Name: _____ Student #:_____

Date:_____ T.A. #:_____

Mathematics 12 Pre-Calculus

LEARNING GUIDE 6/7 TEST – ANGLES AND TRIG EQUATIONS

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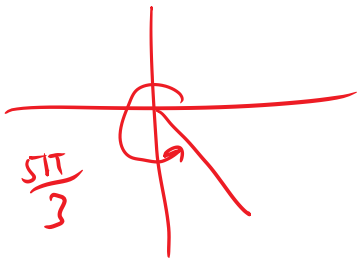
***Full marks will NOT be given for the final answer only.**

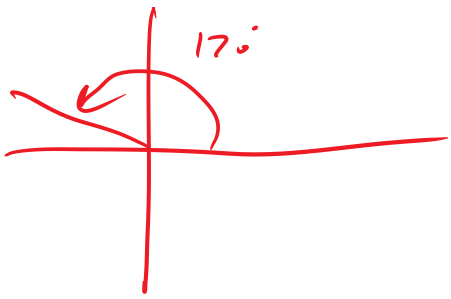
When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. Draw the angle $\frac{5\pi}{3}$ radians in standard position. After you have drawn the angle, convert the angle to degrees. (2 marks)



$\frac{5\pi}{3} \times \frac{180^\circ}{\pi} = 300^\circ$

2. Draw the angle 170° in standard position. After you have drawn the angle, convert the angle to radians. Express your answer as an exact value in terms of π. (2 marks)



$170^\circ \times \frac{\pi}{180} = \frac{17\pi}{18}$

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3. Given the angle -52° , determine all of the coterminal angles on the domain $-720° \leq \theta \leq 180°$. (1 mark)

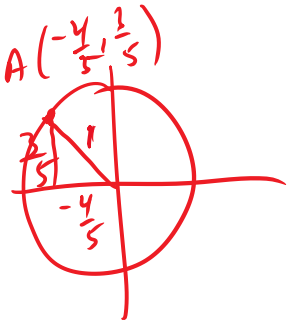
$-52 - 360 = -412°$

4. The pendulum of a grandfather clock has a length of 115cm. If it swings through an angle of $43°$, what is the arc length of the pendulum? (2 marks)

$a = r\theta$ $\qquad 43° = 43 \times \frac{\pi}{180}$ RADIANS

$a = 115 \times \frac{43\pi}{180} = 86.31\text{cm}$

5. The point A$\left(\frac{-4}{5}, \frac{3}{5}\right)$ lies at the intersection of the unit circle and the terminal arm of an angle θ in standard position.
   a) Draw a diagram to show θ in standard position and the point A on it's terminal arm. (1mark)
   b) Determine the values of the six trig ratios for θ. Answers should be in lowest terms. (3 marks)



$\sin\theta = \frac{3}{5}$ $\qquad \csc\theta = \frac{5}{3}$

$\cos\theta = \frac{-4}{5}$ $\qquad \sec\theta = \frac{-5}{4}$

$\tan\theta = \frac{-3}{4}$ $\qquad \cot\theta = \frac{-4}{3}$

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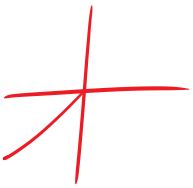
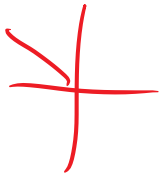
6. Determine the exact value for: (1 mark each)

a) $\sin \frac{7\pi}{6}$



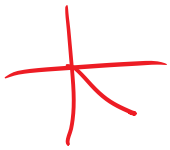
$-\frac{1}{2}$

b) $\tan \frac{2\pi}{3}$



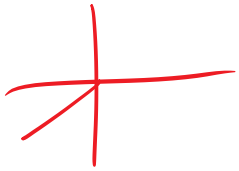
$-\sqrt{3}$

c) $\sec \frac{7\pi}{4}$



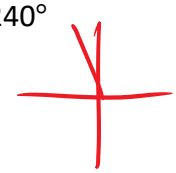
$\sqrt{2}$

d) sin 210°



$-\frac{1}{2}$

e) cot -240°



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

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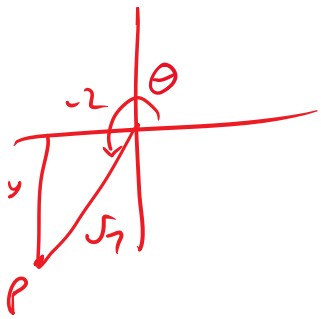
7. The angle θ is in the 3rd quadrant, and $\cos\theta = \frac{-2}{\sqrt{7}}$.

