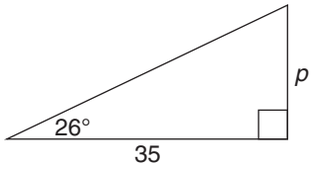
Example 3

Determine the value of p to the nearest hundredth.



$$\tan 26^\circ = \frac{\text{length opposite } 26^\circ}{\text{length adjacent to } 26^\circ}$$

$$\tan 26^\circ = \frac{p}{35}$$

$$35 \cdot \tan 26^\circ = \frac{p}{35} \cdot 35$$

$$35 \tan 26^\circ = p$$

$$17.070... = p$$

Most calculators will allow you to evaluate $35 \cdot \tan 26^\circ$ in one step by entering one of the following.

- $35 \times \tan 26$ enter or =
- $35 \times 26 \tan$ =

Notice that you will get a slightly different answer if you evaluate and round $\tan 26^\circ$ in the second step of the solution.

$$\tan 26^\circ = \frac{\text{length opposite } 26^\circ}{\text{length adjacent to } 26^\circ}$$

$$0.49 \doteq \frac{p}{35}$$

$$35 \cdot 0.49 \doteq \frac{p}{35} \cdot 35$$

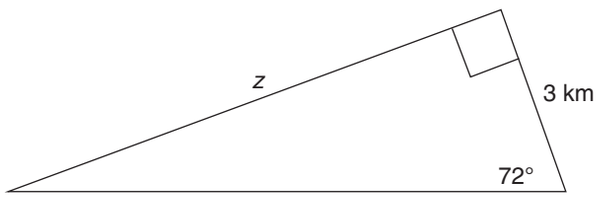
$$17.15 \doteq p$$

It is preferable to leave any rounding until the very last step in a solution.

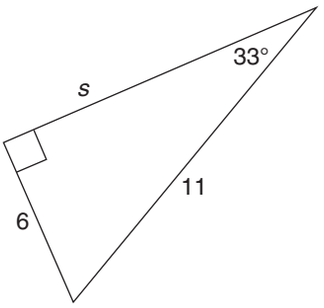
Check Up

1. Use a calculator to determine the value of the unknown variable(s) in each of the following diagrams. Express any angle to the nearest degree, and any length to the nearest tenth.

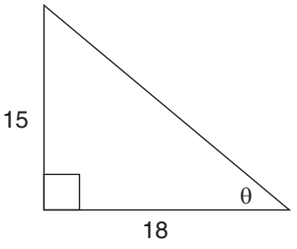
a.



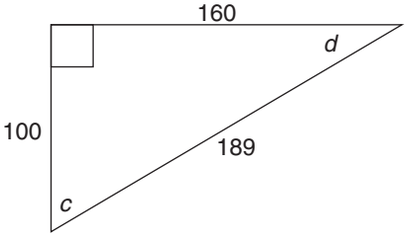
b.



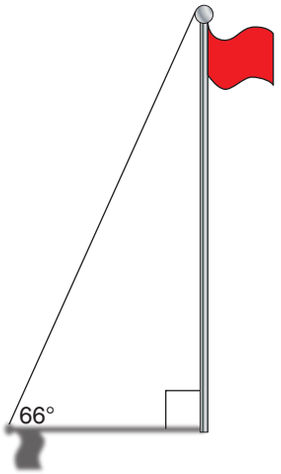
c.



d.



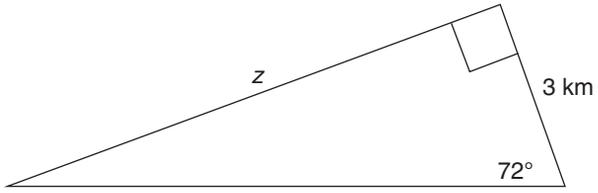
2. If the flagpole in the diagram casts a shadow that is 5.7 m long, how tall is the flagpole? Express your answer to the nearest tenth.



☑ Compare your answers.

1. Use a calculator to determine the value of the unknown variable(s) in each of the following diagrams. Express any angle to the nearest degree, and any length to the nearest tenth.

a.



