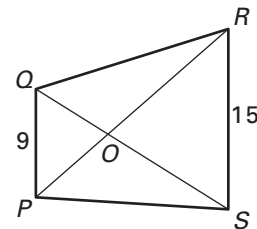


Challenge: Skills and Applications

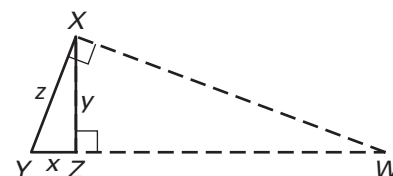
For use with pages 677–682

1. Refer to the diagram. $PQRS$ is a trapezoid with bases $\overline{PQ}$, of length 9, and $\overline{RS}$, of length 15. The area of $\triangle OPQ$ is 27.

- Find the area of $\triangle ORS$.
- Find the height of $\triangle OPQ$.
- Find the height of $\triangle ORS$.
- 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 $\overline{YZ}$ to W so that $\overline{WX} \perp \overline{XY}$. As you know, $\triangle XYZ \sim \triangle WXZ \sim \triangle WYX$.



- 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 .
- 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 .
- Observe that area of $\triangle XYZ + \text{area of } \triangle WXZ = \text{area of } \triangle WYX$. 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 $HIJK$ is $x + 4$.
The perimeter of $HIJK$ is $\frac{x}{2}$. | The area of $STUV$ is 5.
The perimeter of $STUV$ 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 $EFGH$ is $2x + 9$.
The perimeter of $EFGH$ is $x + 3$. | The area of $JKLM$ is $2x - 6$.
The perimeter of $JKLM$ is $x - 1$. |