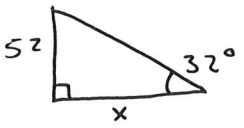
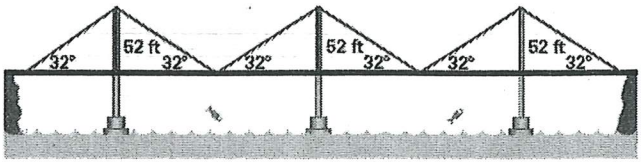
8.3 B- sol

Exercises

1) Use the diagram below to find the distance across the suspension bridge.





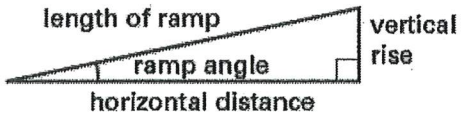
$\tan(32°) = \frac{52}{x}$

$x = \frac{52}{\tan(32°)} \approx 83.217$

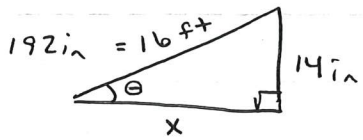
$D = 6x \approx \boxed{499.3 \text{ ft}}$

In Exercises 2 and 3, use the following information

Ramps The Uniform Federal Accessibility Standards specify that the ramp angle used for a wheelchair ramp must be less than or equal to 4.78°.



2) The length of one ramp is 16 feet. The vertical rise is 14 inches. Estimate the ramp's horizontal distance and its ramp angle. Does this ramp meet the Uniform Federal Accessibility Standards?



$16 \times 12 = 192$ in

$x^2 + 14^2 = 192^2$

$x = \sqrt{36864 - 196}$

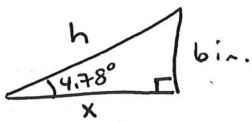
$= \sqrt{36668} \approx \boxed{191.5 \text{ in}}$

$\sin(\theta) = \frac{14}{192}$

$\theta = \sin^{-1}(14/192) \approx \boxed{4.18°}$

Yes, it meets standards

3) You want to build a ramp with a vertical rise of 6 inches. You want to minimize the horizontal distance taken up by the ramp but still meet the Uniform Federal Accessibility Standards. Draw a sketch showing the approximate dimensions of your ramp.



$\sin(4.78°) = \frac{6}{h}$

$h = \frac{6}{\sin(4.78°)} \approx \boxed{72.0 \text{ in} = h}$

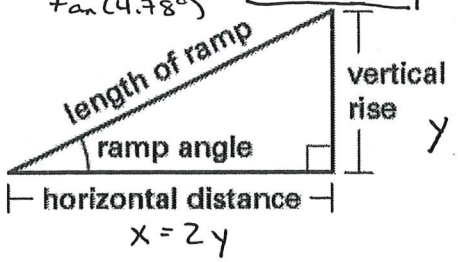
$\tan(4.78°) = \frac{6}{x}$

$x = \frac{6}{\tan(4.78°)} \approx \boxed{71.8 \text{ in} = x}$

6) You are designing a ramp where the horizontal distance is twice the vertical rise. What will be the ramp angle to the nearest tenth of a degree?

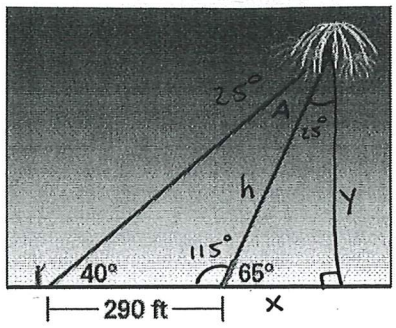
$\tan(\theta) = \frac{y}{2y} = \frac{1}{2}$

$\theta = \tan^{-1}(\frac{1}{2}) \approx \boxed{26.6°}$



Use the following information to answer questions 8 through 10

You are watching a fireworks display where you are standing 290 feet behind the launch pad. The launch tubes are aimed directly away from you at an angle of 65° with the ground. The angle for you to see the fireworks is 40°.



8) To the nearest foot, what is the horizontal distance from the launch pad to the point where the fireworks explode?

$\tan(65°) = \frac{y}{x}$ $\quad \tan(40°) = \frac{y}{290+x}$

$x \cdot \tan(65°) = (290+x) \cdot \tan(40°)$

$x \cdot \tan(65°) - x \cdot \tan(40°) = 290 \cdot \tan(40°)$

$x = \frac{290 \cdot \tan(40°)}{\tan(65°) - \tan(40°)}$

≈ 186.408

9) To the nearest foot, what is the height of the fireworks when they explode?

$\tan(65°) = \frac{y}{186.408}$

$y = 186.408 \cdot \tan(65°)$

$\approx \boxed{399.8 \text{ ft}}$

$\cos(65°) = \frac{186.408}{h}$

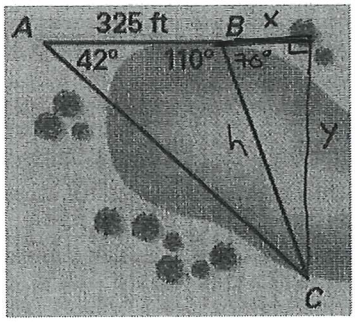
$h = \frac{186.408}{\cos(65°)} \approx \boxed{441.1 \text{ ft}}$

10) What is the measure of angle A?

25°

7) A surveyor needs to find the distance BC across a lake as part of a project to build a bridge. The distance from point A to point B is 325 feet. The measurement of angle A is 42° and the measurement of angel B is 110°. What is the distance BC across the lake to the nearest foot?

Find h



$\tan(42°) = \frac{y}{325+x}$ $\quad \tan(70°) = \frac{y}{x}$

$(325+x) \cdot \tan(42°) = x \cdot \tan(70°)$

$325 \tan(42°) = x \tan(70°) - x \cdot \tan(42°)$

$x = \frac{325 \tan(42°)}{\tan(70°) - \tan(42°)} \approx 158.430$

$\cos(70°) = \frac{158.430}{h}$

$h = \frac{158.430}{\cos(70°)} \approx \boxed{463.2 \text{ ft}}$