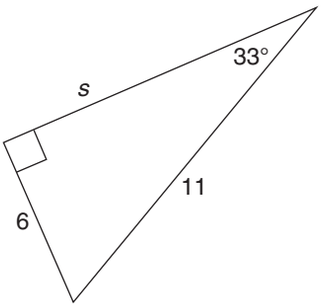
$$\tan 72^\circ = \frac{\text{length opposite } 72^\circ}{\text{length adjacent to } 72^\circ}$$

$$\tan 72^\circ = \frac{z}{3 \text{ km}}$$

$$3 \text{ km} \cdot \tan 72^\circ = \frac{z}{3 \text{ km}} \cdot 3 \text{ km}$$

$$9.2 \text{ km} \doteq z$$

b.



$$\tan 33^\circ = \frac{\text{length opposite } 33^\circ}{\text{length adjacent to } 33^\circ}$$

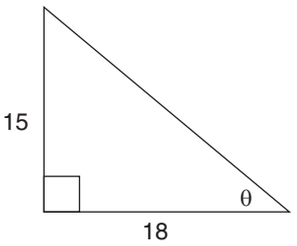
$$\tan 33^\circ = \frac{6}{s}$$

$$s \cdot \tan 33^\circ = \frac{6}{s} \cdot s$$

$$\frac{s \cdot \tan 33^\circ}{\tan 33^\circ} = \frac{6}{\tan 33^\circ}$$

$$s \doteq 9.2$$

c.



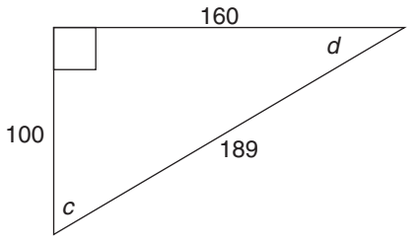
$$\tan \theta = \frac{\text{length opposite } \theta}{\text{length adjacent to } \theta}$$

$$\tan \theta = \frac{15}{18}$$

$$\theta = \tan^{-1}\left(\frac{15}{18}\right)$$

$$\theta \doteq 40^\circ$$

d.



$$\tan c = \frac{\text{length opposite } c}{\text{length adjacent to } c} \qquad \tan d = \frac{\text{length opposite } d}{\text{length adjacent to } d}$$

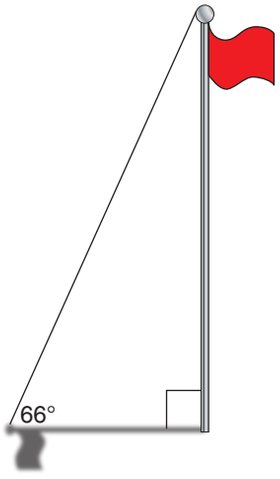
$$\tan c = \frac{160}{100} \qquad \tan d = \frac{100}{160}$$

$$\tan c = 1.6 \qquad \tan d = 0.625$$

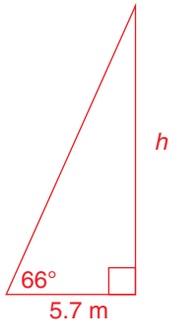
$$c = \tan^{-1}(1.6) \qquad d = \tan^{-1}(0.625)$$

$$c \doteq 58^\circ \qquad d \doteq 32^\circ$$

2. If the flagpole in the diagram casts a shadow that is 5.7 m long, how tall is the flagpole? Express your answer to the nearest tenth.



Begin by sketching a diagram or adding the appropriate information to the diagram provided.



$$\tan 66^\circ = \frac{\text{length opposite } 66^\circ}{\text{length adjacent to } 66^\circ}$$

$$\tan 66^\circ = \frac{h}{5.7 \text{ m}}$$

$$5.7 \text{ m} \cdot \tan 66^\circ = \frac{h}{5.7 \text{ m}} \cdot 5.7 \text{ m}$$

$$12.8 \text{ m} \doteq h$$

The flagpole is approximately 12.8 metres tall.