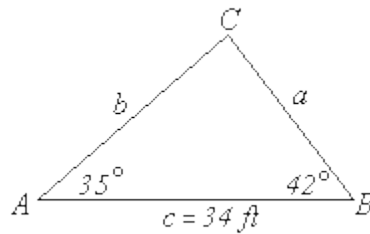


Review Exercise Set 14

Exercise 1: Solve the given triangle. Round measurements to the nearest tenth.



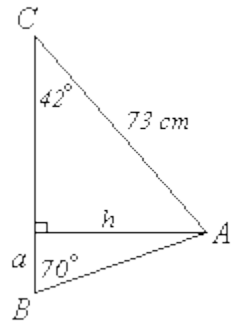
Exercise 2: Solve the triangle with the given conditions. Round measurements to the nearest tenth.

$$A = 21^\circ; C = 84^\circ; a = 6.5 \text{ m}$$

Exercise 3: Determine whether the given measurements produce a single triangle, two triangles, or no triangle. Solve each triangle formed rounding the measurements to the nearest tenth.

$$b = 67 \text{ ft}; c = 58 \text{ ft}; C = 59^\circ$$

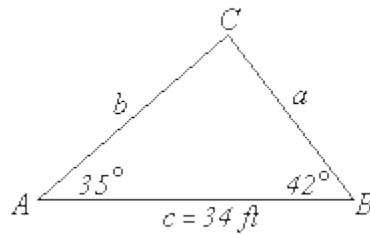
Exercise 4: Find a to the nearest tenth.



Exercise 5: A tree is growing on a hillside at an angle of 65° to the hill. From a distance of 110 meters up the hill, the angle of elevation to the top of the tree is measured as 53° and the angle of depression to the base of the tree is measured as 25° . Find the height of the tree to the nearest tenth of a meter.

Review Exercise Set 14 Answer Key

Exercise 1: Solve the given triangle. Round measurements to the nearest tenth.



Find angle C

$$\begin{aligned}A + B + C &= 180^\circ \\35^\circ + 42^\circ + C &= 180^\circ \\C &= 180^\circ - 77^\circ \\C &= 103^\circ\end{aligned}$$

Find a

$$\begin{aligned}\frac{a}{\sin A} &= \frac{c}{\sin C} \\ \frac{a}{\sin 35^\circ} &= \frac{34}{\sin 103^\circ} \\ a &= \frac{34 \sin 35^\circ}{\sin 103^\circ} \\ &\approx 20.0 \text{ ft}\end{aligned}$$

Find b

$$\begin{aligned}\frac{b}{\sin B} &= \frac{c}{\sin C} \\ \frac{b}{\sin 42^\circ} &= \frac{34}{\sin 103^\circ} \\ b &= \frac{34 \sin 42^\circ}{\sin 103^\circ} \\ &\approx 23.3 \text{ ft}\end{aligned}$$

Exercise 2: Solve the triangle with the given conditions. Round measurements to the nearest tenth.

$$A = 21^\circ; C = 84^\circ; a = 6.5 \text{ m}$$

Find angle B

$$\begin{aligned}A + B + C &= 180^\circ \\21^\circ + B + 84^\circ &= 180^\circ \\B &= 180^\circ - 105^\circ \\B &= 75^\circ\end{aligned}$$

Find b

$$\begin{aligned}\frac{b}{\sin B} &= \frac{a}{\sin A} \\ \frac{b}{\sin 75^\circ} &= \frac{6.5}{\sin 21^\circ} \\ b &= \frac{6.5 \sin 75^\circ}{\sin 21^\circ} \\ &\approx 17.5 \text{ m}\end{aligned}$$

Find c

$$\begin{aligned}\frac{c}{\sin C} &= \frac{a}{\sin A} \\ \frac{c}{\sin 84^\circ} &= \frac{6.5}{\sin 21^\circ} \\ c &= \frac{6.5 \sin 84^\circ}{\sin 21^\circ} \\ &\approx 18.0 \text{ m}\end{aligned}$$

Exercise 3: Determine whether the given measurements produce a single triangle, two triangles, or no triangle. Solve each triangle formed rounding the measurements to the nearest tenth.

$$a = 58 \text{ ft}; b = 67 \text{ ft}; A = 59^\circ$$

Find h

$$\begin{aligned}h &= b \sin A \\ h &= 67 \sin 59^\circ \\ h &\approx 57.4 \text{ ft}\end{aligned}$$

Compare a, b, and h

$$\begin{aligned}57.4 &< 58 < 67 \\ h &< a < b \quad \dots \text{ so there are two triangles formed}\end{aligned}$$

