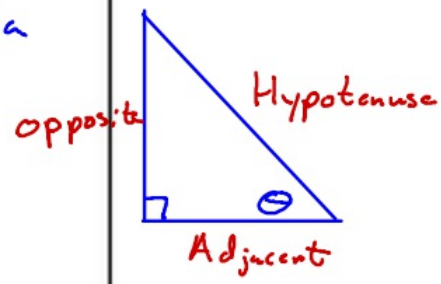
What you'll Learn About

- Right Triangle Trigonometry/ Two Famous Triangles
- Evaluating Trig Functions with a calculator/Applications of right triangle trig

The six trigonometric functions

θ - theta



Sine $\sin\theta = \dfrac{\text{opposite}}{\text{Hypotenuse}}$

Cosine $\cos\theta = \dfrac{\text{Adjacent}}{\text{Hypotenuse}}$

tangent $\tan\theta = \dfrac{\text{opposite}}{\text{Adjacent}}$

SOH-CAH-TOA

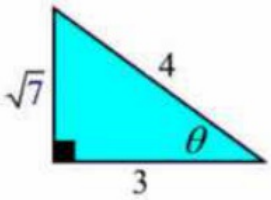
i n p p y p o t o s d j y p o t a n r p d j

secant $\sec\theta = \dfrac{1}{\cos\theta} = \dfrac{\text{Hypot}}{\text{Adj}}$

cosecant $\csc\theta = \dfrac{1}{\sin\theta} = \dfrac{\text{Hypot}}{\text{opp}}$

cotangent $\cot\theta = \dfrac{1}{\tan\theta} = \dfrac{\text{Adj}}{\text{opp}}$

Find the values of all six trigonometric functions.



$\sin\theta = \frac{\sqrt{7}}{4}$ $\csc\theta = \frac{4}{\sqrt{7}}$

$\cos\theta = \frac{3}{4}$ $\sec\theta = \frac{4}{3}$

$\tan\theta = \frac{\sqrt{7}}{3}$ $\cot\theta = \frac{3}{\sqrt{7}}$

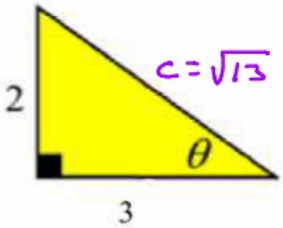
$a^2+b^2=c^2$

$2^2+3^2=c^2$

$4+9=c^2$

$13=c^2$

$c=\sqrt{13}$



$\sin\theta = \frac{2}{\sqrt{13}}$ $\csc\theta = \frac{\sqrt{13}}{2}$

$\cos\theta = \frac{3}{\sqrt{13}}$ $\sec\theta = \frac{\sqrt{13}}{3}$

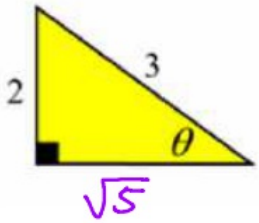
$\tan\theta = \frac{2}{3}$ $\cot\theta = \frac{3}{2}$

$2^2+b^2=3^2$

$4+b^2=9$

$b^2=5$

$b=\sqrt{5}$



$\sin\theta = \frac{2}{3}$ $\csc\theta = \frac{3}{2}$

$\cos\theta = \frac{\sqrt{5}}{3}$ $\sec\theta = \frac{3}{\sqrt{5}}$

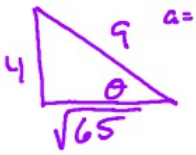
$\tan\theta = \frac{2}{\sqrt{5}}$ $\cot\theta = \frac{\sqrt{5}}{2}$

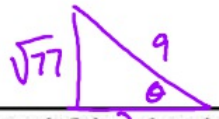
$a^2+4^2=9^2$

$a^2+16=81$

$a^2=65$

$a=\sqrt{65}$





Assume that θ is an acute angle in a right triangle satisfying the given conditions. Evaluate the remaining trigonometric functions.

