

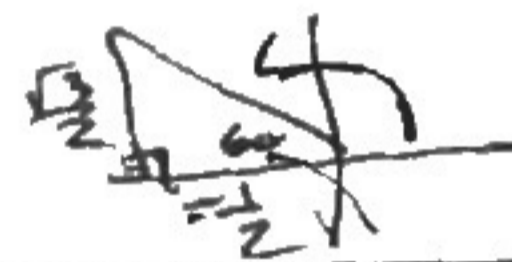
STATION 1 Sum/Diff & Double Identities

Name Key Per: _____

Complete each with the appropriate trig identity as a SINGLE angle, Reduce to lowest terms where appropriate.

1. $\sin(80^\circ) = \sin 30^\circ \cos 50^\circ + \cos 30^\circ \sin 50^\circ$	2. $\tan\left(-\frac{\pi}{6}\right) = \frac{\tan \frac{\pi}{12} - \tan \frac{\pi}{4}}{1 + \tan \frac{\pi}{12} \tan \frac{\pi}{4}} \quad \frac{\frac{1}{12} - \frac{3}{12} - \frac{2}{12}}{\frac{1}{12} + \frac{3}{12} + \frac{2}{12}}$
3. $\tan(35^\circ) = \frac{\tan 15^\circ + \tan 20^\circ}{1 - \tan 15^\circ \tan 20^\circ}$	4. $\cos(100^\circ) = \cos^2 50^\circ - \sin^2 50^\circ$
5. $\tan(250^\circ) = \frac{2 \tan 125^\circ}{1 - \tan^2 125^\circ}$	6. $\cos(-41^\circ) = \cos 14^\circ \cos 55^\circ + \sin 14^\circ \sin 55^\circ$
7. $\cos(120^\circ) = 2 \cos^2 60^\circ - 1$	8. $\cos(150^\circ) = 1 - 2 \sin^2 75^\circ$
9. $\sin(40^\circ) = 2 \sin 20^\circ \cos 20^\circ$	10. $\cos\left(\frac{\pi}{12}\right) = \cos \frac{\pi}{4} \cos \frac{\pi}{6} + \sin \frac{\pi}{4} \sin \frac{\pi}{6} \quad \frac{\frac{3}{12} - \frac{2}{12}}{\frac{1}{12} + \frac{2}{12}}$
11. $\cos(80^\circ) = 1 - 2 \sin^2 40^\circ$	12. $\cos(120^\circ) = \cos^2 60^\circ - \sin^2 60^\circ$

Use Sum & Difference to find each exact value. SHOW YOUR WORK.



13. $\sin(75^\circ) = \sin(45^\circ + 30^\circ)$
 $\sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ$
 $\left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right) =$
 $\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$
 $\frac{\sqrt{6} + \sqrt{2}}{4}$

14. $\tan(255^\circ) = \tan(210^\circ + 45^\circ)$
 $\frac{\tan 210^\circ + \tan 45^\circ}{1 - \tan 210^\circ \tan 45^\circ} = \frac{-\frac{\sqrt{3}}{3} + 1}{1 - \left(-\frac{\sqrt{3}}{3}\right)(1)} = \frac{-\sqrt{3} + 3}{3 + \sqrt{3}}$
 $\frac{3 - \sqrt{3}}{3 + \sqrt{3}}$

15. $\cos(105^\circ) = \cos(60^\circ + 45^\circ)$
 $\cos 60^\circ \cos 45^\circ - \sin 60^\circ \sin 45^\circ$
 $\left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$
 $\frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4}$
 $\frac{\sqrt{2} - \sqrt{6}}{4}$

