

Pre-Calculus - Review

Verify and Solve Trig Equations

Name _____

Block _____ Date _____

Verify each of the following. Remember to work on one side only!!!

1) $\frac{\tan x \cot x}{\csc x} = \sin x$

2) $\sec^2 x (1 - \sin^2 x) = 1$

3) $\frac{\sec x}{\tan x + \cot x} = \sin x$

4) $\sin^2 x - \cos^2 x = 1 - 2\cos^2 x$

5) $\cos^2 x - \sin^2 x = 1 - 2\sin^2 x$

6) $\cos^2 x - \sin^2 x = 2\cos^2 x - 1$

7) $\sec x - \sec x \sin^2 x = \cos x$

8) $\frac{\csc^2 x}{\cot x} = \csc x \sec x$

9) $\frac{\csc^2 x - 1}{\csc^2 x} = \cos^2 x$

10) $\cos x - \cos x \sin^2 x = \cos^3 x$

11) $\sin x \tan x + \cos x = \sec x$

12) $\frac{\sin x}{1 - \cos x} + \frac{1 + \cos x}{\sin x} = \frac{2(1 + \cos x)}{\sin x}$

13) $\frac{\sin x + \cos x}{\cos x} - \frac{\sin x - \cos x}{\sin x} = \sec x \csc x$

Solve over the interval $[0, 2\pi)$.

14) $3\sin^2 x - \cos^2 x = 0$

15) $\sin^2 x - 2\sin x - 3 = 0$

16) $\cos^2 x - 1 = \sin^2 x$

17) $2\sin^2 x = 1 + \cos x$

18) $2\tan^2 x = \sec x - 1$

19) $4\cos^2 x + 4\sin x - 5 = 0$

20) $2\cos x - 1 = \sec x$

21) $2\cos x + \tan x = \sec x$

22) $2\sin x + \cot x - \csc x = 0$

23) $2\cos^2 x + \sin x - 1 = 0$

24) $1 + \sin x = 2\cos^2 x$

25) $2\sin^2 x - 3\sin x + 1 = 0$

Solve over 1 period.

26) $\cos(2x) = -\frac{1}{2}$

27) $\tan\left(\frac{x}{2}\right) = \sqrt{3}$

28) $\sin(3x) = -1$

29) $\sec\left(\frac{3x}{2}\right) = -2$

30) $\cot\left(\frac{2x}{3}\right) = -\sqrt{3}$

31) $\sin\left(\frac{x}{2}\right) = -\frac{\sqrt{3}}{2}$

Match the trigonometric expression with one of the following (32-37)

(a) -1 (b) $\cos x$ (c) $\cot x$ (d) 1 (e) $\tan x$ (f) $\sin x$

32) $\sec x \cos x$

33) $\cot x \sin x$

34) $\tan^2 x - \sec^2 x$

35) $(1 - \cos^2 x)(\csc x)$

36) $\frac{\sec^2 x - 1}{\tan x}$

37) $\csc x \cos x$

38) Determine the period for $y = 2 \sin\left(\frac{x}{2}\right) - 5$.

39) Determine the amplitude: $y = -5 \cos\left(\frac{x}{2} + \pi\right)$

40) Determine the period: $y = 3 \sin(4x)$

41) Find the value of $\cos\left(\frac{5\pi}{3}\right)$.

42) Find the value of $\tan\left(\frac{7\pi}{4}\right)$.

43) Find the value of $\sec\left(\frac{\pi}{2}\right)$.

Write the following in simplest form using trig identities.

