

2.6 Applying the Trigonometric Ratios

Lesson Focus

Use a primary trigonometric ratio to **solve** a problem modelled by a right triangle

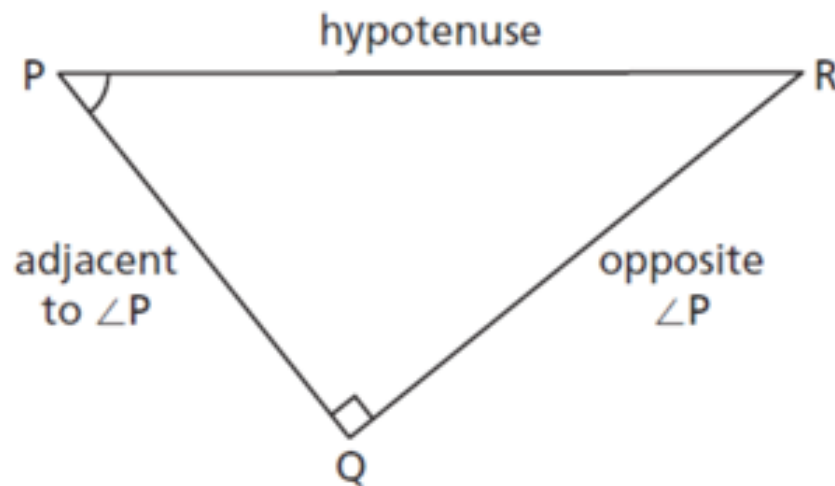
Solving a triangle means to determine the measures of all the angles and the lengths of all the sides in the triangle.

Did you know...

Using SOH CAH TOA we can completely solve any right triangle so long as...

We know two side lengths

We know one side length and one acute angle



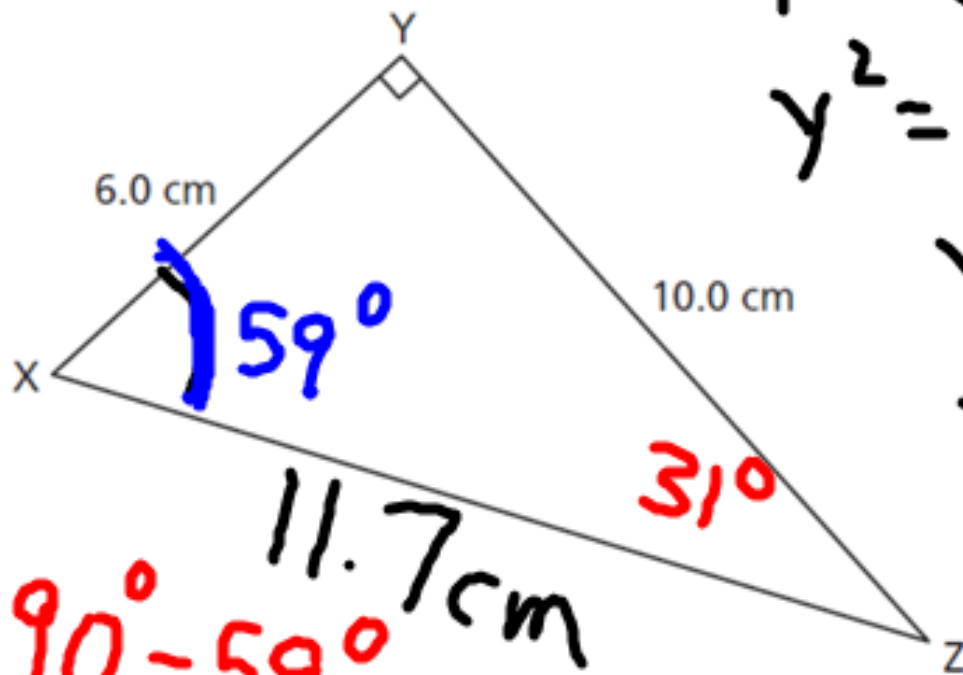
$$\tan P = \frac{\text{opposite}}{\text{adjacent}}$$

$$\sin P = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos P = \frac{\text{adjacent}}{\text{hypotenuse}}$$

