



MATHS

BOOKS - MAXIMUM PUBLICATION

TRIGONOMETRIC FUNCTIONS

Example

1. Convert the following degree measure into radian measure.

45°



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2. Convert the following degree measure into radian measure.

25°



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3. Convert the following degree measure into radian measure.

240°



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4. Convert the following degree measure into radian measure.

$40^\circ 20'$



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5. Convert the following degree measure into radian measure.

$$-47^{\circ} 30'$$



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6. Convert the following radian measure into degree measure.

$$6$$



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7. Convert the following radian measure into degree measure.

$$-4$$



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8. Convert the following radian measure into degree measure.

$$\frac{5\pi}{3}$$



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9. Convert the following radian measure into degree measure.

$$\frac{7\pi}{6}$$



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10. Convert the following radian measure into degree measure.

$$\frac{11}{16}$$



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11. The minute hand of a watch is 1.5 cm long. How far does its tip move in 40 minutes ? (use $\pi = 3.14$)



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12. In a circle of diameter 40 cm, the length of a cord is 20 cm. Find the length of minor arc of the cord.



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13. If the arcs of the same lengths in the two circles subtend angles 65° and 110° at the centre, find the ratio of their radii.



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14. Find the values of the other five trigonometric functions in the following :

$$\cos x = -\frac{3}{5}, x \text{ lies in the third quadrant.}$$

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15. Find the values of the other five trigonometric functions in the following :

$$\cot x = -\frac{5}{12}, x \text{ lies in the second quadrant.}$$

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16. Find the values of the other five trigonometric functions in the following :

$$\sin x = \frac{1}{4}, x \text{ lies in the second quadrant.}$$



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17. Find the value of the trigonometric functions.

$$\tan \frac{19\pi}{3}$$



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18. Find the value of the trigonometric functions.

$$\sin\left(-\frac{11\pi}{3}\right)$$



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19. Find the value of the trigonometric functions.

$$\cot\left(-\frac{15\pi}{4}\right)$$



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20. Find the value of the trigonometric functions.

$$\sin\left(\frac{31\pi}{3}\right)$$

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21. Find the value of the following:

$$3 \sin\left(\frac{\pi}{6}\right) \sec\left(\frac{\pi}{3}\right) - 4 \sin\left(\frac{5\pi}{6}\right) \cot\left(\frac{\pi}{4}\right)$$

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22. Find the value of the following:

$$\sin^2\left(\frac{\pi}{6}\right) + \cos^2\left(\frac{\pi}{3}\right) - \tan^2\left(\frac{\pi}{4}\right)$$

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23. Find the value of the following:

$$2 \sin^2 \left(\frac{\pi}{6} \right) + \cos e c^2 \left(\frac{7\pi}{3} \right) \cos \left(\frac{2\pi}{3} \right)$$



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24. Find the value of the following:

$$\sin 75^\circ$$



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25. Find the value of the following:

$$\tan 15^\circ$$



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26. Find the principle and general solution of the following.

$$\sin x = \frac{\sqrt{3}}{2}$$

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27. Find the principle and general solution of the following.

$$\cos x = \frac{1}{2}$$

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28. Find the principle and general solution of the following.

$$\tan x = \sqrt{3}$$

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29. Find the principle and general solution of the following.

$$\cos ecx = -2$$

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30. prove the following

$$\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2} \cos x$$

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31. prove the following

$$\frac{\sin 5x + \sin x - 2 \sin 3x}{\cos 5x - \cos x} = \tan x$$

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32. prove the following

$$\sin 2x + 2 \sin 4x + \sin 6x = 4 \cos^2 x \sin 4x$$



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33. prove the following

$$\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2 \sin x$$



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34. prove the following

$$\frac{\cos 2x}{1 + \sin 2x} = \tan\left(\frac{\pi}{4} - x\right)$$



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35. prove the following

$$\frac{\sin 3x}{1 + 2 \cos 2x} = \sin x$$



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36. prove the following

$$\sin^2 6x - \sin^2 4x = \sin 2x \sin 10x$$



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37. prove the following

$$\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$$



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38. Find the general solution of the following equations

$$\cos 4x = \cos 2x$$



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39. Find the general solution of the following equations

$$\sin 2x + \cos x = 0$$



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40. Find the general solution of the following equations

$$\cos 3x + \cos x - \cos 2x = 0$$



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41. In Triangle ABC, if $a=25$, $b=52$ and $c=63$, find $\cos A$ and $\sin A$.



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42. For any

ΔABC , prove that $a(b \cos C - c \cos B) = b^2 - c^2$



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43. For any

ΔABC , prove that $\frac{\sin(B - C)}{\sin(B + C)} = \frac{b^2 - c^2}{a^2}$



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44. convert

$2\frac{\pi}{3}$ radian measure into degree measure.



