1. Refer to the diagram. \( PQRS \) is a trapezoid with bases \( PQ \), of length 9, and \( RS \), of length 15. The area of \( \triangle OPQ \) is 27.
   a. Find the area of \( \triangle ORS \).
   b. Find the height of \( \triangle OPQ \).
   c. Find the height of \( \triangle ORS \).
   d. Find the area of trapezoid \( PQRS \).

2. Areas of similar triangles can be used to prove the Pythagorean Theorem. Let \( \triangle XYZ \) be a right triangle with side lengths \( x \), \( y \), and \( z \), as shown. Extend \( YZ \) to \( W \) so that \( WX \perp XY \). As you know, \( \triangle XYZ \sim \triangle WXZ \sim \triangle WYX \).
   a. Find the ratios \( \frac{\text{Side length of } \triangle WXZ}{\text{Side length of } \triangle XYZ} \) and \( \frac{\text{Side length of } \triangle WYX}{\text{Side length of } \triangle XYZ} \) in terms of \( x \), \( y \), and \( z \).
   b. Let \( A \) be the area of \( \triangle XYZ \). Find expressions for the area of \( \triangle WXZ \) and the area of \( \triangle WYX \) in terms of \( A \), \( x \), \( y \), and \( z \).
   c. Observe that area of \( \triangle XYZ \) + area of \( \triangle WXZ \) = area of \( \triangle WYX \). Explain how to use this fact to derive the Pythagorean Theorem.

In Exercises 3–6, use the information about a pair of similar polygons to find all possible values of \( x \).

3. The area of \( \triangle ABC \) is 5.
   The perimeter of \( \triangle ABC \) is 2.
   The area of \( \triangle DEF \) is \( x^2 + 9 \).
   The perimeter of \( \triangle DEF \) is \( x \).

4. The area of \( \triangle HJK \) is \( x + 4 \).
   The perimeter of \( \triangle HJK \) is \( \frac{x}{2} \).
   The area of \( \triangle STUV \) is 5.
   The perimeter of \( \triangle STUV \) is \( \sqrt{x} \).

5. The area of \( \triangle PQR \) is \( 2x - 11 \).
   The perimeter of \( \triangle PQR \) is \( x - 7 \).
   The area of \( \triangle WXY \) is \( 2x + 5 \).
   The perimeter of \( \triangle WXY \) is \( x - 5 \).

6. The area of \( \triangle EFGH \) is \( 2x + 9 \).
   The perimeter of \( \triangle EFGH \) is \( x + 3 \).
   The area of \( \triangle JKL \) is \( 2x - 6 \).
   The perimeter of \( \triangle JKL \) is \( x - 1 \).