Circle final answers *(were applicable)*

TRIG EQUATIONS & IDENTITIES QUIZ

34 %

Name: ______

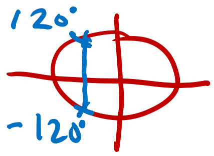
Fun-scale: off the charts

1. Consider the equation $3cosx - 5 = 5cosx - 4$.

   (a) Algebraically determine any solutions on $-180° \le x < 180°$ — 2

   $-2\cos x = 1$

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

   $\boxed{x = \pm 120°}$

   (b) State a general solution — 1

   $x = \boxed{\begin{matrix} 120° + 360n \\ 240° + 360n \\ n \in I \end{matrix}}$

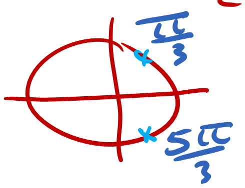
3

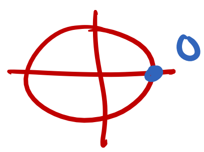
2. Albebraically solve on $0 \le \theta < 2\pi$. — 2

   ➔ $2\cos^2\theta - 3\cos\theta + 1 = 0$

   $(2\cos\theta - 1)(\cos\theta - 1) = 0$

   $\cos\theta = \frac{1}{2}$ $\quad$ $\cos\theta = 1$

   $\theta = 0, \frac{\pi}{3}, \frac{5\pi}{3}$

3. Solve on $0 \le \theta < 360°$ ➔ $3csc\theta + 4 = 0$ — 2

   Round answers to the nearest degree.

   $\csc\theta = -\frac{4}{3}$

   $\sin\theta = -\frac{3}{4}$

   $\alpha = \sin^{-1}(3/4) \approx 49°$

   sin is Neg in III & IV

   $\theta \approx 229°$ or $311°$

   $180 + 49$ $\quad$ $360 - 49$

4

4. Simplify each expression to one of the three primary trig functions. $(sinx,\ cosx,$ or $tanx)$

a) $secx\ cotx\ sin^2x$ — 1

$\frac{1}{\cancel{\cos x}} \cdot \frac{\cancel{\cos x}}{\cancel{\sin x}} \cdot \frac{\cancel{\sin x}\sin x}{1}$

$= \sin x$

b) $\frac{sinx}{tanx}$ — 1

$= \frac{\sin x}{\frac{\sin x}{\cos x}}$ Flip! Mult.

$= \frac{\cancel{\sin x}}{1} \cdot \frac{\cos x}{\cancel{\sin x}}$

$= \cos x$

c) $\frac{sin2\theta}{2cos\theta}$ — 1

$= \frac{\cancel{2}\sin\theta\cancel{\cos\theta}}{\cancel{2\cos\theta}}$

$= \sin\theta$

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d) $\frac{cos2\theta + 1}{2cos\theta}$ — 2

$= \frac{\overbrace{2\cos^2\theta - 1}^{\cos 2\theta} + 1}{2\cos\theta}$

$= \frac{\cancel{2\cos\theta}\cos\theta}{\cancel{2\cos\theta}}$

$= \cos\theta$

e) $\frac{cos^3x}{cos2x + sin^2x}$ — 2

$= \frac{\cos^3 x}{\underbrace{\cos^2 x - \cancel{\sin^2 x}}_{\text{"}\cos 2x\text{"}} + \cancel{\sin^2 x}}$

$= \frac{\cancel{\cos x} \cdot \cancel{\cos x} \cdot \cos x}{\cancel{\cos x} \cdot \cancel{\cos x}}$

$= \cos x$

Pattern is "cos(a+b)" $\quad$ Pattern is "cos 2α"

5. Write each as a single trigonometric function.

a) $cos43°cos28° - sin43°sin28°$

$= \cos(43° + 28°)$

$= \cos 71°$

b) $2cos^2\frac{\pi}{12} - 1$

$= \cos\left(2 \cdot \frac{\pi}{12}\right)$

$= \cos\frac{\pi}{6}$

c) $\frac{2tan76°}{1 - tan^276°}$

$= \tan(152°)$

3

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6. Consider the equation $\dfrac{secx}{tanx + cotx} = sinx$

a) Numerically verify the possibility of an identity using $x = 60°$. **What value do you get for both sides?**