44) $\csc \theta \tan \theta$

45) $\tan \theta \cot \theta - \cos^2 \theta$

46) $\sec \theta \cot \theta$

47) $\tan \theta \csc \theta \cos \theta$

48) $\frac{\sin^2 \theta + \cos^2 \theta}{\sin \theta}$

49) $\frac{1 - \sin^2 \theta}{1 - \cos^2 \theta}$

50) $\frac{\sin \theta}{\tan \theta}$

51) $\frac{\csc \theta}{\sec \theta}$

52) $\frac{1 - \sin^2 \theta}{\sin^2 \theta}$

53) $\frac{1 + \tan^2 \theta}{1 + \cot^2 \theta}$

54) $\frac{1 - \cos^2 \theta}{\sin \theta}$

55) $\frac{\cos^2 \theta}{1 - \sin^2 \theta}$

Find all solutions for the following trig equations. Give EXACT answers.

56) $\sin \theta = \frac{1}{2}$

57) $\sin \theta = 0$

58) $\tan \theta = \sqrt{3}$

59) $\sec \theta = \frac{2}{\sqrt{3}}$

60) $\cot \theta = 1$

61) $\sec \theta = \frac{-2}{\sqrt{3}}$

62) $\cos \theta = 0$

63) $\csc \theta = -2$

64) $\tan \theta = \frac{1}{\sqrt{3}}$

65) $\cos \theta = 1$

66) $\sin \theta = -1$

67) $\cos \theta = \frac{\sqrt{2}}{2}$

68) $\sin 2x = \frac{\sqrt{2}}{2}$

69) $\cos \frac{x}{2} = \frac{\sqrt{3}}{2}$

70) $\tan 3x = \frac{1}{\sqrt{3}}$

71) $\sin 3x = -\frac{1}{2}$

72) $\cos \frac{x}{3} = -\frac{\sqrt{2}}{2}$

73) $\sec \frac{x}{4} = -2$

74) $\sin \frac{x}{2} = -\frac{1}{2}$

75) $\tan \frac{x}{4} = -\sqrt{3}$

Solve over the interval $[0, 2\pi)$.