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45. Prove that

$$\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$$



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46. For any

ΔABC , prove that $\frac{a + b}{c} = \frac{\cos\left(\frac{A - B}{2}\right)}{\sin\left(\frac{c}{2}\right)}$



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47. For any

$$\Delta ABC, \text{ prove that } \sin\left(\frac{B - C}{2}\right) = \frac{b - c}{a} \cos\left(\frac{A}{2}\right)$$

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48. Which of the following is not possible.

$$\sin x = \frac{1}{2}$$

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49. Which of the following is not possible.

$$\cos x = \frac{2}{3}$$

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50. Which of the following is not possible.

$$\cos ecx = \frac{1}{3}$$

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51. Which of the following is not possible.

$$\tan x = 8$$

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52. Find the value of

$$\sin 15^\circ .$$

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53. Hence write the value of

$\cos 75^\circ$.



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54. The angle of elevation of the top point P of the vertical tower PQ of height h from a point A is

45° and from a point B, the angle of elevation is

60° , where B is a point at a distance d from the point A measured along the line AB which makes angle

30° with AQ. Prove that

$$d = h(\sqrt{3} - 1).$$



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55. A tree stands vertically on a hill side which makes an angle of 15° with the horizontal. From a point on the ground 35m down the hill from the base of the tree, the angle of elevation of the top of the tree is 60° . Find the height of the tree.



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56. if

$\sin x = c \otimes x, x \in [0, \pi]$ then is

A. 0

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. π

Answer: B



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57. Write the following in ascending order of its values $\langle \rangle$

$\sin 100^\circ, \sin 0^\circ, \sin 50^\circ, \sin 200^\circ$.



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58. Solve:

$$\sin 2x - \sin 4x + \sin 6x = 0$$



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59. Find the degree measure corresponding to $\frac{11}{14}$ radians.

(use $\pi = \frac{22}{7}$)



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60. if $\cos x = -\frac{1}{2}$. x lies in the third quadrant, find $\sin x$ and

$\tan x$



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61. Prove that

$$\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$$



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62. Show that

$$(\cos x + \cos y)^2 + (\sin x + \sin y)^2 = 4 \cos^2 \left(\frac{x - y}{2} \right)$$

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63. prove that

$$\frac{\tan\left(\frac{\pi}{4} + x\right)}{\tan\left(\frac{\pi}{4} - x\right)} = \left(\frac{1 + \tan x}{1 - \tan x} \right)^2$$

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64. Consider the trigonometric equation

$$\tan x = \sqrt{3}$$

write the general solution.

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65. Consider the trigonometric equation

$$\tan x = \sqrt{3}$$

write the principle solution.



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66. The value of

$$\sin(\pi - x) \text{ is}$$



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67. Find the principle and general solution of the equation

$$\sin x = \frac{\sqrt{3}}{2}$$



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68. prove that

$$\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$$

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69. $1 + \tan^2 x =$

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70. If $\sin x = \frac{3}{5}$ and x lies in the second quadrant, find the values of $\cos x$, $\tan x$ and $\sec x$.

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71. Expand $\cos(x + y)$ and hence prove

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



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72. solve the equation

$$\tan^2 \theta + \cot^2 \theta = 2$$



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73. Show that

$$\frac{\cos 8A \cos 5A - \cos 12A \cos 9A}{\sin 8A \cos 5A + \cos 12A \sin 9A} = \tan 4A$$



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74. Find the value of

$$\sin\left(\frac{31\pi}{3}\right)$$



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75. Find the principle and general solution of the equation

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



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76. Solve: $\sin 2x - \sin 4x + \sin 6x = 0$



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77. Show that $\tan x \tan 2x \tan 3x = \tan 3x - \tan 2x - \tan x$



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78. Evaluate

$$\tan\left(\frac{13\pi}{6}\right)$$



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79. if $\tan x = \frac{1}{2}$ and x is the third quadrant, find $\sin x$ and $\cos x$.



