

MATH 109 – TOPIC 6  
EXACT VALUES OF  $\sin \theta$ ,  $\cos \theta$ , AND  $\tan \theta$

Topics 3a and 5 discussed the right triangle and unit circle definitions of the trigonometric functions. (We emphasize that these definitions are equivalent!) In each topic, tables were presented which gave exact values of the trigonometric functions for various values of  $\theta$ . The table below merely summarizes these earlier tables.

Because these values will often be used in calculus, it is important to know as many as possible. Try to memorize as many as possible, but for the remaining values, here's what we suggest:

- a) Use the unit circle for just quadrantal angles (i.e.,  $0$ ,  $\frac{\pi}{2}$ ,  $\pi$ , etc.)
- b) Use the 2 special triangles (and reference angles) for all other angles. That applies to any angle (positive or negative) which is a multiple of  $\frac{\pi}{6}$ ,  $\frac{\pi}{4}$ , or  $\frac{\pi}{3}$ .
- c) Don't memorize reciprocal values. To find  $\csc \frac{\pi}{6}$ , just take  $\sin \frac{\pi}{6}$  and invert.

PRACTICE PROBLEM for Topic 6 – Exact Values of  $\sin \theta$ ,  $\cos \theta$ , and  $\tan \theta$

See next page  $\longrightarrow$

6.1 By memory, complete the following table.

$\theta$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$\sin \theta$											
$\cos \theta$											
$\tan \theta$											
$\cot \theta$											
$\sec \theta$											
$\csc \theta$											

[Answers](#)

ANSWER to PRACTICE PROBLEM (Topic 6 – Exact Values of  $\sin \theta$ ,  $\cos \theta$ , and  $\tan \theta$ )

6.1

$\theta$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$\sin \theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	0	1
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	und	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	und	0
$\cot \theta$	und	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	$-\frac{1}{\sqrt{3}}$	-1	$-\sqrt{3}$	und	0	und
$\sec \theta$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	und	-2	$-\sqrt{2}$	$-\frac{2}{\sqrt{3}}$	-1	und	1
$\csc \theta$	und	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	und	-1	und

“und” means undefined

[Return to Problem](#)

[Beginning of Topic](#)

[109 Study Topics](#)

[109 Skills Assessment](#)