(\overline{XY}\)?
   - (A) 30 cm
   - (B) 36 cm
   - (C) 40 cm
   - (D) 42 cm

Short Response

7. How many points in a coordinate plane are 4 units from \((4, 0)\) and also 5 units from \((10, 0)\)?

Extended Response

8. Two congruent circles with radius \(r\) inches have centers that are 12 inches apart. Write an equation or inequality that describes the possible values of \(r\) for each condition below.
   - (a) The circles do not intersect.
   - (b) The circles intersect in exactly one point.
   - (c) The circles intersect in two points.
Chapter Standardized Test 10B

Multiple Choice

1. An equation of a circle is 
\((x + 9)^2 + (y + 14)^2 = 16\).
   What are the coordinates of the center of the circle and what is the length of the radius?
   \(\text{A} \) center: (5, 23); radius: 16
   \(\text{B} \) center: (−5, −23); radius: 16
   \(\text{C} \) center: (9, 14); radius: 4
   \(\text{D} \) center: (−9, −14); radius: 4

2. In the figure below, \(AB\) is a diameter in circle \(M\). What is the measure of \(BC\)?
   \(\text{A} \) 21°
   \(\text{B} \) 27°
   \(\text{C} \) 39°
   \(\text{D} \) 45°

3. If two chords intersect in the interior of a circle, what do you know is true about the measures of the vertical angles formed?
   \(\text{A} \) The measure of each angle is one half the difference of the measures of the two arcs intercepted by the vertical angles.
   \(\text{B} \) They never equal one another.
   \(\text{C} \) Their sum never equals 90°.
   \(\text{D} \) The measure of each angle is one half the sum of the measures of the two arcs intercepted by the vertical angles.

4. Which is an equation for the set of all points in the coordinate plane 1 unit from both the \(y\)-axis and the line \(x = 2\)?
   \(\text{A} \) \(x = 1\)
   \(\text{B} \) \(x = −1\)
   \(\text{C} \) \(y = 1\)
   \(\text{D} \) \(y = −1\)

5. In the figure below, what is the value of \(x\)?
   \(\text{A} \) 6
   \(\text{B} \) 8
   \(\text{C} \) 10
   \(\text{D} \) 12

6. Find the length of a chord that is 30 inches from the center of a circle whose diameter is 68 inches long.
   \(\text{A} \) 36 in.
   \(\text{B} \) 32 in.
   \(\text{C} \) 28 in.
   \(\text{D} \) 16 in.

Short Response

7. How many points in a coordinate plane are 4 units from (4, 0) and also 2 units from (5, 0)?

Extended Response

8. A circle has center \(C(2, 3)\) and radius 4. Explain how to find out whether \(P(5, 5)\) is inside, outside, or on circle \(C\). In general, how would you find out if \(P(x, y)\) is inside, outside, or on the circle?
Chapter Standardized Test 11A

Multiple Choice
1. The sides of a regular dodecagon are 7 feet long. The sides of another regular dodecagon are 21 feet long. What is the ratio of the area of the smaller figure to that of the larger one?
   A 1 : 3  B 2 : 5  C 3 : 4  D 1 : 9

In Exercises 2 and 3, use this figure.

2. To the nearest tenth, what is the length of AB?
   A 3.6 cm  B 5.7 cm  C 11.5 cm  D 25.5 cm

3. To the nearest square centimeter, what is the area of the shaded region?
   A 616 cm²  B 535 cm²  C 80 cm²  D 40 cm²

4. The apothem of a square is 8 units long. What is the radius of the circle in which the square is inscribed?
   A $8\sqrt{2}$ units  B 8 units  C $4\sqrt{2}$ units  D 4 units

5. In the figure below, which represents the probability that a point on DE chosen at random is on FG?

   A 100%  B 70%  C 30%  D 15%

6. A square is inscribed in a circle whose radius is 5 inches. What is the area of the square?
   A 50 in²  B $20\sqrt{2}$ in²  C 25 in²  D $5\sqrt{2}$ in²

7. The measure of each interior angle of a regular polygon is 135°. How many sides does the polygon have?
   A 4  B 8  C 9  D 12

Short Response
8. A target consists of three concentric circles. These circles have radii $a$, $2a$, and $4a$. A dart lands at random inside the target. As a decimal, what is the probability that the dart lands inside the circle with radius $4a$ but outside the circle with radius $2a$?

Extended Response
9. A design for a garden has the shape of a regular octagon. The design is 32 centimeters on a side. What is the perimeter of the design? To the nearest square centimeter, what is its area?
Chapter Standardized Test 11B

Multiple Choice

1. The sides of a regular dodecagon are 8 centimeters long. The sides of another regular dodecagon are 12 centimeters long. What is the ratio of the area of the smaller figure to that of the larger one?
   - A 4:9
   - B 3:4
   - C 2:3
   - D 1:3

2. To the nearest tenth, what is the length of $DE$?
   - A 44.6 cm
   - B 22.3 cm
   - C 11.2 cm
   - D 7.0 cm

3. To the nearest square centimeter, what is the area of the shaded region?
   - A 17 cm²
   - B 38 cm²
   - C 77 cm²
   - D 154 cm²

4. What is the length of the apothem of a square whose sides are $8\sqrt{2}$ units long?
   - A $8\sqrt{2}$ units
   - B $4\sqrt{2}$ units
   - C $2\sqrt{2}$ units
   - D $\sqrt{2}$ units

5. In the figure below, which represents the probability that a point on $AC$ chosen at random is not on $AB$?
   - A 0.8
   - B 0.375
   - C 0.25
   - D 0.2

6. The side length of an equilateral triangle is 14 inches. To the nearest tenth of a square inch, what is the area of the triangle?
   - A 340 in²
   - B 97.0 in²
   - C 84.9 in²
   - D 49.0 in²

7. The measure of each interior angle of a regular polygon is $120°$. How many sides does the polygon have?
   - A 6
   - B 12
   - C 15
   - D 30

In Exercises 2 and 3, use this figure.

D

E

F

142

9 cm

Short Response

8. This target is a circle, with a radius of 16 inches, that has a square inscribed in it. A dart thrown at random lands inside the circle. To the nearest hundredth, what is the probability that the dart lands in the shaded area?

Extended Response

9. A design for a garden has the shape of a regular octagon. The distance between two parallel sides is 600 centimeters. To the nearest centimeter, what is the perimeter of the design? To the nearest square centimeter, what is its area?
Chapter Standardized Test 12A

Multiple Choice

1. How many faces does a polyhedron have if it has 12 vertices and 30 edges?
   A 14  B 16  C 18  D 20

2. A right cylinder has surface area $1036\pi$ square feet and radius 14 feet. To the nearest hundredth of a foot, what is the height?
   A 5.29 ft  B 23.00 ft  C 31.30 ft  D 98.00 ft

3. Which of the following is the surface area of a rectangular prism whose length is 20 centimeters, whose width is 15 centimeters, and whose height is 10 centimeters?
   A $3000\text{ cm}^2$  B $1300\text{ cm}^2$  C $650\text{ cm}^2$  D $90\text{ cm}^2$

4. To the nearest whole number of cubic inches, what is the volume of a circular cone with a radius of 3.5 inches and a height of 6 inches?
   A $77\text{ in.}^3$  B $132\text{ in.}^3$  C $231\text{ in.}^3$  D $308\text{ in.}^3$

5. A right rectangular prism has width 6 centimeters and length 12 centimeters. Its volume is 1080 cubic centimeters. What is its height?
   A 15 cm  B 21.8 cm  C 28 cm  D 34 cm

6. To the nearest square inch, what is the surface area of a sphere whose radius is 5 inches?
   A $79\text{ in.}^2$  B $100\text{ in.}^2$  C $314\text{ in.}^2$  D $393\text{ in.}^2$

7. The diagram shows a half sphere atop a cone. To the nearest tenth of a cubic inch, what is the volume of the entire solid?
   [Diagram of a half sphere atop a cone with dimensions: radius 2.75 in., height 6 in.]
   A $182.0\text{ in.}^3$  B $91.1\text{ in.}^3$  C $30.7\text{ in.}^3$  D $29.5\text{ in.}^3$

8. The ratio of the lengths of the sides of two cubes is 2 : 5. The smaller cube is 5 centimeters on one edge. To the nearest whole number of cubic units, what is the volume of the larger cube?
   A $391\text{ cm}^3$  B $782\text{ cm}^3$  C $977\text{ cm}^3$  D $1953\text{ cm}^3$

Short Response

9. The volume of a sphere is between $36\pi$ and $288\pi$ inclusive. What can you say about the radius $r$ of the sphere?

Extended Response

10. Two cylindrical tanks have concentric circles as bases. The inner tank has diameter 14 feet. The outer tank wall is 5 feet beyond the inner tank wall. Both tanks are 20 feet tall. To the nearest cubic foot, what is the volume of the space between the inner and outer tanks?
Chapter Standardized Test 12B

Multiple Choice

1. How many edges does a polyhedron have if it has 14 faces and 24 vertices?
   - A 10
   - B 14
   - C 28
   - D 36

2. A right cylinder has surface area $1202\pi$ square centimeters and radius 14 centimeters. To the nearest hundredth of a centimeter, what is the height?
   - A 12.00 cm
   - B 28.93 cm
   - C 36.00 cm
   - D 48.00 cm

3. Which of the following is the surface area of a rectangular prism whose length is 12 feet, whose width is 10 feet, and whose height is 10 feet?
   - A $1200 \text{ ft}^2$
   - B $680 \text{ ft}^2$
   - C $340 \text{ ft}^2$
   - D $64 \text{ ft}^2$

4. Which of the following is the volume of a circular cone with diameter 16 millimeters and height 22.5 millimeters?
   - A $120\pi \text{ mm}^3$
   - B $360\pi \text{ mm}^3$
   - C $480\pi \text{ mm}^3$
   - D $1920\pi \text{ mm}^3$

5. A right rectangular prism has width 5 centimeters and length 15 centimeters. Its volume is 450 cm$^3$. What is its height?
   - A $2\frac{1}{3}$ cm
   - B 6 cm
   - C 8 cm
   - D 20 cm

6. To the nearest square inch, what is the surface area of a sphere whose radius is 4 inches?
   - A 452 in.$^2$
   - B 339 in.$^2$
   - C 201 in.$^2$
   - D 113 in.$^2$

7. The diagram below shows a half sphere atop a cone. To the nearest tenth of a cubic inch, what is the volume of the entire solid?

   ![Diagram of a half sphere atop a cone]

   - A 268.1 in.$^3$
   - B 301.6 in.$^3$
   - C 167.6 in.$^3$
   - D 50.3 in.$^3$

8. The ratio of the lengths of the sides of two cubes is 1 : 4. The smaller cube is 10 meters on an edge. What is the volume of the larger cube?
   - A 400 m$^3$
   - B 4000 m$^3$
   - C 16,000 m$^3$
   - D 64,000 m$^3$

Short Response

9. The volume of a sphere is greater than $288\pi$ and less than $972\pi$. What can you say about the radius $r$ of the sphere?

Extended Response

10. This table shows two sets of measurements used to find the volume of a cylindrical tank.

<table>
<thead>
<tr>
<th>radius</th>
<th>height</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0 ft</td>
<td>6.0 ft</td>
</tr>
<tr>
<td>3.1 ft</td>
<td>6.1 ft</td>
</tr>
</tbody>
</table>

By how much does the greater calculation of volume exceed the smaller calculation of it?
**Building Test-Taking Skills**

For use after Chapters 10–12

---

**Strategies for Answering**

**Extended Response Questions**

**Problem**

A tank contains 30 gallons of water. You pull out the drain plug, and water begins to flow from the tank at a rate of 4 gallons per minute. Make a table and draw a graph that shows the amount of water in the tank as the water drains. After how much time will the tank contain exactly 16 gallons of water? Give your answer in minutes and seconds. Explain how you found your answer.

**Full credit solution**

In the graph, the horizontal axis shows minutes after pulling the plug, and the vertical axis shows the gallons of water in the tank.

The table and graph are correct and reflect an understanding of the problem.

<table>
<thead>
<tr>
<th>minutes</th>
<th>gallons remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

The answer is correct. After 3 minutes and 30 seconds, the tank will contain 16 gallons of water.

The reasoning behind the answer is explained clearly. To find my answer, I looked at the graph and saw that the tank will hold 16 gallons at $3\frac{1}{2}$ minutes. Because $\frac{1}{2}$ of a minute equals 30 seconds, I know that the tank will hold 16 gallons of water after 3 minutes and 30 seconds.
Building Test-Taking Skills  continued
For use after Chapters 10–12

Partial credit solution

The table and graph are correct.

<table>
<thead>
<tr>
<th>minutes</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>gallons</td>
<td>30</td>
<td>26</td>
<td>22</td>
<td>18</td>
<td>14</td>
</tr>
</tbody>
</table>

The answer is incorrect. The tank will hold 16 gallons after 3 minutes and 5 seconds.
The graph shows that there are 16 gallons after 3.5 minutes.

No credit solution

The table is correct, but there is no graph.

<table>
<thead>
<tr>
<th>minutes</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>gallons</td>
<td>30</td>
<td>26</td>
<td>22</td>
<td>18</td>
<td>14</td>
</tr>
</tbody>
</table>

The answer is incorrect. The tank will never have exactly 16 gallons in it, and there is no explanation.

Your turn now

Watch Out! Scoring is often based on how clearly you explain your reasoning.

1. Score one student’s answer to the problem on the previous page as full credit, partial credit, or no credit. Explain your choice. If you choose partial credit or no credit, explain how to change the answer so that it earns full credit.

<table>
<thead>
<tr>
<th>minutes</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>gallons</td>
<td>30</td>
<td>26</td>
<td>22</td>
<td>18</td>
<td>14</td>
</tr>
</tbody>
</table>

The tank will have 16 gallons after 3 minutes and 30 seconds. The table shows that the tank will have 16 gallons between 3 and 4 minutes. 16 is halfway between 14 and 18. So, the tank must have 16 gallons halfway between 3 and 4 minutes. The tank has 16 gallons at 3 minutes and 30 seconds.
Practicing Test-Taking Skills
For use after Chapters 10–12

Extended Response

1. The two spinners shown here are divided into sectors, not all equal in area. Measures of central angles are shown. The radius of the larger spinner is 36 inches, and the radius of the smaller one is 27 inches.

Find the probability that an arrow will land in region A on the larger spinner. Show that the probability of landing in the 40° region is the same regardless of the size of the circle.

2. Jason sketched an isosceles right triangle and the arc of circle C as shown. What is the diameter of the circle? What is the length of the arc? Show your work.

3. A box contains 12 right square pyramids, which are arranged in 3 rows of 4 pyramids per row. The pyramids are as tall as the box, whose height is 5 inches. The figure shows the box from the top. Find the total volume of the pyramids. Show your work.

4. Relationships among the angle measures in polygon ABCDEF are shown here. Find the measures of the angles. Arrange the angles in order from least to greatest. Explain your reasoning.

5. Brian and Emily stand at points X and T, respectively, around circle C, so that m\angle XCT = 140°. Emily looks across the center of the circle at Megan, who is 10 feet away at point Y. What is m\angle TYP? What is m\angle TCP? What is the circumference of the circle? To the nearest 0.25 foot, what is the shortest distance around the circumference of the circle between Brian and Megan? between Brian and Emily? between Megan and Emily? Show your work.
Cumulative Practice
For use after Chapters 10–12

Chapter 10

Multiple Choice In Exercises 1–6, choose the letter of the correct answer.

1. In $\mathcal{C}$, what is the measure of major arc $DGF$? (Lesson 10.2)
   - A $210^\circ$
   - B $200^\circ$
   - C $190^\circ$
   - D $180^\circ$

2. If an angle that has a measure of $36.9^\circ$ is inscribed in a circle, what is the measure of its intercepted arc? (Lesson 10.3)
   - A $18.45^\circ$
   - B $36.9^\circ$
   - C $73.8^\circ$
   - D $143.1^\circ$

3. In the figure below, what is $m\angle DEC$? (Lesson 10.4)
   - A $82^\circ$
   - B $97^\circ$
   - C $100^\circ$
   - D $164^\circ$

4. In the figure showing the circle with center $P$, what is the value of $a$? (Lesson 10.5)
   - A $2$
   - B $\sqrt{2}$
   - C $1$
   - D $\frac{1}{\sqrt{2}}$

5. Which of the following equations represents a circle with a center at $(12, -9)$ and a diameter of 31? (Lesson 10.6)
   - A $(x - 18)^2 + (y + 3)^2 = 961$
   - B $(x - 12)^2 + (y + 9)^2 = 961$
   - C $(x - 3)^2 + (y + 3)^2 = 240.25$
   - D $(x - 12)^2 + (y + 9)^2 = 240.25$

6. Circles $A$ and $B$ are externally tangent. The radius of circle $A$ is 9, and the radius of circle $B$ is 2.5. Which describes the set of all points in the coordinate plane $AB$ units from $B$? (Lesson 10.7)
   - A $y = 11.5$
   - B a circle with center $B$ and radius 6.5 cm
   - C a circle with center $B$ and radius 11.5 cm
   - D the two points where a circle centered at $A$ with radius $AB$ intersects with circle $B$

7. Short Response To the nearest tenth of a unit, what is the diameter of a circle centered at $(9, 7)$ and containing the point $(-3, 3)$? (Lesson 10.6)

8. Extended Response In $\mathcal{J}$, $\overline{JH}$ and $\overline{JK}$ are radii and $L$ is located so that $\overrightarrow{HL}$ and $\overrightarrow{KL}$ are two different tangents to $\mathcal{J}$. (Lesson 10.1)
   a. What type of quadrilateral is $HJKL$?
   b. Make a sketch and explain how to prove that your answer is correct.
Cumulative Practice
For use after Chapters 10–12

Chapter 11

Multiple Choice In Exercises 9–14, choose the letter of the correct answer.

