Key

Math 4

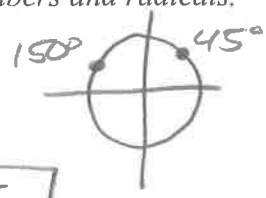
4-7 Learn Check

Name _____

Date _____

In this learning check, you are being assessed on the following learning goals:
I can, without a calculator, use trigonometric identities such as angle addition/subtraction and double angle formulas, to express values of trigonometric functions in terms of rational numbers and radicals.

1. $\sin(195^\circ) = \sin(150^\circ + 45^\circ)$



$= \sin 150 \cdot \cos 45 + \cos 150 \cdot \sin 45$

$= \frac{1}{2} \cdot \frac{\sqrt{2}}{2} + \frac{-\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4} = \boxed{\frac{\sqrt{2}-\sqrt{6}}{4}}$

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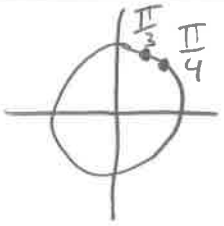
2. $\tan\left(\frac{7\pi}{12}\right) = \tan\left(\frac{4\pi}{12} + \frac{3\pi}{12}\right) = \tan\left(\frac{\pi}{3} + \frac{\pi}{4}\right)$



$= \frac{\tan\left(\frac{\pi}{3}\right) + \tan\left(\frac{\pi}{4}\right)}{1 - \tan\left(\frac{\pi}{3}\right) \cdot \tan\left(\frac{\pi}{4}\right)} = \frac{\sqrt{3}+1}{1-\sqrt{3}\cdot 1} = \boxed{\frac{\sqrt{3}+1}{1-\sqrt{3}}}$

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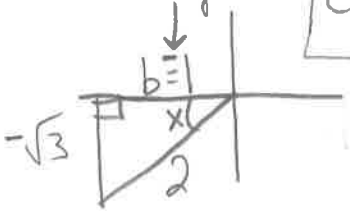
3. Suppose that $0 < y < \frac{\pi}{2}$ and $\pi < x < \frac{3\pi}{2}$, $\sin x = -\frac{\sqrt{3}}{2}$, and $\cos y = \frac{4}{5}$. Find exact values of the following: 1st Quad. 3rd Quad

a. $\cos x$

left of origin



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

$(-\sqrt{3})^2 + b^2 = 2^2$

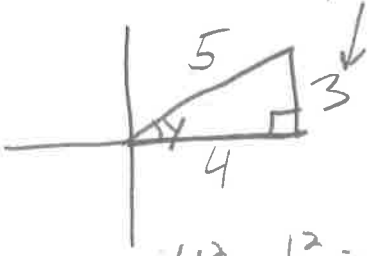
$3 + b^2 = 4$

$b = 1$

b. $\sin y$

$\sin y = \frac{3}{5}$

Pythag. Theorem



$4^2 + b^2 = 5^2$

$b = 3$

c. $\cos(x+y)$

$= \cos x \cdot \cos y - \sin x \cdot \sin y$

$= \frac{-1}{2} \cdot \frac{4}{5} - \left(\frac{-\sqrt{3}}{2}\right) \cdot \frac{3}{5}$

$= \frac{-4}{10} + \frac{3\sqrt{3}}{10}$

$= \boxed{\frac{3\sqrt{3}-4}{10} \text{ or } \frac{-4+3\sqrt{3}}{10}}$

OVER →

$\cos x = -\frac{1}{2}$ $\sin x = -\frac{\sqrt{3}}{2}$

$\cos y = \frac{4}{5}$ $\sin y = \frac{3}{5}$

d. $\sin(x+y)$

$= \sin x \cdot \cos y + \cos x \cdot \sin y$

$= -\frac{\sqrt{3}}{2} \cdot \frac{4}{5} + -\frac{1}{2} \cdot \frac{3}{5}$

$= \frac{-4\sqrt{3}}{10} - \frac{3}{10} = \boxed{\frac{-4\sqrt{3}-3}{10}}$

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e. $\tan(x+y) = \frac{\sin(x+y)}{\cos(x+y)}$ or use tangent $(\alpha+\beta)$ formula

$= \frac{\frac{-4\sqrt{3}-3}{10}}{\frac{3\sqrt{3}-4}{10}}$

$= \frac{-4\sqrt{3}-3}{\cancel{10}} \cdot \frac{\cancel{10}}{3\sqrt{3}-4}$

$= \boxed{\frac{-4\sqrt{3}-3}{3\sqrt{3}-4}}$