___ 1

___ 3

$$\frac{\frac{1}{\cos 60°}}{\tan 60° + \frac{1}{\tan 60°}} = \frac{\sqrt{3}}{2} \checkmark \qquad \sin 60 = \frac{\sqrt{3}}{2} \checkmark$$

b) State the non-permissible values of the equation on the domain $0° \leq x < 360°$

___ 2

$\tan x \neq 0$ $\quad$ $\cot x \neq 0$

$x \neq 0, 180°$ $\quad$ $x \neq 90°, 270°$

(c) BONUS Prove this identity **(on scrap paper)**

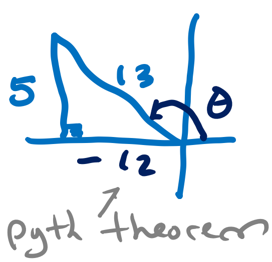
7. Simplify $\boldsymbol{cos}(\frac{\pi}{2} - \boldsymbol{x})$ using a difference identity.

___ 2

$$= \cos\frac{\pi}{2}\cos x + \sin\frac{\pi}{2}\sin x$$

$$= (0)\cos x + (1)\sin x \longrightarrow = \sin x$$

8. Given that θ is in quadrant II and $sin\theta = \frac{5}{13}$, determine the exact value of:



___ 4

a) $cos\, 2\theta$

___ 2

$$= 1 - 2\sin^2\theta$$

$$= 1 - 2\left(\frac{5}{13}\right)^2$$

$$= \frac{119}{169}$$

b) $\sin(\theta + 90°)$

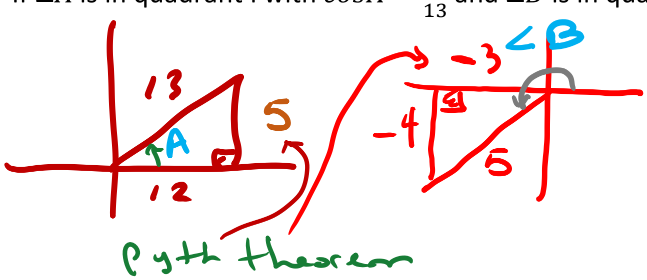
$$= \sin\theta\cos 90° + \cos\theta\sin 90°$$

$$= \left(\frac{5}{13}\right)(0) + \left(-\frac{12}{13}\right)(1)$$

$$= -\frac{12}{13}$$

9. If $\angle A$ is in quadrant I with $cosA = \frac{12}{13}$ and $\angle B$ is in quadrant III with $sinB = -\frac{4}{5}$, evaluate $\sin(A + B)$

___ 2



$$= \sin A\cos B + \cos A\sin B$$

$$= \left(\frac{5}{13}\right)\left(-\frac{3}{5}\right) + \left(\frac{12}{13}\right)\left(-\frac{4}{5}\right)$$

$$= -\frac{63}{65}$$

10. Use an appropriate sum/difference formula to determine the exact value of: ***show all steps on scrap paper – provide simplified exact-value answers here***

___ 4

a) $sin165°$ $= \dfrac{\sqrt{6} - \sqrt{2}}{4}$

___ 2

b) $tan\dfrac{17\pi}{12}$ $= \sqrt{3} + 2$

___ 2

* Show work!

11. Prove each identity

a) $\dfrac{cosx}{cotx} * cscx = 1$

___ 2

___ 2

LS	RS
$= \dfrac{\cos x}{\frac{\cos x}{\sin x}} \cdot \dfrac{1}{\sin x}$	1
$= \cancel{\cos x} \cdot \dfrac{\cancel{\sin x}}{\cancel{\cos x}} \cdot \dfrac{1}{\cancel{\sin x}}$	
$= 1$	

LS = RS

b) $sinx + cosxcotx = cscx$

___ 2

LS	RS
$\sin x + \cos x \cdot \dfrac{\cos x}{\sin x}$	$\dfrac{1}{\sin x}$
$= \dfrac{\sin x}{1} \cdot \dfrac{\sin x}{\sin x} + \dfrac{\cos^2 x}{\sin x}$	
$= \dfrac{\sin^2 x + \cos^2 x}{\sin x}$	
$= \dfrac{1}{\sin x}$	

LS = RS!!

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