   a) Draw a diagram to show θ in standard position and a point P on its terminal arm. (1mark)

   b) Determine possible coordinates for P. (1 mark)



$y^2 + (-2)^2 = (\sqrt{7})^2$

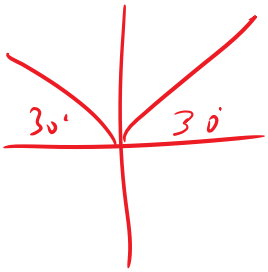
$y^2 = 7 - 4$

$y^2 = 3$

$y = -\sqrt{3}$

$P(-2, -\sqrt{3})$

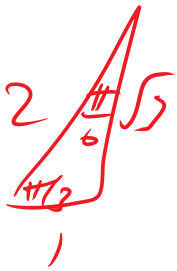
8. Solve the equation $\sin\theta = \frac{1}{2},\ 0° \le \theta < 360°$. (2 marks)



$\theta = 30°, 150°$

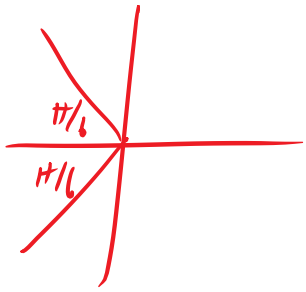
9. Solve each equation for θ algebraically, giving your answers as exact values when possible.
(2 marks each).

a) $3\cos\theta + \sqrt{3} = \cos\theta \ , 0 \le \theta < 2\pi$



$2\cos\theta = -\sqrt{3}$

$\cos\theta = \frac{-\sqrt{3}}{2}$

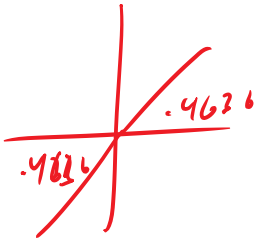


$\theta = \frac{5\pi}{6}, \frac{7\pi}{6}$

b) $2tan^2\theta + \tan\theta - 1 = 0, \ -\pi \le \theta \le \pi$

$(2\tan\theta - 1)(\tan\theta + 1) = 0$

$\tan\theta = \frac{1}{2}$ $\quad \tan\theta = -1$



$\theta_1 = .46$

$\theta_2 = \pi + .4636$

$\theta_2 = -2.68$

$\theta = \tan^{-1}\left(\frac{1}{2}\right)$

$= .4636$

$\theta_3 = \frac{3\pi}{4}$

$\theta_4 = \frac{-\pi}{4}$

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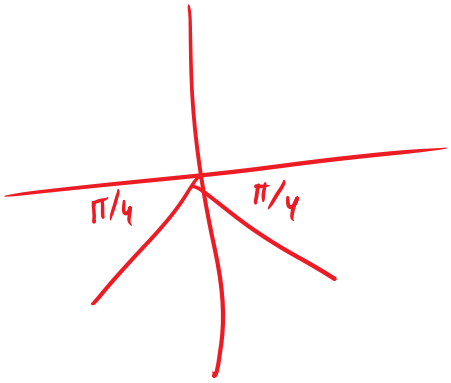
10. Solve algebraically for θ in radians. Write your general solution as exact values. (3 marks)

$\csc\theta + \sqrt{2} = 0$

$\csc\theta = -\sqrt{2}$

$\frac{1}{\sin\theta} = -\sqrt{2}$

$\sin\theta = \frac{1}{-\sqrt{2}}$



$\theta_1 = \frac{5\pi}{4} + n2\pi, n \in I$

$\theta_2 = \frac{7\pi}{4} + n2\pi, n \in I$

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