9. The measures of four angles in a convex pentagon are $53^\circ$, $97^\circ$, $102^\circ$, and $120^\circ$. What is the measure of the fifth angle? (Lesson 11.1)
   \( \text{A} \) $72^\circ$ \hfill \( \text{B} \) $120^\circ$ \hfill \( \text{C} \) $168^\circ$ \hfill \( \text{D} \) $176^\circ$

10. In the figure below, what is the area of the regular octagon? (Lesson 11.2)

   \begin{align*}
   \text{A} & \quad 1344 \text{ cm}^2 \\
   \text{B} & \quad 1400 \text{ cm}^2 \\
   \text{C} & \quad 2688 \text{ cm}^2 \\
   \text{D} & \quad 4655 \text{ cm}^2
   \end{align*}

11. To the nearest hundredth of a centimeter, what is the length of a side of an equilateral triangle whose area is $72 \text{ cm}^2$? (Lesson 11.2)
   \( \text{A} \) $12.15 \text{ cm}$ \hfill \( \text{B} \) $12.89 \text{ cm}$ \hfill \( \text{C} \) $14.79 \text{ cm}$ \hfill \( \text{D} \) $16.45 \text{ cm}$

12. The perimeter of rectangle $ABCD$ is 42 inches. The lengths of the sides of a similar rectangle $EFGH$ are 10.5 inches and 21 inches. What is the ratio of the area of $ABCD$ to the area of $EFGH$? (Lesson 11.3)
   \( \text{A} \) $2 : 3$ \hfill \( \text{B} \) $3 : 7$ \hfill \( \text{C} \) $4 : 9$ \hfill \( \text{D} \) $5 : 6$

13. Circle $C$ with diameter $DG$ is shown in the figure below. To the nearest hundredth of a centimeter, what is the length of arc $DF$? (Lesson 11.4)

   \( \text{A} \) $2.62 \text{ cm}$ \hfill \( \text{B} \) $7.85 \text{ cm}$ \hfill \( \text{C} \) $13.09 \text{ cm}$ \hfill \( \text{D} \) $32.71 \text{ cm}$

14. To the nearest hundredth of a foot, what is the radius of a circular sector whose area is 45 square feet and that intercepts an arc with measure $25^\circ$? (Lesson 11.5)
   \( \text{A} \) $7.18 \text{ ft}$ \hfill \( \text{B} \) $11.34 \text{ ft}$ \hfill \( \text{C} \) $12.46 \text{ ft}$ \hfill \( \text{D} \) $14.36 \text{ ft}$

15. Short Response The price of a rectangular rug that measures 6 feet by 8 feet is $110. Based on area alone, what is the cost for the same type of rug that is 18 feet by 24 feet? (Lesson 11.3)

16. Extended Response Circles $A$ and $B$ with radii 2 inches and 3 inches, respectively, lie inside circle $C$ whose radius is 10 inches. The interiors of circles $A$ and $B$ have no points in common. (Lesson 11.6)
   a. As a percent, what is the probability that a dart lands inside circle $C$ but outside each of circles $A$ and $B$?
   b. What is the radius of a circle that has an area equivalent to the area inside circle $C$ but outside circles $A$ and $B$?
Cumulative Practice
For use after Chapters 10–12

Chapter 12
Multiple Choice In Exercises 17–21, choose the letter of the correct answer.

17. The length and width of a right rectangular prism whose surface area is 292 square centimeters are 4 centimeters and 5 centimeters, respectively. What is the height of the prism? (Lesson 12.2)
   A 7 cm  B 9 cm  C 14 cm  D 18 cm

18. In the figure below, the pyramid is a right pyramid with a square base. Which of the following represents its surface area? (Lesson 12.3)
   \[
   \text{A} \quad 1040 \text{ m}^2 \\
   \text{B} \quad 1240 \text{ m}^2 \\
   \text{C} \quad 1440 \text{ m}^2 \\
   \text{D} \quad 2480 \text{ m}^2
   \]

19. A round sports ball has a radius of 2.5 inches. If you add more air to the ball until its radius equals 5 inches, which of the following statements is true? (Lesson 12.6)
   A The surface area of the inflated ball is 2 times greater.
   B The volume of the inflated ball is 4 times greater.
   C The volume of the inflated ball is 2 times greater.
   D The surface area of the inflated ball is 4 times greater.

20. To the nearest cubic foot, what is the volume of a right circular cone whose circular base has a diameter of 12 feet and whose height is 12 feet? (Lesson 12.5)
   A 144 ft\(^3\)  B 452 ft\(^3\)  C 576 ft\(^3\)  D 904 ft\(^3\)

21. In the figure below, what is the ratio of the volume of the larger cone to the volume of the smaller cone? (Lesson 12.7)
   \[
   \text{A} \quad 1 \text{ to } 1.75^3 \\
   \text{B} \quad 1.75^3 \text{ to } 1 \\
   \text{C} \quad 1.75^2 \text{ to } 1 \\
   \text{D} \quad 1.75 \text{ to } 1
   \]

22. Short Response Name the plane figure that is formed by intersecting a cube with a plane that passes through a pair of opposite faces and is parallel to the face that intersects those opposite faces. (Lesson 12.1)

23. Extended Response Suppose you require a cylindrical container that will hold 1 liter, or 1000 cubic centimeters, of drinking water for a mountain-climbing adventure. (Lesson 12.4)
   a. Write an equation for the height \(h\) in terms of the radius \(r\).
   b. What radius and height would you choose? Explain your thinking.
Post-Course Test

1. Given $R(-3, 1), S(0, -1),$ and $T(3, -2),$ what are the lengths of $RS$ and $ST$?
   \( \text{A} \) $RS = \sqrt{5}$ and $ST = \sqrt{6}$  
   \( \text{B} \) $RS = \sqrt{13}$ and $ST = \sqrt{10}$  
   \( \text{C} \) $RS = 9$ and $ST = 9$  
   \( \text{D} \) $RS = 3$ and $ST = 9$

2. $BD$ is the bisector of $\angle ABC.$ What is the measure of $\angle ABC$?
   \( \text{A} \) 29°  
   \( \text{B} \) 30.5°  
   \( \text{C} \) 61°  
   \( \text{D} \) 122°

3. The length of a rectangle is 12 centimeters, and its perimeter is 38 centimeters. What is its width?
   \( \text{A} \) 6 cm  
   \( \text{B} \) 7 cm  
   \( \text{C} \) 12 cm  
   \( \text{D} \) 14 cm

4. Given the statement below, which of the related statements are true?

   \text{If two angles are complementary, then the sum of their measures is 90°.}

   \( \text{A} \) only the conditional statement and its converse  
   \( \text{B} \) only the conditional statement and its contrapositive  
   \( \text{C} \) only the conditional statement, its converse, and its inverse  
   \( \text{D} \) the conditional statement, its converse, its inverse, and its contrapositive

5. In the figure below, $JK \equiv KL$ and $KL \equiv LM.$ What is the length of $KL$?

   \( \text{A} \) 42  
   \( \text{B} \) 28  
   \( \text{C} \) 14  
   \( \text{D} \) 7

6. Given that $m \angle 1 = m \angle 3 = 32^\circ$ and $HJ \perp HK,$ what is the measure of $\angle 2$?

   \( \text{A} \) 26°  
   \( \text{B} \) 32°  
   \( \text{C} \) 36°  
   \( \text{D} \) 64°

7. What is an equation of the line parallel to the line with equation $3x - y = 2$ that has a $y$-intercept of 4?
   \( \text{A} \) $y = 3x - 12$  
   \( \text{B} \) $y = -3x + 4$  
   \( \text{C} \) $y = 3x + 4$  
   \( \text{D} \) $y = 3x - 4$

8. Which of the following equations represents a line perpendicular to the line with equation $x - 2y = -4$?
   \( \text{A} \) $y = -2x - 1$  
   \( \text{B} \) $y = 2x - 2$  
   \( \text{C} \) $y = \frac{1}{2}x + 2$  
   \( \text{D} \) $y = \frac{1}{2}x - 1$
9. One of the acute angles of a right triangle is four times larger than the other. What are the measures of the two angles?
   A 14° and 76°
   B 18° and 72°
   C 24° and 66°
   D 30° and 60°

10. Given that \( m \angle A = 49^\circ \) and \( m \angle F = 63^\circ \), what is \( m \angle E \)?
   A 49°
   B 63°
   C 68°
   D 111°

11. In the figure below, what postulate or theorem would you use to prove that \( \triangle WXY \cong \triangle WZY \)?
   A Hinge Theorem
   B Converse of the Hinge Theorem
   C ASA Congruence Postulate
   D SAS Congruence Postulate

12. The vertices of the sides of \( \triangle RST \) have coordinates \( R(-1, 1), S(3, 1), \) and \( T(5, 5) \). Which of the following coordinates describe a point on a midsegment of \( \triangle RST \)?
   A (0, 1)
   B (4, 3)
   C (5, 1)
   D (5, 3)

13. The lengths of the sides of a triangle are 17 centimeters, 24 centimeters, and \( a \) centimeters. Which of the following statements is true?
   A \( a = 7 \)
   B \( a = 41 \)
   C \( 17 < a < 24 \)
   D \( 7 < a < 41 \)

14. In quadrilateral \( ABCD \), \( m \angle B = 72^\circ \) and \( m \angle B = m \angle C = m \angle D \). What is \( m \angle A \)?
   A 72°
   B 144°
   C 184°
   D 220°

15. In the parallelogram below, if \( JH = 7.25 \) and \( MH = 6 \), which of the following statements is true?
   A \( KH = 7.25 \) and \( LH = 6 \)
   B \( KH = 9 \) and \( LH = 11 \)
   C \( KM = 12 \) and \( JL = 14.5 \)
   D \( KM = 13.25 \) and \( JL = 13.25 \)

16. In the figure below, \( MN \) is the midsegment of trapezoid \( TRAP \). What is the length of \( MN \)?
   A 30
   B 24
   C 9
   D 2

17. Which most precisely describes the quadrilateral whose vertices are \( A(-1, -2), B(2, 1), C(5, -2), \) \( D(2, -5) \)?
   A parallelogram
   B trapezoid
   C rectangle
   D square
18. The area of a rhombus is 45 square centimeters. If one diagonal is 9 centimeters long, what is the length of the other diagonal?
   \[ \text{A} \quad 5 \text{ cm} \quad \text{B} \quad 9 \text{ cm} \]
   \[ \text{C} \quad 10 \text{ cm} \quad \text{D} \quad 13.5 \text{ cm} \]

19. \( EF \) has endpoints \( E(-3, -2) \) and \( F(2, 4) \). What are the endpoints of \( EF' \), the image of \( EF \) under a reflection in the line \( y = 1 \)?
   \[ \text{A} \quad E'(-3, 4) \text{ and } F'(2, -2) \]
   \[ \text{B} \quad E'(-3, -1) \text{ and } F'(-2, -1) \]
   \[ \text{C} \quad E'(3, -2) \text{ and } F'(-2, -4) \]
   \[ \text{D} \quad E'(-4, 1) \text{ and } F'(1, 3) \]

20. What is the component form of the vector whose initial point is \( A(32, -12) \) and whose terminal point is \( B(-8, -21) \)?
   \[ \text{A} \quad (-40, -9) \quad \text{B} \quad (-24, 33) \]
   \[ \text{C} \quad (24, -33) \quad \text{D} \quad (4, 11) \]

21. An 11 inch by 14 inch rectangular photograph is reduced so that its new perimeter is 30 inches. What are the dimensions of the new photograph?
   \[ \text{A} \quad 3 \text{ inches by } 5 \text{ inches} \]
   \[ \text{B} \quad 5.5 \text{ inches by } 7 \text{ inches} \]
   \[ \text{C} \quad 6.6 \text{ inches by } 8.4 \text{ inches} \]
   \[ \text{D} \quad 7 \text{ inches by } 8 \text{ inches} \]

22. The sides of \( \triangle HJK \) have lengths 7, 8, and 14. Which set of numbers could be the lengths of the sides of a triangle similar to \( \triangle HJK? \)
   \[ \text{A} \quad 9, 10, \text{ and } 16 \]
   \[ \text{B} \quad 12.5, 16, \text{ and } 25.5 \]
   \[ \text{C} \quad 15, 16, \text{ and } 20 \]
   \[ \text{D} \quad 17.5, 20, \text{ and } 35 \]

23. In the diagram below, what is the value of \( a \)?
   \[ \begin{align*}
   \text{A} \quad 5 \\
   \text{B} \quad 7 \\
   \text{C} \quad 8.6 \\
   \text{D} \quad 15
   \end{align*} \]

24. A segment has endpoints \( A(9, 18) \) and \( B(-3, -3) \). What are the coordinates of the endpoints \( A' \) and \( B' \) of \( A'B' \), the image of \( AB \) under a dilation with center at the origin and scale factor \( \frac{1}{3} \)?
   \[ \text{A} \quad A'(-2, 4) \text{ and } B'(-3, -1) \]
   \[ \text{B} \quad A'(3, 6) \text{ and } B'(-1, -1) \]
   \[ \text{C} \quad A'(3, 6) \text{ and } B'(6, -3) \]
   \[ \text{D} \quad A'(27, 54) \text{ and } B'(-9, -9) \]

25. In the figure below, what are the values of \( x \) and \( y \)?
   \[ \begin{align*}
   \text{A} \quad x = 6 \text{ and } y = \sqrt{10} \\
   \text{B} \quad x = 6 \text{ and } y = 12 \\
   \text{C} \quad x = 6 \text{ and } y = 10 \\
   \text{D} \quad x = 8 \text{ and } y = 12
   \end{align*} \]

26. In a right triangle, one leg is 7 feet long and the hypotenuse is 25 feet long. How long is the second leg?
   \[ \begin{align*}
   \text{A} \quad 7 \text{ ft} \\
   \text{B} \quad 18 \text{ ft} \\
   \text{C} \quad 24 \text{ ft} \\
   \text{D} \quad 25 \text{ ft}
   \end{align*} \]
27. The length of the hypotenuse of a 45°-45°-90° triangle is 2 meters. What are the lengths of the legs?

(A) \( \sqrt{3} \) m  
(B) \( \sqrt{2} \) m  
(C) \( \frac{\sqrt{2}}{2} \) m  
(D) 1 m

28. The length of the legs of a right triangle are 5 and 12. The length of its hypotenuse is 13. What is the tangent of the smaller acute angle?

(A) \( \frac{12}{13} \)  
(B) \( \frac{13}{12} \)  
(C) \( \frac{5}{12} \)  
(D) \( \frac{5}{13} \)

29. In the figure below, what are the approximate values of \( QR, QS \), and \( y \)?

(A) \( QR = 10.2, QS = 7.4 \) and \( y = 36 \)  
(B) \( QR = 10.2, QS = 8.3 \) and \( y = 36 \)  
(C) \( QR = 10.2, QS = 7.4 \) and \( y = 54 \)  
(D) \( QR = 10.2, QS = 8.3 \) and \( y = 54 \)

30. Point \( P \) is in the exterior of circle \( M \), and \( PA \) and \( PB \) are tangent to circle \( M \). Which of the following statements is always true?

(A) \( APBM \) is a rhombus.  
(B) \( m\angle AMB < 180^\circ \)  
(C) \( AB \equiv PM \)  
(D) \( PM = 2(AM) \)

31. In the figure below, \( GK \) is a diameter of circle \( R \). What is the measure of \( GKJ \)?

(A) 274°  
(B) 227°  
(C) 188°  
(D) 94°

32. Find the length of a chord that is 5 centimeters from the center of a circle with a diameter 26 centimeters.

(A) 6 cm  
(B) 12 cm  
(C) 18 cm  
(D) 24 cm

33. Which of the following statements best defines the set of all points in the coordinate plane equidistant from \( A(-1, 2) \) and \( B(3, 2) \) and exactly four units from \( B \)?

