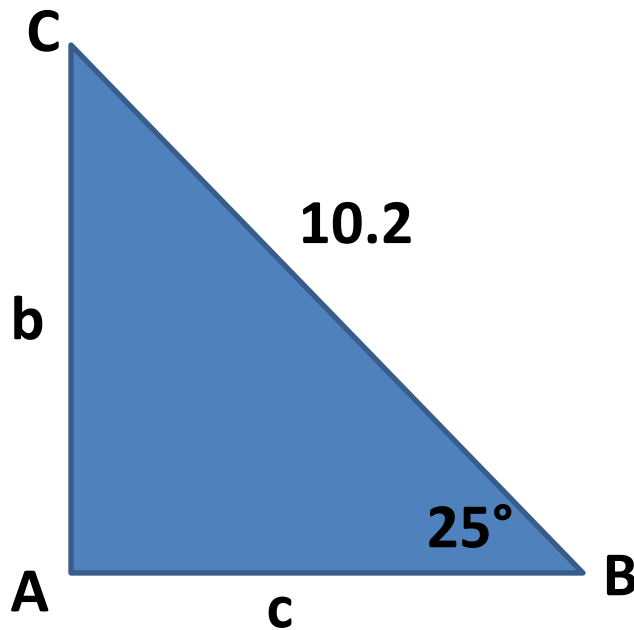


# WARM UP

- Solve the triangle:



**A=**

**a=**

**B=**

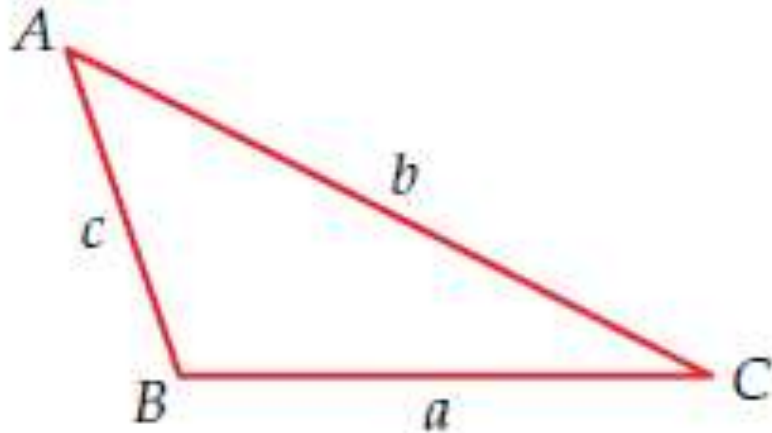
**b=**

**C=**

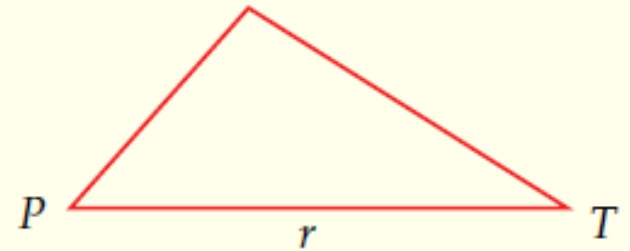
**c=**

## Objectives

- Solve oblique triangles by using the Law of Cosines.



## Standard Notation



- The forms of the cosine law are

$$a^2 = b^2 + c^2 - 2bc \cos A \quad \cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$b^2 = a^2 + c^2 - 2ac \cos B \quad \cos B = \frac{a^2 + c^2 - b^2}{2ac}$$

$$c^2 = a^2 + b^2 - 2ab \cos C \quad \cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

- The cosine law can be used to solve any triangle when given
  - a) the measures of two sides and the contained angle
  - b) the measures of three sides

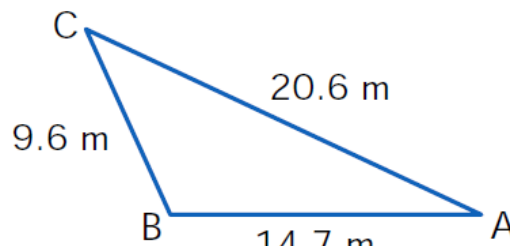
# Example: SSS The Cosine Law, Given Three Sides

Solve the triangle.

$\triangle ABC$ ,  $a = 9.6$  m,  $b = 20.6$  m, and  $c = 14.7$  m.

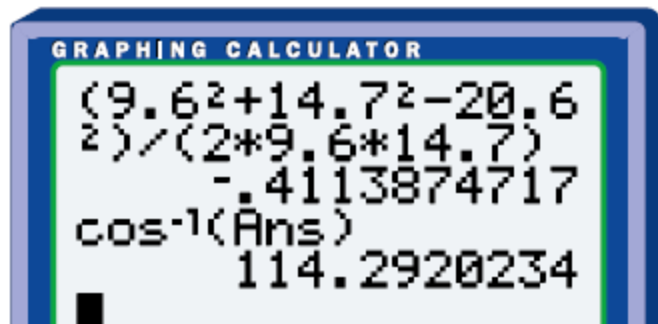
## SOLUTION

Draw a diagram.



