

# 40S Pre-Calculus Math

## Trig Equation and Identity Test v1

Name \_\_\_\_\_

/ 41 marks

Multiple Choice: Circle the BEST answer.

1. Which is the general solution to the equation  $2 \sin x = 1$ ?

- A)  $x = \frac{\pi}{6} + 2\pi k, k \in Z$
- B)  $x = \frac{\pi}{6}$  or  $\frac{5\pi}{6}$
- C)  $x = \frac{\pi}{3} + 2\pi k, k \in Z$  or  $\frac{2\pi}{3} + 2\pi k, k \in Z$
- D)  $x = \frac{\pi}{6} + 2\pi k, k \in Z$  or  $\frac{5\pi}{6} + 2\pi k, k \in Z$

2. Which of the following is **NOT** the solution of  $\cos \theta = -\frac{\sqrt{3}}{2}$ ?

- A)  $150^\circ$
- B)  $510^\circ$
- C)  $-\frac{11\pi}{6}$
- D)  $-\frac{5\pi}{6}$

3. Express  $\cos^2(2x) - \sin^2(2x)$  in terms of one circular function.

- A)  $\cos 2x$
- B)  $\cos 4x$
- C) 1
- D) *none of the above*

4. What is the value of  $\csc^2 \frac{4\pi}{3}$ ?

- A)  $\frac{4}{3}$
- B)  $\frac{\sqrt{3}}{2}$
- C)  $-\frac{2}{\sqrt{3}}$
- D)  $\frac{9}{4}$

5. Given that  $\tan \theta = 1$  and  $\sec \theta > 0$ , what is the value of  $\theta$ ?

- A)  $\frac{\pi}{4}$
- B)  $\frac{7\pi}{4}$
- C)  $225^\circ$
- D)  $135^\circ$

## Short and Long Response Questions

6. Verify the equation  $\frac{\sin x \cos x}{1 + \cos x} = \frac{1 - \cos x}{\tan x}$  is true when  $x = \frac{\pi}{4}$  (4 marks)

7. Prove the following identities.

a)  $\frac{1 + \cos^2 x}{\sin^2 x} = 2 \csc^2 x - 1$  (3 marks)

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b)  $\frac{1}{1+\sin x} = \sec^2 x - \frac{\tan x}{\cos x}$

(3 marks)

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c)  $\cot \theta \csc 2\theta = \frac{1}{2\sin^2 \theta}$

(3 marks)

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8. Given  $\sin \alpha = -\frac{3}{5}$  and  $\alpha \in QIV$ ,  $\sin \beta = \frac{1}{4}$  and  $\beta \in QII$ , determine the value of :

a)  $\sin(\alpha + \beta)$  (4 marks)

b)  $\cos(2\beta)$  (3 marks)

c)  $\tan(2\alpha)$  (3 marks)

9. Solve each of the following equations over the indicated domain.

a)  $\cot x = \frac{1}{\sqrt{3}}$  over  $[-\pi, \pi]$

(3 marks)

b)  $2 \cos^2 x + 3 \cos x = -1$  over  $[0, 2\pi)$

(3 marks)

c)  $\sin 2x = \sqrt{2} \sin x$  over  $[0^\circ, 360^\circ)$

(3 marks)

d)  $\sin 2x = -\frac{1}{2}$  over for  $\{x \in R\}$

(3 marks)

10. Find the exact value of  $\cos 210^\circ$

(1 mark)

**Bonus Question:**

Given  $2 \cos^3 x - \cos^2 x - 2 \cos x + 1 = 0$ . Solve the equation for  $x, 0 \leq x \leq 2\pi$ . (3 marks)