Precalculus Notes   Name:
Section 4.2/4.8

Use the following for #1-2:   A draw bridge helps vehicles cross a 150-foot wide river. When fully opened, the two arms each raise up to an angle of 35 degrees.

1.   When the bridge is lowered, the water level is 15 feet from the bottom of the bridge. How far above the water are the arms when they are fully opened?

2.   How far apart are the ends of the two sections (arms) when the bridge is fully opened?

3. A car is traveling toward a building that is 300 feet tall. Its angle of depression of the car from the top of the building changes from 27 degrees to 42 degrees as it drives toward the building. How far did the car travel?

4. If a car is traveling at 45 miles per hour on tires that have a 13-inch radius, how many revolutions per second are the tires making?

Precalculus Notes   Name: *KEY*
Section 4.2/4.8

Use the following for #1-2:   A draw bridge helps vehicles cross a 150-foot wide river. When fully opened, the two arms each raise up to an angle of 35 degrees.
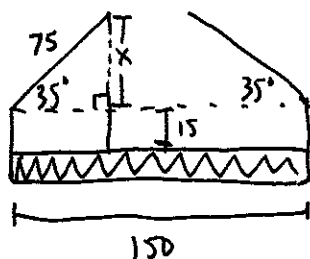
1.   When the bridge is lowered, the water level is 15 feet from the bottom of the bridge. How far above the water are the arms when they are fully opened?

$$\sin 35 = \frac{x}{75}$$

$$x = 75 \sin 35$$

$$x = 43.02 \text{ ft}$$

answer $\approx 43.02 + 15 \approx 58.02$ ft.

2.   How far apart are the ends of the two sections (arms) when the bridge is fully opened?

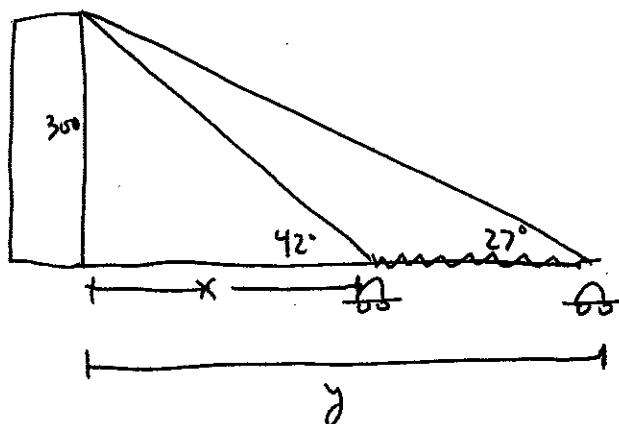$$\cos 35° = \frac{y}{75}$$

$$y = 75 \cos 35°$$

answer $= 150 - 2(75\cos 35°) \approx 27.13$ ft.

3. A car is traveling toward a building that is 300 feet tall. Its angle of depression of the car from the top of the building changes from 27 degrees to 42 degrees as it drives toward the building. How far did the car travel?

$$\tan 27° = \frac{300}{y}$$

$$y = \frac{300}{\tan 27°}$$

$$\tan 42° = \frac{300}{x}$$

$$x = \frac{300}{\tan 42°}$$

$$\text{answer} = y - x = \frac{300}{\tan 27°} - \frac{300}{\tan 42°} \approx 255.60 \text{ ft.}$$

4. If a car is traveling at 45 miles per hour on tires that have a 13-inch radius, how many revolutions per second are the tires making? $1 \text{ rev} = 1 \; C = 2\pi(13) = 26\pi \text{ in}$

$$\frac{45 \text{ mi}}{hr} \cdot \frac{1 \text{ hr.}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{12 \text{ in}}{1 \text{ ft.}} \cdot \frac{1 \text{ rev}}{26\pi \text{ in}} \approx$$

$$\frac{45(5280)(12)}{60(60)(26\pi)} \cdot \frac{\text{rev}}{\text{sec}} \approx 9.70 \; \frac{\text{rev}}{\text{sec.}}$$