Answer Key: Designing With Geometry

Worksheet 1:
Polygons on the Coordinate Plane

1 and 2 The side lengths are 4 and 6, so the perimeter is 20 meters and the area is 24 square meters.

3 (5, -7)

4 and 5 The side lengths are 10 and 4, so the perimeter is 28 meters and the area is 40 square meters.

6 Answers will vary.

Worksheet 2:
Scale Drawings of Geometric Figures

1 6 meters x 12 meters

2 6 meters

3 24 meters

4 90 square meters

5 Answers will vary.

Worksheet 3:
Finding Missing Angle Measurements

1 35°. \( \angle EDF \) and \( \angle CDG \) are vertical angles so they have the same measurement.

2 \( x = 180° - 35° \), so \( x = 145° \). From problem 1, we know that the measurement of \( \angle EDF = 35° \). \( \angle EDF \) and \( \angle EDC \) are supplementary and must add up to 180°. Thus, \( \angle EDC = 180° - 35° \), so \( x = 145° \).

3 If the tetherball arena is rectangular, then \( \angle IBJ = 90° \). \( \angle IBJ \) and \( \angle ABI \) are supplementary, so \( \angle ABI \) must also be 90°.

4 \( x = 180° - (90° + 35°) \), so \( x = 55° \). Recognize that the snack bar is a right triangle, with the three angles adding up to 180°. \( \angle ABC \) is a right angle because it and \( \angle ABI \) are vertical angles, and we know that \( \angle ABI = 90° \) from problem 3. In the triangle, we also know that \( \angle CDG = \angle EDF \) because they are also vertical angles, and we know from problem 1 that \( \angle EDF = 35° \). So we know that two of the three angle measurements in the triangle add up to 125°. Thus, the missing angle is 55° because 180° - 125° = 55°.

Worksheet 4:
Congruence and Transformations

1 The two triangles are congruent because their side lengths and angle measurements are the same.

2 The transformation is a translation, i.e., a slide. If a reflection took place, \( A' \) would be at the coordinates for \( C' \) and vice versa.

3 The location of the corners of the drum statue would be: \( D' \) at \((-3, -4) \), \( E' \) at \((-3, -3) \), \( F' \) at \((-5, -3) \).

4 The location of the corners of the second seating area would be: \( G' \) at \((1, 5) \), \( H' \) at \((-1, 5) \), \( I' \) at \((1, 7) \), and \( J' \) at \((-1, 7) \).

5 Answers will vary.

Worksheet 5:
Applying the Pythagorean Theorem

1 The lengths of the two sides are 3 and 4, so \( 3^2 + 4^2 = 25 \), so the hypotenuse is \( \sqrt{25} = 5 \).

2 \( \sqrt{5} \). The side lengths are 1 and 2, so \( 1^2 + 2^2 = 5 \), so the hypotenuse is \( \sqrt{5} \).

3 \( 2\sqrt{2} \). Each side is 2, so using the Pythagorean Theorem, \( 2^2 + 2^2 = 8 \) and \( \sqrt{8} = 2\sqrt{2} \).

4 The legs are 3 and 3 and the hypotenuse is \( 3\sqrt{2} \). Add a point at \((1, 4) \). One side length is the difference between the y coordinates of \((1, 4) \) and \((1, 7) \) or 3, and the other side length is the difference between the x coordinates of \((1, 4) \) and \((4, 4) \) or 3. Using the Pythagorean Theorem, the hypotenuse equals the square root of \( 3^2 + 3^2 = \sqrt{18} \). \( \sqrt{18} = \sqrt{9\times2} \), which equals \( 3\sqrt{2} \).

5 The sides will be 2 and 3. The diagonal will be the square root of 13 because \( 2^2 + 3^2 = \sqrt{13} \).