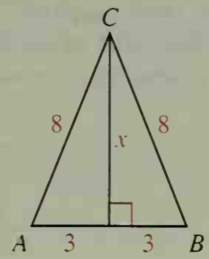
Example 3 An isosceles triangle has sides 8, 8, and 6. Find the lengths of its three altitudes.

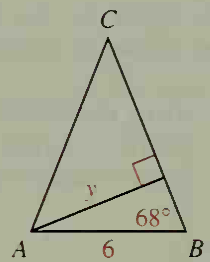


Solution The altitude to the base can be found using the Pythagorean Theorem.

$x^2 = 8^2 - 3^2 = 55$

$x = \sqrt{55} \approx 7.4$

Notice that $\cos B = \frac{3}{8}$ (so $m\angle B \approx 68$), and that the altitudes from A and B are congruent. (Why?)
To find the length of the altitudes from A and B, use



$\sin B \approx \sin 68° \approx \frac{y}{6}$.

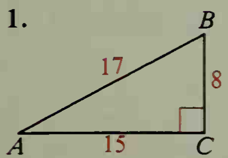
$y \approx 6 \cdot \sin 68°$

$y \approx 5.6$

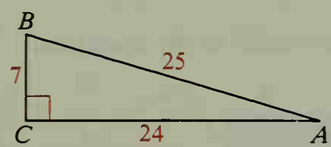
Classroom Exercises

In Exercises 1–3 express sin A, cos A, and tan A as fractions.

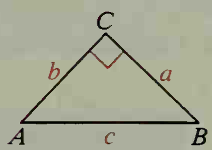
1.



2.



3.



4–6. Using the triangles in Exercises 1–3, express sin B, cos B, and tan B as fractions.

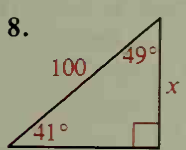
7. Use the table on page 311 or a scientific calculator to complete the statements.

a. $\sin 24° \approx$ __?__ **b.** $\cos 57° \approx$ __?__ **c.** $\sin 87° \approx$ __?__

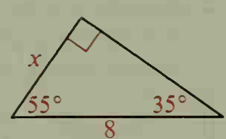
d. cos __?__ ≈ 0.9659 **e.** sin __?__ ≈ 0.1045 **f.** cos __?__ ≈ 0.1500

State two different equations you could use to find the value of x.

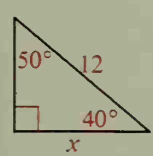
8.



9.



10.



11. The word *cosine* is related to the phrase "complement's sine." Explain the relationship by using the diagram to express the cosine of $\angle A$ and the sine of its complement, $\angle B$.