Key

Math 4

4-6 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. $\cos(195^\circ) = \cos(60+135)$

$= \cos(60)\cdot\cos(135) - \sin(60)\cdot\sin(135)$

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

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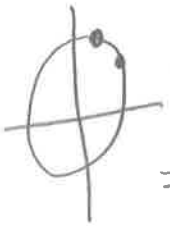
2. $\cos\left(\frac{7\pi}{12}\right) = \cos\left(\frac{4\pi}{12}+\frac{3\pi}{12}\right) = \cos\left(\frac{\pi}{3}+\frac{\pi}{4}\right)$



$= \cos\left(\frac{\pi}{3}\right)\cdot\cos\left(\frac{\pi}{4}\right) - \sin\left(\frac{\pi}{3}\right)\sin\left(\frac{\pi}{4}\right)$

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

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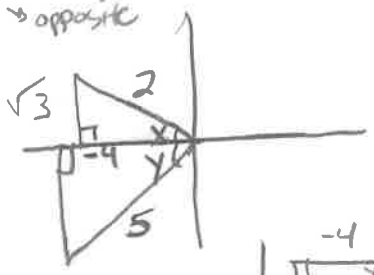
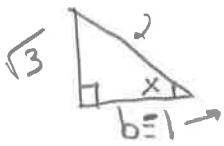
3. Suppose that $\frac{\pi}{2} < x < \pi$ (2nd Quadrant) and $\pi < y < \frac{3\pi}{2}$ (3rd Quadrant), $\sin x = \frac{\sqrt{3}}{2}$ (↗ opposite, ↘ Hypotenuse), and $\cos y = -\frac{4}{5}$ (↗ Adjacent, ↘ opposite). Find exact values of the following:



a. $\cos x$

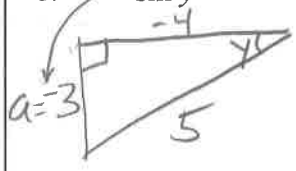


left of origin

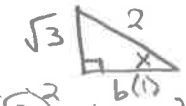
$\cos x = -\frac{1}{2}$

b. $\sin y$

Below origin



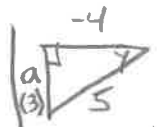
$\sin y = \frac{-3}{5}$



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

$b^2 = 1$

$b = 1$



$(-4)^2 + a^2 = 5^2$

$16 + a^2 = 25$

$a^2 = 9$

$a = 3$

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c. $\cos(x+y)$

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

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

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

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

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

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

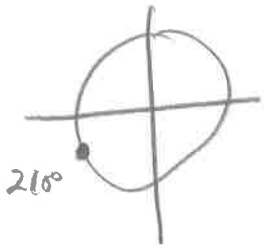
$\sin y = \frac{-3}{5}$

$\cos y = -\frac{4}{5}$

OVER →

(Prove)

4. Verify the following identity: $\cos(x + 210°) = \dfrac{-\sqrt{3}\cos x + \sin x}{2}$



$= \cos x \cdot \cos 210 - \sin x \cdot \sin 210$

$= \dfrac{\cos x}{1}\left(-\dfrac{\sqrt{3}}{2}\right) - \dfrac{\sin x}{1}\left(-\dfrac{1}{2}\right)$

$= \dfrac{-\sqrt{3}\cdot\cos x}{2} + \dfrac{\sin x}{2}$

$= \boxed{\dfrac{-\sqrt{3}\cdot\cos x + \sin x}{2}}$