Example

Solve $\triangle XYZ$. Give the measures to the nearest tenth.



$$y^2 = \frac{\text{side } y}{(6)^2 + (10)^2}$$

$$y^2 = 36 + 100$$

$$y^2 = 136$$

$$y = 11.7\text{ cm}$$

$$\angle Z = 90^\circ - 59^\circ$$

$$\angle Z = 31^\circ$$

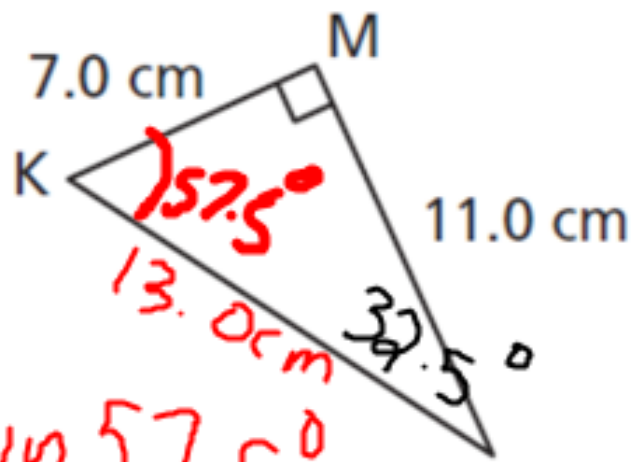
$$\tan X = \frac{10}{6}$$

$$X = \tan^{-1}\left(\frac{10}{6}\right)$$

$$X = 59^\circ$$

Example – Your Turn

Solve this triangle. Give the measures to the nearest tenth.



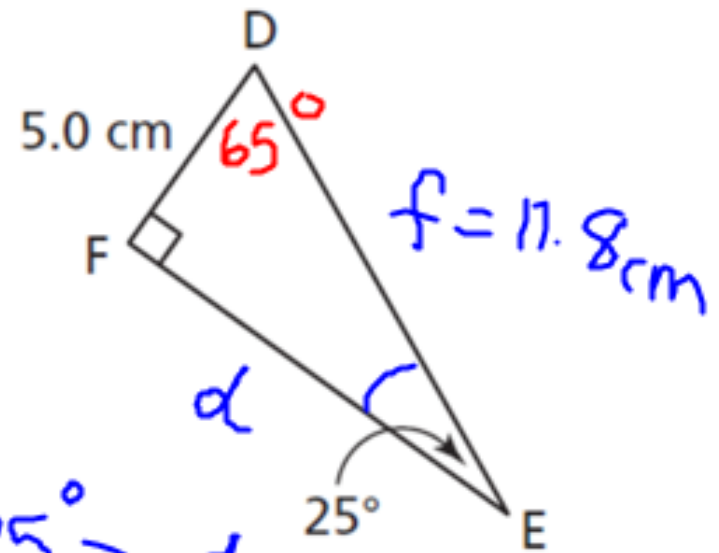
$$\tan K = \frac{11}{7}$$
$$K = \tan^{-1}\left(\frac{11}{7}\right)$$
$$K = 57.5^\circ$$

$$\sin 57.5^\circ = \frac{11}{m}$$

$$m = \frac{11}{\sin 57.5^\circ} = 13.0$$

Example – Your Turn

Solve this triangle. Give the measures to the nearest tenth where necessary.