(A) the line \( x = 1 \)  
(B) the circle with center \( B \) and radius 4  
(C) two points where circle \( A \) with radius 4 intersects line \( x = 2 \)  
(D) two points where circle \( B \) with radius 4 intersects line \( x = 1 \)

34. Each interior angle of a regular polygon measures 168°. How many sides does the polygon have?

(A) 12  
(B) 24  
(C) 30  
(D) 44
35. The floor of a gazebo forms a regular octagon. The length of a side of the octagon is 6 meters. What is the approximate area of the floor?
   A 165 m²   B 174 m²   C 192 m²   D 254 m²

36. The ratio of the lengths of the sides of \( \triangle ABC \) to the corresponding sides of a similar \( \triangle DEF \) is 10 : 4, and the area of \( \triangle ABC \) is 400 square inches. What is the area of \( \triangle DEF \)?
   A 160 in.²   B 100 in.²   C 64 in.²   D 32 in.²

37. The endpoints of a diameter of a circle are (1, 5) and (1, 18). To the nearest tenth, what is the circumference of the circle?
   A 13.9 units   B 20.4 units   C 22.9 units   D 40.8 units

38. In the isosceles trapezoid below, what is the probability that a randomly chosen point in the figure lies in the shaded region?
   \[
   \begin{array}{c}
   \text{3} \\
   \hline
   \text{8} \\
   \text{5} \\
   \text{3}
   \end{array}
   \]
   A \( \frac{3}{11} \)   B \( \frac{3}{8} \)   C \( \frac{3}{4} \)   D \( \frac{8}{11} \)

39. A solid has 24 faces and 76 edges. How many vertices does the solid have?
   A 52   B 54   C 78   D 102

40. To the nearest square inch, what is the surface area of a right cylinder with radius 3 inches and height 18 inches?
   A 198 in.²   B 283 in.²   C 396 in.²   D 509 in.²

41. What is the volume of the right rectangular prism?
   \[
   \begin{array}{c}
   \text{4 cm} \\
   \hline
   \text{6 cm} \\
   \text{11 cm}
   \end{array}
   \]
   A 132 cm³   B 264 cm³   C 315 cm³   D 528 cm³

42. A right cone has radius 7 feet and height 22 feet. To the nearest ten cubic feet, what is the volume of the right cone?
   A 1130 ft³   B 1520 ft³   C 1690 ft³   D 3390 ft³
Test-Taking Tips for Students
For use before the End-of-Course Practice Tests A & B

Test-Taking Strategies
To do a task well, you need both competence and confidence. A person playing the guitar for the first time will not sound like a professional, but even a talented guitarist may perform poorly if he or she is tense and worried.

To perform well on a test, you must have the necessary knowledge and problem-solving skills—you must be competent in the subject matter. The most important part of test preparation comes from your everyday work during the school year. If you keep up with your homework, pay attention and ask questions in class, and work to understand each new topic as it comes up, you will develop the knowledge you need to perform well on tests. However, there are strategies that will help you apply your knowledge efficiently and avoid obstacles.

You also need to feel confident in your test-taking abilities. While success itself is the best confidence booster, there are some simple things you can do that will help you go into a test feeling relaxed and self-assured.

Before the Test
It is difficult to do well on a test when you are tired, hungry, and nervous. The following strategies will help you be at your best when the test begins.

Take one or more practice tests. Taking a practice test is like rehearsing for a play or going to basketball practice. Practice tests help you understand what the real thing will be like and help you identify areas you may need work on.

Get a full night's sleep. Don't stay up too late the night before an important test, even if you are trying to do last-minute “cramming.” A good night’s sleep will help you concentrate during the test.

Eat a good breakfast. You need a healthy breakfast to be alert and resourceful during a test, especially a long one.

Be on time, and be prepared. It’s hard to do your best on a test when you arrive 5 minutes late and without a pencil. (It’s also difficult for your classmates to concentrate while you look for an empty desk!) Being on time will give you a few moments to relax before the test begins.

Choose a good seat. Will you be distracted if you sit near a corner or by your friends? Is there a noisy heater along one wall? Select a comfortable place away from distractions.

Be positive. Try not to be intimidated by a test, even one that is especially important. Go into the room ready to show off how much you know.

During the Test
To do your best on a test, you need to work steadily and efficiently. The following ideas will help you keep on track.

Read questions carefully. Before you begin to answer a question, read it completely. Key information may come at the end of the question. Reread the question if you are not sure you understand what it is asking.

Don't read the answers too soon. Whenever possible, answer the question before looking at the answer choices. Even if you cannot come up with the answer right away, your first try may help you understand the question better and eliminate some answers.

Read all choices before marking your answer. Be sure you know all of your options before choosing an answer. If you are having difficulty understanding a question, the answer choices may help you understand what that question is asking.

Pace yourself. Don’t try to go through the test as quickly as you can—this can lead to careless mistakes. Work steadily.

Don't get distracted. Resist the temptation to look up every time you hear a rustling paper or a scooting desk. Focus on your paper and your thought process.

Don't look for patterns. Especially on standardized tests, there is no way to tell what answer comes next by looking at previous answers. Don't waste precious time looking for a pattern that isn’t there.

Mark your answer sheet carefully. Take a moment to make sure you mark your answer in the correct place. This is especially important if you skip one or more problems. When answering multiple-choice tests, be sure to fill in the bubble completely and, if you change an answer, to erase all traces of your old mark.
Test-Taking Tips for Students continued

For use before the End-of-Course Practice Tests A & B

Check your answers. If you have time, go back and check your answers, filling in answers to any problems you may have skipped. However . . .

Be SURE before you change an answer. Your first answer is usually your best answer. Don’t change an answer unless you are certain the original answer is incorrect.

If you get stuck, it is important to stay relaxed and confident even if you struggle with some problems. (Even the best test-takers are stumped occasionally!) The following tips will help you work through any temporary setbacks.

Stay calm. Realize that this is only a small part of the test. Don’t let a momentary obstacle affect your confidence.

Don’t spend too much time on one problem. If you find a problem especially difficult, move on to others that are easier for you. Make the best guess you can and go on, or skip the problem entirely and return to it later if time permits.

Make an educated guess. If you know some of the answer choices are wrong, eliminate those and make the best guess you can from the rest.

Example The perimeter of a parallelogram is 136. The ratio of the lengths of the sides is 7 : 10. What are the lengths of the sides?

A 14 and 20
B 21 and 30
C 28 and 40
D 35 and 50

Since the perimeter is 136, half the perimeter is 68. The two numbers in each answer choice must add up to 68.

You can eliminate answer choices A and B because the numbers are too small. You can eliminate answer choice D because the numbers are too large. Answer C is correct because 28 : 40 is in the ratio of 7 : 10, and $28 + 40 + 28 + 40 = 136$.

Work backward. If you are having a difficult time with a problem, you may be able to substitute the answers into the problem and see which one is correct.

Watch for negative questions. Sometimes you are asked to find a statement that is not true. In this case, answer choices that are true statements should not be chosen.

Example The triangles shown are similar. Which of the following is not a correct statement?

A $\triangle ABC \approx \triangle DEF$
B $\frac{EF}{BC} = \frac{DF}{AC}$
C $\frac{AB}{DE} = \frac{AC}{EF}$
D $\frac{AB}{BC} = \frac{DE}{EF}$

Answer choices A, B, and D are true, so they may be eliminated. Answer choice C is the correct answer, because C is false; the listed sides do not correspond.

On open-ended problems, be sure your answer covers all that is being asked. Show all of your work and explain your steps or reasoning. Include a diagram if necessary. After you finish your answer, go back and reread the question to make sure you have not left anything out.

After the Test

Reward yourself. If possible, take some time to relax after the test.

Make a plan for the next test. Review what you did before and during the test. Decide which techniques and strategies worked well for you and which ones were not helpful. Think about what you will do differently next time.

Learn from the test. Find out what types of problems caused you the most difficulty and what types you did well on. This will help you prepare for future tests.

Build your confidence for next time. Even if the test did not go well, there are probably some areas where you did succeed. Congratulate yourself on what you did well, and resolve to learn from your mistakes.
## Answer Sheet for Practice Test A

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>7</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>8</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>9</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>10</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>11</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>12</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>15</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>16</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>17</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>18</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>19</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>20</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>21</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>22</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>23</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>24</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>27</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>28</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>29</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>30</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>31</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>32</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>33</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>34</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>35</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>36</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>39</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>40</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>41</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>42</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>43</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>44</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>45</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>46</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>47</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>48</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>51</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>52</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>53</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>54</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>55</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>56</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>57</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>58</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>59</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>60</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>63</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>64</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>65</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>66</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>67</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>68</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>69</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>70</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>71</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>72</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
Answer Sheet for Practice Test B

1 A A C D 13 A B C D 25 A B C D 37 A B C D 49 A B C D 61 A B C D
2 A A C D 14 A B C D 26 A B C D 38 A B C D 50 A B C D 62 A B C D
3 A A C D 15 A B C D 27 A B C D 39 A B C D 51 A B C D 63 A B C D
4 A A C D 16 A B C D 28 A B C D 40 A B C D 52 A B C D 64 A B C D
5 A A C D 17 A B C D 29 A B C D 41 A B C D 53 A B C D 65 A B C D
6 A A C D 18 A B C D 30 A B C D 42 A B C D 54 A B C D 66 A B C D
7 A A C D 19 A B C D 31 A B C D 43 A B C D 55 A B C D 67 A B C D
8 A A C D 20 A B C D 32 A B C D 44 A B C D 56 A B C D 68 A B C D
9 A A C D 21 A B C D 33 A B C D 45 A B C D 57 A B C D 69 A B C D
10 A A C D 22 A B C D 34 A B C D 46 A B C D 58 A B C D 70 A B C D
11 A A C D 23 A B C D 35 A B C D 47 A B C D 59 A B C D 71 A B C D
12 A A C D 24 A B C D 36 A B C D 48 A B C D 60 A B C D 72 A B C D
End-of-Course Practice Test A

1. Points $K$ and $L$ lie in plane $P$, and point $N$ does not lie in plane $P$. What is the intersection of plane $P$ and the plane that contains points $K$, $L$, and $N$?
   - A $KL$
   - B $KN$
   - C $LN$
   - D The planes do not intersect.

2. Points $A$, $B$, and $C$ are contained in an infinite number of planes. Which of the following statements is true?
   - A $A$, $B$, and $C$ are collinear.
   - B $A$, $B$, and $C$ are not collinear.
   - C $\overline{AB}$ and $\overline{AC}$ are perpendicular.
   - D $\overline{AB}$ and $\overline{BC}$ are perpendicular.

3. In the figure below, $\overline{QS}$ bisects $\angle PQR$. What is $m\angle PQS$?

   - A $30^\circ$
   - B $36^\circ$
   - C $54^\circ$
   - D $108^\circ$

4. In the figure, what is $m\angle BJD$?

   - A $30^\circ$
   - B $60^\circ$
   - C $100^\circ$
   - D $150^\circ$

5. $\angle P$ and $\angle Q$ are complementary angles. If $m\angle P = 75^\circ$, what is $m\angle Q$?
   - A $15^\circ$
   - B $25^\circ$
   - C $90^\circ$
   - D $105^\circ$

6. A rectangular card is cut along $\overline{AB}$ and $\overline{BC}$ as shown below. What is the area of $\triangle ABC$?

   - A $5.83$ in.$^2$
   - B $7.5$ in.$^2$
   - C $8$ in.$^2$
   - D $15$ in.$^2$
7. What is the contrapositive of the following statement?

*If two angles are not complementary, then the sum of their measures does not equal 90°.*

A If two angles are complementary, then the sum of their measures equals 90°.

B If two angles are not complementary, then the sum of their measures equals 90°.

C If the sum of the measures of two angles equals 90°, then the angles are complementary.

D If the sum of the measures of two angles equals 90°, then the angles are not complementary.

8. Given the statement below, which of the related statements are true?

*If the sum of the measures of two angles is 180°, then the angles are supplementary.*

A only the conditional statement

B only the conditional statement and its contrapositive

C only the conditional statement, its converse, and its inverse

D the conditional statement, its converse, its inverse, and its contrapositive

9. If $m\angle 1$ is $35°$, $\angle 1$ and $\angle 2$ are complementary, $m\angle 2 = m\angle 3$, and $m\angle 3 = m\angle 4$, what is $m\angle 4$?

A $35°$

B $55°$

C $90°$

D $145°$

10. What can you conclude if you know $m\angle P + m\angle Q = m\angle R + m\angle Q$?

A $m\angle P = m\angle Q$

B $m\angle P = m\angle R$

C $m\angle Q = m\angle R$

D $\angle P$ and $\angle R$ are supplementary.

11. Point $Q$ is the midpoint of $\overline{PR}$. $PQ = 2x + 1$ and $QR = 3x - 6$. What is $PR$?

A 7

B 14

C 15

D 30

12. $\angle AXB$ and $\angle BXC$ are adjacent, complementary angles, and $\angle BXC$ and $\angle CXD$ are adjacent, supplementary angles. Which statement is true?

A $\angle AXB$ and $\angle BXC$ are vertical angles.

B $\angle AXB$ and $\angle CXD$ are vertical angles.

C $\angle CXD$ and $\angle DXA$ are supplementary.

D $\angle DXA$ and $\angle AXB$ are supplementary.
13. What do you need to know to conclude that \( m \angle 1 = m \angle 4 \)?

A Line \( a \) is parallel to line \( b \).
B Line \( a \) is parallel to line \( c \).
C Line \( a \) is perpendicular to line \( c \).
D Line \( b \) is perpendicular to line \( c \).

14. Lines \( j \), \( k \), \( m \), and \( n \) lie in a plane. You know line \( j \) is perpendicular to line \( n \), line \( m \) is perpendicular to line \( n \), and line \( k \) is parallel to line \( m \). What can you conclude?

A Line \( n \) is parallel to line \( k \).
B Line \( j \) is perpendicular to line \( m \).
C Line \( k \) is perpendicular to line \( j \).
D Line \( j \) is parallel to line \( k \).

15. If \( m \angle F = 60^\circ \), what is \( m \angle FKL \)?

A 30°
B 60°
C 120°
D 150°

16. Which of the following is an equation of a line parallel to the line with the equation \( 3y = -\frac{5}{2}x + 4 \)?

A \( y = -\frac{5}{2}x + 7 \)
B \( 3y = -\frac{2}{5}x + 4 \)
C \( y = -\frac{5}{6}x + 7 \)
D \( 4y = -\frac{5}{6}x + 3 \)

17. Which of the following is an equation of a line parallel to the one shown?

A \( 2x - 2y = 3 \)
B \( -3x + y = 2 \)
C \( x - y = -3 \)
D \( -2x - y = -9 \)

18. Which of the following is an equation of a line perpendicular to the line with equation \( 2y = -x + \frac{2}{3} \)?

A \( 2y = x + \frac{2}{3} \)
B \( y = 2x - 6 \)
C \( y = x - 3 \)
D \( 6y = 3x + 2 \)
19. If \( m\angle A = 60^\circ \) and \( m\angle B = 60^\circ \), what is the measure of \( \angle BCD \)?

20. In the figure, what is the value of \( x \)?

21. Suppose \( \triangle PQR \cong \triangle ZYX \). Which statement can you conclude?

22. In the figure below, \( B \) is the midpoint of \( AE \), and \( m\angle A = m\angle E \). Which of the following cannot be proven without more information?

23. In the figure below, \( C \) is the midpoint of \( BE \), \( m\angle B = m\angle E \), and \( AB = DE \). What is the measure of \( \angle ACB \)?

24. In the figure below, \( \angle K \cong \angle M \). What is the length of \( NK \)?
25. Points C and D are on the perpendicular bisector of \(AB\). Which statement can you conclude?

A \(AB = CD\)  
B \(AC = AD\)  
C \(CB = DB\)  
D \(AC = CB\)

26. In the figure below, \(P\) is the centroid of \(\triangle DEF\), and \(PG = 4\). What is \(EG\)?

![Diagram with labeled points D, E, F, G, H, P, and K]

A 8  
B 12  
C 16  
D \(EG\) cannot be determined.

27. A triangle has a perimeter of 24 inches. What is the perimeter of the triangle formed by its midsegments?

A 6 in.  
B 8 in.  
C 12 in.  
D 24 in.

28. In \(\triangle ABC\), \(AB < BC\) and \(BC < AC\). Which of the following is true?

A \(\angle A < \angle C\) and \(\angle B < \angle C\)  
B \(\angle A < \angle C\) and \(\angle B < \angle A\)  
C \(\angle A < \angle B\) and \(\angle C < \angle A\)  
D \(\angle A < \angle B\) and \(\angle A < \angle C\)

29. In \(\triangle ABC\), \(AB = x + 3\), \(AC = x + 2\), and \(BC = 23\). Which of the following is a possible value of \(x\)?

A 7  
B 8  
C 9  
D 10

30. \(\angle ABC\) and \(\angle CBD\) are adjacent angles, \(m\angle ABC = 60^\circ\), and \(m\angle CBD = 50^\circ\). Also, \(BA = BC = BD\). Which statement is true?

A \(AC > AB\)  
B \(AC > BD\)  
C \(AC > CD\)  
D \(AC > DA\)
31. A quadrilateral has interior angles with measures \(x^\circ, 2x^\circ, 3x^\circ,\) and \(4x^\circ\). What is the value of \(x^\circ\)?

A 40  
B 36  
C 20  
D 18

32. In parallelogram \(QRST\), \(QS = 4y - 3\) and \(RT = 2y + 6\), and \(RT = 2(QS)\). What is \(QS\)?

A 2  
B 5  
C 10  
D 12

33. In the figure, \(RHMB\) is a rhombus. What is \(m\angle B\)?

A 151°  
B 122°  
C 119°  
D 110°

34. Quadrilateral \(KITE\) is a kite. If \(m\angle KTI = 22^\circ\), what is \(m\angle ITE\)?

35. \(UVWX\) is a trapezoid with midsegment \(YZ\). What is the length of \(UV\)?

