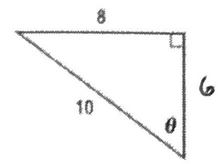
5-Minute Check (over Chapter 4)

Use with Lesson **5-1**

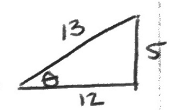
1. Find the exact values of the six trigonometric functions of θ.



$8^2 + x^2 = 10^2$
$x^2 = 36$
$x = 6$

1. $\sin\theta = \frac{8}{10} = \frac{4}{5}$
$\cos\theta = \frac{6}{10} = \frac{3}{5}$
$\tan\theta = \frac{8}{6} = \frac{4}{3}$
$\csc\theta = \frac{5}{4}$
$\sec\theta = \frac{5}{3}$
$\cot\theta = \frac{3}{4}$

2. If $\sin\theta = \frac{5}{13}$, find the exact values of the five remaining trigonometric function values of θ.

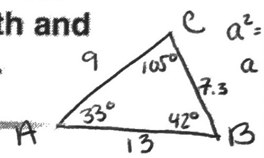


2. $\cos\theta = \frac{12}{13}$
$\tan\theta = \frac{5}{12}$
$\csc\theta = \frac{13}{5}$
$\sec\theta = \frac{13}{12}$
$\cot\theta = \frac{12}{5}$

3. Write $-150°$ in radians as a multiple of π.

$-\cancel{150}^{5} \cdot \frac{\pi}{{}_{6}\cancel{180}} = -\frac{5\pi}{6}$

4. Solve $\triangle ABC$ if $A = 33°$, $b = 9$, and $c = 13$. Round side lengths to the nearest tenth and angle measures to the nearest degree.



$a^2 = 13^2 + 9^2 - 2(13)(9)\cos 33$
$a = 7.3$

$13^2 = 7.3^2 + 9^2 - 2(7.3)(9)\cos C$
$34.71 = -131.4\cos C$
$-0.264 = \cos C$
$C = 105°$

Standardized Test Practice

5. Find the exact value of $\sin[(\tan^{-1}(-1))]$.

A $-\frac{\pi}{4}$ B $-\frac{\sqrt{2}}{2}$ C $\frac{\sqrt{2}}{2}$ D $\frac{\pi}{4}$

$\sin\left(\frac{7\pi}{4}\right) = -\frac{\sqrt{2}}{2}$

ANSWERS

1. $\sin\theta = \frac{4}{5}$, $\cos\theta = \frac{3}{5}$, $\tan\theta = \frac{4}{3}$, $\csc\theta = \frac{5}{4}$, $\sec\theta = \frac{5}{3}$, $\cot\theta = \frac{3}{4}$
2. $\cos\theta = \frac{12}{13}$, $\tan\theta = \frac{5}{12}$, $\csc\theta = \frac{13}{5}$, $\sec\theta = \frac{13}{12}$, $\cot\theta = \frac{12}{5}$
3. $-\frac{5\pi}{6}$
4. $B = 42°$, $C = 105°$, $a = 7.3$
5. B

Homework Questions: Page 311 (1-17 odd)

Then

You found trigonometric values using the unit circle. (Lesson 4-3)

Now

- Identify and use basic trigonometric identities to find trigonometric values.
- Use basic trigonometric identities to simplify and rewrite trigonometric expressions.

Review

KeyConcept **Reciprocal and Quotient Identities**

Reciprocal Identities			Quotient Identities
$\sin\theta = \frac{1}{\csc\theta}$	$\cos\theta = \frac{1}{\sec\theta}$	$\tan\theta = \frac{1}{\cot\theta}$	$\tan\theta = \frac{\sin\theta}{\cos\theta}$
$\csc\theta = \frac{1}{\sin\theta}$	$\sec\theta = \frac{1}{\cos\theta}$	$\cot\theta = \frac{1}{\tan\theta}$	$\cot\theta = \frac{\cos\theta}{\sin\theta}$

A. If $\cos\theta = \frac{3}{4}$, find $\sec\theta$.

$\sec\theta = \frac{1}{\cos\theta} = \frac{1}{\frac{3}{4}} = 1 \cdot \frac{4}{3} = \frac{4}{3}$

B. If $\sec x = \frac{5}{4}$ and $\tan x = \frac{3}{4}$, find sin x.

$\cos x = \frac{4}{5}$ $\quad \tan x = \frac{\sin x}{\cos x}$

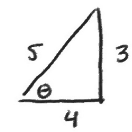
$\frac{3}{4} = \frac{\sin x}{\frac{4}{5}}$

$\frac{12}{5} = 4 \sin x$

$\frac{12}{20} = \sin x$

$\frac{3}{5} = \sin x$

or



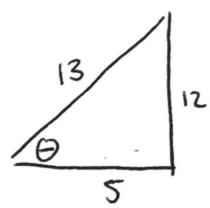
$\sin x = \frac{3}{5}$

↑ much easier

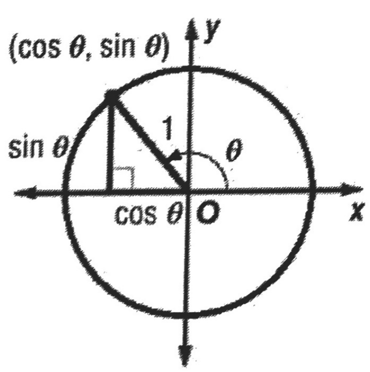
You Try:

If $\sec\theta = \frac{13}{5}$, find $\sin\theta$.

$\cos\theta = \frac{5}{13}$



$\sin\theta = \frac{12}{13}$



Can you write the Pythagorean theorem using sine and cosine?