Exercise 3 (Continued):

Find angles B_1 and B_2

$$\begin{aligned}\frac{\sin B_1}{b} &= \frac{\sin A}{a} \\ \frac{\sin B_1}{67} &= \frac{\sin 59^\circ}{58} \\ \sin B_1 &= \frac{67 \sin 59^\circ}{58} \\ &\approx 0.9902 \\ B_1 &\approx 82^\circ \\ B_2 &\approx 180^\circ - 82^\circ \\ &\approx 98^\circ\end{aligned}$$

Find angles C_1 and C_2

$$\begin{aligned}A + B_1 + C_1 &= 180^\circ \\ 59^\circ + 82^\circ + C_1 &= 180^\circ \\ C_1 &= 180^\circ - 141^\circ \\ C_1 &= 39^\circ \\ A + B_2 + C_2 &= 180^\circ \\ 59^\circ + 98^\circ + C_2 &= 180^\circ \\ C_2 &= 180^\circ - 157^\circ \\ C_2 &= 23^\circ\end{aligned}$$

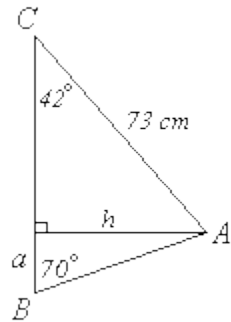
Find c_1 and c_2

$$\begin{aligned}\frac{c_1}{\sin C_1} &= \frac{a}{\sin A} & \frac{c_2}{\sin C_2} &= \frac{a}{\sin A} \\ \frac{c_1}{\sin 39^\circ} &= \frac{58}{\sin 59^\circ} & \frac{c_2}{\sin 23^\circ} &= \frac{58}{\sin 59^\circ} \\ c_1 &= \frac{58 \sin 39^\circ}{\sin 59^\circ} & c_2 &= \frac{58 \sin 23^\circ}{\sin 59^\circ} \\ &\approx 42.6 \text{ ft} & &\approx 26.4 \text{ ft}\end{aligned}$$

triangle 1: $B_1 \approx 82^\circ$; $C_1 \approx 39^\circ$; and $c_1 \approx 42.6$ ft

triangle 2: $B_2 \approx 98^\circ$; $C_2 \approx 23^\circ$; and $c_2 \approx 26.4$ ft

Exercise 4: Find a to the nearest tenth.



Find h

$$\begin{aligned}\sin 42^\circ &= \frac{h}{73} \\ h &= 73 \sin 42^\circ \\ &\approx 48.8 \text{ cm}\end{aligned}$$

Find angle A in the lower triangle

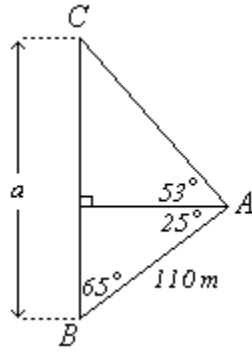
$$\begin{aligned}A + B + C &= 180^\circ \\ A + 70^\circ + 90^\circ &= 180^\circ \\ A &= 180^\circ - 160^\circ \\ A &= 20^\circ\end{aligned}$$

Find a

$$\begin{aligned}\frac{a}{\sin A} &= \frac{b}{\sin B} \\ \frac{a}{\sin 20^\circ} &= \frac{48.8}{\sin 70^\circ} \\ a &= \frac{48.8 \sin 20^\circ}{\sin 70^\circ} \\ &\approx 17.8 \text{ cm}\end{aligned}$$

Exercise 5: A tree is growing on a hillside at an angle of 65° to the hill. From a distance of 110 meters up the hill, the angle of elevation to the top of the tree is measured as 53° and the angle of depression to the base of the tree is measured as 25° . Find the height of the tree to the nearest tenth of a meter.

Draw a diagram of the problem



Find angle C

$$\begin{aligned}
 A + B + C &= 180^\circ \\
 (53^\circ + 25^\circ) + 65^\circ + C &= 180^\circ \\
 C &= 180^\circ - 143^\circ \\
 C &= 37^\circ
 \end{aligned}$$

Find a

$$\begin{aligned}
 \frac{a}{\sin A} &= \frac{c}{\sin C} \\
 \frac{a}{\sin 78^\circ} &= \frac{110}{\sin 37^\circ} \\
 a &= \frac{110 \sin 78^\circ}{\sin 37^\circ} \\
 &\approx 178.8 \text{ m}
 \end{aligned}$$