

Trig Basics

Part I

NO CALCULATOR ALLOWED

Round to 3 decimal places. Show all work

1. Fill in the coordinates from QII of the Unit Circle and the Table Values from QI.

| | | | | |
|--|---------|--------|--------------|--------------|
| | Radians | Degree | Cos | Sin |
| | 0 | 0 | 1 | 0 |
| | $\pi/6$ | 30 | $\sqrt{3}/2$ | $1/2$ |
| | $\pi/4$ | 45 | $1/\sqrt{2}$ | $1/\sqrt{2}$ |
| | $\pi/3$ | 60 | $1/2$ | $\sqrt{3}/2$ |
| | $\pi/2$ | 90 | 0 | 1 |

2. Find the exact value of the following:

(a) $3\sin^2 \frac{7\pi}{3} + 2\cos^2 \frac{7\pi}{4}$

$$= 3\left(\frac{\sqrt{3}}{2}\right)^2 + 2\left(\frac{1}{\sqrt{2}}\right)^2 = \frac{9}{4} + 1 = \frac{13}{4}$$

(b) $\sec \frac{\pi}{6} \tan \frac{\pi}{3} + \cot \frac{\pi}{3} \csc \frac{\pi}{6} = \frac{2}{\sqrt{3}} \left(\frac{\sqrt{3}}{1}\right) + \frac{1}{\sqrt{3}} (2) = \frac{2\sqrt{3} + 2}{2}$

(c) $\sin^2 \left(\frac{5\pi}{4}\right) - \cos^2 \left(\frac{3\pi}{2}\right) + \tan \left(\frac{4\pi}{3}\right)$

$$= \left(-\frac{1}{\sqrt{2}}\right)^2 - 0^2 + \left(\frac{\sqrt{3}}{1}\right) = \frac{1}{2} + \sqrt{3} = \frac{1 + 2\sqrt{3}}{2}$$

Trig Basics

Part II--CALCULATOR ALLOWED

1. $\sin(\sec^{-1}\sqrt{2}) = \sin 45^\circ$

- a. 0.50 **b.** 0.71 c. 0.86 d. 1.414 e. 0.67

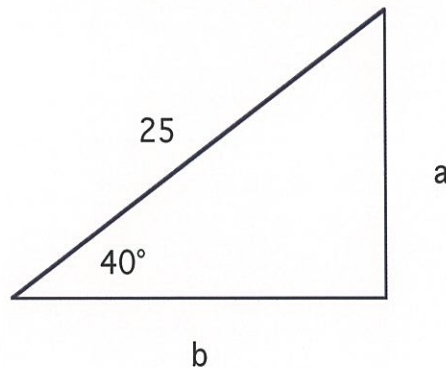
2. Which of the following is a unit vector?

- a. $-1\vec{i} + \vec{j}$ b. $0\vec{i} - 0\vec{j}$ c. $2\vec{i} - \vec{j}$

- d. $\vec{v} = \frac{1}{4}\vec{i} - \frac{3}{4}\vec{j}$ **e.** $\frac{12}{13}\vec{i} - \frac{5}{13}\vec{j}$

$x^2 + y^2 = 1$

3. In the triangle shown, which of the following best approximates b ?



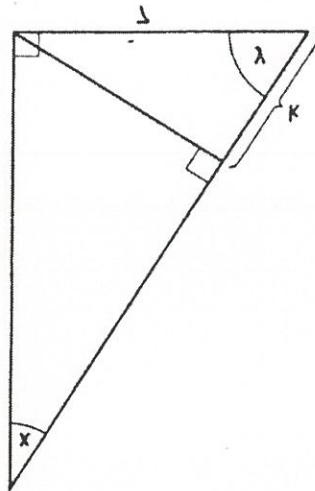
$\frac{b}{25} = \cos 40^\circ$

- a. 16.07 **b.** 19.15 c. 20.98
- d. 32.64 e. 38.89

4. . If $f(x,y) = \tan x + \tan y$ and $g(x,y) = 1 - \tan x \cdot \tan y$, then, in radians, $\frac{f(2,1)}{g(2,1)} =$

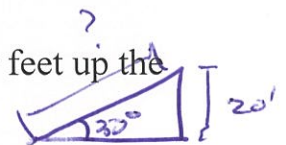
- a. 0 **b.** -0.14 c. 1.58 = $\frac{\tan 2 + \tan 1}{1 - \tan 2 \tan 1}$
 d. 0.15 e. -1.56

5. In the figure below, $\cos y =$



- a. $\frac{7}{k}$ **b.** $\frac{k}{7}$ c. $\frac{7-k}{7}$ d. $\frac{\sqrt{49-k^2}}{7}$ e. $\frac{\sqrt{49-k^2}}{k}$

6. An incline makes an angle of 30° with level ground. How many feet up the incline must one go in order to rise 20 feet above the ground?



