Math 12 TRIG QUIZ: Sum & Difference IDENTITIES

Name: _____ Date: _____ BLOCK: ____

1) If $\sin\theta = 2/3$ and θ is in quadrant I, find the EXACT VALUE for each expression.

a) $\sin(\theta + \pi/2)$

ANSWER: _____

b) $\cos(\theta - \pi)$

ANSWER: _____

2. If $\sin\alpha = -\frac{4}{5}$ and $\cos\beta = \frac{3}{4}$ where both α and β are in quadrant IV, evaluate each expression EXACTLY.

a) $\cos(\alpha + \beta)$

ANSWER: _____

b) $\sin(\alpha - \beta)$

ANSWER: _____

3. Find the EXACT value for each:

a) $\sin\frac{\pi}{12}$

b) $\cos\frac{5\pi}{12}$

c) $\tan\frac{7\pi}{12}$

ANSWER a) _____ b) _____ c) _____

4) If $\cos x = 5/7$ and $0 < x < \pi/2$, evaluate each expression EXACTLY:

a) $\cos 2x$

b) $\sin 2x$

c) $\tan 2x$

ANSWER: _____

ANSWER: _____

ANSWER: _____

5) Prove each identity:

a) $(\sin\theta - \cos\theta)^2 = 1 - \sin 2\theta$

(b) $\dfrac{2}{1+\cos 2x} = \tan^2 x + 1$

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Name: Key Date: _____ BLOCK: ____

1) If $\sin\theta = 2/3$ and θ is in quadrant I, find the EXACT VALUE for each expression.

a) $\sin(\theta + \pi/2)$

$\sin\theta\cos\frac{\pi}{2} + \cos\theta\sin\pi/2$

$\frac{2}{3}(0) + \frac{\sqrt{5}}{3}(1)$

ANSWER: $\sqrt{5}/3$

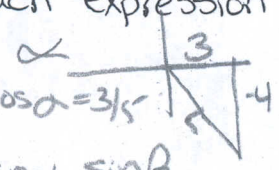
b) $\cos(\theta - \pi)$

$\cos\theta\cos\pi - \sin\theta\sin\pi$

$\frac{\sqrt{5}}{3}(-1) - \frac{2}{3}(0)$

ANSWER: $-\sqrt{5}/3$

2. If $\sin\alpha = -\frac{4}{5}$ and $\cos\beta = \frac{3}{4}$ where both α and β are in quadrant IV, evaluate each expression EXACTLY.

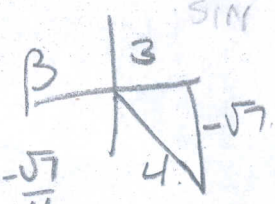


a) $\cos(\alpha + \beta)$ $\cos\alpha = 3/5$

$\cos\alpha\cos\beta - \sin\alpha\sin\beta$

$(3/5)(3/4) - (-4/5)\left(\frac{-\sqrt{7}}{4}\right)$

$\frac{9}{20} - \frac{4\sqrt{7}}{20}$



$\sin\beta = \frac{-\sqrt{7}}{4}$

ANSWER: $\frac{9-4\sqrt{7}}{20}$

b) $\sin(\alpha - \beta)$

$\sin\alpha\cos\beta - \cos\alpha\sin\beta$

$\left(\frac{-4}{5}\right)\left(\frac{3}{4}\right) - \left(\frac{3}{5}\right)\left(\frac{-\sqrt{7}}{4}\right)$

$\frac{-12}{20} + \frac{3\sqrt{7}}{20}$

ANSWER: $\frac{-12+3\sqrt{7}}{20}$

3. Find the EXACT value for each:

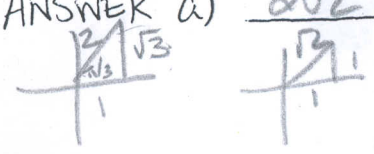
a) $\sin\frac{\pi}{12}$ $\pi/3 - \frac{\pi}{4} = \pi/12$

$\sin(\pi/3 - \pi/4)$

$\sin\pi/3\cos\pi/4 - \cos\pi/3\sin\pi/4$

$\frac{\sqrt{3}}{2}\cdot\frac{1}{\sqrt{2}} - \frac{1}{2}\cdot\frac{1}{\sqrt{2}}$

ANSWER a) $\frac{\sqrt{3}-1}{2\sqrt{2}}$



b) $\cos\frac{5\pi}{12}$ $\frac{\pi}{6} + \frac{\pi}{4} = \frac{5\pi}{12}$

$\cos(\frac{\pi}{6} + \frac{\pi}{4})$

$\cos\frac{\pi}{6}\cos\frac{\pi}{4} - \sin\frac{\pi}{6}\sin\frac{\pi}{4}$

$\left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right) - \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right)$

$\frac{\sqrt{3}-1}{2\sqrt{2}}$

b) $2\sqrt{2}$

c) $\tan\frac{7\pi}{12}$ $\frac{\pi}{4} + \frac{\pi}{3} = \frac{7\pi}{12}$

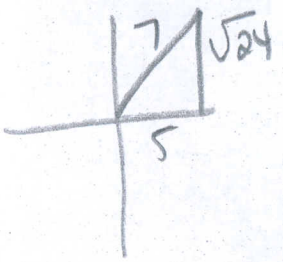
$\tan(\frac{\pi}{4} + \frac{\pi}{3})$

$\frac{\tan\frac{\pi}{4} + \tan\frac{\pi}{3}}{1 - \tan\frac{\pi}{4}\tan\frac{\pi}{3}}$

$\frac{1+\sqrt{3}}{1-1(\sqrt{3})}$

c) $\frac{1+\sqrt{3}}{1-\sqrt{3}}$

4) If $\cos x = 5/7$ and $0 < x < \pi/2$, evaluate each expression EXACTLY:



$\sin x = \frac{\sqrt{24}}{7}$

a) $\cos 2x$

$2\cos^2 x - 1$

$2(5/7)^2 - 1$

$2\left(\frac{25}{49}\right) - 1$

$\frac{50}{49} - 1$

ANSWER: $1/49$

b) $\sin 2x$

$2\sin x \cos x$

$2\left(\frac{\sqrt{24}}{7}\right)\left(\frac{5}{7}\right)$

$= \frac{10\sqrt{24}}{49}$ ← pull out pair!

$= \frac{20\sqrt{6}}{49}$

ANSWER: _____

c) $\tan 2x$

$\frac{\sin 2x}{\cos 2x}$

$= \frac{\frac{20\sqrt{6}}{49}}{\frac{1}{49}}$

ANSWER: $20\sqrt{6}$

5) Prove each identity:

a) $(\sin\theta - \cos\theta)^2 = 1 - \sin 2\theta$

$\sin^2\theta - 2\sin\theta\cos\theta + \cos^2\theta$	$1 - 2\sin\theta\cos\theta$
$\sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta$	
$1 - 2\sin\theta\cos\theta$	
LS = RS.	

b) $\frac{2}{1+\cos 2x} = \tan^2 x + 1$

$\frac{2}{1 + 2\cos^2 x - 1}$	$\sec^2 x$
$\frac{2}{2\cos^2 x}$	$\frac{1}{\cos^2 x}$
$\frac{1}{\cos^2 x}$	
LS = RS	