Answers

1. If you draw the altitude to the hypotenuse in any right triangle, you divide the triangle into two similar triangles that are also similar to the original triangle. By setting up proportions between the side lengths of the three triangles, you can prove the Pythagorean Theorem.
2. Casey is incorrect because in a 30°-60°-90° triangle, the hypotenuse is 2 times the length of the short leg.
3. Let the length of the short leg be s. Since $s = 4.5$, the length of the long leg, $(4.5)\sqrt{3}$, is $s\sqrt{3}$, and the length of the hypotenuse, 9, is $2s$. These are the relationships between the lengths of the legs and hypotenuse of a 30°-60°-90° triangle.
4. $x = (3.2)\sqrt{2}$
5. $x = 9\sqrt{3}$
6. Yes; $20^2 + 21^2 \stackrel{?}{=} 29^2$

   $841 = 841$
7. No; $35^2 + 36^2 \stackrel{?}{=} 71^2$

   $2{,}521 \neq 5{,}041$
8. No; $11^2 + 40^2 \stackrel{?}{=} 41^2$

   $1{,}721 \neq 1{,}681$
9. No; the pennant is a 30°-60°-90° triangle, so the length of the hypotenuse is 2 times the length of the short leg. The short leg is the widest part of the pennant. It is $41 \div 2 = 20.5$ inches. The pennant is too wide for the 19-inch space between the windows.

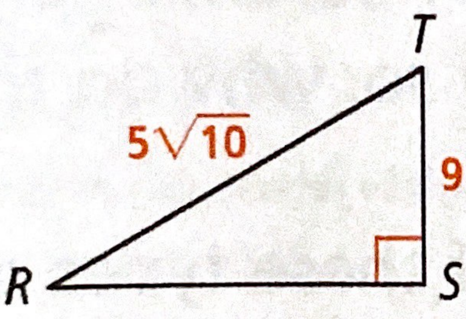
11. Triangle *DEF* is a 45°-45°-90° triangle. So, $14 = \sqrt{2}(EF)$, or $EF = 7\sqrt{2}$.

12. $MN = \sqrt{2}x$, $LN = \frac{\sqrt{2}x}{2} + \frac{\sqrt{6}x}{2}$

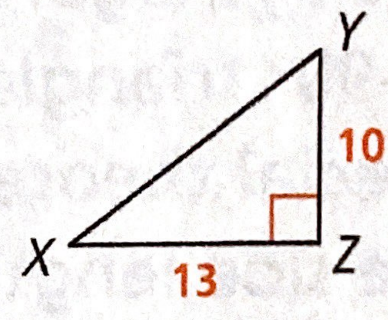
PRACTICE

For Exercises 15 and 16, find the unknown side length of each triangle. SEE EXAMPLE 1

15. *RS* 13

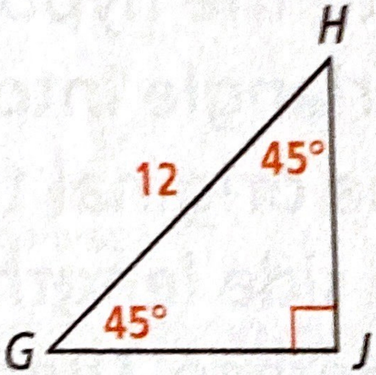


16. *XY* $\sqrt{269}$



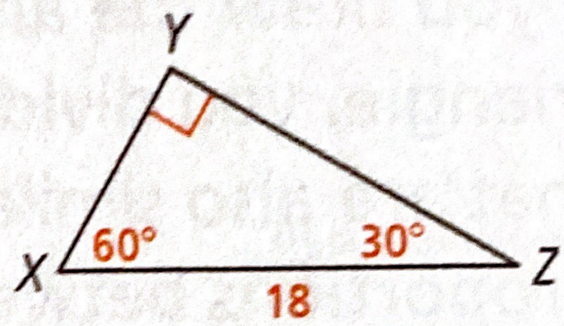
For Exercise 20 and 21, find the side lengths of each triangle. SEE EXAMPLES 3 AND 4

20. What are GJ and HJ?



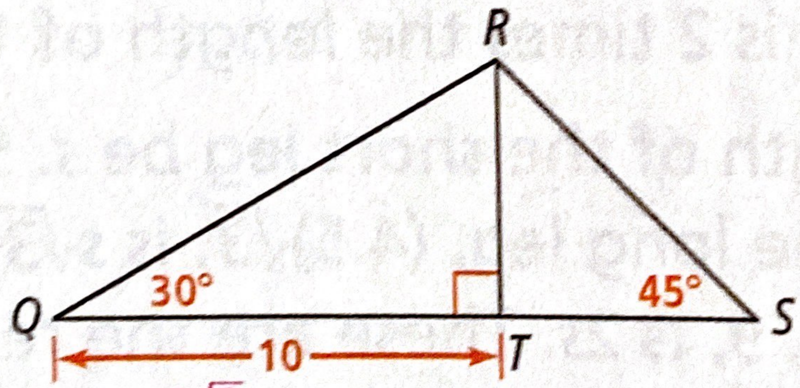
$GJ = HJ = 6\sqrt{2}$

21. What are XY and YZ?



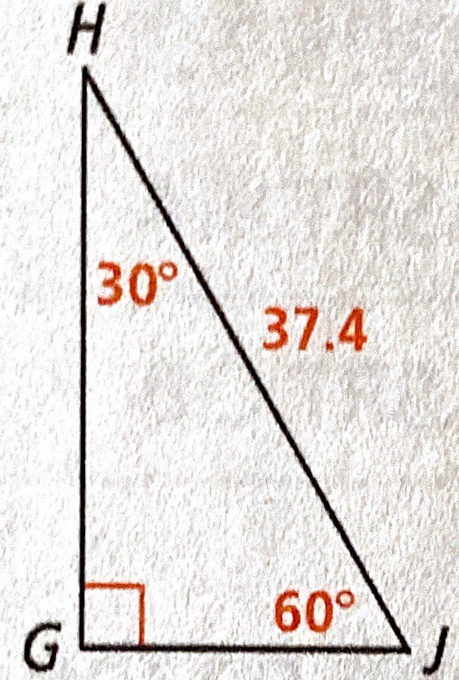
$XY = 9,\ YZ = 9\sqrt{3}$

22. What is QS? SEE EXAMPLE 5



$10 + \frac{10\sqrt{3}}{3}$

27. **SAT/ACT** What is *GJ*?



Ⓐ 18.7

Ⓑ $18.7\sqrt{2}$

Ⓒ $18.7\sqrt{3}$

Ⓓ 74.8