76) $2\sin x - \sqrt{3} = 0$

77) $\tan x \sec x = \tan x$

78) $\tan^2 x - 1 = 0$

79) $2\sin x - \sqrt{2} = 0$

80) $\sqrt{2} \tan x \cos x - \tan x = 0$

81) $2\cos^2 x = \cos x$

82) $2\cos^2 x - 5\cos x + 2 = 0$

83) $\sin^2 x - \sin x - 6 = 0$

84) $4\sin^2 x = 1$

85) $2\sin^2 x + 3\sin x + 1 = 0$

86) $\sqrt{3} \csc^2 x + 2 \csc x = 0$

87) $2\sin(2x) - 1 = 0$

88) $4\cos^2 x - 4\cos x + 1 = 0$

89) $2\sec^2 x - 3\sec x - 2 = 0$

90) $\sin x \tan^2 x = \sin x$

91) $\tan^2 x = \frac{1}{3}$

92) $4\sec x + 6 = -2$

93) $5\csc x - 3 = 2$

<p>1.) $\frac{\tan x \cdot \frac{1}{\tan x}}{\csc x} = \frac{1}{\csc x} = \sin x$</p>	<p>2.) $\sec^2 x (\cos^2 x) =$ $\frac{1}{\cos^2 x} \cdot \frac{\cos^2 x}{1} = 1$</p>	<p>3.) $\frac{\frac{1}{\cos x}}{\frac{\sin x + \cos x}{\cos x + \sin x}} =$ $\frac{1}{\cos x} \cdot \frac{\cos x + \sin x}{\sin^2 x + \cos^2 x} =$ $\frac{\cos x \sin x}{\cos x \sin x} =$ $\frac{1}{\cos x} \div \frac{1}{\cos x \sin x} =$ $\frac{1}{\cos x} \cdot \frac{\cos x \sin x}{1} = \sin x$</p>
<p>4.) $(1 - \cos^2 x) - \cos^2 x =$ $1 - 2\cos^2 x$</p>	<p>5.) $(1 - \sin^2 x) - \sin^2 x =$ $1 - 2\sin^2 x$</p>	<p>6.) $\cos^2 x - (1 - \cos^2 x) =$ $\cos^2 x - 1 + \cos^2 x =$ $2\cos^2 x - 1$</p>
<p>7.) $\sec x (1 - \sin^2 x) =$ $\sec x \cdot \cos^2 x =$ $\frac{1}{\cos x} \cdot \frac{\cos^2 x}{1} = \cos x$</p>	<p>8.) $\frac{1}{\sin^2 x} \div \frac{\cos x}{\sin x} =$ $\frac{1}{\sin^2 x} \cdot \frac{\sin x}{\cos x} =$ $\frac{1}{\sin x} \cdot \frac{1}{\cos x} =$ $\csc x \sec x$</p>	<p>9.) $\frac{\cot^2 x}{\csc^2 x} = \frac{\cos^2 x}{\sin^2 x} \div \frac{1}{\sin^2 x} =$ $\frac{\cos^2 x}{\sin^2 x} \cdot \frac{\sin^2 x}{1} = \cos^2 x$</p>
<p>10.) $\cos x (1 - \sin^2 x) =$ $\cos x (\cos^2 x) = \cos^3 x$</p>	<p>11.) $\frac{\sin x}{1} \cdot \frac{\sin x}{\cos x} + \frac{\cos x}{1} =$ $\frac{\sin^2 x}{\cos x} + \frac{\cos^2 x}{\cos x} =$ $\frac{\sin^2 x + \cos^2 x}{\cos x} =$ $\frac{1}{\cos x} = \sec x$</p>	<p>12.) $\frac{\sin^2 x + (1 + \cos x)(1 - \cos x)}{\sin x(1 - \cos x)} =$ $\frac{\sin^2 x + 1 - \cos^2 x}{\sin x(1 - \cos x)} =$ $\frac{1 - \cos^2 x + 1 - \cos^2 x}{\sin x(1 - \cos x)} =$ $\frac{2(1 - \cos^2 x)}{\sin x(1 - \cos x)} =$ $\frac{2(1 - \cos x)(1 + \cos x)}{\sin x(1 - \cos x)} =$ $\frac{2(1 + \cos x)}{\sin x}$</p>

<p>13.)</p> $\frac{\sin x(\sin x + \cos x) - \cos x(\sin x - \cos x)}{\sin x \cos x} =$ $\frac{\sin^2 x + \sin x \cos x - \sin x \cos x + \cos^2 x}{\sin x \cos x} =$ $\frac{\sin^2 x + \cos^2 x}{\sin x \cos x} = \frac{1}{\sin x \cos x} =$ $\frac{1}{\sin x} \cdot \frac{1}{\cos x} = \csc x \sec x$	<p>14.)</p> $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$	<p>15.)</p> $\frac{3\pi}{2}$
<p>16.)</p> $0, \pi$	<p>17.)</p> $\frac{\pi}{3}, \frac{5\pi}{3}, \pi$	<p>18.)</p> 0
<p>19.)</p> $\frac{\pi}{6}, \frac{5\pi}{6}$	<p>20.)</p> $\frac{2\pi}{3}, \frac{4\pi}{3}, 0$	<p>21.)</p> $\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$
<p>22.)</p> $\frac{2\pi}{3}, \frac{4\pi}{3}, 0$	<p>23.)</p> $\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$	<p>24.)</p> $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$
<p>25.)</p> $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{\pi}{2}$	<p>26.)</p> $\frac{\pi}{3}, \frac{2\pi}{3}$	<p>27.)</p> $\frac{2\pi}{3}, \frac{8\pi}{3}$
<p>28.)</p> $\frac{\pi}{2}$	<p>29.)</p> $\frac{4\pi}{9}, \frac{8\pi}{9}$	<p>30.)</p> $\frac{5\pi}{4}, \frac{11\pi}{4}$
<p>31.)</p> $\frac{8\pi}{3}, \frac{10\pi}{3}$	<p>32.) D</p>	<p>33.) B</p>
<p>34.) A</p>	<p>35.) F</p>	<p>36.) E</p>
<p>37.) C</p>	<p>38.) 4π</p>	<p>39.) 5</p>
<p>40.) $\frac{\pi}{2}$</p>	<p>41.) $\frac{1}{2}$</p>	<p>42.) -1</p>
<p>43.) undefined</p>	<p>44.) $\sec \theta$</p>	<p>45.) $\sin^2 \theta$</p>
<p>46.) $\csc \theta$</p>	<p>47.) 1</p>	<p>48.) $\sec \theta$</p>
<p>49.) $\cot^2 \theta$</p>	<p>50.) $\cos \theta$</p>	<p>51.) $\cot \theta$</p>
<p>52.) $\cot^2 \theta$</p>	<p>53.) $\tan^2 \theta$</p>	<p>54.) $\sin \theta$</p>
<p>55.) 1</p>	<p>56.) $\frac{\pi}{6} + 2\pi k, \frac{5\pi}{6} + 2\pi k$</p>	<p>57.) $0 + 2\pi k, \pi + 2\pi k$</p>
<p>58.) $\frac{\pi}{3} + \pi k, \frac{4\pi}{3} + \pi k$</p>	<p>59.) $\frac{\pi}{6} + 2\pi k, \frac{11\pi}{6} + 2\pi k$</p>	<p>60.) $\frac{\pi}{4} + \pi k, \frac{5\pi}{4} + \pi k$</p>
<p>61.) $\frac{5\pi}{6} + 2\pi, \frac{7\pi}{6} + 2\pi k$</p>	<p>62.) $\frac{\pi}{2} + 2\pi k, \frac{3\pi}{2} + 2\pi k$</p>	<p>63.) $\frac{7\pi}{6} + 2\pi k, \frac{11\pi}{6} + 2\pi k$</p>