A 25  
B 20  
C 18  
D 12

36. A rhombus has diagonals of length 20 centimeters and 40 centimeters. What is the area of the rhombus?

A 800 cm\(^2\)  
B 600 cm\(^2\)  
C 400 cm\(^2\)  
D More information is needed to determine the area.
End-of-Course Practice Test A continued

37. \( \triangle PQR \) is transformed by an isometry to \( \triangle P'Q'R' \). What statement is always true?
   A. \( PP' = QQ' \)
   B. \( m\angle PQR = m\angle P'Q'R' \)
   C. \( \triangle PQR \cong \triangle R'Q'P' \)
   D. \( P = P' \)

38. What are the coordinates of the images of \( A(2, -7) \) and \( B(-5, 4) \) after a reflection in the y-axis?
   A. \( A'(-7, 2), B'(4, -5) \)
   B. \( A'(-2, 7), B'(5, -4) \)
   C. \( A'(-2, -7), B'(5, 4) \)
   D. \( A'(2, 7), B'(-5, -4) \)

39. Lines \( j \) and \( k \) intersect at point \( P \) to form angles measuring 45° and 135°. \( \triangle ABC \) is reflected in line \( j \) and the image \( \triangle A'B'C' \) is reflected in line \( k \) to create \( \triangle A''B''C'' \). What transformation maps \( \triangle ABC \) to \( \triangle A''B''C'' \)?
   A. reflection in the line that bisects the 45° angles
   B. reflection in the line that bisects the 135° angles
   C. 22.5° rotation about \( P \)
   D. 90° rotation about \( P \)

40. What is the coordinate notation for a translation 4 units down and 2 units to the left?
   A. \((x, y) \rightarrow (x - 4, y - 2)\)
   B. \((x, y) \rightarrow (x - 2, y - 4)\)
   C. \((x, y) \rightarrow (4 - x, 2 - y)\)
   D. \((x, y) \rightarrow (2 - x, 4 - y)\)

41. The vertices of \( \triangle JKL \) are \( J(2, 1), K(6, 5), \) and \( L(7, 0) \). What transformation does the matrix sum below represent?
   \[
   \begin{bmatrix}
   2 & 6 & 7 \\
   1 & 5 & 0 \\
   0 & 0 & 0 
   \end{bmatrix}
   +
   \begin{bmatrix}
   3 & 3 & 3 \\
   0 & 0 & 0 
   \end{bmatrix}
   \]
   A. reflection in \( x = 3 \)
   B. 30° rotation
   C. translation 3 units to the right
   D. dilation with scale factor 3

42. Quadrilateral \( ABCD \) undergoes the glide reflection described below. What are the coordinates of \( B', C', \) and \( D' \)?
   Translation: \((x, y) \rightarrow (x + 4, y)\)
   Reflection: in the \( x \)-axis

   \[
   \begin{array}{c}
   \begin{array}{c}
   A(1, 2) \\
   B(2, 4) \\
   C(6, 4) \\
   D(5, 2)
   \end{array}
   \end{array}
   \]

   \[
   \begin{array}{c}
   \begin{array}{c}
   A'(5, -2) \\
   B'(6, 0) \\
   C'(10, 0) \\
   D'(9, -2)
   \end{array}
   \end{array}
   \]
   A. \( B'(6, 0), C'(10, 0), D'(9, -2) \)
   B. \( B'(6, -4), C'(10, -4), D'(9, -2) \)
   C. \( B'(4, -4), C'(8, -4), D'(9, -2) \)
   D. \( B'(4, 0), C'(8, 0), D'(9, -2) \)
43. What ratio does $\frac{15\text{ in.}}{5\text{ yd.}}$ equal?
   - A 3 to 1
   - B 1 to 1
   - C 5 to 12
   - D 1 to 12

44. Which pair of numbers has a geometric mean of 30?
   - A 2, 450
   - B 4, 120
   - C 6, 54
   - D 10, 3

45. A rectangle has sides in the ratio 3 : 5. What is the width of a similar rectangle if its length is 11?
   - A 5.1
   - B 6
   - C 6.6
   - D 9

46. In the figure below, $LT = 12$, $MN = 4$, and $NR = 6$. What is $TR$?
   - A 12
   - B 15
   - C 18
   - D Not enough information is given.

47. In trapezoid $KLMN$, what is the value of $x$?

48. The matrix expression below represents the image when a triangle with vertices (3, 0), (3, 5), and (6, 5) is transformed by a dilation centered at the origin with a scale factor of 4.

$$4 \cdot \begin{bmatrix} 3 & 3 & 6 \\ 0 & 5 & 5 \end{bmatrix}$$

What is the image matrix?
   - A $\begin{bmatrix} 7 & 7 & 10 \\ 4 & 9 & 9 \end{bmatrix}$
   - B $\begin{bmatrix} 6 & 6 & 12 \\ 0 & 10 & 10 \end{bmatrix}$
   - C $\begin{bmatrix} 12 & 12 & 24 \\ 0 & 20 & 20 \end{bmatrix}$
   - D $\begin{bmatrix} 12 & 3 & 6 \\ 0 & 5 & 5 \end{bmatrix}$
End-of-Course Practice Test A  continued

49. A box weighted with sand in one corner is floating in water, as shown. To the nearest tenth of a foot, what is $CD$?

[Diagram of a box floating in water with a shaded triangle CD]

A  7.0 ft  
B  6.3 ft  
C  6.0 ft  
D  5.7 ft

50. $\triangle ABC$ is isosceles, with $AB = BC$ and altitude $BD$. If $AD = 5$ and $BD = 12$, what is the perimeter of $\triangle ABC$?

A  17  
B  36  
C  60  
D  169

51. An equilateral triangle has vertices $(-3, 0)$ and $(3, 0)$. The third vertex lies above the $x$-axis. Which ordered pair is closest to the third vertex?

A  $(0, 6.0)$  
B  $(0, 5.2)$  
C  $(0, 4.2)$  
D  $(0, 3.0)$

52. A ramp leading to a loading dock forms a $15^\circ$ angle with the ground. The height of the loading dock is 4 feet. To the nearest tenth of a foot, what is $AB$?

[Diagram of a ramp with angle and height]

A  4.1 ft  
B  14.9 ft  
C  15.5 ft  
D  26.7 ft

53. To the nearest hundredth, what is $AB$?

[Diagram of a triangle with angles and side length]

A  5.50  
B  8.43  
C  9.23  
D  14.36

54. A right triangle has legs of length 13 inches and 17 inches. What are the approximate measures of the acute angles of the triangle?

A  $37.41^\circ$ and $52.59^\circ$  
B  $39^\circ$ and $51^\circ$  
C  $40.12^\circ$ and $49.88^\circ$  
D  $45^\circ$ and $45^\circ$
End-of-Course Practice Test A continued

55. You are standing 12 feet from a circular tent. The distance from you to a point of tangency of the tent is 19 feet. To the nearest tenth of a foot, what is the radius of the tent?

![Diagram of a circle with a point of tangency 12 feet from the center and 19 feet from the point of tangency]  

A 7.6 ft  
B 9.0 ft  
C 15.2 ft  
D 18.0 ft

56. What is the measure of \( \angle ACB \) of the circle with center \( K \)?

![Diagram of a circle with center \( K \) and points \( A, B, C \)]  

A 60°  
B 120°  
C 180°  
D 240°

57. What is the measure of \( \angle ADC \)?

![Diagram of a circle with points \( A, B, C, D \)]  

A 130°  
B 135°  
C 140°  
D 145°

58. Two nails are driven through a round post until the tips meet at point \( C \). You know that \( m\overline{AB} = 38° \) and \( m\overline{XY} = 80° \). What is the measure of \( \angle ACB \)?

![Diagram of a circle with points \( A, B, C, X, Y \)]  

A 19°  
B 21°  
C 38°  
D 42°

59. What is the value of \( x \)?

![Diagram of a circle with a triangle and \( x \)]  

A 1  
B \( \frac{3}{4} \)  
C \( \frac{1}{3} \)  
D \( \frac{1}{4} \)

60. An equation of a circle is \( (x + 7)^2 + (y + 2)^2 = 16 \). Which ordered pair represents a point inside the circle?

![Diagram of a circle with points \( A, B, C, D \)]  

A \((7, 1)\)  
B \((-7, 3)\)  
C \((-7, -5)\)  
D \((-3, -1)\)
61. The angle measures of four exterior angles of a convex pentagon are 75°, 62°, 68°, and 81°. What is the measure of the fifth exterior angle?
   A 64°
   B 74°
   C 78°
   D 84°

62. A softball infield is a square with a side length of 60 feet. A baseball infield is a square with a side length of 90 feet. By what factor is the area of the baseball infield larger than the area of the softball infield?
   A 1.5
   B 2
   C 2.12
   D 2.25

63. To the nearest hundredth of a centimeter, what is the length of \(ABC\)?
   A 4.53 cm
   B 9.07 cm
   C 16.05 cm
   D 18.15 cm

64. To the nearest square meter, what is the area of the shaded sector?
   A 5585 m²
   B 11,170 m²
   C 14,521 m²
   D 20,106 m²

65. The sectors of the spinner are congruent. What is the probability the pointer will stop in a sector other than 1 or 4?
   A \(\frac{3}{2}\)
   B \(\frac{2}{3}\)
   C \(\frac{1}{2}\)
   D \(\frac{1}{3}\)

66. You throw a dart and it sticks in a random location on the target. What is the probability that it will not land in one of the shaded regions?
   A \(\frac{1}{8}\)
   B \(\frac{1}{4}\)
   C \(\frac{3}{4}\)
   D \(\frac{7}{8}\)
67. A box printing company needs to wrap boxes that are 6 inches long, 6 inches wide, and 4 inches tall. What is the surface area of the box?
   A 168 in.²
   B 144 in.²
   C 132 in.²
   D 84 in.²

68. The net shown consists of rectangles and squares. What is the volume of the prism formed by folding the net?

69. A cylindrical can of tomatoes contains 800 cubic centimeters in volume and is 11.5 centimeters in height. What are the dimensions of a rectangular label that will cover the curved surface with an overlap of less than 1 centimeter?
   A 60 cm width and 11.5 cm height
   B 30 cm width and 11.5 cm height
   C 10 cm width and 11.5 cm height
   D 6 cm width and 11.5 cm height

70. A cone-shaped funnel with a height of 30 centimeters and a radius of 20 centimeters is used to fill a container with liquid. The container is a cylinder with a height of 15 centimeters and a radius of 40 centimeters. How many times must the funnel be completely filled in order to fill the container?
   A 2
   B 4
   C 6
   D 12

71. A sphere with radius 6 feet fits inside a cube whose edges are 12 feet long. To the nearest hundredth of a cubic foot, what is the volume of the space inside the cube and outside the sphere?
   A 823.22 ft³
   B 904.78 ft³
   C 1049.42 ft³
   D 1728 ft³

72. A size 7 basketball has a circumference of 29.5 inches. A size 6 basketball has a circumference of 28.5 inches. To the nearest hundredth, what is the ratio of the volume of a size 7 basketball to the volume of a size 6 basketball?
   A 1.00
   B 1.04
   C 1.07
   D 1.11
End-of-Course Practice Test B

1. Points $A$, $B$, and $C$, but not point $D$, are collinear. What is the intersection of a plane that contains $A$, $B$, and $C$ with a different plane that contains $A$, $B$, and $D$?
   A $AD$
   B $AB$
   C $AC$
   D $AC$

2. Points $A$, $B$, and $C$ are collinear. Which of the following statements is true?
   A $A$, $B$, and $C$ are contained in an infinite number of planes.
   B $A$, $B$, and $C$ are contained in exactly one plane.
   C $A$, $B$, and $C$ are not coplanar.
   D $AB$ and $AC$ are perpendicular.

3. In the figure below, $YW$ bisects $\angle XYZ$. What is $m\angle WYZ$?
   
   A $4^\circ$
   B $20^\circ$
   C $24^\circ$
   D $52^\circ$

4. In the figure, what is $m\angle JCL$?
   
   A $75^\circ$
   B $77^\circ$
   C $80^\circ$
   D $85^\circ$

5. $\angle M$ and $\angle N$ are supplementary angles. If $m\angle M = 25^\circ$, what is $m\angle N$?
   A $25^\circ$
   B $65^\circ$
   C $155^\circ$
   D $180^\circ$

6. What is the largest area $\triangle ABC$ can have if it is inscribed in a semicircle with radius 6 units?
   A $9 \text{ units}^2$
   B $18 \text{ units}^2$
   C $36 \text{ units}^2$
   D $72 \text{ units}^2$
End-of-Course Practice Test B  continued

7. What is the contrapositive of the following statement?
   *If two angles are supplementary, then the sum of their measures is 180°.*
   
   A  If two angles are not supplementary, then the sum of their measures is not 180°.
   B  If the sum of the measures of two angles is 180°, then the angles are supplementary.
   C  If the sum of the measures of two angles is not 180°, then the angles are not supplementary.
   D  If two angles are supplementary, then the sum of their measures is not 180°.

8. Given the statement below, which of the related statements are true?
   *If \( m\angle A = 60° \), then \( \angle A \) is an acute angle.*
   
   A  only the conditional statement
   B  only the conditional statement and its contrapositive
   C  only the conditional statement, its converse, and its inverse
   D  the conditional statement, its converse, its inverse, and its contrapositive

9. If \( m\angle 1 = 72° \), \( \angle 1 \) and \( \angle 2 \) are supplementary, \( m\angle 2 = m\angle 3 \), and \( m\angle 3 = m\angle 4 \), what is \( m\angle 4 \)?
   
   A  18°
   B  72°
   C  108°
   D  162°

10. What can you conclude if you know \( m\angle P - m\angle Q = m\angle R - m\angle Q \)?
    
    A  \( m\angle P > m\angle Q \)
    B  \( m\angle P = m\angle Q \)
    C  \( m\angle P = m\angle R \)
    D  \( m\angle P > m\angle R \)

11. Point \( S \) is the midpoint of \( RT \).
    \( RS = 3x + 4 \) and \( ST = 5x - 10 \).
    What is \( RT \)?
    
    A  7
    B  25
    C  50
    D  80

12. \( \angle AXB \) and \( \angle BXC \) are adjacent, supplementary angles, and \( \angle BXC \) and \( \angle CXD \) are adjacent, supplementary angles. Which statement is true?
    
    A  \( \angle CXD \) and \( \angle AXB \) are a linear pair.
    B  \( \angle DXA \) and \( \angle BXC \) are a linear pair.
    C  \( \angle AXB \) and \( \angle BXC \) are vertical angles.
    D  \( \angle BXC \) and \( \angle DXA \) are vertical angles.
13. What do you need to know to conclude that \( m\angle 3 = m\angle 4 \)?

\[ \begin{align*}
\text{A} & \quad \text{Line } d \text{ is parallel to line } e. \\
\text{B} & \quad \text{Line } d \text{ is parallel to line } f. \\
\text{C} & \quad \text{Line } d \text{ is perpendicular to line } f. \\
\text{D} & \quad \text{Line } e \text{ is perpendicular to line } f.
\end{align*} \]

14. Lines \( j \), \( k \), \( m \), and \( n \) lie in a plane. Line \( j \) is parallel to line \( n \), line \( m \) is perpendicular to line \( n \), and line \( k \) is parallel to line \( m \). What can you conclude?

\[ \begin{align*}
\text{A} & \quad \text{Line } n \text{ is parallel to line } k. \\
\text{B} & \quad \text{Line } j \text{ is parallel to line } m. \\
\text{C} & \quad \text{Line } k \text{ is perpendicular to line } j. \\
\text{D} & \quad \text{Line } m \text{ is perpendicular to line } k.
\end{align*} \]

15. If \( m\angle A = 40^\circ \), what is \( m\angle ADE \)?

\[ \begin{align*}
\text{A} & \quad 40^\circ \\
\text{B} & \quad 110^\circ \\
\text{C} & \quad 120^\circ \\
\text{D} & \quad 140^\circ
\end{align*} \]

16. Which of the following is an equation of a line parallel to the line with the equation \( 4x + 3y = -6 \)?

\[ \begin{align*}
\text{A} & \quad -3x + 4y = 4 \\
\text{B} & \quad -4x + 3y = 3 \\
\text{C} & \quad 3x + 4y = 4 \\
\text{D} & \quad 4x + 3y = 3
\end{align*} \]

17. Which of the following is an equation of a line perpendicular to the one shown?

\[ \begin{align*}
\text{A} & \quad y = -2x \\
\text{B} & \quad y = -\frac{1}{2}x \\
\text{C} & \quad y = \frac{1}{2}x \\
\text{D} & \quad y = 2x
\end{align*} \]

18. Which of the following is an equation of a line perpendicular to the line with the equation \( 5x + 7y = 7 \)?

\[ \begin{align*}
\text{A} & \quad y = -\frac{7}{5}x + 7 \\
\text{B} & \quad y = \frac{5}{7}x + 7 \\
\text{C} & \quad y = \frac{5}{7}x + 7 \\
\text{D} & \quad y = \frac{7}{5}x + 7
\end{align*} \]
19. If $m\angle A = 40^\circ$ and $m\angle B = 70^\circ$, what is the measure of $\angle BCD$?