STATION 2

FINDING Sum/Diff & Doubles Ratios

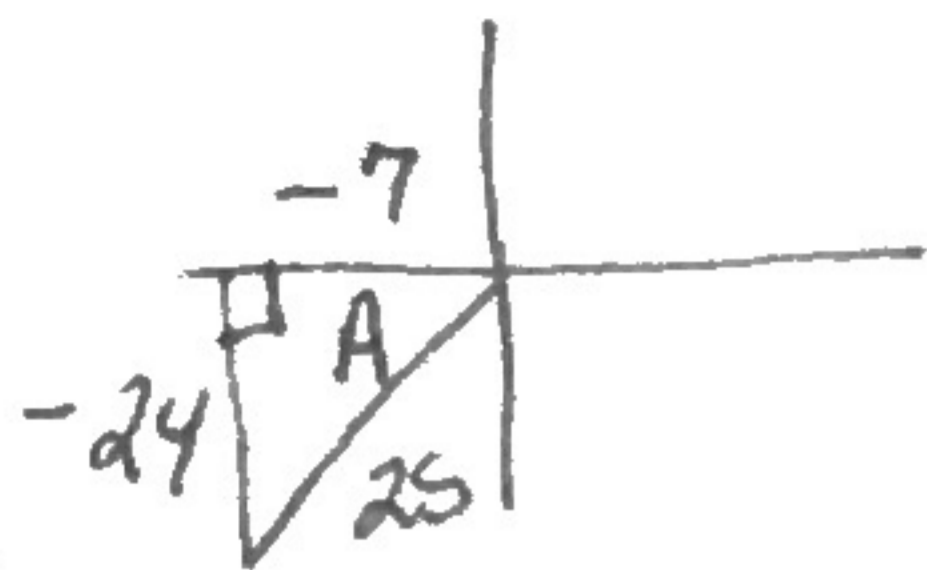
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Per: _____

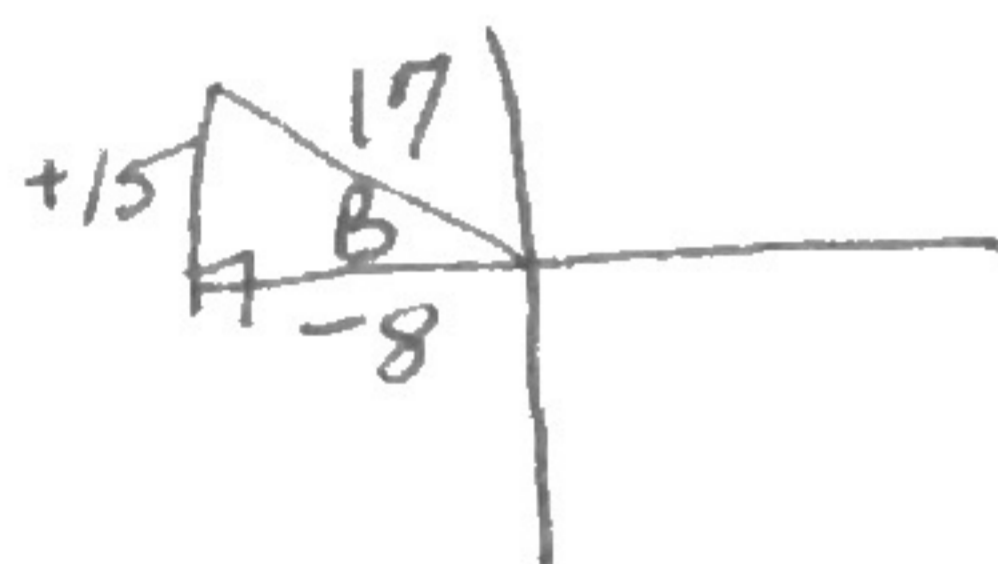
SHOW YOUR WORK! Use the sum and difference identities to find the exact value of each given...

Draw your reference triangles below:

$$\cos A = -\frac{7}{25} \text{ and } \pi \leq A \leq \frac{3\pi}{2}$$



$$\tan B = -\frac{15}{8} \text{ and } \frac{\pi}{2} \leq B \leq \pi$$



1. $\cos(A+B)$

$$\cos A \cos B - \sin A \sin B$$

$$\left(-\frac{7}{25}\right)\left(-\frac{8}{17}\right) - \left(-\frac{24}{25}\right)\left(\frac{15}{17}\right)$$

$$\frac{416}{425}$$

2. $\sin(B-A)$

$$\sin B \cos A - \cos B \sin A$$

$$\left(\frac{15}{17}\right)\left(-\frac{7}{25}\right) - \left(-\frac{8}{17}\right)\left(-\frac{24}{25}\right)$$

$$-\frac{297}{425}$$

3. $\tan(A+B)$

$$\frac{\tan A + \tan B}{1 - \tan A \tan B} = \frac{\frac{24}{7} + \frac{-15}{8}}{1 - \left(\frac{24}{7}\right)\left(\frac{-15}{8}\right)}$$

$$\frac{87}{416}$$

SHOW YOUR WORK! Use the double-angle identities to find the exact value of each given...

