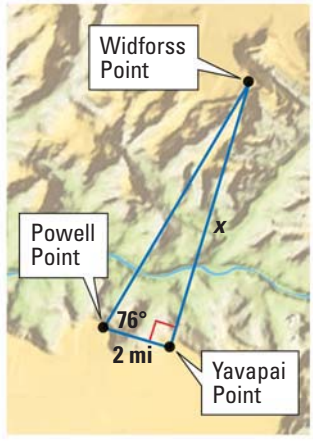
EXAMPLE 5 Use indirect measurement

GRAND CANYON While standing at Yavapai Point near the Grand Canyon, you measure an angle of 90° between Powell Point and Widforss Point, as shown. You then walk to Powell Point and measure an angle of 76° between Yavapai Point and Widforss Point. The distance between Yavapai Point and Powell Point is about 2 miles. How wide is the Grand Canyon between Yavapai Point and Widforss Point?



Solution

CHOOSE FUNCTIONS The tangent function is used to find the unknown distance because it involves the ratio of x and 2.

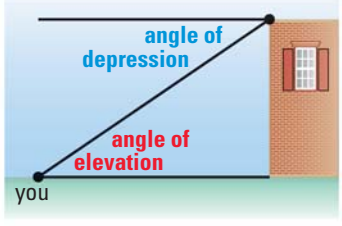
$\tan 76° = \frac{x}{2}$ **Write trigonometric equation.**

$2(\tan 76°) = x$ **Multiply each side by 2.**

$8.0 \approx x$ **Use a calculator.**

▶ The width is about 8.0 miles.

ANGLES OF SIGHT If you look at a point above you, such as the top of a building, the angle that your line of sight makes with a line parallel to the ground is called the **angle of elevation**. At the top of the building, the angle between a line parallel to the ground and your line of sight is called the **angle of depression**. These two angles have the same measure.



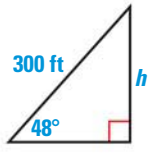
EXAMPLE 6 Use an angle of elevation

PARASAILING A parasailer is attached to a boat with a rope 300 feet long. The angle of elevation from the boat to the parasailer is 48°. Estimate the parasailer's height above the boat.

Solution

STEP 1 **Draw** a diagram that represents the situation.

STEP 2 **Write** and solve an equation to find the height h.



$\sin 48° = \frac{h}{300}$ **Write trigonometric equation.**

$300(\sin 48°) = h$ **Multiply each side by 300.**

$223 \approx h$ **Use a calculator.**

▶ The height of the parasailer above the boat is about 223 feet.

GUIDED PRACTICE for Examples 5 and 6

9. **GRAND CANYON** In Example 5, find the distance between Powell Point and Widforss Point.

10. **WHAT IF?** In Example 6, estimate the height of the parasailer above the boat if the angle of elevation is 38°.