![Diagram of triangle ABD with angles A and B labeled]

A. 140°  
B. 130°  
C. 120°  
D. 110°

20. In the figure, what is the value of $y$?

![Diagram of triangle BCE with angles labeled]

A. 92  
B. 107  
C. 118  
D. 122

21. Suppose $\triangle JKL \cong \triangle QRS$. Which statement can you conclude?

A. $\angle L \cong \angle Q$  
B. $JK = SR$  
C. $\angle Q \cong \angle S$  
D. $JL = QS$

22. In the figure below, $\overline{EK} \parallel \overline{JH}$, and $G$ is the midpoint of $KJ$. Which of the following cannot be proven without more information?

![Diagram of parallel lines EK and JH with G as midpoint of KJ]

A. $\angle EGK$ is isosceles.  
B. $m\angle K = m\angle J$  
C. $EG = HG$  
D. $\triangle EGK \cong \triangle HGJ$

23. In the figure below, $\triangle KLM \cong \triangle NPM$ and $M$ is the midpoint of $LP$. What is the value of $y$?

![Diagram of triangles KLM and NPM with midpoint M on LP]

A. 80  
B. 60  
C. 45  
D. 30

24. In $\triangle RST$, $\angle R \cong \angle T$. Also, $RS = 4y$ and $ST = y + 27$. What is $RS$?

A. 54  
B. 44  
C. 36  
D. 9
25. Point $C$ is equidistant from the endpoints of $AB$. Which statement can you conclude?
   A. $\triangle ABC$ is equilateral.
   B. $AB = AC$
   C. $BA = BC$
   D. Point $C$ is on the perpendicular bisector of $AB$.

26. In the figure below, $P$ is the centroid of $\triangle ABC$, and $PR = 6$. What is $BP$?

![Triangle with points labeled A, B, C, P, S, and T]

   A. 6
   B. 12
   C. 18
   D. $BP$ cannot be determined.

27. A triangle has a perimeter of 60 feet. What is the perimeter of the triangle formed by its midsegments?
   A. 20 ft
   B. 30 ft
   C. 60 ft
   D. 120 ft

28. In $\triangle DEF$, $m \angle F < m \angle D < m \angle E$. Which of the following is true?
   A. $DE < EF$ and $EF < DF$
   B. $EF < DE$ and $EF < DF$
   C. $DE < EF$ and $DF < EF$
   D. $EF < DE$ and $EF < DF$

29. In $\triangle DEF$, $DE = 3x - 2$, $EF = x + 5$, and $FD = 19$. Which of the following is a possible value of $x$?
   A. 5
   B. 4
   C. 3
   D. 2

30. In the diagram below, $m \angle ACB = 60^\circ$ and $m \angle CBD = 50^\circ$. Also, $AC = CB = BD$. Which statement is true?

![Triangle with points labeled A, B, C, D, and angles marked 60° and 50°]

   A. $AB > AC$
   B. $AB > BC$
   C. $AB > CD$
   D. $AB > DB$
31. A quadrilateral has interior angles with measures $3x^\circ$, $4x^\circ$, $5x^\circ$, and $6x^\circ$. What is the value of $x$?
   A 40
   B 36
   C 20
   D 18

32. In parallelogram $KLMN$, $KL = 2x - 1$, and $MN = x + 1$. What is $KL$?
   A 5
   B 3
   C 2
   D 1

33. In the figure, $RHMB$ is a rhombus. What is $m\angle B$?

   A 180°
   B 150°
   C 120°
   D 60°

34. Quadrilateral $AGFL$ is a kite. If $m\angle FAL = 65^\circ$, what is $m\angle GLA$?

35. $ABCD$ is a trapezoid with midsegment $EF$. What is the length of $DC$?

   A 3
   B 4
   C 8
   D 9

36. A kite has diagonals of length 2 feet and 3 feet. What is the area of the kite?
   A 6 ft$^2$
   B 5 ft$^2$
   C 3 ft$^2$
   D More information is needed to find the area.
37. $EFGH$ is transformed by an isometry to $E'F'G'H'$. What statement is always true?
   A $EE' = FF'$
   B $m\angle EFG = m\angle F'G'H'$
   C $\triangle FGH \cong \triangle F'G'H'$
   D $H = H'$

38. What are the coordinates of the images of $A(3, -9)$ and $B(-2, 1)$ after a reflection in the $x$-axis?
   A $A'(-9, 3), B'(1, -2)$
   B $A'(-3, 9), B'(2, -1)$
   C $A'(-3, -9), B'(2, 1)$
   D $A'(3, 9), B'(-2, -1)$

39. Lines $j$ and $k$ intersect at point $P$ to form angles measuring $60^\circ$ and $120^\circ$. $\triangle ABC$ is reflected in line $j$ and the image $\triangle A'B'C'$ is reflected in line $k$ to create $\triangle A''B''C''$. What transformation maps $\triangle ABC$ to $\triangle A''B''C''$?
   A $30^\circ$ rotation about $P$
   B $60^\circ$ rotation about $P$
   C $120^\circ$ rotation about $P$
   D $180^\circ$ rotation about $P$

40. What is the coordinate notation for a translation 3 units up and 5 units to the left?
   A $(x, y) \rightarrow (x + 3, y - 5)$
   B $(x, y) \rightarrow (x - 5, y + 3)$
   C $(x, y) \rightarrow (3 + x, 5 - y)$
   D $(x, y) \rightarrow (5 - x, 3 + y)$

41. The vertices of $\triangle JKL$ are $J(2, 1), K(6, 5)$, and $L(7, 0)$. What transformation does the matrix sum below represent?
   \[
   \begin{bmatrix}
   2 & 6 & 7 \\
   1 & 5 & 0 \\
   \end{bmatrix}
   +
   \begin{bmatrix}
   0 & 0 & 0 \\
   6 & 6 & 6 \\
   \end{bmatrix}
   \]
   A reflection in $y = 6$
   B $60^\circ$ rotation
   C translation 6 units up
   D dilation with scale factor 6

42. Quadrilateral $ABCD$ undergoes the glide reflection described below. What are the coordinates of $A', C'$, and $D'$?
   **Translation:** $(x, y) \rightarrow (x + 4, y)$
   **Reflection:** in the line $y = 1$
   A $A'(5, -3), C'(1, -1), D'(2, -3)$
   B $A'(5, -3), C'(9, -1), D'(8, -3)$
   C $A'(5, 1), C'(9, -1), D'(8, 1)$
   D $A'(5, 1), C'(1, -1), D'(2, 1)$
43. What ratio does $\frac{1 \text{ km}}{100 \text{ m}}$ equal?
   A 1 to 100
   B 1 to 10
   C 10 to 1
   D 100 to 1

44. Which pair of numbers has a geometric mean of 20?
   A 2, 200
   B 4, 5
   C 5, 35
   D 10, 30

45. A rectangle has sides in the ratio 5 : 8. What is the width of a similar rectangle if its length is 11?
   A 8
   B 7.416
   C 6.875
   D 6

46. In the figure below, $HL = 24$, $KJ = 12$, and $KQ = 10$. What is $QL$?
   A 22
   B 20
   C 5
   D Not enough information is given.

47. In trapezoid $QRST$, what is the value of $a$?
   \[ \begin{array}{c}
   Q \quad 9 \quad 10 \\
   12 \\
   a \\
   S \\
   \end{array} \]
   A $\frac{40}{3}$
   B 13
   C $\frac{54}{5}$
   D 10

48. The matrix expression below represents the image when a triangle with vertices $(3, 0), (3, 5),$ and $(6, 5)$ is transformed by a dilation centered at the origin with a scale factor of 2.
   \[ 2 \cdot \begin{bmatrix} 3 & 3 & 6 \\ 0 & 5 & 5 \end{bmatrix} \]
   What is the image matrix?
   A $\begin{bmatrix} 6 & 6 & 8 \\ 2 & 7 & 7 \end{bmatrix}$
   B $\begin{bmatrix} 6 & 6 & 12 \\ 0 & 10 & 10 \end{bmatrix}$
   C $\begin{bmatrix} 12 & 12 & 24 \\ 0 & 20 & 20 \end{bmatrix}$
   D $\begin{bmatrix} 6 & 3 & 6 \\ 0 & 5 & 5 \end{bmatrix}$
49. A right triangular sheet of plywood, \( \triangle ABC \), stands as shown on a floor. To the nearest inch, what is \( CD \)?

- A 56 in.
- B 40 in.
- C 36 in.
- D 30 in.

50. Triangle \( PST \) is isosceles with \( PS = ST \) and median \( SV \). The perimeter of \( \triangle PST \) is 84 and \( PV = 7 \). What is \( ST \)?

- A 14
- B 28
- C 35
- D 84

51. An equilateral triangle has vertices \((0, 0)\) and \((4, 0)\). The third vertex lies above the \( x \)-axis. Which ordered pair is closest to the third vertex?

- A \((2, 2.0)\)
- B \((2, 2.8)\)
- C \((2, 3.5)\)
- D \((2, 4.0)\)

52. A 20 foot ladder is placed against the side of a house. The ladder and the ground form an \( 80^\circ \) angle. To the nearest tenth of a foot, how high above the ground does the ladder touch the house?

- A 16.5 ft
- B 19.0 ft
- C 19.7 ft
- D 20.0 ft

53. To the nearest hundredth, what is \( AB \)?

- A 5.50
- B 9.23
- C 14.35
- D 15.67

54. A right triangle has legs of length 20 inches and 25 inches. What are the approximate measures of the acute angles of the triangle?

- A 36.87° and 53.13°
- B 38.66° and 51.34°
- C 40° and 50°
- D 45° and 45°
55. A golf ball at point $B$ is 9 yards from point $C$, the closest point on the edge of the circular putting green. The ball is 15 yards from point $A$, a point of tangency on the circle. What is $BD$?

A) 8 yd  
B) 17 yd  
C) 18 yd  
D) 27 yd

56. What is the measure of $RT$ of the circle with center $M$?

A) $45^\circ$  
B) $135^\circ$  
C) $225^\circ$  
D) $315^\circ$

57. What is the measure of $\angle DGF$?

A) $45^\circ$  
B) $60^\circ$  
C) $120^\circ$  
D) $135^\circ$

58. Two secants intersect inside a circle, $m_{AFD} = 137^\circ$, and $m_{CGE} = 150^\circ$. What is the measure of $\angle ABD$?

A) $6.5^\circ$  
B) $137^\circ$  
C) $143.5^\circ$  
D) $287^\circ$

59. What is the value of $x$?

A) 1.1  
B) 1.4  
C) 2.2  
D) 2.8

60. An equation of a circle is $(x + 4)^2 + (y - 2)^2 = 25$. Which ordered pair represents a point inside the circle?

A) $(-4, 6)$  
B) $(-6, 7)$  
C) $(-4, -4)$  
D) $(2, 4)$
End-of-Course Practice Test B continued

61. A regular hexagon is changed to a pentagon by replacing two adjacent sides with a single side. The pentagon has four sides of equal length and a fifth side that is longer than the others. What is the measure of each interior angle that includes the longest side?

A 120°  
B 105°  
C 90°  
D 60°

62. The center circle on a soccer field has a radius of 9.15 meters. The center circle on an international-rules basketball court has a radius of 1.80 meters. To the nearest hundredth, how many times larger is the circumference of the soccer circle than the circumference of the basketball circle?

A 5.08  
B 10.16  
C 13.23  
D 25.84

63. To the nearest hundredth of a centimeter, what is the length of \( CDE? \)

A 25.13 cm  
B 10.48 cm  
C 5.24 cm  
D 2.62 cm

64. To the nearest square foot, what is the area of the shaded sector?

A 63 ft²  
B 127 ft²  
C 190 ft²  
D 253 ft²

65. The sectors of the spinner are congruent. What is the probability that the pointer will stop in a sector labeled 3, 5, or 6?

A \( \frac{3}{8} \)  
B \( \frac{1}{2} \)  
C \( \frac{5}{8} \)  
D \( \frac{8}{3} \)

66. You throw a dart and it sticks in a random location on the target. What is the probability that it will land in one of the shaded regions?

A \( \frac{3}{16} \)  
B \( \frac{1}{4} \)  
C \( \frac{5}{16} \)  
D \( \frac{3}{8} \)
67. A box printing company needs to wrap boxes that are 4 inches long, 4 inches wide, and 1 inch tall. What is the surface area of each box?
   A 16 in.²
   B 32 in.²
   C 44 in.²
   D 48 in.²

68. The net below consists of squares and rectangles. What is the surface area of the prism formed by folding the net?

   A 90 units²
   B 72 units²
   C 48 units²
   D 18 units²

69. A new cylindrical container will have a volume that is double the volume of the old container it is replacing. The height of the new container is the same as the height of the old one. To the nearest tenth, by what factor must the radius of the new cylinder be increased?
   A 1.4
   B 1.5
   C 2
   D 4

70. A cone-shaped funnel with a height of 30 centimeters and a radius of 20 centimeters is used to fill a container with liquid. The container is a cylinder with a height of 60 centimeters and a radius of 20 centimeters. How many times must the funnel be completely filled in order to fill the container?
   A 3
   B 4
   C 6
   D 9

71. A sphere with radius 2 meters fits inside a cube whose edges are 4 meters long. To the nearest hundredth of a cubic meter, what is the volume of the space inside the cube and outside the sphere?
   A 13.73 m³
   B 30.49 m³
   C 33.51 m³
   D 50.27 m³

72. A size 7 basketball has a circumference of 29.5 inches. A size 6 basketball has a circumference of 28.5 inches. To the nearest hundredth, what is the ratio of the surface area of a size 7 basketball to the surface area of a size 6 basketball?
   A 1.00
   B 1.04
   C 1.07
   D 1.11
## Answers

### Pre-Course Diagnostic Test

<table>
<thead>
<tr>
<th></th>
<th>See Lesson</th>
<th>Geometry NC Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong></td>
<td>B</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>2.</strong></td>
<td>C</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>3.</strong></td>
<td>D</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>4.</strong></td>
<td>B</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>5.</strong></td>
<td>B</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>6.</strong></td>
<td>B</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>7.</strong></td>
<td>A</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>8.</strong></td>
<td>C</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>9.</strong></td>
<td>A</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>10.</strong></td>
<td>A</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>11.</strong></td>
<td>B</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>12.</strong></td>
<td>C</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>13.</strong></td>
<td>A</td>
<td>3.6</td>
</tr>
<tr>
<td><strong>14.</strong></td>
<td>D</td>
<td>3.7</td>
</tr>
<tr>
<td><strong>15.</strong></td>
<td>A</td>
<td>4.1</td>
</tr>
<tr>
<td><strong>16.</strong></td>
<td>B</td>
<td>4.3</td>
</tr>
<tr>
<td><strong>17.</strong></td>
<td>B</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>18.</strong></td>
<td>C</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>19.</strong></td>
<td>D</td>
<td>5.1</td>
</tr>
<tr>
<td><strong>20.</strong></td>
<td>A</td>
<td>5.3</td>
</tr>
<tr>
<td><strong>21.</strong></td>
<td>B</td>
<td>5.4</td>
</tr>
<tr>
<td><strong>22.</strong></td>
<td>D</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>23.</strong></td>
<td>A</td>
<td>6.1</td>
</tr>
<tr>
<td><strong>24.</strong></td>
<td>A</td>
<td>6.2</td>
</tr>
<tr>
<td><strong>25.</strong></td>
<td>D</td>
<td>6.4</td>
</tr>
<tr>
<td><strong>26.</strong></td>
<td>C</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>27.</strong></td>
<td>B</td>
<td>7.2</td>
</tr>
<tr>
<td><strong>28.</strong></td>
<td>D</td>
<td>7.2</td>
</tr>
<tr>
<td><strong>29.</strong></td>
<td>C</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>30.</strong></td>
<td>A</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>31.</strong></td>
<td>C</td>
<td>8.1</td>
</tr>
<tr>
<td><strong>32.</strong></td>
<td>D</td>
<td>8.2</td>
</tr>
<tr>
<td><strong>33.</strong></td>
<td>B</td>
<td>8.6</td>
</tr>
<tr>
<td><strong>34.</strong></td>
<td>A</td>
<td>8.6</td>
</tr>
<tr>
<td><strong>35.</strong></td>
<td>D</td>
<td>9.2</td>
</tr>
<tr>
<td><strong>36.</strong></td>
<td>A</td>
<td>9.5</td>
</tr>
<tr>
<td><strong>37.</strong></td>
<td>B</td>
<td>9.6</td>
</tr>
<tr>
<td><strong>38.</strong></td>
<td>B</td>
<td>9.7</td>
</tr>
<tr>
<td><strong>39.</strong></td>
<td>C</td>
<td>10.2</td>
</tr>
<tr>
<td><strong>40.</strong></td>
<td>A</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>41.</strong></td>
<td>D</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>42.</strong></td>
<td>B</td>
<td>10.7</td>
</tr>
<tr>
<td><strong>43.</strong></td>
<td>C</td>
<td>11.2</td>
</tr>
<tr>
<td><strong>44.</strong></td>
<td>C</td>
<td>11.4</td>
</tr>
<tr>
<td><strong>45.</strong></td>
<td>A</td>
<td>11.5</td>
</tr>
<tr>
<td><strong>46.</strong></td>
<td>B</td>
<td>11.6</td>
</tr>
</tbody>
</table>

### Pre-Course Skills Practice

#### Problem Solving

1. $454.52$ loss
2. at least $32$ ships
3. $3900$ miles
4. $360$ miles
5. There are multiple solution possibilities, as shown in the table below.