This is the same information as the front side. You may redraw if you wish, or flip your paper over!! ☺

$$\cos A = -\frac{7}{25} \text{ and } \pi \leq A \leq \frac{3\pi}{2}$$

$$\tan B = -\frac{15}{8} \text{ and } \frac{\pi}{2} \leq A \leq \pi$$

4. $\cos 2A$

$$\cos^2 A - \sin^2 A$$

$$\left(-\frac{7}{25}\right)^2 - \left(\frac{24}{25}\right)^2$$

$$-\frac{527}{625}$$

5. $\sin 2B$

$$= 2 \sin B \cos B$$

$$= 2 \left(\frac{15}{17}\right)\left(-\frac{8}{17}\right)$$

$$-\frac{240}{289}$$

6. $\tan 2A$

$$= \frac{2 \tan A}{1 - \tan^2 A} = \frac{2\left(\frac{24}{7}\right)}{1 - \left(\frac{24}{7}\right)^2}$$

$$-\frac{336}{527}$$

STATION 3 Solve each over the interval $[0^\circ, 360^\circ)$ SHOW ALL WORK!!

Name _____

End _____

START

$$\sin x = \frac{\sqrt{3}}{2}$$

~~$x = 60^\circ, 120^\circ$~~

$$6 \cos x + 3 = 0$$

$$\cos x = -\frac{1}{2}$$

$$x = 120^\circ, 240^\circ$$

$$2 \sin x = -1$$

$$4 \cos^2 x = 3$$

~~$60^\circ, 120^\circ$~~

$60^\circ, 300^\circ$

$30^\circ, 150^\circ$

$30^\circ, 150^\circ$

~~$120^\circ, 240^\circ$~~

270°

$30^\circ, 150^\circ,$
 $220^\circ, 330^\circ$

$$2 \cos x + 1 = 0$$

$$3 \csc^2 x - 4 = 0$$

$$\csc^2 x = \frac{4}{3}$$

$$\csc x = \pm \frac{2}{\sqrt{3}}$$

$$\sin x = \pm \frac{\sqrt{3}}{2}$$

$$x = 60^\circ, 120^\circ, 240^\circ, 300^\circ$$

$$-5 \tan^2 x = -5$$

$$\tan^2 x = 1$$

$$x = 45^\circ, 135^\circ, 225^\circ, 315^\circ$$

$$\sin^2 x = 3 \cos^2 x$$

$60^\circ,$
 300°

~~$60^\circ, 120^\circ,$
 $240^\circ, 300^\circ$~~

undefined

$120^\circ,$
 240°

$30^\circ, 150^\circ,$
 $210^\circ, 330^\circ$

~~$45^\circ, 135^\circ,$
 $225^\circ, 315^\circ$~~

$60^\circ, 120^\circ,$
 $240^\circ, 300^\circ$

$$\sec x - 2 = 1$$

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

$$2 \sin^2 x + \sin x - 1 = 0$$

$$(2 \sin x - 1)(\sin x + 1) = 0$$

$$\sin x = \frac{1}{2} \quad \sin x = -1$$

$$x = 30^\circ, 150^\circ, 270^\circ$$

$$\cos x - \tan x \cos x = 0$$

$$\cos x (1 - \tan x) = 0$$