$x^2 + y^2 = 1^2$

$\cos^2\theta + \sin^2\theta = 1$

Could you transform this equation to Tangent and Secant?

$\frac{\cos^2\theta}{\cos^2\theta} + \frac{\sin^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta}$

$1 + \tan^2\theta = \sec^2\theta$

Could you transform this equation to Cotangent and Cosecant?

$$\frac{\cos^2\theta}{\sin^2\theta}+\frac{\sin^2\theta}{\sin^2\theta}=\frac{1}{\sin^2\theta}$$

$$\cot^2\theta + 1 = \csc^2\theta$$

KeyConcept Pythagorean Identities

$\sin^2\theta+\cos^2\theta=1$	$\tan^2\theta+1=\sec^2\theta$	$\cot^2\theta+1=\csc^2\theta$

Why do we need to know this? So we can rewrite equations with sin, cos, and tan because these are easier to evaluate.

Try to simplify this expression to equal $\tan\vartheta$.

$$\csc\vartheta\sec\vartheta-\cot\vartheta=$$

$$\frac{1}{\sin\theta}\cdot\frac{1}{\cos\theta}-\frac{\cos\theta}{\sin\theta}\left(\frac{\cos\theta}{\cos\theta}\right)$$

$$\frac{1}{\sin\theta\cos\theta}-\frac{\cos^2\theta}{\sin\theta\cos\theta}$$

$$\frac{1-\cos^2\theta}{\sin\theta\cos\theta}$$

$$\frac{\sin^2\theta}{\sin\theta\cos\theta} \longleftarrow \text{from } \sin^2\theta+\cos^2\theta=1$$

$$-\cos^2\theta \quad -\cos^2\theta$$

$$\sin^2\theta=1-\cos^2\theta$$

$$\frac{\sin\theta}{\cos\theta}=\tan\theta$$

You Try: Simplify to sin *or cos*.

$$\sec x - \tan x \sin x$$

$$\frac{1}{\cos\theta}-\frac{\sin\theta}{\cos\theta}\cdot\sin\theta$$

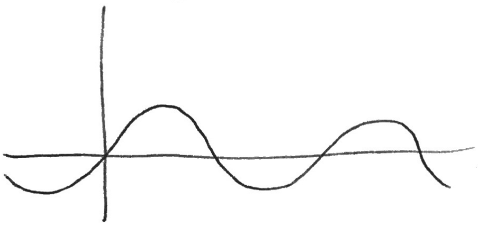
$$\frac{1-\sin^2\theta}{\cos\theta}$$

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

KeyConcept Odd-Even Identities

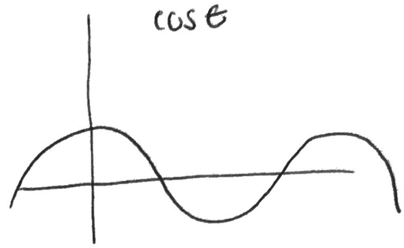
$\sin(-\theta) = -\sin\theta$	$\cos(-\theta) = \cos\theta$	$\tan(-\theta) = -\tan\theta$
$\csc(-\theta) = -\csc\theta$	$\sec(-\theta) = \sec\theta$	$\cot(-\theta) = -\cot\theta$

$\sin\theta$



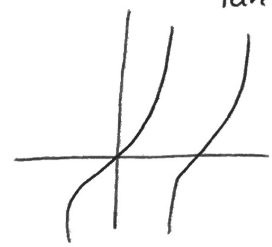
odd function

$\cos\theta$



even function

$\tan\theta$



odd function

odd: $f(-x) = -f(x)$

even: $f(-x) = f(x)$

KeyConcept Cofunction Identities

$\sin\theta = \cos\left(\frac{\pi}{2} - \theta\right)$	$\tan\theta = \cot\left(\frac{\pi}{2} - \theta\right)$	$\sec\theta = \csc\left(\frac{\pi}{2} - \theta\right)$
$\cos\theta = \sin\left(\frac{\pi}{2} - \theta\right)$	$\cot\theta = \tan\left(\frac{\pi}{2} - \theta\right)$	$\csc\theta = \sec\left(\frac{\pi}{2} - \theta\right)$

If $\cos x = -0.75$, *find* $\sin\left(x - \frac{\pi}{2}\right)$.

$\sin\left[-\left(\frac{\pi}{2} - x\right)\right]$ because sin is odd

$-\sin\left(\frac{\pi}{2} - x\right)$

$-\cos(x)$

$-(-0.75)$

0.75

If $\tan x = 1.28$, *find* $\cot\left(x - \frac{\pi}{2}\right)$.

$\cot\left[-\left(\frac{\pi}{2} - x\right)\right]$ because cot is odd

$-\cot\left(\frac{\pi}{2} - x\right)$

$-\tan(x)$

$-(1.28) = -1.28$

Simplify: $\sin^2 x \cos x \; - \sin(\frac{\pi}{2} - x)$

$\sin^2 x \cos x - \cos x$

$\cos x\,(\sin^2 x - 1)$

$\cos x\,(-\cos^2 x)$

$-\cos^3 x$

$\cos^2 x + \sin^2 x = 1$

$\sin^2 x - 1 = -\cos^2 x$

Simplify: $\cos x \tan x \; - \sin x \cos^2 x$

$\cancel{\cos x}\,\dfrac{\sin x}{\cancel{\cos x}} - \sin x \cos^2 x$

$\sin x - \sin x \cos^2 x$

$\sin x\,(1 - \cos^2 x)$

$\sin x\,(\sin^2 x)$

$\sin^3(x)$

$\cos^2 x + \sin^2 x = 1$

$\sin^2 x = 1 - \cos^2 x$

Assignment: page 317 (1-31 odd)

*Start memorizing these identities!!!