<table>
<thead>
<tr>
<th>CDs</th>
<th>Tapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
</tr>
</tbody>
</table>

6. $27$
7. The problem cannot be solved. You need to know the depth of the pool.

#### Numeric and Algebraic Expressions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8.</strong></td>
<td>$-84$</td>
</tr>
<tr>
<td><strong>9.</strong></td>
<td>$-17.8$</td>
</tr>
<tr>
<td><strong>10.</strong></td>
<td>$-75$</td>
</tr>
<tr>
<td><strong>11.</strong></td>
<td>$-42$</td>
</tr>
<tr>
<td><strong>12.</strong></td>
<td>$-12$</td>
</tr>
<tr>
<td><strong>13.</strong></td>
<td>$7.23$</td>
</tr>
<tr>
<td><strong>14.</strong></td>
<td>$6$</td>
</tr>
<tr>
<td><strong>15.</strong></td>
<td>$-36$</td>
</tr>
<tr>
<td><strong>16.</strong></td>
<td>$1$</td>
</tr>
<tr>
<td><strong>17.</strong></td>
<td>$-1$</td>
</tr>
<tr>
<td><strong>18.</strong></td>
<td>$-6$</td>
</tr>
<tr>
<td><strong>19.</strong></td>
<td>$-6.75$</td>
</tr>
<tr>
<td><strong>20.</strong></td>
<td>$-3$</td>
</tr>
<tr>
<td><strong>21.</strong></td>
<td>$13$</td>
</tr>
<tr>
<td><strong>22.</strong></td>
<td>$99$</td>
</tr>
<tr>
<td><strong>23.</strong></td>
<td>$10$</td>
</tr>
<tr>
<td><strong>24.</strong></td>
<td>$16$</td>
</tr>
<tr>
<td><strong>25.</strong></td>
<td>$-13$</td>
</tr>
<tr>
<td><strong>26.</strong></td>
<td>$5$</td>
</tr>
<tr>
<td><strong>27.</strong></td>
<td>$125$</td>
</tr>
<tr>
<td><strong>28.</strong></td>
<td>$9$</td>
</tr>
<tr>
<td><strong>29.</strong></td>
<td>$13.8$</td>
</tr>
<tr>
<td><strong>30.</strong></td>
<td>$25$</td>
</tr>
<tr>
<td><strong>31.</strong></td>
<td>$-23$</td>
</tr>
<tr>
<td><strong>32.</strong></td>
<td>$25$</td>
</tr>
<tr>
<td><strong>33.</strong></td>
<td>$-28$</td>
</tr>
<tr>
<td><strong>34.</strong></td>
<td>$-6$</td>
</tr>
<tr>
<td><strong>35.</strong></td>
<td>$50$</td>
</tr>
<tr>
<td><strong>36.</strong></td>
<td>$-2$</td>
</tr>
<tr>
<td><strong>37.</strong></td>
<td>$-10$</td>
</tr>
<tr>
<td><strong>38.</strong></td>
<td>$-15$</td>
</tr>
<tr>
<td><strong>39.</strong></td>
<td>$16$</td>
</tr>
<tr>
<td><strong>40.</strong></td>
<td>$-18$</td>
</tr>
<tr>
<td><strong>41.</strong></td>
<td>$-1$</td>
</tr>
<tr>
<td><strong>42.</strong></td>
<td>$36$</td>
</tr>
<tr>
<td><strong>43.</strong></td>
<td>$43$</td>
</tr>
<tr>
<td><strong>44.</strong></td>
<td>$5$</td>
</tr>
<tr>
<td><strong>45.</strong></td>
<td>$5$</td>
</tr>
<tr>
<td><strong>46.</strong></td>
<td>$-18$</td>
</tr>
<tr>
<td><strong>47.</strong></td>
<td>$-5$</td>
</tr>
<tr>
<td><strong>48.</strong></td>
<td>$8x^2 - 22xy$</td>
</tr>
<tr>
<td><strong>49.</strong></td>
<td>$-4a - 10$</td>
</tr>
<tr>
<td><strong>50.</strong></td>
<td>$5rs + 5rt$</td>
</tr>
<tr>
<td><strong>51.</strong></td>
<td>$2d^2 + 7de - 4d$</td>
</tr>
<tr>
<td><strong>52.</strong></td>
<td>$-\frac{3}{2}r^2 - \frac{9}{2}rs + 3r$</td>
</tr>
<tr>
<td><strong>53.</strong></td>
<td>$-3d - cd$</td>
</tr>
<tr>
<td><strong>54.</strong></td>
<td>$-8p^2 + 28pq$</td>
</tr>
<tr>
<td><strong>55.</strong></td>
<td>$-6e + 2e^2$</td>
</tr>
<tr>
<td><strong>56.</strong></td>
<td>$r^2 + 3rs - 18r$</td>
</tr>
<tr>
<td><strong>57.</strong></td>
<td>$2.7 + 3.6a$</td>
</tr>
<tr>
<td><strong>58.</strong></td>
<td>$7r - 13$</td>
</tr>
<tr>
<td><strong>59.</strong></td>
<td>$-1.5$</td>
</tr>
<tr>
<td><strong>60.</strong></td>
<td>$3xy - 3x + 2y$</td>
</tr>
<tr>
<td><strong>61.</strong></td>
<td>$-3j + 14$</td>
</tr>
<tr>
<td><strong>62.</strong></td>
<td>$30a - 63$</td>
</tr>
<tr>
<td><strong>63.</strong></td>
<td>$n^2 - 5n + 10$</td>
</tr>
</tbody>
</table>
Pre-Course Skills Practice  continued

Reciprocals and Ratios

64. \( \frac{100}{61} \)  65. \( -\frac{11}{2} \)  66. \( \frac{1}{120} \)  67. \( -\frac{10}{3} \)
68. \(-4\)  69. \( -\frac{1}{242} \)  70. \( -\frac{6}{5} \)  71. \( \frac{1}{14} \)
72. \( \frac{1}{8} \)  73. \( \frac{1}{12} \)  74. \( \frac{1}{4} \)  75. \( \frac{20}{3} \)
76. \( \frac{3}{8} \)  77. \( \frac{3}{2} \)  78. \( \frac{3}{4} \)  79. \( \frac{44}{5} \)
80. \( \frac{11}{19} \)  81. \( \frac{14}{3} \)  82. \( \frac{3}{5} \)  83. \( \frac{2}{1} \)

Solving Equations and Inequalities

84. 7  85. 10  86. 30  87. 32
88. -3  89. -16  90. 53  91. -36
92. 14  93. 5  94. -13  95. 2
96. 24  97. -4
98. \( a < 36 \)  99. \( h < -10 \)
100. \( y > 33 \)  101. \( k < -\frac{9}{8} \)
102. \( r < -\frac{3}{2} \)  103. \( s < 14.4 \)
104. \( x > 7 \)  105. \( p < -1 \)
106. no  107. no
108. yes  109. yes
110. Sample answer: 6, 7, 8; no;
3(5) - 4 + (5 - 2) = 14 and 5 + 11 = 16
and 14 < 16
111. Sample answer: -9, -10, -11; yes;
41 + 8(-9.5) = 35 and -9.5 - 15 = -24.5
and -35 < -24.5

Linear Equations

112. (1, 1)  113. (-1, 3)
114. (3, -2)  115. (-4, 5)
116. (-6, -5)  117. (-4, 0)
118. (4, 1)  119. (1, -3)
120. (-5, 2)  121. (0, 4)
122. (4, -4)  123. (-2, -2)
124-135. See the graph below.
The slope is equal to zero because \( \frac{\text{rise}}{\text{run}} \) produces a zero in the numerator. The graph has no \( x \)-intercept because it is a horizontal line that is parallel to the \( x \)-axis.

148. \( y = x - 9 \)  
149. \( y = 3x + 32 \)  
150. \( y = -2x - 17 \)  
151. \( y = 5x + 3 \)  
152. \( y = \frac{2}{3}x + 3 \)  
153. \( y = 6x - \frac{9}{2} \)  
154. \( y = -7x - 7 \)  
155. \( y = \frac{1}{2}x - 9 \)  
156. \( y = -4x + 7 \)  
157. \( y = x - 4 \)  
158. \( y = \frac{1}{5}x + 2 \)  
159. \( y = -6x + 25 \)  
160. \( y = -2x \)  
161. \( y = -9x + 27 \)  
162. \( y = -\frac{7}{8}x - 7 \)  
163. \( y = x - 34 \)  
164. \((5, -1)\)  
165. \((2, 7)\)  
166. \((40, 72)\)  
167. \((6, -4)\)  
168. \((1, 3)\)  
169. \((5, 3)\)  
170. \((6, 10)\)  
171. \((5, 3)\)  

Properties of Exponents

172. \( u^8 \)  
173. \( 64y^6 \)  
174. \( x^{11} \)  
175. \( \frac{1}{x^{10}} \)  
176. \( x^5 \)  
177. \( 1 \)  
178. \( g^{11} \)  
179. \( \frac{1}{g^{20}} \)  
180. \( n^2 - 9 \)  
181. \( 5g^2 - 33g - 14 \)  
182. \( -2c^2 - 7c + 4 \)  
183. \( 2f^2 - 19.6f + 5.7 \)  
184. \( 4r^2 + 17r + 4 \)  
185. \( h^2 - 16h + 39 \)  
186. \( 4m^2 + 23m - 35 \)  
187. \( -10p^2 - 21p + 108 \)  
188. \( m^2 + 12m + 36 \)  
189. \( x^2 - 2x + 1 \)  
190. \( r^2 + r + 0.25 \)  
191. \( e^2 - 18e + 81 \)  
192. \( y^2 - 11y + 30.25 \)  
193. \( n^2 - 4n + 4 \)  
194. \( q^2 - 6q + 9 \)  
195. \( f^2 - 42f + 441 \)
Pre-Course Skills Practice continued

Solving Quadratic Equations

196. $\frac{1}{5}$ and $-\frac{1}{5}$
197. no square roots
198. 16 and $-16$
199. 0.4 and $-0.4$
200. $\sqrt{13}$
201. $2\sqrt{2}$
202. $\sqrt{73}$
203. $2\sqrt{5}$
204. $2\sqrt{7}$
205. 1
206. $\frac{\sqrt{23}}{3}$
207. $\frac{3\sqrt{2}}{2}$
208. 0
209. 16
210. $-12$
211. $13\sqrt{10}$
212. no solution
213. $-6$ and 6
214. $-17$ and 17
215. 0
216. $-1$ and 1
217. $-2$ and $-5$
218. 5.20 and 5.20
219. no solution
220. $\frac{9 + \sqrt{17}}{2} = 6.56$ and $\frac{9 - \sqrt{17}}{2} = 2.44$
221. $\frac{4 + 6}{2} = 5$ and $\frac{4 - 6}{2} = -1$
222. $\frac{1 + 5}{2} = 1$ and $\frac{1 - 5}{2} = -1.75$
223. $\frac{5 + \sqrt{45}}{10} = 1.17$ and $\frac{5 - \sqrt{45}}{10} = -0.17$

Solving Formulas

224. $b = \frac{1}{2}P - a$
225. $l = \frac{A}{w}$
226. $a = \frac{2A}{P}$
227. $B = \frac{3V}{W}$

Chapter Standardized Test 1A

1. A
2. B
3. D
4. D
5. B
6. D
7. 30°
8. In one turn of the large pulley, the belt must move a distance equal to the circumference of the large pulley. This distance is $d = 2\pi(27)$ cm. The belt moves around the small pulley the same distance. But for the small pulley, each full turn (one circumference) is only $2\pi(9)$ cm. To get the result, divide $d$ by $2\pi(9)$ cm.

Therefore, the small pulley would turn three full times to cover the distance of one turn of the large pulley.

Chapter Standardized Test 1B

1. C
2. D
3. D
4. B
5. A
6. B
7. 60°
8. Assuming that the larger area can be mowed at the same rate, the ratio of the areas will be the same as the ratio of the times required to mow the two areas. The ratio of the areas is given by

$\frac{\pi(40)^2}{\pi(30)^2} = \frac{40^2}{30^2} = \frac{16}{9} = 1.78$.

Therefore, to the nearest 10 minutes, the larger area would require about 1 hour and 50 minutes to mow.

Chapter Standardized Test 2A

1. B
2. B
3. A
4. C
5. B
6. Vertical angles are equal in measure. Two complementary angles that are equal in measure must have 45° as their measures.

7. Sample answer: “If the measure of an angle is 40°, then it is an acute angle.” But the converse is false. “If an angle is an acute angle, then it has a measure of 40°.” An acute angle may have a measure of 45°, or other possible measures, up to but not including 90°.

Chapter Standardized Test 2B

1. C
2. D
3. B
4. A
5. B
6. The sum of the measures of angles that form a linear pair is 180°. Since the angles must be congruent and the measures must have 180° as their sum, each angle must measure 90°.

7. Sample answer: “An angle is acute if and only if its measure is greater than 0° and less than 90°.” Equivalent: “If an angle has a measure greater than 0° and less than 90°, then it is acute. If an angle is acute, then it has a measure greater than 0° and less than 90°.”

Chapter Standardized Test 3A

1. C
2. A
3. C
4. A
5. B
6. A
7. 43°
8. The linear function is represented by $F = mC + b$ where $m$ and $b$ are real numbers. Since $F = 32$ when $C = 0$, $b = 32$. Since $F = 212$ when $C = 100$, $212 = 100m + 32$ and $m = \frac{9}{5}$. The relationship is expressed by the equation $F = \frac{9}{5}C + 32$. Substitute to find $C$ when $F$ is 0:
\[ C = -\frac{160}{9}, \text{ or about } -18\ degrees. \]

**Chapter Standardized Test 3B**

1. B  
2. D  
3. A  
4. B  
5. C  
6. B  
7. 114°  
8. To get an equation in the form equivalent to \( y = mx + b \), recognize that the slope of the line, from the given information, is 
\[ \frac{y_2 - y_1}{x_2 - x_1} = \frac{800}{16,000} = \frac{1}{20} = 0.05. \]
Also, when \( d = 0 \), \( y = 1200 \), so \( b = 1200 \). The equation of the line is \( y = 0.05x + 1200 \). Using this equation, \( y = 1728 \) feet when \( x = 10,560 \) feet (2 miles).  

**Building Test-Taking Skills**

**Chapters 1–3**

1. 2 times 7, plus 7, does not give a negative result.  
2. \$1.50 times 750 would be greater than \$500.  

**Practicing Test-Taking Skills**

**Chapters 1–3**

1. A  
2. D  
3. D  
4. C  
5. D  
6. C  
7. B  
8. A  
9. D  

**Cumulative Practice for Chapters 1–3**

1. D  
2. B  
3. C  
4. A  
5. B  
6. C  
7. 47°  
8. The length of the base, \( AC \), is 6 units and the height of the triangle is 4 units. Use \( A = \frac{1}{2}bh \). So, the area is \( \frac{1}{2} \times 6(4) \), or 12 square units. In \( \triangle ABC \), \( AC = 6 \) and \( \overline{AB} = \overline{BC} \). Since 
\[ AB = \sqrt{3^2 + 4^2} = 5, \text{ the perimeter is } 6 + 5 + 5, \text{ or } 16, \text{ units}. \]
9. D  
10. B  
11. A  
12. A  
13. C  
14. yes; if \( A, B, \) and \( C \) are collinear, then there are infinitely many planes in which the line lies; no; if \( \overline{AB} \perp \overline{AC} \), then \( A, B, \) and \( C \) are not collinear. A postulate states that three noncollinear points must lie in exactly one plane.  
15. yes; Sample answer: “If an angle measures 179°, then it is not acute.” This statement is true. The converse of this statement is “If an angle is not acute, then it measures 179°.” This statement is false because such an angle could have many possible measures greater than or equal to 90°; no; Sample answer: The contrapositive of a true conditional statement is always true.  
16. D  
17. C  
18. B  
19. A  
20. B  
21. If two lines are cut by a transversal, they are parallel if and only if a pair of alternate angles are congruent.  
22. a. sometimes true; when the lines are coplanar, the statement is true.  
b. sometimes true; if all three lines intersect at a single point and each line is perpendicular to the other two, the statement is true.  
c. always true

**Chapter Standardized Test 4A**

1. B  
2. D  
3. C  
4. A  
5. D  
6. The two triangles should have the same shape, but be of different size.  

7. Using the SSS Congruence Postulate, 
\( \triangle DEH \equiv \triangle DGH \), because two pairs of their corresponding sides are given as congruent, and their third sides are shared. Then \( \angle FED \equiv \angle FGD \) because \( \triangle DEH \equiv \triangle DGH \). Recalling that \( DE \equiv DG \) is given, and noting that \( DF \) is a shared side, by the SAS Congruence Postulate \( \triangle EDF \equiv \triangle GDF \).  