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80. Prove that

$$\frac{\cos 3x + \cos 7x - \cos 2x}{\sin 7x - \sin 3x - \sin 2x} = \cot 2x$$



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81.
$$\frac{\tan x + \tan y}{1 - \tan x \tan y} = \dots\dots\dots$$

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82. Prove that

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

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83. Match the following

A	B
$\sin x \cos y - \cos x \sin y$	1
$\tan \frac{\pi}{4}$	$2 \cos^2 x$
$2 \sin x \cos x$	$\sin(x - y)$
$1 + \cos 2x$	$\sin 2x$

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84. Prove that

$$\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$$

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85. prove that

$$3 \sin \frac{\pi}{6} \sec \frac{\pi}{3} - 4 \sin \frac{5\pi}{6} \cot \frac{\pi}{4} = 1$$



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86. Show that

$$\tan 15^\circ = 2 - \sqrt{3}$$



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87. Show that

$$\tan 15^\circ + \cot 15^\circ = 4$$



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88. Prove that

$$\tan^2 \frac{\pi}{4} + \sin^2 \frac{\pi}{6} - \cos^2 \frac{\pi}{3} = 1$$



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89. Prove that

$$\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$$



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90. if $\tan x = \frac{3}{4}$, x lies in the third quadrant,

find the value of $\cos x$.



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91. Find the principal and general solution of $\cos x = \frac{1}{2}$



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92. write the value of

$\sin 600^\circ$, $\cos 330^\circ$, $\cos 120^\circ$, $\sin 150^\circ$



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93. Prove that

$\sin 600^\circ \cos 330^\circ + \cos 120^\circ \sin 150^\circ + \sin 180^\circ \cos 180^\circ = -1$



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94. Find the value of

$$\sin 75^\circ$$

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95. Prove that

$$\frac{\sin(x - y)}{\sin(x + y)} = \frac{\tan x - \tan y}{\tan x + \tan y}$$

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96. $\frac{2\pi}{3}$ radians = degree.

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97. $\cos(2\pi - x) =$



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98. The general solution of : $\sin 2x - \sin 4x + \sin 6x = 0$



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99. $\sin x \cos y + \cos x \sin y = \dots\dots\dots$



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100. Find

$\sin 50^\circ \cos 10^\circ + \cos 50^\circ \sin 10^\circ$





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101. Prove that

$$\frac{\sin(x - y)}{\sin(x + y)} = \frac{\tan x - \tan y}{\tan x + \tan y}$$



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102. Which one of the following values of $\sin x$ is incorrect ?

A. 0

B. $\frac{1}{2}$

C. 3

D. 1

Answer: C



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103. prove that

$$\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2} \cos x$$



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104. A tree breaks due to a storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8m. Find the height of the tree.



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105. $\sin 225^\circ =$

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

B. $\frac{\sqrt{3}}{2}$

C. $-\frac{1}{\sqrt{2}}$

D. $\frac{1}{2}$

Answer: C



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106. Find the principle and general solutions of

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



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107. Prove that

$$\tan\left(\frac{A - B}{2}\right) = \frac{a - b}{a + b} \cot \frac{c}{2}$$



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108. Which of the equal to

520° ?

A. $\frac{26\pi}{9}$

B. 9π

C. 26π

D. $\frac{9\pi}{26}$

Answer: A



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109. Solve $\sin 2x - \sin 4x + \sin 6x = 0$



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110. In any triangle ABC, prove that

$$\tan\left(\frac{B - C}{2}\right) = \frac{b - c}{b + c} \cot \frac{A}{2}$$



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111. The degree measure of

$\frac{7\pi}{6}$ radian is

A. 120°

B. 102°

C. 201°

D. 210°

Answer: D



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112. prove that

$$\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$$



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113. A lamp post is situated at the middle point M of the side AC of a triangular plot ABC with BC=7m, CA=8m, AB=9m. Lamp

post subtends an angle 15° at the point B. Determine the height of the lamp post.



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114. $40^\circ 20' = \dots\dots\dots$ Radians

A. $\frac{112\pi}{540}$

B. $\frac{211\pi}{540}$

C. $\frac{122\pi}{540}$

D. $\frac{121\pi}{540}$

Answer: D



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115. Prove that

$$3 \sin\left(\frac{\pi}{6}\right) \sec\left(\frac{\pi}{3}\right) - 4 \sin\left(\frac{5\pi}{6}\right) \cot\left(\frac{\pi}{4}\right) = 1$$



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116. Solve $\sin 2x - \sin 4x + \sin 6x = 0$



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117. $\sin 405^\circ =$

A. $\frac{1}{2}$

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

C. $\frac{\sqrt{3}}{2}$

D. 1

Answer: A



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118. $\sin x = \frac{3}{5}$,

x lies in the second quadrant. Find the values of $\cos x, \sec x, \tan x, \cot x$



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119. Solve: $\sin 2x - \sin 4x + \sin 6x = 0$



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120. $\frac{7\pi}{6}$ radian = Degree

A. 210

B. 300

C. 240

D. 120

Answer: A



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121. Find the value of

$\tan 75^\circ$



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122. In a triangle ABC, Prove that

$$a \sin(B - C) + b \sin(C - A) + c \sin(A - B) = 0$$



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