$$\cos x = 0 \quad 1 - \tan x = 0$$

$$x = 90^\circ, 270^\circ \quad \tan x = 1$$

$$x = 45^\circ, 225^\circ$$

$$9 \tan^2 x = 3$$

$60^\circ, 120^\circ,$
 270°

~~$45^\circ, 90^\circ,$
 $180^\circ, 225^\circ$~~

$90^\circ,$
 45°

$30^\circ, 210^\circ$

undefined

~~$30^\circ, 150^\circ,$
 270°~~

$$3 \tan^3 x + \tan x = 0$$

$$\tan x (3 \tan^2 x + 1) = 0$$

~~$\tan x = 0$~~

$$\tan x = \frac{1}{3}$$

NS

$$2 \cos^2 x - 11 \cos x - 6 = 0$$

$$(2 \cos x + 1)(\cos x - 6) = 0$$

$$\cos x = -\frac{1}{2} \quad \text{NS}$$

$$x = 120^\circ, 240^\circ$$

$$2 \sin^2 x - \sin x - 1 = 0$$

$$2 \sin x = \sqrt{2}$$

~~$120^\circ,$
 240°~~

~~$\frac{-12}{2}$
 $\frac{-12 \pm \sqrt{144 - 4(2)(-6)}}{2(2)}$~~

$225^\circ, 315^\circ$

$60^\circ,$
 300°

End

End

STATION 4 Solving Trig Equations

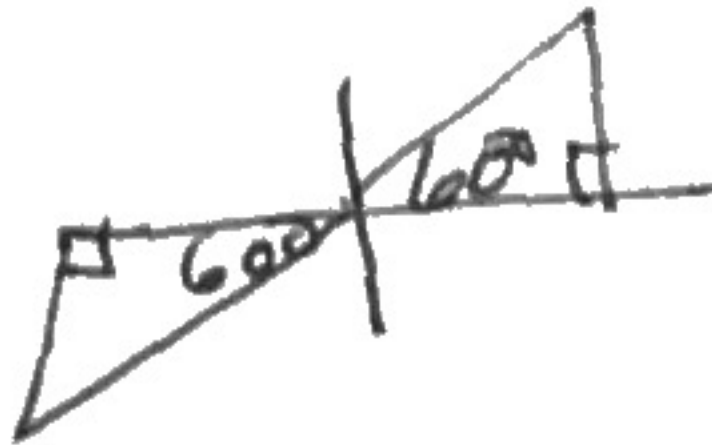
Name _____ Per: _____

SHOW YOUR WORK! You may need to factor and you may need to use identities to simplify.

Show ALL answers in degrees.

1. $\tan 3x = \sqrt{3}$

$3x = \tan^{-1} \sqrt{3}$

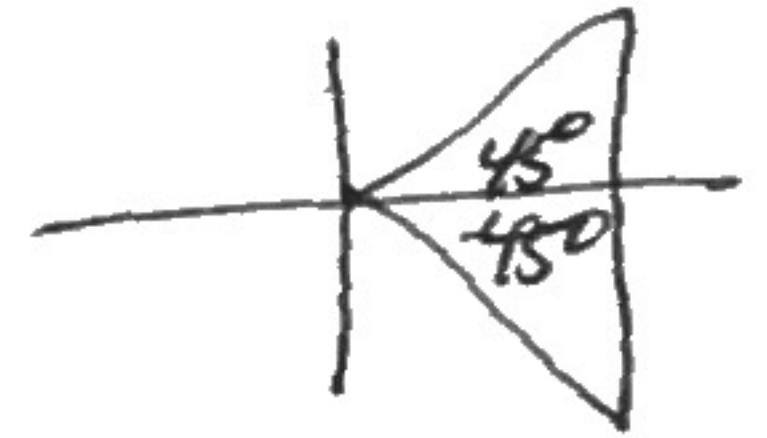


$3x = 60^\circ + 180^\circ N$

$x = 20^\circ + 60^\circ N$

2. $2 \cos\left(\frac{x}{4}\right) = \sqrt{2}$

$\cos \frac{x}{4} = \frac{\sqrt{2}}{2}$



$4 \left[\frac{x}{4} = 45^\circ + 360^\circ N \right] \quad 4 \left[\frac{x}{4} = -45^\circ + 360^\circ N \right]$

$x = 180^\circ + 1440^\circ N$

OR $-180^\circ + 1440^\circ N$

3. $\sin^2 x - 3 \cos x = 3$

$(1 - \cos^2 x) - 3 \cos x - 3 = 0$

$-\cos^2 x - 3 \cos x - 2 = 0$

$\cos^2 x + 3 \cos x + 2 = 0$

$(\cos x + 1)(\cos x + 2) = 0$

$\cos x = -1$

$\cos x = -2$
N.S.

$x = 180^\circ$

4. $2 \cot^2 x - \csc x - 1 =$

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

$2(\csc^2 x - 1) - \csc x - 1 = 0$ $\cot^2 x = \csc^2 x - 1$

$2 \csc^2 x - 2 - \csc x - 1 = 0$

$2 \csc^2 x - \csc x - 3 = 0$

$(\csc x + 1)(2 \csc x - 3) = 0$

$\csc x = -1$

$\csc x = \frac{3}{2}$

$\sin x = -1$

$\sin x = \frac{2}{3}$

$x = 270^\circ$

(N.S.)