Find the exact value of the following.

a. $\sin 270°$ $= -1$

b. $\cos -225°$ $= \frac{-1}{\sqrt{2}}$

c. $\sec 315°$ $= \sqrt{2}$

d. $\csc 420°$ $= \frac{2}{\sqrt{3}}$

e. $\cot -135°$ $= 1$

$30° < 60° < 90°$

$1 < 3 < 4$

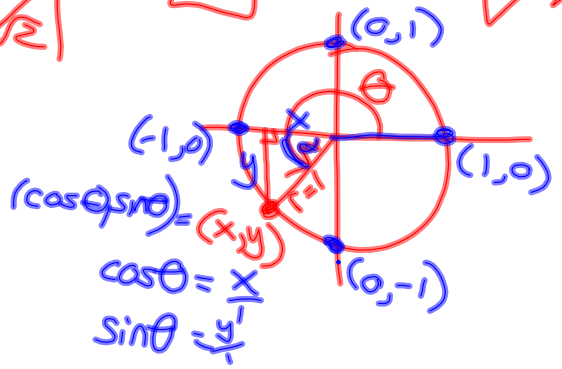
$\sqrt{1} < \sqrt{3} < \sqrt{4}$

$1 < \sqrt{3} < 2$

$\cos \frac{2\pi}{3} = \frac{-1}{2}$

$\tan \frac{7\pi}{4} = -1$

$\sin \frac{7\pi}{6} = \frac{-1}{2}$



$\csc(-180°) = \frac{1}{\sin(-180°)} = \frac{1}{0}$ = undefined

7. Write the following in terms of $\sin 38°$ and $\cos 38°$.

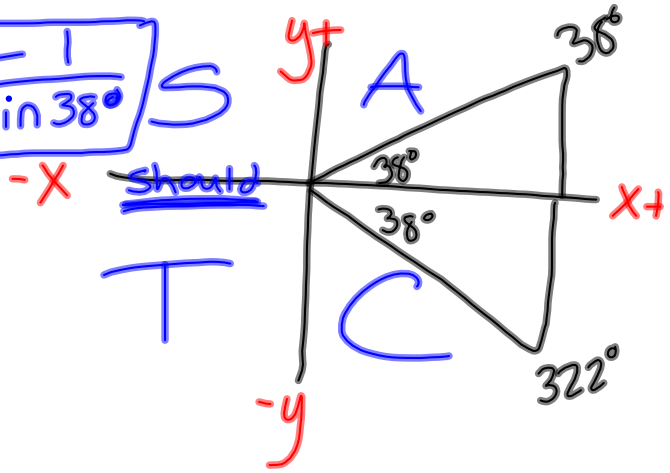
a. $\csc 322° = -\csc 38° = \frac{-1}{\sin 38°}$

b. $\tan 52° =$

$\cot(90° - 52°) =$

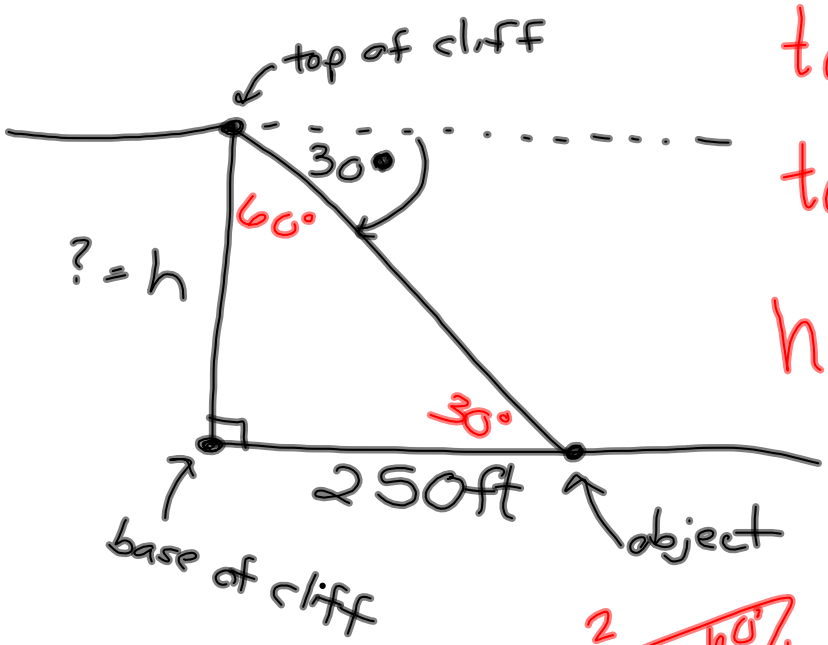
$= \cot 38° =$

$= \frac{\cos 38°}{\sin 38°}$



Should

8. The angle of depression from the top of a cliff to an object on the ground is 30°. If the object is 250 feet from the base of the cliff, how tall is the cliff? Give an exact answer in feet.

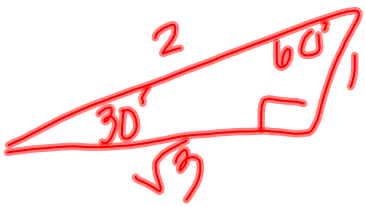


$\tan 60° = \frac{250}{h}$

$\tan 30° = \frac{h}{250}$

$h = 250 \tan 30°$

$= 250 \cdot \frac{1}{\sqrt{3}}$



$= \frac{250}{\sqrt{3}}$ ft

9. A child rides his tricycle at a rate of 20 miles per hour. If the diameter of the front wheel is 8 inches, find the angular speed of the wheel in revolutions per minute. Give an exact answer, in terms of π if necessary.

