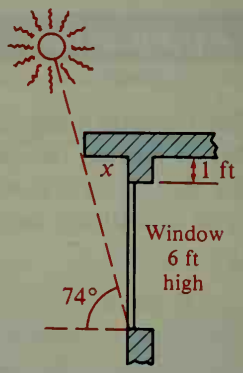
9. An architect is designing a passive solar house to be located in Terre Haute, Indiana. The diagram shows a cross-section of a wall that will face south. How long must the overhang x be to shade the entire window at noon at the summer solstice?

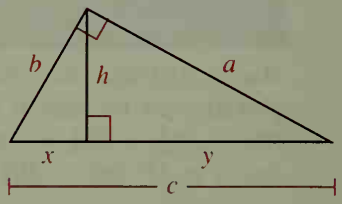
10. If the overhang has the length found in Exercise 9, how much of the window will be in the sun at noon at the winter solstice?



Chapter Summary

1. When $\frac{a}{x} = \frac{x}{b}$, x is the geometric mean between a and b.

2. A right triangle is shown with the altitude drawn to the hypotenuse.

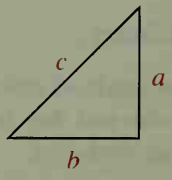


a. The two triangles formed are similar to the original triangle and to each other.

$$\frac{x}{h} = \frac{h}{y} \qquad \frac{c}{b} = \frac{b}{x} \qquad \frac{c}{a} = \frac{a}{y}$$

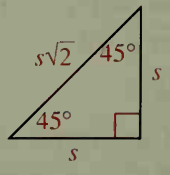
b. Pythagorean Theorem: $c^2 = a^2 + b^2$

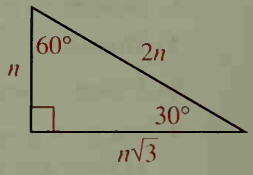
3. The longest side of the triangle shown is c.



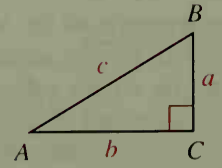
If $c^2 = a^2 + b^2$, then the triangle is a right triangle.
If $c^2 > a^2 + b^2$, then the triangle is obtuse.
If $c^2 < a^2 + b^2$, then the triangle is acute.

4. The sides of a 45°-45°-90° triangle and the sides of a 30°-60°-90° triangle are related as shown.





5. In the right triangle shown:



$$\tan A = \frac{a}{b} \qquad \sin A = \frac{a}{c} \qquad \cos A = \frac{b}{c}$$

The tangent, sine, and cosine ratios are useful in solving problems involving right triangles.