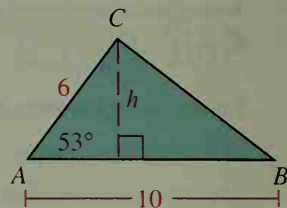


Example 1 Given the SAS information shown for $\triangle ABC$, find its area.

Solution Draw the altitude from C .

$$\text{Then } \frac{h}{6} = \sin 53^\circ \approx 0.7986; h \approx 4.79.$$

$$\text{Area} = \frac{1}{2}bh \approx \frac{1}{2}(10)(4.79) \approx 24.0$$



Example 2 Given the ASA information shown for $\triangle ABC$, find its area.

Solution

Step 1 Draw the altitude from C .

$$\text{Then } \tan 25^\circ = \frac{h}{12 - x} \quad \text{and} \quad \tan 34^\circ = \frac{h}{x}.$$

$$(12 - x) \tan 25^\circ = h \quad \text{and} \quad x \tan 34^\circ = h$$

$$(12 - x) \tan 25^\circ = x \tan 34^\circ$$

$$(12 - x)(0.4663) \approx x(0.6745)$$

$$5.5956 - 0.4663x \approx 0.6745x$$

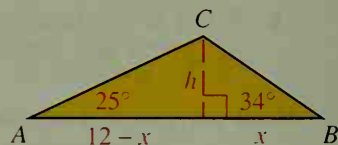
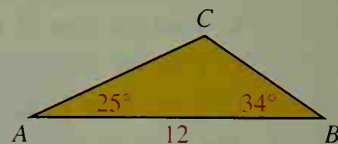
$$5.5956 \approx 1.1408x$$

$$4.905 \approx x$$

Step 2 Knowing x , we can find h :

$$h = x \tan 34^\circ \approx (4.905)(0.6745) \approx 3.308$$

Step 3 Area = $\frac{1}{2}bh \approx \frac{1}{2}(12)(3.308) \approx 19.8$



Exercises

Use the given information to find the approximate area of $\triangle ABC$. In Exercises 6 and 7 the altitude from C lies outside the triangle.

- (SAS) $AB = 8$, $m\angle B = 67^\circ$, $BC = 15$
- (HL) $m\angle C = 90^\circ$, $AB = 30$, $BC = 20$ (Use $\sqrt{5} \approx 2.236$.)
- (SSS) $AB = 10$, $BC = 12$, $CA = 8$ (Hint: Use Heron's Formula.)
- (ASA) $m\angle A = 28^\circ$, $AB = 10$, $m\angle B = 42^\circ$
- (AAS) $m\angle A = 36^\circ$, $m\angle B = 80^\circ$, $BC = 10$ (Hint: Find the measure of $\angle C$. Then proceed as in Example 2.)
- (SAS) $AB = 12$, $m\angle A = 118^\circ$, $AC = 20$
- (ASA) $m\angle A = 107^\circ$, $AB = 20$, $m\angle B = 35^\circ$
- ★ The two triangles shown have two pairs of congruent corresponding sides and one pair of congruent corresponding non-included angles (SSA). Of course, they are *not* congruent. Find the area of each triangle.