$V = \frac{20\text{ mi}}{\text{h}}$, $r = 4\text{ in}$, $\omega = ? \frac{\text{rev}}{\text{min}}$

$\frac{V}{r} = \frac{r\omega}{r}$ $\omega = \frac{V}{r} = \frac{V}{1} \cdot \frac{1}{r}$ $\frac{20\text{ mi/h}}{4\text{ in}}$

$\omega = \frac{20\text{ mi}}{\text{h}} \cdot \frac{1}{4\text{ in}} \cdot \frac{5280\text{ ft}}{1\text{ mi}} \cdot \frac{12\text{ in}}{1\text{ ft}} \cdot \frac{1\text{ h}}{60\text{ min}} \cdot \frac{1\text{ rev}}{2\pi}$

$= \frac{2640}{\pi} \frac{\text{rev}}{\text{min}}$

10. Find the exact measure in inches of the radius of a circle with a central angle of 72° that subtends an arc of length 8 feet.

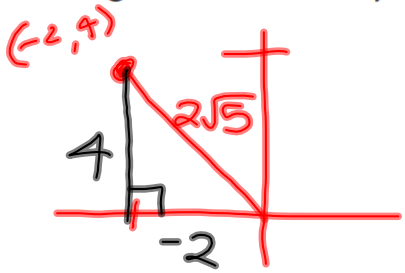
$r = ?$ in ; $\theta = 72°$; $s = 8$ ft

$$\frac{s}{\theta} = \frac{r\theta}{\theta}$$

$$r = \frac{8\text{ ft}}{72^\circ} \cdot \frac{12\text{ in}}{1\text{ ft}} \cdot \frac{60}{\pi} = \frac{240}{\pi}\text{ in}$$

5. Given that the terminal side of an angle β passes through the point $(-2, 4)$,

a. Draw a picture depicting the reference triangle with accurately labeled sides.



b. Find the length of the hypotenuse. (simplify all radicals)

$h^2 = (4)^2 + (-2)^2$

$= 16 + 4 = 20$

$h = \sqrt{20} = 2\sqrt{5}$

c. Evaluate $\cot\beta$.

$\frac{-2}{4} = \frac{-1}{2}$

d. Evaluate $\csc\beta$.

$\frac{2\sqrt{5}}{4} = \frac{\sqrt{5}}{2}$

e. Evaluate $\cos\beta$.

$\frac{-2}{2\sqrt{5}} = \frac{-1}{\sqrt{5}}$

Formulas to know for Test #1:

Trig Functions of an Acute Angle

$\sin\theta = \frac{side\ opposite\ \theta}{hypotenuse}$ $\quad \csc\theta = \frac{hypotenuse}{side\ opposite\ \theta}$

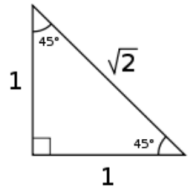
$\cos\theta = \frac{side\ adjacent\ to\ \theta}{hypotenuse}$ $\quad \sec\theta = \frac{hypotenuse}{side\ adjacent\ to\ \theta}$

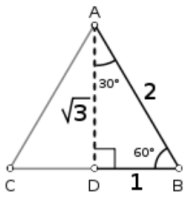
$\tan\theta = \frac{side\ opposite\ \theta}{side\ adjacent\ to\ \theta}$ $\quad \cot\theta = \frac{side\ adjacent\ to\ \theta}{side\ opposite\ \theta}$

Converting Between Degree & Radian Measure

To convert from degree to radian measure, multiply by $\frac{\pi}{180°}$

To convert from radian to degree measure, multiply by $\frac{180°}{\pi}$





Trig Identities

Reciprocal Identities

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

Ratio Identities

$\tan x = \frac{\sin x}{\cos x}$, $\cot x = \frac{\cos x}{\sin x}$

Arc Length and Angular Speed

Variables

$s = distance\ traveled$ or $arc\ length\ (inches, kilometers, etc)$
$t = time\ (seconds, minutes, hours, days, etc)$
$\theta = amount\ of\ rotation$ or $included\ angle\ (degrees, radians, rotations, revol$
$r = radius\ or\ distance\ from\ the\ center\ of\ rotation\ (centimeters, inches, etc)$

$v = \text{linear speed} = \frac{distance}{time}$

$\omega = angular\ speed = \frac{amount\ of\ rotation}{time}$

Formulas

$s = r\theta$, $\quad v = \frac{s}{t}$, $\quad \omega = \frac{\theta}{t}$, $\quad v = r\omega$

Dimensional analysis conversion factors

$\frac{5280\ ft}{1\ mi}$, $\frac{12\ in}{1\ ft}$, $\frac{2\pi}{1\ rev}$, $\frac{\pi}{180°}$, $\frac{60\ min}{1\ hr}$, $\frac{60\ sec}{1\ min}$, $and\ their\ reciprocals$

Key words:
cofunction
complement
coterminal
reference angle
heading
bearing
angle of elevation/depression