$$f \sin 25^\circ = \frac{5}{f}$$

$$f = \frac{5}{\sin 25^\circ}$$

$$f = 11.8 \text{ cm}$$

$$(11.8) \cos 25^\circ = d$$

$$10.7 = d$$

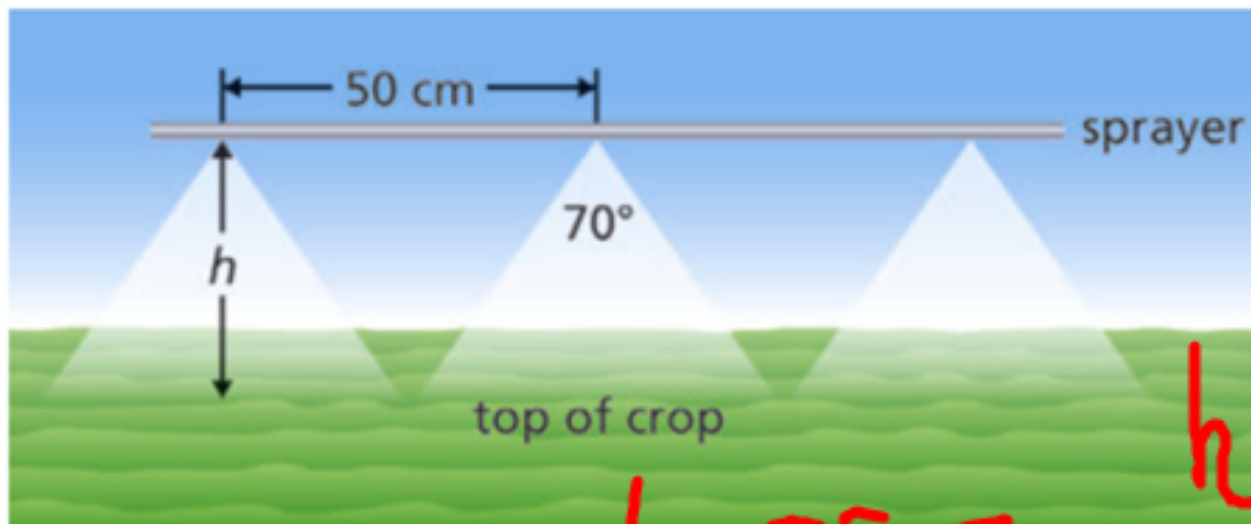
Homework

P. 110-112

3, 4, 6, 7

The height of sprayer should be 30cm.
Example

To irrigate crops, a farmer uses a boom sprayer pulled by a tractor. The nozzles are 50 cm apart and spray at an angle of 70° . To the nearest centimetre, how high should the sprayer be placed above the crops to ensure that all the crops are watered?



$$h = 35.7 \text{ cm}$$



$$\begin{aligned} \tan 35^\circ &= \frac{25 \text{ cm}}{h} \\ &= \frac{25}{\tan 35^\circ} \end{aligned}$$

Example – Your Turn

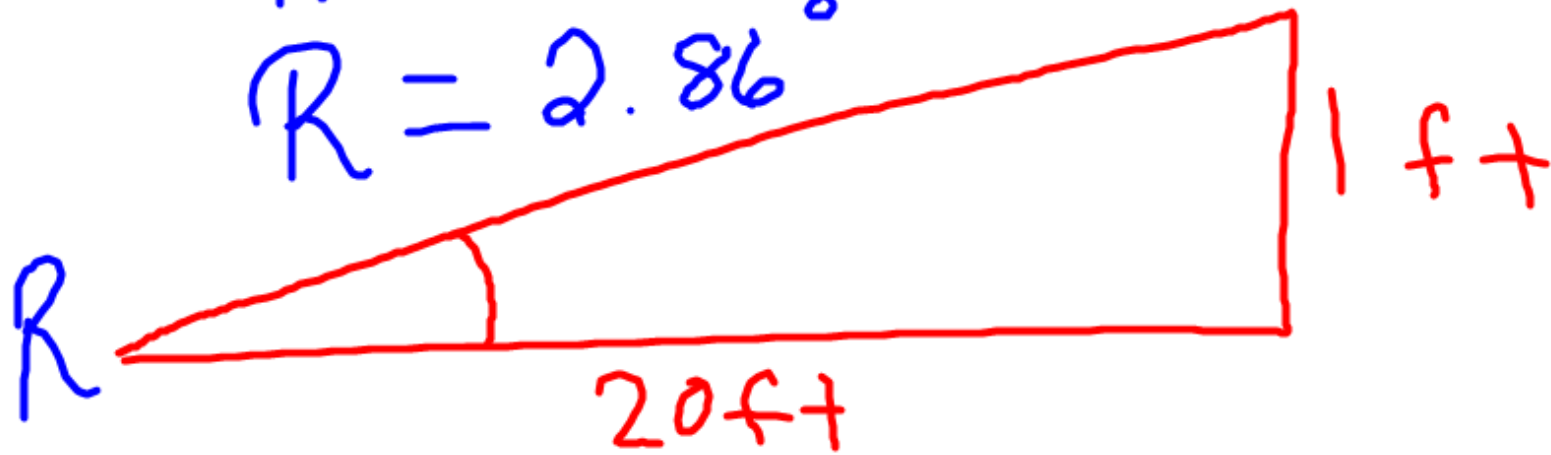
Anwar is designing a wheelchair accessibility ramp for his sister.

