

Name: \_\_\_\_\_

Student #: \_\_\_\_\_

Date: \_\_\_\_\_

T.A. #: \_\_\_\_\_

## Mathematics 12 Pre-Calculus

### LEARNING GUIDE 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. Sketch the angle  $\frac{2\pi}{3}$  radians in standard position. After you have sketched the angle, convert the angle to degrees. (2 marks)



$$\frac{2\pi}{3} \times \frac{180}{\pi} = 120^\circ$$

2. Sketch the angle  $250^\circ$  in standard position. After you have sketched the angle, convert the angle to radians. Express your answer as an exact value in terms of  $\pi$ . (2 marks)



$$250 \times \frac{\pi}{180} = \frac{25\pi}{18}$$

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3. Given the angle  $\frac{4\pi}{7}$ , determine all of the coterminal angles on the domain  $-2\pi \leq \theta \leq 2\pi$ . (1 mark)

$$\frac{4\pi}{7} - 2\pi = \frac{4\pi}{7} - \frac{14\pi}{7} = \frac{-10\pi}{7}$$

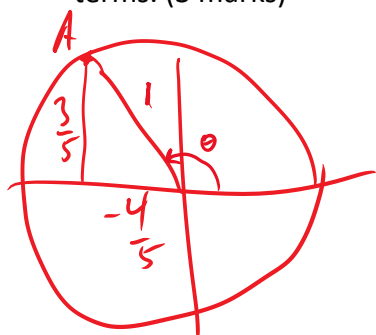
4. A child on a swing, swings through an arc length of 4.4m. If the measure of the central angle is  $98^\circ$ , what is the length of the swing? (2 marks)

$$a = r\theta \quad \theta = 98^\circ \times \frac{\pi}{180} \quad (\text{NEED TO CONVERT TO RADIANS})$$

$$4.4 = r \left( \frac{98\pi}{180} \right)$$

$$r = 2.57\text{m}$$

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  $\theta$  in standard position.
- Draw a diagram to show  $\theta$  in standard position and the point A on it's terminal arm. (1mark)
  - Determine the values of the six trig ratios for  $\theta$ . Answers should be in lowest terms. (3 marks)



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

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

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

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

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

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

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

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

$$\frac{1}{2}$$

b)  $\tan \frac{5\pi}{6}$

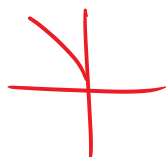
$$-\frac{1}{\sqrt{3}}$$

c)  $\csc \frac{5\pi}{3}$



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

d)  $\sin 135^\circ$



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

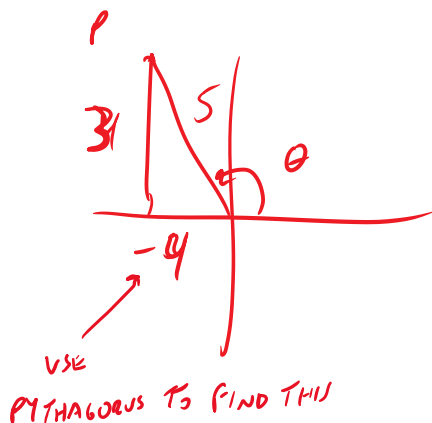
e)  $\cot -240^\circ$



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

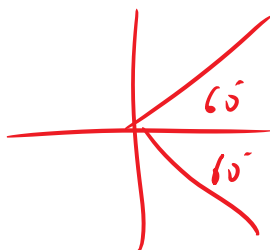
7. The angle  $\theta$  is in the 2<sup>nd</sup> quadrant, and  $\sin \theta = \frac{3}{5}$ .

- Draw a diagram to show  $\theta$  in standard position and a point P on its terminal arm. (1 mark)
- Determine possible coordinates for P. (1 mark)

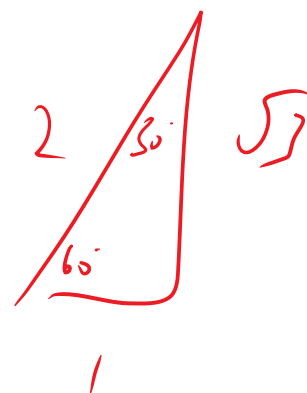


$$P(-4, 3)$$

8. Solve the equation  $\cos \theta = \frac{1}{2}$ ,  $0^\circ \leq \theta < 360^\circ$ . (2 marks)



$$\theta = 60^\circ, 300^\circ$$

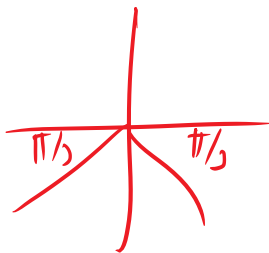


9. Solve each equation for  $\theta$  algebraically, giving your answers as exact values where possible. (2 marks each)

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

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

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



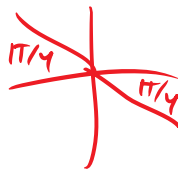
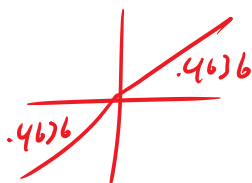
$$\theta = \frac{4\pi}{3}, \frac{5\pi}{3}$$

b)  $2 \tan^2 \theta + \tan \theta - 1, -\pi \leq \theta \leq \pi$

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

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

$$\tan \theta = -1$$



$$\theta_2 = \frac{3\pi}{4}$$

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

$$\theta = \tan^{-1}\left(\frac{1}{2}\right) = .46$$

$$\theta_1 = 0.46$$

$$\theta_2 = -2.68$$

10. Solve algebraically for  $\theta$  in radians. Write your general solution as exact values.

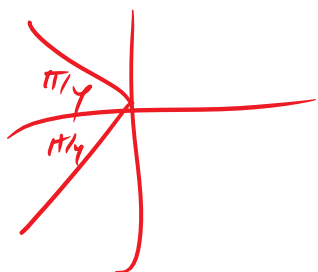
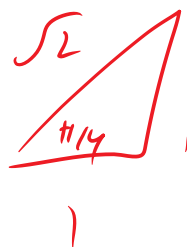
(3 marks)

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

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

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

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



$$\theta = \frac{3\pi}{4} + n2\pi, n \in \mathbb{I}$$

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