A) $\sin\theta = \frac{4}{9}$

$\csc\theta = \frac{9}{4}$

$\cos\theta = \frac{\sqrt{65}}{9}$ $\sec\theta = \frac{9}{\sqrt{65}}$

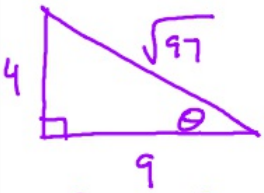
$\tan\theta = \frac{4}{\sqrt{65}}$ $\cot\theta = \frac{\sqrt{65}}{4}$

B) $\cos\theta = \frac{2}{9}$

$\sec\theta = \frac{9}{2}$

$\sin\theta = \frac{\sqrt{77}}{9}$ $\csc\theta = \frac{9}{\sqrt{7}}$

$\tan\theta = \frac{\sqrt{77}}{2}$ $\cot\theta = \frac{2}{\sqrt{7}}$



$4^2+9^2=c^2$

$16+81=c^2$

$c=\sqrt{97}$

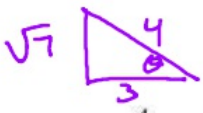
C) $\tan\theta = \frac{4}{9}$

$\cot\theta = \frac{9}{4}$

$\sin\theta = \frac{4}{\sqrt{97}}$ $\csc\theta = \frac{\sqrt{97}}{4}$

$\cos\theta = \frac{9}{\sqrt{97}}$ $\sec\theta = \frac{\sqrt{97}}{9}$

D) $\cot\theta = \frac{2}{9}$



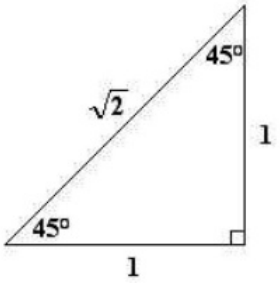
E) $\csc\theta = \frac{10}{7}$

F) $\sec\theta = \frac{4}{3}$

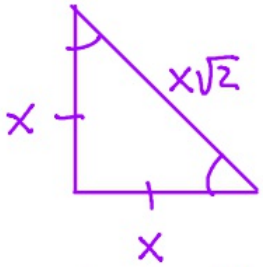
$\cos\theta = \frac{3}{4}$

$\sin\theta = \frac{\sqrt{7}}{4}$ $\csc\theta = \frac{4}{\sqrt{7}}$

$\tan\theta = \frac{\sqrt{7}}{3}$ $\cot\theta = \frac{3}{\sqrt{7}}$



45-45-90 Triangle



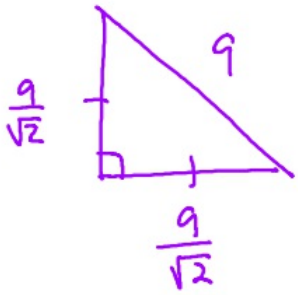
Legs are same length

Hypotenuse – Leg time $\sqrt{2}$

$$x^2 + x^2 = c^2$$

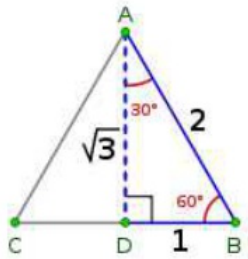
$$\sqrt{2x^2} = \sqrt{c^2}$$

$$c = x\sqrt{2}$$

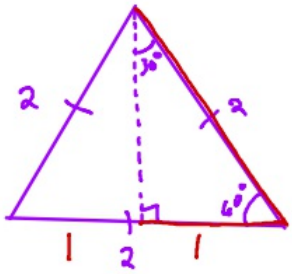


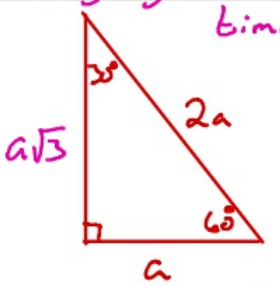
Hypotenuse – 2 times Shorter Leg

Long Leg – Short Leg times $\sqrt{3}$



30-60-90 Triangle





$$a^2 + b^2 = (2a)^2$$

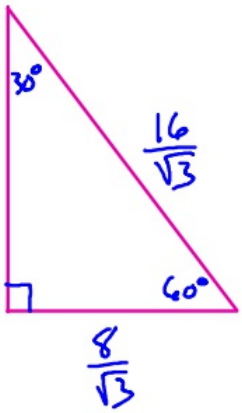
$$a^2 + b^2 = 4a^2$$

$$-a^2 \qquad -a^2$$

$$\sqrt{b^2} = \sqrt{3a^2}$$

$$b = a\sqrt{3}$$

8



Evaluate using a calculator. Make sure your calculator is in the correct mode. Give answers to 3 decimal places and then draw the triangle that represents the situation.

A) $\sin 53^\circ$ $= .799$

B) $\cos \frac{2\pi}{5}$

C) $\tan 154^\circ$ $= -.488$

D) $\cot \frac{\pi}{9}$

E) $\csc 220^\circ$

F) $\sec \frac{8\pi}{5}$ $= \cancel{\cos \frac{5}{8\pi}}$

$\frac{1}{\cos \frac{8\pi}{5}}$