- a. 10 b. 20 c. $20\sqrt{3}$ **d.** 40 e. $40\sqrt{3}$

7. What is the measure of an angle whose sine is twice the sine of 45° ?

- a. 30° b. 60° c. 90°
 d. 120° **e.** No such angle

Honors Precalculus '16-17
Trig Basics
Part III--CALCULATOR ALLOWED

Name Solution Key

1. $(4, -5)$ is on the terminal side of A . Find the six exact trig values:

$$\begin{aligned} \sin A &= \frac{-5}{\sqrt{41}} & \csc A &= \frac{-\sqrt{41}}{5} \\ \cos A &= \frac{4}{\sqrt{41}} & \sec A &= \frac{\sqrt{41}}{4} \\ \tan A &= \frac{-5}{4} & \cot A &= \frac{-4}{5} \end{aligned}$$

$5^2 + 4^2 = 41$

2. If $\sin B = \frac{3}{8}$ in QII, find the other five exact trig values:

$$\begin{aligned} \sin B &= \frac{3}{8} & \csc B &= \frac{8}{3} \\ \cos B &= \frac{-\sqrt{55}}{8} & \sec B &= \frac{-8}{\sqrt{55}} \\ \tan B &= \frac{-3}{\sqrt{55}} & \cot B &= \frac{-\sqrt{55}}{3} \end{aligned}$$

$x^2 + 9 = 64$
 $x = -\sqrt{55}$

3. What are the approximate values, in degrees of A and B (from #1 and #2)?

$$A = \underline{-51.340 \pm 360n}$$

$$B = \underline{157.976 \pm 360n}$$

4. (a) Find the approximate values of:

$$\cos^{-1} .38 = .955$$

$$\sin^{-1} .246 = .914$$

$$\tan^{-1} 5.36 = -1.322$$

$$\sec^{-1} -.347 = 1.063$$

$$\csc^{-1} 5.36 = 10.705$$

$$\cot^{-1} 12 = -1.573$$

(b) Find the approximate values (in degrees) of:

$$\cos^{-1} .705 = \left\{ \begin{array}{l} \pm 45.17^\circ \pm 360^\circ \end{array} \right. \quad \sin^{-1} (-1.345) = \left\{ \begin{array}{l} \text{NO SOLUTION} \end{array} \right.$$

$$\tan^{-1} 2.758 = \left\{ \begin{array}{l} 70.07^\circ \pm 360^\circ \\ 250.07^\circ \pm 360^\circ \\ \text{OR } 70.07^\circ \pm 180^\circ \end{array} \right. \quad \sec^{-1} 1.982 = \left\{ \begin{array}{l} \pm 59.699^\circ \pm 360^\circ \end{array} \right.$$

$$\csc^{-1} -.362 = \left\{ \begin{array}{l} \text{NO SOLUTION} \end{array} \right.$$

5. A boat sails 53 mph at a bearing of 213° . The current flows 7 mph at 54° . Find the magnitude and bearing of the resultant vector.

$$\begin{aligned}
 & 53 \cos 213^\circ \vec{i} + 53 \sin 213^\circ \vec{j} \\
 & 7 \cos 54^\circ \vec{i} + 7 \sin 54^\circ \vec{j} \\
 \hline
 & -40.335 \vec{i} - 23.203 \vec{j} \\
 |\vec{r}| &= \sqrt{40.335^2 + 23.203^2} = 46.533 \\
 \theta &= -\cos^{-1}\left(\frac{-40.335}{46.533}\right) = -150.690^\circ
 \end{aligned}$$

6. Identify the quadrant and reference angle of :

- | | | |
|------------------|--------------|---------------------------|
| a) 965° | Q <u>III</u> | $\theta_{ref} = 65^\circ$ |
| b) -732° | Q <u>IV</u> | $\theta_{ref} = 12^\circ$ |
| c) -1614° | Q <u>III</u> | $\theta_{ref} = 6^\circ$ |
| d) -572° | Q <u>II</u> | $\theta_{ref} = 32^\circ$ |