64.) $\frac{\pi}{6} + \pi k, \frac{7\pi}{6} + \pi k$	65.) 0	66.) $\frac{3\pi}{2}$
67.) $\frac{\pi}{4}, \frac{7\pi}{4}$	68.) $\frac{\pi}{8} + \pi k, \frac{3\pi}{8} + \pi k$	69.) $\frac{\pi}{3} + 4\pi k, \frac{11\pi}{3} + 4\pi k$
70.) $\frac{\pi}{18} + \frac{\pi}{3}k, \frac{7\pi}{18} + \frac{\pi}{3}k$	71.) $\frac{7\pi}{18} + \frac{2\pi}{3}k, \frac{11\pi}{18} + \frac{2\pi}{3}k$	72.) $\frac{9\pi}{4} + 6\pi k, \frac{15\pi}{4} + 6\pi k$
73.) $\frac{8\pi}{3} + 8\pi k, \frac{16\pi}{3} + 8\pi k$	74.) $\frac{14\pi}{6} + 4\pi k, \frac{22\pi}{6} + 4\pi k$	75.) $\frac{8\pi}{3} + 4\pi k, \frac{20\pi}{3} + 4\pi k$
76.) $\frac{\pi}{3}, \frac{2\pi}{3}$	77.) $0, \pi$	78.) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$
79.) $\frac{\pi}{4}, \frac{3\pi}{4}$	80.) $0, \pi, \frac{\pi}{4}, \frac{7\pi}{4}$	81.) $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{3}, \frac{5\pi}{3}$
82.) $\frac{\pi}{3}, \frac{5\pi}{3}$	83.) none	84.) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$
85.) $\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2}$	86.) $\frac{4\pi}{3}, \frac{5\pi}{3}$	87.) $\frac{\pi}{12}, \frac{5\pi}{12}$
88.) $\frac{\pi}{3}, \frac{5\pi}{3}$	89.) $\frac{\pi}{3}, \frac{5\pi}{3}$	90.) $0, \pi, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$
91.) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$	92.) $\frac{2\pi}{3}, \frac{4\pi}{3}$	93.) $\frac{\pi}{2}$