He knows these data:

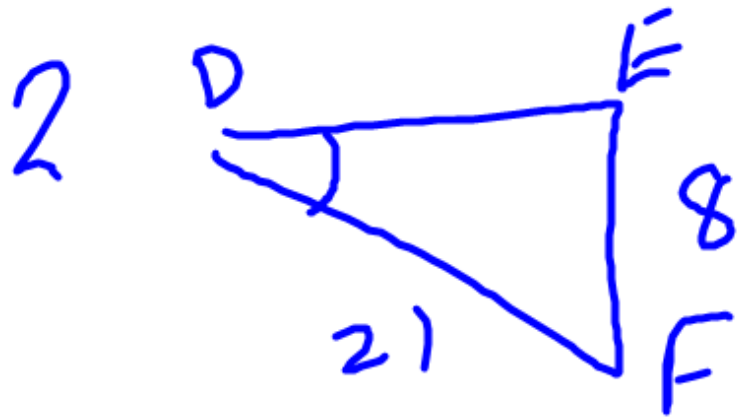
- The ramp will rise 1 ft. from the level ground to the door of the house.
- The horizontal distance from the start of the ramp at the sidewalk to the door is 20 ft.
- The building code states that the angle of inclination of the ramp must be less than 5° .

Determine whether Anwar's design will comply with the building code.

$$\tan R = \frac{1}{20}$$
$$R = \tan^{-1}\left(\frac{1}{20}\right)$$
$$R = 2.86^\circ$$



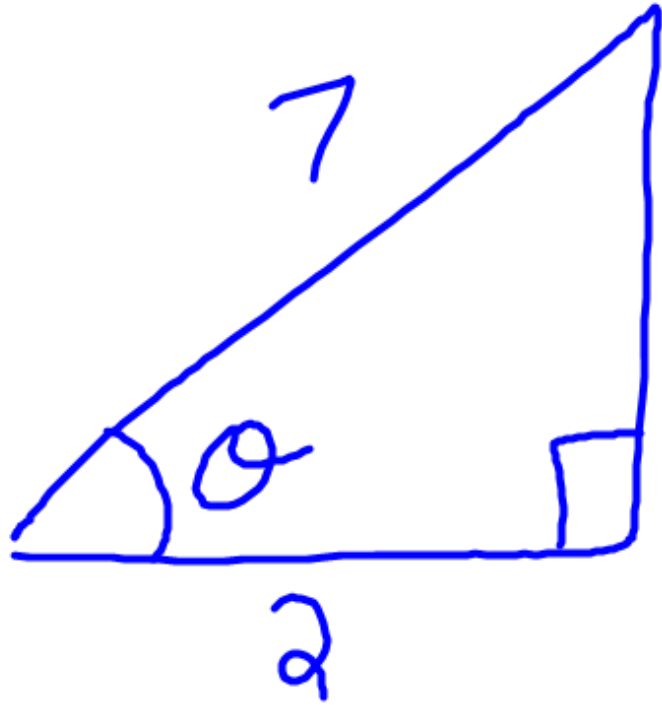
Anwar's ramp meets the construction code.