**Chapter Standardized Test 4B**

1. C  
2. B  
3. A  
4. A  
5. A  
6. \( \angle ABD \equiv \angle AED \), \( \triangle ABC \equiv \triangle AEF \), or \( \angle BAC \equiv \angle EDF \).  
7. The figure shows triangle \( ABC \) and triangle \( ABD \) have two sides and an angle (not included between the sides) in common. The circular curve illustrates that \( BC \equiv BD \). This counterexample shows that congruence of two sides and one angle, if the angle is not included between the sides, does not prove that two triangles are congruent.  

---

*Geometry* 101

North Carolina Standards Test Preparation and Practice
102 ~ Geometry
North Carolina Standards Test Preparation and Practice

Chapter Standardized Test 5A
7. This triangle is isosceles; its base is the line segment with endpoints (−1, −2) and (3, −2).
The midpoint of the base is (1, −2). The centroid is then located \( \frac{2}{3} \) of the distance along the segment from (1, 4) to (1, −2). The centroid is thus (1, 0).
The three medians are contained in the lines given by \( x = 1, y = x - 1, \) and \( y = -x + 1. \)

Chapter Standardized Test 5B
7. This triangle is isosceles; its base is the line segment with endpoints (−2, 4) and (−2, −4). The midpoint of the base is (−2, 0). The centroid is then located \( \frac{2}{3} \) of the distance along the segment from (1, 0) to (−2, 0). The centroid is thus (−1, 0).
The three medians are contained in the lines given by \( y = 0, y = 4x + 4, \) and \( y = -4x - 4. \)

Chapter Standardized Test 6A
9. Refer to the diagram. Since \( ABCD \) is a parallelogram, its diagonals bisect each other (Theorem 6.5). So, \( AE = CE \) and \( BE = DE. \) Given that the diagonals are perpendicular, they form 4 congruent right angles. Then by the SAS Congruence Postulate, \( \triangle AEB \cong \triangle CED \cong \triangle CEB. \) The four sides \( ABCD \) are corresponding sides in congruent triangles, so they are all congruent. Therefore, \( ABCD \) is a rhombus.

Chapter Standardized Test 6B
9. Refer to the figure. The two triangles share the diagonal, \( BD. \) Because this is an isosceles trapezoid, \( AD \cong BC. \) Finally, \( \angle ABD \cong \angle BDC \) because they are alternate interior angles between the parallel segments. But the triangles themselves cannot be congruent because \( AB \) and \( CD \) are not congruent. The consequence is that even though two pairs of sides and one pair of angles not included between the sides are congruent, the two triangles are not congruent. This shows that every isosceles trapezoid demonstrates that SSA cannot be used to prove triangle congruence.

Building Test-Taking Skills
Chapters 4–6
1. Partial credit; the answer is correct but no reasoning is included.
2. Full credit; the answer is correct and the work and reasoning are included.

Practicing Test-Taking Skills
Chapters 4–6
1. Solve \( 4n - 5 = 2n - 1 \) to find \( n = 2. \) Solve \( 3m + 1 = 5m - 1 \) to find \( m = 1. \) By the Midpoint Theorem for Triangles, \( XY = \frac{1}{2} \text{ED}. \) So, \( XY = 5. \)
2. Use the fact that the \( \triangle ABC \) is isosceles and that \( K \) and \( L \) are midpoints to reason that \( AK = LC, KL \parallel MN, \) and that \( AC = 2KL. \) Since \( KL = MN = 2.4 \text{ ft, } AC = 4.8 \text{ ft and } AC = 2a + 2.4 = 4.8; \) so \( a = 1.2 \text{ ft. Then, the area of the trapezoid is } \frac{1}{2} \cdot 1.8 \cdot (4.8 + 2.4), \text{ or } 6.48 \text{ ft}^2. \)
3. The triangles are \( \triangle XYZ \) and \( \triangle ABC \) with \( XY \cong XZ \) and \( AB \cong AC \). Case 1: Bring \( BC \) and \( YZ \) together to form a rhombus.

[Diagram]

Case 2: Bring \( AC \) and \( XY \) together to form a kite.

[Diagram]

Case 3: Bring \( AC \) and \( YX \) together to form a parallelogram.

4. \( UT = 10 + 10 - 4 = 16 \); area of \( PXTU = 16 \times 8 \); area of \( UCXD = 10 \times 8 \); difference \((16 - 10)8 = 48; 48 \text{ in.}^2\)

5. Let \( a \) represent the length of the shorter base of the trapezoid. Then, \( 240 = \frac{1}{2}(16)(a + 2a) \). So, \( a = 10 \), \( JK = 10 \) m, and \( FT = 20 \) m.

6. The diagram below shows quadrilateral \( OABC \).

[Diagram]

\( OC = AB \) and \( OC \parallel AB \); since one pair of sides is both congruent and parallel, \( OABC \) is a parallelogram.

7. \( \triangle AMX \) and \( \triangle BMX \) are congruent isosceles right triangles and \( \triangle YMA \) and \( \triangle YMB \) are congruent right triangles. Bases and heights are shown below.

[Diagram]

Area of kite

\[ YAXB = 2 \left( \frac{1}{2} \times 9 \times 9 \right) + 2 \left( \frac{1}{2} \times 9 \times 27 \right) = 324; \]

324 in.\(^2\)

Cumulative Practice for Chapters 4–6


5. D

6. \( 11.25^\circ \) and \( 78.75^\circ \)

7. Sample answer: Since \( OA = AB \), \((OA)^2 = (AB)^2\).

\[ h^2 + k^2 = (h - b)^2 + (k - 0)^2 \]

\[-2hb + b^2 = 0 \]

\[-b(-2h + b) = 0 \]

Since \( B \) and \( O \) are not the same point, \( b \neq 0 \).

Therefore, \( h = \frac{b}{2} \) and \( P \) has coordinates \( P \left( \frac{b}{2}, 0 \right) \).

The midpoint \( M \) of \( OB \) has coordinates \( M \left( \frac{0 + b}{2}, \frac{0 + 0}{2} \right) \) or \( M \left( \frac{b}{2}, 0 \right) \). This proves that \( P \) and \( M \) are the same. So, \( P \) is the midpoint of \( OB \).


12. D

13. \((1, 0) \) and \((3, -1)\)

14. a. Find the slopes of the sides of \( \triangle HJK \). The slopes are \(-\frac{2}{3}\), \(-1\), and \(1\). The midpoints of the sides are \((5, 0)\), \((7, 2)\) and \((2, 2)\). Draw the perpendicular bisectors of the sides. They have these equations:

\[ x = 5, \ y = \frac{3}{2}x - \frac{17}{2}. \]

and \( y = -x + 4 \). Use a system of any two of these equations to find the coordinates of the circumcenter.

b. The circumcenter is \((5, -1)\).
Cumulative Practice for Chapters 4–6

19. A
20. Sample answer: Find equations for the four sides and see if opposite sides have equal slope. Find the lengths of the four sides and see if opposite sides have the same length.

21. a. \( WX = \sqrt{(5 - (-1))^2 + (1 - 3)^2} = 2\sqrt{10} \)
    \( XY = \sqrt{((-1) - 5)^2 + ((-1) - 1)^2} = 2\sqrt{10} \)
    Also using the distance formula,
    \( YZ = WZ = 2\sqrt{2} \). Since opposite sides of \( WXYZ \) are not congruent, \( WXYZ \) is not a parallelogram.

b. \( WXYZ \) is a kite because the figure has two pairs of consecutive congruent sides.

Chapter Standardized Test 7A

7. four
8. Sample answer: Sketch a figure showing the four points involved.

Reflect \( PQ \) in the y-axis. The coordinates of the image are \( P'(3, -6) \) and \( Q'(0, -8) \). Then translate \( P'Q' \) 2 units right and 3 units up to get \( P''Q'' \) whose endpoints are \( P''(5, -3) \) and \( Q''(2, -5) \).

Chapter Standardized Test 7B

5. D  6. A
7. three

8. Sample answer: Make a sketch like the one below.

Reflect \( PQ \) in the y-axis to get \( P'(3, -6) \) and \( Q'(0, -8) \). Then translate \( P'Q' \) to \( P''Q'' \) under the translation \((x, y) \rightarrow (x, y + 12)\).

Chapter Standardized Test 8A

5. C  6. A
7. \( DF = EF = 12 \) and \( FH = GH = 24 \)
8. \( AB = \sqrt{3^2 + 2^2} = \sqrt{13} \approx 3.61 \)
    \( BC = \sqrt{2^2 + 2^2} = \sqrt{8} \approx 2.83 \)
    \( CD = \sqrt{1^2 + 4^2} = \sqrt{17} \approx 4.12 \)
    \( DE = \sqrt{(1.5)^2 + 1} = \sqrt{3.25} \approx 1.80 \)
    \( EF = 4.50 \)
    Multiply each distance by 3.47 to calculate actual distances in kilometers.
    A to B: 12.53 km
    B to C: 9.82 km
    C to D: 14.30 km
    D to E: 6.25 km
    E to F: 15.61 km
    The total distance is 58.5 kilometers.

Chapter Standardized Test 8B

5. B  6. C
7. \( YZ = 105 \)
8. Calculate map distances.
   \( AB = 3.00 \)
   \( BC = \sqrt{4^2 + 2^2} = \sqrt{20} \approx 4.47 \)
   \( CD = 3.00 \)
   \( DE = \sqrt{1^2 + 1^2} = \sqrt{2} \approx 1.41 \)
   \( EF = \sqrt{1^2 + 3^2} = \sqrt{10} \approx 3.16 \)
   Add to get 15.04 as total map distance. Then divide 75.2 by 15.04 to calculate scale: 1 grid block = 5 kilometers. Multiply each map distance by 5 to approximate actual distances.
   A to B: 15 km
   B to C: 22.4 km
   C to D: 15 km
   D to E: 7.1 km
   E to F: 15.8 km
Chapter Standardized Test 9A
5. A  6. B
7. \( AB = 9.6 \) and \( BD = 16 \)
8. If \( m \angle S = 87.2^\circ \), then \( d = 1.5(\tan 87.2^\circ) \), about 30.67 m. If \( m \angle S = 88.2^\circ \), then \( d = 1.5(\tan 88.2^\circ) \), about 47.73 m. The two values of \( d \) differ by 17.06 m. The percent difference is \( \frac{17.06}{30.67} \times 100 \), or about 55.62%.

Chapter Standardized Test 9B
5. B  6. A
7. \( XY = 34.6 \), \( XW = 17.3 \), and \( WZ = 10.0 \)
8. If \( m \angle M = 84.7^\circ \), then \( \tan 84.7^\circ = \frac{h - 2}{5} \).
So \( h = 55.90 \). If \( m \angle M = 83.7^\circ \), then \( \tan 83.7^\circ = \frac{h - 2}{5} \).
In this case, \( h = 47.29 \). The calculations differ by 8.61 m. The percent difference is \( \frac{8.61}{55.90} \times 100 \), or about 15.4%.

Building Test-Taking Skills
Chapters 7–9

Practicing Test-Taking Skills
Chapters 7–9
5. C

Cumulative Practice for Chapters 7–9
5. \(<17, -25>
6. a. Check drawings.
  b. \( J'(-4, 7), K'(-3, 3) \)
11. C  12. A
13. The length of the parallelogram is 20 inches, and the width is 8 inches.
14. a. If \( \triangle ABC \) and \( \triangle XYZ \) are 45°-45°-90° triangles, then by the AA Postulate, they must be similar.
  b. Consider rectangle \( ABCD \), whose length is 2 and whose width is 1. You can easily make a rectangle whose length is double that of rectangle \( ABCD \) but whose width is more than or less than twice that of rectangle \( ABCD \). The two rectangles would not be similar. The second statement is not always true.
21. \( m \angle A = 30^\circ \) and \( m \angle C = 60^\circ \)
22. Draw a sketch showing the given information.
  a. Check drawings.
  b. \( DC = 13 \sin 25^\circ \). That is, \( DC \) is about 5.49. By the Pythagorean Theorem, \( AC = \sqrt{13^2 - (13 \sin 25^\circ)^2} \).
Thus, \( BC = 5.49 \times 25^\circ \), which is about 5.89. Since \( \angle DBC = \frac{DC}{BC} \), \( \angle DBC \approx 43.0^\circ \).

Chapter Standardized Test 10A
5. A  6. D  7. two
8. a. If \( r < 6 \), the circles will not intersect.
  b. If \( r = 6 \), the circles will intersect in exactly one point.
  c. If \( r > 6 \), then the circles will intersect in two points.

Chapter Standardized Test 10B
8. \( CP = \sqrt{(5 - 2)^2 + (5 - 3)^2} = \sqrt{13} \approx 3.6 \).
Since \( CP \) is less than the radius of 4, \( P(5, 5) \) is inside the circle.
In general, calculate \( CP \).
If \( CP < \text{radius} \), then \( P(x, y) \) is inside the circle.
If \( CP > \text{radius} \), then \( P(x, y) \) is outside the circle.
If \( CP = \text{radius} \), then \( P(x, y) \) is on the circle.
Chapter Standardized Test 11A

9. The perimeter is 32 centimeters multiplied by 8, or 256 cm. To find the area, sketch a diagram like this one. The measure of each interior angle of the regular octagon is 135°.

\[ CB = 16 \tan 67.5° \]

\[ \text{area} = 16 \tan 67.5° \times 256 \approx 4944.31 \]

The area is about 4944 square centimeters.

Chapter Standardized Test 11B

9. In the figure below, \( CD = 600 \). Thus, \( CA = 300 \). Also, \( AB \) bisects an angle of the regular octagon. So, \( m\angle ABC = 67.5° \).

Therefore, \( BC = \frac{300}{\tan 67.5°} \).

\[ \text{perimeter} = 8 \times \frac{300}{\tan 67.5°} = 1988.23 \]

\[ \text{area} = 8 \times 300 \times \frac{300}{\tan 67.5°} = 298,233.76 \]

The perimeter is about 1988 centimeters, and the area is about 298,234 square centimeters.

Chapter Standardized Test 12A

9. \( 3 \leq r \leq 6 \)

10. Draw a sketch showing the two concentric circles.

\[ \begin{align*}
\text{outer tank radius: } & \frac{14 + 2(5)}{2} = 12; \\
\text{inner tank radius: } & \frac{14}{2} = 7; \\
\text{outer tank volume: } & \pi(12)^2(20) \approx 9048 \text{ ft}^3; \\
\text{inner tank volume: } & \pi(7)^2(20) \approx 3079 \text{ ft}^3; \\
\text{The space between the inner and outer tanks is about } & 5969 \text{ ft}^3.
\end{align*} \]

Chapter Standardized Test 12B

9. \( 6 < r < 9 \)

10. smaller calculation: \( \pi(3.0)^2(6.0) \approx 169.65; \)

greater calculation: \( \pi(3.1)^2(6.1) \approx 184.16; \)

The difference is 14.52 ft\(^3\).

Building Test-Taking Skills

Chapters 10–12

1. Full credit; the answer is correct and the reasoning is correct.

Practicing Test-Taking Skills

Chapters 10–12

1. Probability of landing in region A:

\[ \frac{(36^2\pi) \frac{40}{360}}{(36^2\pi) \frac{40}{360}} = \frac{1}{9}; \]

if 36 were to be replaced by 27 or any other positive number, the probability would still be \( \frac{1}{9} \) because \( 40^\circ \) is \( \frac{1}{9} \) of \( 360^\circ \).

2. The diameter of the circle is found using the Pythagorean theorem to find the length of \( XC \), which equals \( \sqrt{\frac{g^2}{2}} = \sqrt{18} = 3\sqrt{2} \).

The diameter is twice \( XC \), or \( 6\sqrt{2} \). The length of arc \( XY \) is one fourth the circumference of the circle:

\[ \frac{6\pi\sqrt{2}}{4} = \frac{3\pi\sqrt{2}}{2} \]

3. base area of one pyramid: \( (18)(24) \div 12 \), or 36 in.:

volume of one pyramid: \( \frac{1}{3} (5 \times 36) \); volume of 12 pyramids: \( 4(5 \times 36) \), or 720 in.\(^3\)
4. The interior angles must add up to $720^\circ$ since the polygon has 6 sides. $720^\circ - 90^\circ = 630^\circ$

$32a - 10 = 630$
$32a = 640$
$a = 20$

In order from least to greatest:
$m\angle A = 90^\circ$, $m\angle F = 92^\circ$,
$m\angle C = 130^\circ$, $m\angle D = 132^\circ$,
$m\angle E = 136^\circ$, $m\angle B = 140^\circ$

5. $m\angle TYP = 20^\circ$
$m\angle TCP = 40^\circ$

The circumference of the circle is approximately 31.4 feet.

From Brian to Megan is approximately 3.5 feet:

$(\frac{40}{360})(31.4) = 3.49$

From Brian to Emily is approximately 12.25 feet:

$(\frac{140}{360})(31.4) = 12.21$

From Megan to Emily is approximately 15.75 feet:

$(\frac{180}{360})(31.4) = 15.7$

Cumulative Practice for Chapters 10–12

8. a. Quadrilateral $HJKL$ is a kite.
   b. Sample answer:

To show that $HJKL$ satisfies the definition of a kite, show that $\overline{JH} \cong \overline{JK}$ and $\overline{HL} \cong \overline{KL}$. Because $\overline{JH}$ and $\overline{JK}$ are both radii, they must be congruent.
   Because $\overline{HL}$ and $\overline{KL}$ are two segments from the same exterior point that are tangent to a circle, they are congruent.


