Precalculus   Worksheet #4   Chapter 5   Selected Solutions

Find the exact value of each without the use of a calculator.

8. $\sin(\arccos(0.8)) = \underline{\ \ 0.6\ \ }$

There are two 'common methods' used to solve this type of problem.

Let A = arccos(0.8)

→ $\underline{\cos A = 0.8}$ and $\underline{A \text{ is a quad. I number.}}$ → method 2
  method 1   Draw a triangle.

Apply the pythagorean identity
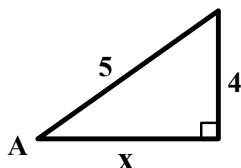
$(\cos A)^2 + (\sin A)^2 = 1$

$0.64 + (\sin A)^2 = 1$

$(\sin A)^2 = 0.36$

$\sin A = 0.6$ or $\sin A = -0.6$

$\boxed{\sin A = 0.6}$

$\sin A = \dfrac{X}{5}$ $x^2 + 16 = 25$

$\boxed{\sin A = 3/5}$ $x^2 = 9$
                             $x = 3$

14. $\tan(\arcsin(-0.6)) =$

Let A = arcsin(-0.6)

→ $\underline{\sin A = -0.6}$ and $\underline{A \text{ is a quad. IV number.}}$

Apply the pythagorean identity

$(\cos A)^2 + (\sin A)^2 = 1$

$(\cos A)^2 + 0.36 = 1$
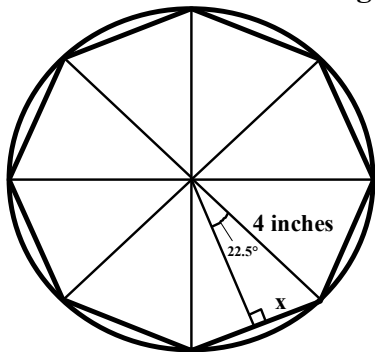
$(\cos A)^2 = 0.64$

$\cos A = 0.8$ or $\cos A = -0.8$

$\cos A = 0.8$

$\tan A = \dfrac{\sin A}{\cos A} = \dfrac{-0.6}{0.8}$

$\boxed{\tan A = -0.75}$

Solve each of the following problems.

21. A regular octagon is inscribed in a circle with a 8 inch diameter. What is the length of each side of the octagon?
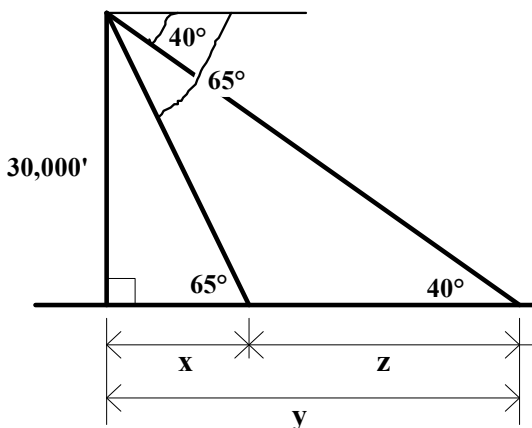

4 inches

22.5°

x

$\sin 22.5° = \dfrac{X}{4}$

$x = 4\sin 22.5°$

$2x = 8\sin 22.5° \approx 3.05$

$\boxed{\text{Each side of the octagon is about 3.06 inches long.}}$

22. A passenger in an airplane flying at a height of 30,000 feet sees two towns directly to the right of the plane. The angles of depression to the towns are 40º and 65º. How far apart are the towns?

40°
65°
30,000'
65°   40°
x   z
y

$\cot 65° = \dfrac{X}{30,000}$ $\cot 40° = \dfrac{y}{30,000}$

$x = 30,000 \cot 65°$ $y = 30,000 \cot 40°$

z represents the distance between the towns.

$z = y - x = 30,000 \cot 40° - 30,000 \cot 65°$

$z \approx 21,763' \approx 4.12$ miles.

$\boxed{\text{The towns are about 4.12 miles apart.}}$