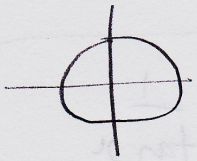
27.1 # Review: Trig Functions

① Radians: arc length around unit circle



Circumference $= 2\pi r = 2\pi$

$360° = 2\pi$ rad

$180° = \pi$

$30° = 30° \times \frac{\pi}{180°} = \frac{\pi}{6}$

$\frac{\pi}{4} = \frac{\pi}{4} \times \frac{180°}{\pi} = 45°$

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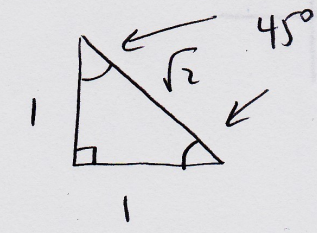
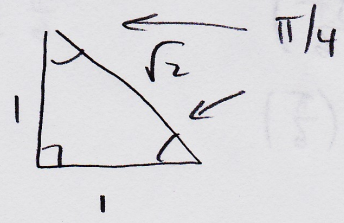
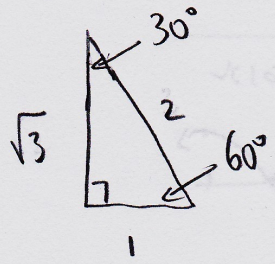
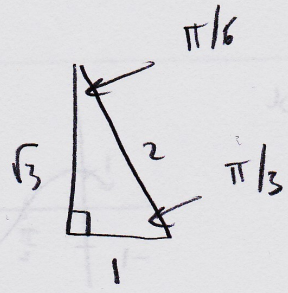
②









③ SOHCAHTOA

$\sin\frac{\pi}{6} = \frac{O}{H} = \frac{1}{2}$ $\quad \cos\frac{\pi}{6} = \frac{A}{H} = \frac{\sqrt{3}}{2}$

$\tan 30° = \frac{O}{A} = \frac{1}{\sqrt{3}}$

④ $\csc x = \frac{1}{\sin x}$ $\quad \sec x = \frac{1}{\cos x}$ $\quad \cot x = \frac{1}{\tan x}$

$\sec\frac{\pi}{6} = \frac{H}{A} = \frac{2}{\sqrt{3}}$ or $\frac{2\sqrt{3}}{3}$ $\quad \cot\frac{\pi}{3} = \frac{A}{O} = \frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$

⑤ CAST Rule

$\sin\theta, \cos\theta, \tan\theta$ all positive

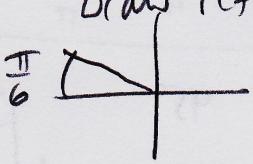
$\sin\theta > 0$
$\cos\theta, \tan\theta < 0$ → $\sin\theta$ = S

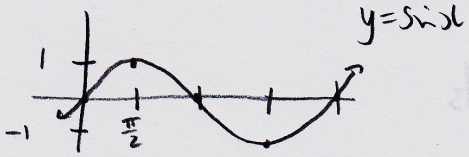
S	A = All
T	C

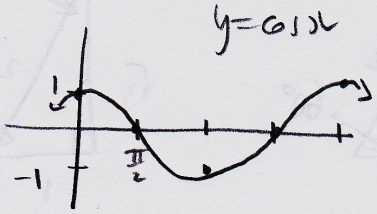
Ex: $\cos\left(\frac{5\pi}{6}\right)$

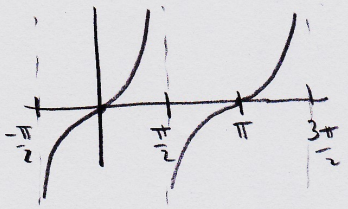
$= -\cos\left(\frac{\pi}{6}\right)$

$= -\frac{\sqrt{3}}{2}$









y = tan x

⑥ $\sin^2 x$ means $[\sin x]^2$

$$\tan^2 \frac{\pi}{6} = \left[\tan \frac{\pi}{6}\right]^2$$
$$= \left[\frac{1}{\sqrt{3}}\right]^2$$
$$= \frac{1}{3}$$

⑦ $\tan x = \dfrac{\sin x}{\cos x}$ $\qquad \cot x = \dfrac{\cos x}{\sin x}$

⑧ $\sin^2 x + \cos^2 x = 1$

$\div \sin^2 x$ $\qquad 1 + \dfrac{\cos^2 x}{\sin^2 x} = \dfrac{1}{\sin^2 x}$

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

$\div \cos^2 x$

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

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

(9) Ex: Round to 2 decimal places

a) $\sin 60° \simeq 0.87$

Degree Mode

b) $\sin \frac{\pi}{3} \simeq 0.87$

Radian Mode

c) $f(x) = e^x + \sin x$

Find $f(30°)$

Caution: $\sin x$ is a #

e^x must be a # (not degrees!)

$f(30°) = f\left(\frac{\pi}{6}\right)$

$= e^{\pi/6} + \sin\left(\frac{\pi}{6}\right)$

Radian Mode

$\simeq 2.19$