$$\sin D = \frac{8}{21}$$

$$D = \sin^{-1}\left(\frac{8}{21}\right)$$

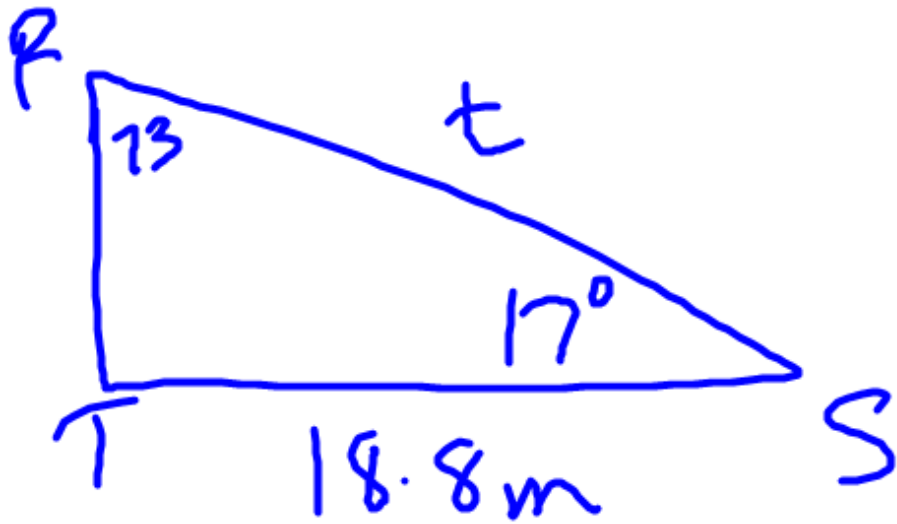
$$D = 22.4^\circ$$



$$\cos \theta = \frac{2}{7}$$

$$\theta = \cos^{-1}\left(\frac{2}{7}\right)$$

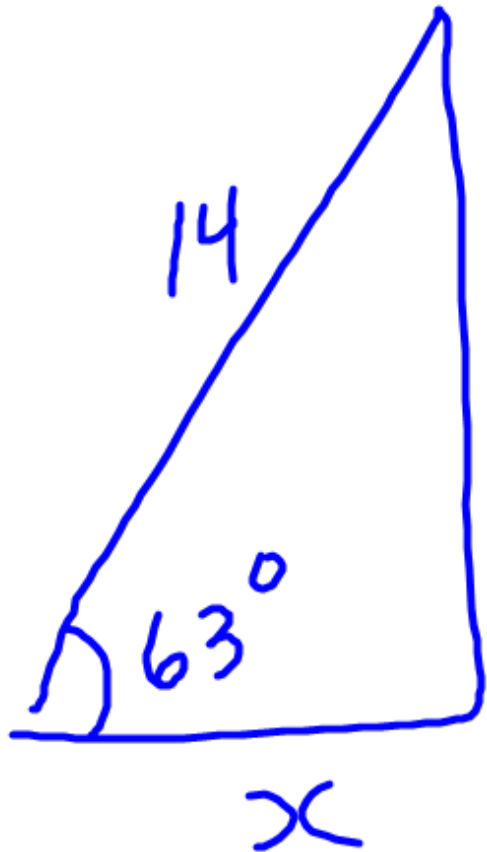
$$\theta = 73.4^\circ$$



$$\cos 17^\circ = \frac{18.8}{t}$$

$$t = \frac{18.8}{\cos 17^\circ} = 19.7 \text{ m.}$$

5.



$$\cos 63^\circ = \frac{x}{14}$$

$$14 \cos 63^\circ = x$$

6.4 feet

Statement

Homework

P. 110-112

9, 11, 13, 16