16. a. Calculate the quotient whose denominator is the area of circle $C$ and whose numerator is the area of circle $C$ less the sum of the areas of circles $A$ and $B$.

\[
\frac{100\pi - (4\pi + 9\pi)}{100\pi} = \frac{87\pi}{100\pi} = \frac{87}{100}
\]

The probability is 87%.

b. The area of circle $C$ minus the sum of the areas of circles $A$ and $B$ is $87\pi$. The radius of the circle is

\[
r = \sqrt{\frac{87\pi}{\pi}} = \sqrt{87} \approx 9.3 \text{ inches.}
\]

21. B  22. square
23. a. Sample answer: Use the formula for the volume of a right cylinder. Solve for $h$ in terms of $r$.

\[
\pi r^2 h = 1000; h = \frac{1000}{\pi r^2}
\]

b. Sample answer: A diameter of 8 centimeters is easy to hold. If $r = 4$, then $h = \frac{1000}{\pi(4^2)}$, or about 19.9 centimeters. A cylinder with these dimensions would easily fit in a backpack.
## Post-Course Test

<table>
<thead>
<tr>
<th></th>
<th>See Lesson</th>
<th>Geometry NC Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>B 1.3</td>
<td>1.02</td>
</tr>
<tr>
<td>2.</td>
<td>D 1.5</td>
<td>2.02</td>
</tr>
<tr>
<td>3.</td>
<td>B 1.7</td>
<td>1.02</td>
</tr>
<tr>
<td>4.</td>
<td>D 2.1</td>
<td>2.01</td>
</tr>
<tr>
<td>5.</td>
<td>A 2.5</td>
<td>2.02</td>
</tr>
<tr>
<td>6.</td>
<td>A 3.2</td>
<td>2.02</td>
</tr>
<tr>
<td>7.</td>
<td>C 3.6</td>
<td>2.02</td>
</tr>
<tr>
<td>8.</td>
<td>A 3.7</td>
<td>2.02</td>
</tr>
<tr>
<td>9.</td>
<td>B 4.1</td>
<td>2.03</td>
</tr>
<tr>
<td>10.</td>
<td>C 4.2</td>
<td>2.03</td>
</tr>
<tr>
<td>11.</td>
<td>D 4.3</td>
<td>2.03</td>
</tr>
<tr>
<td>12.</td>
<td>B 5.4</td>
<td>2.02</td>
</tr>
<tr>
<td>13.</td>
<td>D 5.5</td>
<td>2.03</td>
</tr>
<tr>
<td>14.</td>
<td>B 6.1</td>
<td>2.03</td>
</tr>
<tr>
<td>15.</td>
<td>C 6.2</td>
<td>2.03</td>
</tr>
<tr>
<td>16.</td>
<td>B 6.5</td>
<td>1.02</td>
</tr>
<tr>
<td>17.</td>
<td>D 6.6</td>
<td>2.03</td>
</tr>
<tr>
<td>18.</td>
<td>C 6.7</td>
<td>2.03</td>
</tr>
<tr>
<td>19.</td>
<td>A 7.2</td>
<td>3.01</td>
</tr>
<tr>
<td>20.</td>
<td>A 7.4</td>
<td>3.01</td>
</tr>
<tr>
<td>21.</td>
<td>C 8.3</td>
<td>1.02</td>
</tr>
<tr>
<td>22.</td>
<td>D 8.5</td>
<td>2.03</td>
</tr>
<tr>
<td>23.</td>
<td>B 8.6</td>
<td>2.03</td>
</tr>
<tr>
<td>24.</td>
<td>B 8.7</td>
<td>3.01</td>
</tr>
<tr>
<td>25.</td>
<td>C 9.2</td>
<td>2.03</td>
</tr>
<tr>
<td>26.</td>
<td>C 9.2</td>
<td>2.03</td>
</tr>
<tr>
<td>27.</td>
<td>B 9.4</td>
<td>2.03</td>
</tr>
<tr>
<td>28.</td>
<td>C 9.5</td>
<td>1.01</td>
</tr>
<tr>
<td>29.</td>
<td>B 9.6</td>
<td>1.01</td>
</tr>
<tr>
<td>30.</td>
<td>B 10.1</td>
<td>2.03</td>
</tr>
<tr>
<td>31.</td>
<td>A 10.2</td>
<td>2.03</td>
</tr>
<tr>
<td>32.</td>
<td>D 10.5</td>
<td>2.03</td>
</tr>
<tr>
<td>33.</td>
<td>D 10.7</td>
<td>3.01</td>
</tr>
<tr>
<td>34.</td>
<td>C 11.1</td>
<td>2.03</td>
</tr>
<tr>
<td>35.</td>
<td>B 11.2</td>
<td>1.02</td>
</tr>
<tr>
<td>36.</td>
<td>C 11.3</td>
<td>1.02</td>
</tr>
<tr>
<td>37.</td>
<td>D 11.4</td>
<td>1.02</td>
</tr>
<tr>
<td>38.</td>
<td>A 11.6</td>
<td>1.03</td>
</tr>
<tr>
<td>39.</td>
<td>B 12.1</td>
<td>2.04</td>
</tr>
<tr>
<td>40.</td>
<td>C 12.2</td>
<td>1.02</td>
</tr>
<tr>
<td>41.</td>
<td>B 12.4</td>
<td>1.02</td>
</tr>
<tr>
<td>42.</td>
<td>A 12.5</td>
<td>1.02</td>
</tr>
</tbody>
</table>
## End-of-Course Practice Test A

<table>
<thead>
<tr>
<th>Tally</th>
<th>See Lesson</th>
<th>Geom. NC Obj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A B C D</td>
<td>1.2</td>
<td>2.01</td>
</tr>
<tr>
<td>2. A B C D</td>
<td>1.2</td>
<td>2.01</td>
</tr>
<tr>
<td>3. A B C D</td>
<td>1.5</td>
<td>2.02</td>
</tr>
<tr>
<td>4. A B C D</td>
<td>1.6</td>
<td>2.02</td>
</tr>
<tr>
<td>5. A B C D</td>
<td>1.6</td>
<td>2.02</td>
</tr>
<tr>
<td>6. A B C D</td>
<td>1.7</td>
<td>2.03</td>
</tr>
<tr>
<td>7. A B C D</td>
<td>2.1</td>
<td>2.01</td>
</tr>
<tr>
<td>8. A B C D</td>
<td>2.1</td>
<td>2.01</td>
</tr>
<tr>
<td>9. A B C D</td>
<td>2.4</td>
<td>2.01</td>
</tr>
<tr>
<td>10. A B C D</td>
<td>2.4</td>
<td>2.01</td>
</tr>
<tr>
<td>11. A B C D</td>
<td>2.5</td>
<td>2.01</td>
</tr>
<tr>
<td>12. A B C D</td>
<td>2.6</td>
<td>2.02</td>
</tr>
<tr>
<td>13. A B C D</td>
<td>3.3</td>
<td>2.02</td>
</tr>
<tr>
<td>14. A B C D</td>
<td>3.5</td>
<td>2.02</td>
</tr>
<tr>
<td>15. A B C D</td>
<td>3.5</td>
<td>2.02</td>
</tr>
<tr>
<td>16. A B C D</td>
<td>3.6</td>
<td>2.02</td>
</tr>
<tr>
<td>17. A B C D</td>
<td>3.6</td>
<td>2.02</td>
</tr>
<tr>
<td>18. A B C D</td>
<td>3.7</td>
<td>2.02</td>
</tr>
<tr>
<td>19. A B C D</td>
<td>4.1</td>
<td>2.03</td>
</tr>
<tr>
<td>20. A B C D</td>
<td>4.1</td>
<td>2.03</td>
</tr>
<tr>
<td>21. A B C D</td>
<td>4.2</td>
<td>2.03</td>
</tr>
<tr>
<td>22. A B C D</td>
<td>4.5</td>
<td>2.03</td>
</tr>
<tr>
<td>23. A B C D</td>
<td>4.5</td>
<td>2.03</td>
</tr>
<tr>
<td>24. A B C D</td>
<td>4.6</td>
<td>2.03</td>
</tr>
<tr>
<td>25. A B C D</td>
<td>5.1</td>
<td>2.01</td>
</tr>
<tr>
<td>26. A B C D</td>
<td>5.3</td>
<td>2.03</td>
</tr>
<tr>
<td>27. A B C D</td>
<td>5.4</td>
<td>2.03</td>
</tr>
<tr>
<td>28. A B C D</td>
<td>5.5</td>
<td>2.03</td>
</tr>
<tr>
<td>29. A B C D</td>
<td>5.5</td>
<td>2.03</td>
</tr>
<tr>
<td>30. A B C D</td>
<td>5.6</td>
<td>2.01</td>
</tr>
<tr>
<td>31. A B C D</td>
<td>6.1</td>
<td>2.03</td>
</tr>
<tr>
<td>32. A B C D</td>
<td>6.2</td>
<td>2.03</td>
</tr>
<tr>
<td>33. A B C D</td>
<td>6.4</td>
<td>2.03</td>
</tr>
<tr>
<td>34. A B C D</td>
<td>6.5</td>
<td>2.03</td>
</tr>
<tr>
<td>35. A B C D</td>
<td>6.5</td>
<td>2.03</td>
</tr>
<tr>
<td>36. A B C D</td>
<td>6.7</td>
<td>1.02</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tally</th>
<th>See Lesson</th>
<th>Geom. NC Obj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>37. A B C D</td>
<td>7.1</td>
<td>3.01</td>
</tr>
<tr>
<td>38. A B C D</td>
<td>7.2</td>
<td>3.01</td>
</tr>
<tr>
<td>39. A B C D</td>
<td>7.3</td>
<td>3.01</td>
</tr>
<tr>
<td>40. A B C D</td>
<td>7.4</td>
<td>3.01</td>
</tr>
<tr>
<td>41. A B C D</td>
<td>7.4*</td>
<td>3.02</td>
</tr>
<tr>
<td>42. A B C D</td>
<td>7.5</td>
<td>3.01</td>
</tr>
<tr>
<td>43. A B C D</td>
<td>8.1</td>
<td>1.02</td>
</tr>
<tr>
<td>44. A B C D</td>
<td>8.2</td>
<td>1.02</td>
</tr>
<tr>
<td>45. A B C D</td>
<td>8.3</td>
<td>2.03</td>
</tr>
<tr>
<td>46. A B C D</td>
<td>8.4</td>
<td>2.03</td>
</tr>
<tr>
<td>47. A B C D</td>
<td>8.4</td>
<td>2.03</td>
</tr>
<tr>
<td>48. A B C D</td>
<td>8.7*</td>
<td>3.02</td>
</tr>
<tr>
<td>49. A B C D</td>
<td>9.1</td>
<td>2.03</td>
</tr>
<tr>
<td>50. A B C D</td>
<td>9.2</td>
<td>1.02</td>
</tr>
<tr>
<td>51. A B C D</td>
<td>9.4</td>
<td>2.03</td>
</tr>
<tr>
<td>52. A B C D</td>
<td>9.5</td>
<td>1.01</td>
</tr>
<tr>
<td>53. A B C D</td>
<td>9.5</td>
<td>1.01</td>
</tr>
<tr>
<td>54. A B C D</td>
<td>9.6</td>
<td>1.01</td>
</tr>
<tr>
<td>55. A B C D</td>
<td>10.1</td>
<td>2.03</td>
</tr>
<tr>
<td>56. A B C D</td>
<td>10.2</td>
<td>2.03</td>
</tr>
<tr>
<td>57. A B C D</td>
<td>10.3</td>
<td>2.03</td>
</tr>
<tr>
<td>58. A B C D</td>
<td>10.4</td>
<td>2.03</td>
</tr>
<tr>
<td>59. A B C D</td>
<td>10.5</td>
<td>2.03</td>
</tr>
<tr>
<td>60. A B C D</td>
<td>10.6</td>
<td>2.03</td>
</tr>
<tr>
<td>61. A B C D</td>
<td>11.1</td>
<td>2.03</td>
</tr>
<tr>
<td>62. A B C D</td>
<td>11.3</td>
<td>1.02</td>
</tr>
<tr>
<td>63. A B C D</td>
<td>11.4</td>
<td>1.02</td>
</tr>
<tr>
<td>64. A B C D</td>
<td>11.5</td>
<td>1.02</td>
</tr>
<tr>
<td>65. A B C D</td>
<td>11.6</td>
<td>1.03</td>
</tr>
<tr>
<td>66. A B C D</td>
<td>11.6</td>
<td>1.03</td>
</tr>
<tr>
<td>67. A B C D</td>
<td>12.2</td>
<td>2.04</td>
</tr>
<tr>
<td>68. A B C D</td>
<td>12.4</td>
<td>2.04</td>
</tr>
<tr>
<td>69. A B C D</td>
<td>12.4</td>
<td>2.04</td>
</tr>
<tr>
<td>70. A B C D</td>
<td>12.5</td>
<td>2.04</td>
</tr>
<tr>
<td>71. A B C D</td>
<td>12.6</td>
<td>2.04</td>
</tr>
<tr>
<td>72. A B C D</td>
<td>12.6</td>
<td>2.04</td>
</tr>
</tbody>
</table>

*See Appendix 2: Matrices and Transformations.
### End-of-Course Practice Test B

#### Tally See Lesson Geom. NC Obj.

<table>
<thead>
<tr>
<th>Tally</th>
<th>See Lesson</th>
<th>Geom. NC Obj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A B C D</td>
<td>1.2</td>
<td>2.01</td>
</tr>
<tr>
<td>2. A B C D</td>
<td>1.2</td>
<td>2.01</td>
</tr>
<tr>
<td>3. A B C D</td>
<td>1.5</td>
<td>2.02</td>
</tr>
<tr>
<td>4. A B C D</td>
<td>1.6</td>
<td>2.02</td>
</tr>
<tr>
<td>5. A B C D</td>
<td>1.6</td>
<td>2.02</td>
</tr>
<tr>
<td>6. A B C D</td>
<td>1.7</td>
<td>2.03</td>
</tr>
<tr>
<td>7. A B C D</td>
<td>2.1</td>
<td>2.01</td>
</tr>
<tr>
<td>8. A B C D</td>
<td>2.1</td>
<td>2.01</td>
</tr>
<tr>
<td>9. A B C D</td>
<td>2.4</td>
<td>2.01</td>
</tr>
<tr>
<td>10. A B C D</td>
<td>2.4</td>
<td>2.01</td>
</tr>
<tr>
<td>11. A B C D</td>
<td>2.5</td>
<td>2.01</td>
</tr>
<tr>
<td>12. A B C D</td>
<td>2.6</td>
<td>2.02</td>
</tr>
<tr>
<td>13. A B C D</td>
<td>3.3</td>
<td>2.02</td>
</tr>
<tr>
<td>14. A B C D</td>
<td>3.5</td>
<td>2.02</td>
</tr>
<tr>
<td>15. A B C D</td>
<td>3.5</td>
<td>2.02</td>
</tr>
<tr>
<td>16. A B C D</td>
<td>3.6</td>
<td>2.02</td>
</tr>
<tr>
<td>17. A B C D</td>
<td>3.6</td>
<td>2.02</td>
</tr>
<tr>
<td>18. A B C D</td>
<td>3.7</td>
<td>2.02</td>
</tr>
<tr>
<td>19. A B C D</td>
<td>4.1</td>
<td>2.03</td>
</tr>
<tr>
<td>20. A B C D</td>
<td>4.1</td>
<td>2.03</td>
</tr>
<tr>
<td>21. A B C D</td>
<td>4.2</td>
<td>2.03</td>
</tr>
<tr>
<td>22. A B C D</td>
<td>4.5</td>
<td>2.03</td>
</tr>
<tr>
<td>23. A B C D</td>
<td>4.5</td>
<td>2.03</td>
</tr>
<tr>
<td>24. A B C D</td>
<td>4.6</td>
<td>2.03</td>
</tr>
<tr>
<td>25. A B C D</td>
<td>5.1</td>
<td>2.01</td>
</tr>
<tr>
<td>26. A B C D</td>
<td>5.3</td>
<td>2.03</td>
</tr>
<tr>
<td>27. A B C D</td>
<td>5.4</td>
<td>2.03</td>
</tr>
<tr>
<td>28. A B C D</td>
<td>5.5</td>
<td>2.03</td>
</tr>
<tr>
<td>29. A B C D</td>
<td>5.5</td>
<td>2.03</td>
</tr>
<tr>
<td>30. A B C D</td>
<td>5.6</td>
<td>2.01</td>
</tr>
<tr>
<td>31. A B C D</td>
<td>6.1</td>
<td>2.03</td>
</tr>
<tr>
<td>32. A B C D</td>
<td>6.2</td>
<td>2.03</td>
</tr>
<tr>
<td>33. A B C D</td>
<td>6.4</td>
<td>2.03</td>
</tr>
<tr>
<td>34. A B C D</td>
<td>6.5</td>
<td>2.03</td>
</tr>
<tr>
<td>35. A B C D</td>
<td>6.5</td>
<td>2.03</td>
</tr>
<tr>
<td>36. A B C D</td>
<td>6.7</td>
<td>1.02</td>
</tr>
</tbody>
</table>

### *See Appendix 2: Matrices and Transformations.*