Use the cosine law to find the measure of an angle.

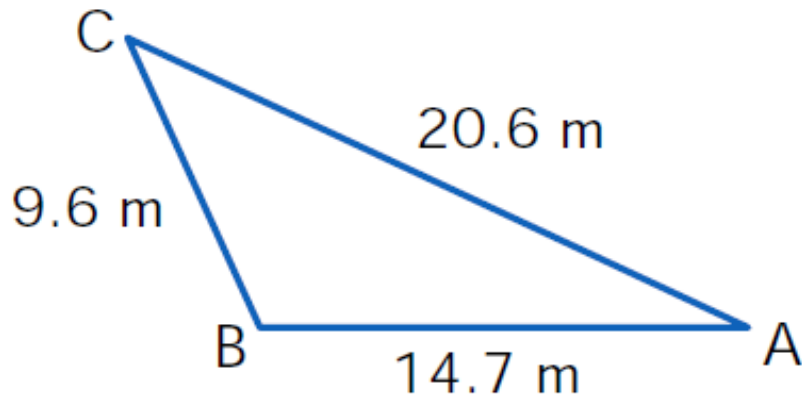
$$\cos B = \frac{a^2 + c^2 - b^2}{2ac} = \frac{9.6^2 + 14.7^2 - 20.6^2}{2(9.6)(14.7)}$$



$$B = 114.3^\circ$$

# Example cont.

Find angles A and C using the cosine law

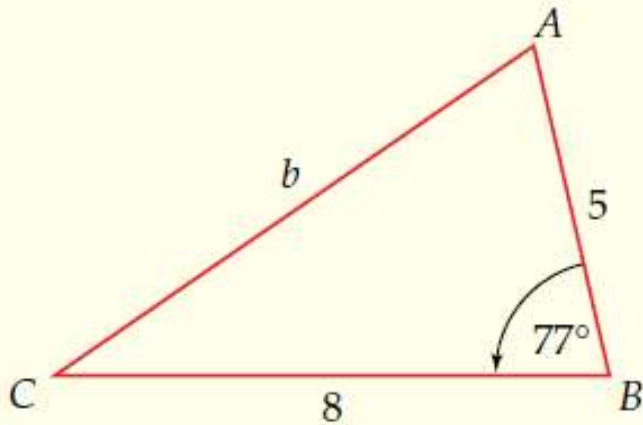


$$A = 25.1^\circ$$

$$C = 40.6^\circ$$

# Example Solve a Triangle with SAS Information

Solve triangle  $ABC$  shown below.



$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos A \approx \frac{8.4^2 + 5^2 - 8^2}{2(8.4)(5)}$$

$$A \approx \cos^{-1} 0.3798$$

$$A \approx 67.7^\circ$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$b^2 = 8^2 + 5^2 - 2(8)(5) \cos 77^\circ$$

$$b^2 = 89 - 80 \cos 77^\circ$$

$$b = \sqrt{89 - 80 \cos 77^\circ}$$

$$b \approx 8.4$$

$$C \approx 180^\circ - (77^\circ + 67.7^\circ) = 35.3^\circ$$

$$b \approx 13.3, A \approx 35.5^\circ, C \approx 104.5^\circ$$

One for you to try:

$$B = 40^\circ, a = 12, c = 20$$

# Daily Practice : p.622 #1-15 odds

Standard notation for triangle  $ABC$  is used throughout. Use a calculator and round your answers to one decimal place at the end of each computation.

In Exercises 1–16, solve the triangle  $ABC$  under the given conditions.

1.  $A = 20^\circ, b = 10, c = 7$

2.  $B = 40^\circ, a = 12, c = 20$

3.  $C = 118^\circ, a = 6, b = 10$

4.  $C = 52.5^\circ, a = 6.5, b = 9$

5.  $A = 140^\circ, b = 12, c = 14$

6.  $B = 25.4^\circ, a = 6.8, c = 10.5$

7.  $C = 78.6^\circ, a = 12.1, b = 20.3$

9.  $a = 7, b = 3, c = 5$

10.  $a = 8, b = 5, c = 10$

11.  $a = 16, b = 20, c = 32$

12.  $a = 5.3, b = 7.2, c = 10$

13.  $a = 7.2, b = 6.5, c = 11$

14.  $a = 6.8, b = 12.4, c = 15.1$

15.  $a = 12, b = 16.5, c = 21.3$