

$$\frac{\quad}{40} + \frac{\quad}{3} = \frac{\quad}{43}$$

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

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

**MHF4U**

**Unit 6 – Test: Trigonometric Identities and Equations**

*Answer all questions on this paper. Be sure to show all applicable work and express all answers in simplest form. Marks are awarded for presentation and technical correctness.*

For questions 1 - 12, fill in the blanks with the correct answer: (1 mark each)

1. Give an equivalent expression for  $y = \cos(\pi - \theta)$  \_\_\_\_\_

2. True or False:  $\sin(-\theta) = -\sin \theta$  \_\_\_\_\_

3. Give an equivalent expression for  $\cos \frac{13\pi}{12}$ . \_\_\_\_\_

4. Express  $\frac{\pi}{12}$  as a compound angle, using angles from special triangles. \_\_\_\_\_

5.  $\cos(a + b)$  is equivalent to \_\_\_\_\_

6. Simplify  $2 \sin 45^\circ \cos 45^\circ$ . Do not evaluate \_\_\_\_\_

7. Evaluate  $1 - 2 \sin^2 \frac{3\pi}{8}$  using exact values. \_\_\_\_\_

8. Solve  $\cos^2 x = 1$ ,  $0 \leq x \leq 2\pi$  \_\_\_\_\_

9. Find the related acute angle of the equation  $\cos \theta = \frac{5}{13}$ . \_\_\_\_\_

10. Determine an equivalent expression  $\sin \frac{5\pi}{12}$ . (2 marks)

11. Solve for  $\theta$  to the nearest hundredth, if  $\cos 2\theta = -0.4348$ , where  $0 \leq \theta \leq 2\pi$  (5 marks)

12. The average monthly temperature,  $T$ , in degrees Celcius, for any month,  $t$ , for the town of Gander, NF, is modelled by the function  $T(t) = 19.1 \sin \frac{\pi}{6}(t - 4) + 7.5$ .

For  $t = 0$ , the month is January.

- a) What is the maximum monthly temperature? (1 mark)
- b) What is the period of the function and what does it mean? (2 marks)
- c) When is the monthly temperature  $-4^\circ\text{C}$ ? (4 marks)

11. Prove the following identities:

a) 
$$\frac{2 \csc 2x \tan x}{\sec x} = \sec x \quad (3 \text{ marks})$$

b) 
$$\frac{1 + \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 + \sin \theta} = \frac{2}{\cos \theta} \quad (3 \text{ marks})$$

12. Solve  $8 + 13\sin\theta = 12\cos^2\theta$ ,  $0 \leq \theta \leq 2\pi$ . Round angles to 1 decimal place. (5 marks)

13. Given  $\cos x = \frac{-4}{5}$  and  $\pi \leq x \leq \frac{3\pi}{2}$ , find  $\tan 2x$ . (4 marks)

14. Explain the differences between  $-\cos\left(\frac{7\pi}{12}\right)$  and  $\cos\left(-\frac{7\pi}{12}\right)$  (2 marks)