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MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

TRIGONOMETRIC , OR CIRCULAR, FUNCTIONS

Solved Example

1. If $\sec\theta = -\frac{13}{12}$ and θ lies in the second quadrant then find the values of all the other five trigonometric functions

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2. If $\sin\theta = \frac{-4}{5}$ and $\pi < \theta < \frac{3\pi}{2}$, Find the values of all the other five trigonometric functions

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3. Find the value of `(i) "sin" ((25pi)/(3))" ""(ii) cos "((41pi)/(4))"

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4. Find the value of

(i) sin (765°) (ii) cosec (-1110°) (iii) cot (-600°)

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5. Find the value of

(i) cos 15 π (ii) sin 16π (iii) cos $(-\pi)$

(iv) sin 5π (v) tan $\left(\frac{5\pi}{4}\right)$ (vi) sec 6π

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6. Prove that: $s \in^2 \frac{\pi}{6} + \frac{\cos^2 \pi}{3} - tan^2 \frac{\pi}{4} = -\frac{1}{2}$

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7. Find the value of

$(i)\cos 480^\circ \quad (ii)\sin 1230^\circ \quad (iii)\cot(-135^\circ)$

$(iv)\text{cosec}\ (-1410^\circ) \quad (v)\cos(-870^\circ) \quad (vi)\tan 330^\circ$

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8. Find the values of all trigonometric functions of (i) 120° $(ii)150^\circ$

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9. Show that $\sin 150^\circ + \cos 105^\circ = \frac{1}{\sqrt{5}}$

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10. Calculate the value of

$(i)\sin 15^\circ \quad (ii)\cos 15^\circ \quad (iii)\tan 15^\circ$

$(iv)\sin 75^\circ \quad (v)\cos 75^\circ \quad (vi)\tan 75^\circ$

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11. Evaluate $\tan \frac{13\pi}{12}$

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12. Prove that

(i) $\sin 70^\circ \cos 10^\circ - \cos 70^\circ \sin 10^\circ = \frac{\sqrt{3}}{2}$

(ii) $\cos 50^\circ \cos 10^\circ - \sin 50^\circ \sin 10^\circ = \frac{1}{2}$

(ii) $\cos 80^\circ \cos 20^\circ + \sin 80^\circ \sin 20^\circ = \frac{1}{2}$

(iv) $\sin 36^\circ \cos 9^\circ + \cos 36^\circ \sin 9^\circ = \frac{1}{\sqrt{3}}$

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13. $\sin(40+\theta).\cos(10+\theta)-\cos(40+\theta)\sin(10+\theta)=\frac{1}{2}$

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14. Prove that

$\cos\theta+\sin\ (270^\circ+\theta)-\sin\ (270^\circ-\theta)+\cos\ (180^\circ+\theta)=0$

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15. $\frac{COS(90^\circ+\theta)\sec(270^\circ+\theta)\sin(180^\circ+\theta)}{\cos ec(-\theta)\cos(270^\circ-\theta)\tan(180^\circ+\theta)}$

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16. $\cos\left(\frac{3\pi}{2}+\theta\right)\cos(2\pi+\theta)\times\left[\cot\left(\frac{3\pi}{2}-\theta\right)+\cot(2\pi+\theta)\right]=?$

A. 0

B. 1

C. $\sin\theta$

D. $\cos\theta$

Answer: B

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17. Prove that $(i)\sin\frac{7\pi}{12}\cos\frac{\pi}{2}-\cos\cdot\frac{7\pi}{12}\sin\frac{\pi}{4}=\frac{\sqrt{3}}{2}$

$(ii)\ \sin\frac{\pi}{4}\cos\frac{\pi}{2}+\cos\frac{\pi}{4}\sin\frac{\pi}{12}=\frac{\sqrt{3}}{2}$

$(iii)\ \cos\frac{2\pi}{3}\cos\frac{\pi}{4}-\sin\frac{2\pi}{3}\sin\frac{\pi}{4}=\frac{-\left(\sqrt{3}+1\right)}{2\sqrt{2}}$

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18. Evaluate : $(i)\ \sin\frac{\pi}{2}$ $(ii)\ \sin\frac{5\pi}{12}$

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19. Prove that $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\tan x + \tan y}{\tan x - \tan y}$

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20. If $\sin\theta = \frac{15}{17}$ and $\cos\phi = \frac{12}{13}$ where θ and ϕ both lie in the first quadrant find the values of

(i) $\sin(\theta+\phi)$ (ii) $\cos(\theta-\phi)$ (iii) $\tan(\theta+\phi)$

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21. If $\sin\theta = \frac{3}{5}$ and $\cos\phi = \frac{-12}{13}$ where θ and ϕ both lie in the second quadrant find the values of

(i) sin ' (theta- phi) (ii) cos (theta + phi) (iii) $\tan(\theta-\phi)$

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22. If $\cos\theta = \frac{4}{5}$ and $\cos\phi = \frac{12}{13}$ where θ and ϕ both lie in the fourth quadrant find the values of

$(i)\ \cos(\theta+\phi)$ $(ii)\ \sin(\theta-\phi)$ ' $(iii)\ \tan(\theta+\phi)$

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23. If `cotalpha=1/2,""secbeta=-5/3,w h e r epi

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24. Prove that $\tan 56^\circ = \frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$

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25. Prove that $\tan 70^\circ = \tan 20^\circ + 2\tan 50^\circ$

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26. Show that cot $2x$ cot x - cot 3x cot 2x -cot x=1

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27. Prove that

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

$(ii)\ \cos\left(\frac{3\pi}{4}+x\right)-\cos\left(\frac{3\pi}{4}-x\right)=-\sqrt{2}\sin x$

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28. Express each of the following as an algebraic sum of sines or cosines :

A. $2\sin 3x\cos 2x$

B. $2\cos 4x\sin 2x$

C. $2\cos 6x\cos 4x$

D. $2\sin 3x\sin 5x$

Answer:

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29. Express each of following as a product of sines or cosines or sine and cosiner. $\cos\ 5x + \cos\ 3x$

A. $\cos\ 5x + \cos\ 3x$

B. $\cos\ 5x - \cos\ 7x$

C. $\text{siun}\ 7x + \sin\ 3x$

D. $\sin\ 5x - \sin\ 3x$

Answer:

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30. Prove that $\dfrac{\cos\ 6x + \cos\ 4x}{\sin\ 6x - \sin\ 4x} = \cot x$

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31. Prove that $\frac{\sin 3x - \sin x}{\cos x - \cos 3x} = \cot 2x$

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32. Prove that $\frac{\sin 3x - \sin x}{\cos 2x} = 2\sin x$

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33. Prove that $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \operatorname{cosec} 2x - \cot 2x$

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34. If $\frac{\cos(A+B)}{\cos(A-B)} = \frac{\sin(C+D)}{\sin(C-D)}$, prove that tan A tan B tan C + tan D=0

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35. Prove that $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

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36. Prove that sin x + sin 3x + sin 5x + sin 7x=4 sin 4x cos 2x cos x.

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37. Prove that $\cos 2x \cos\left(\frac{x}{2}\right) - \cos 3x \cos\left(\frac{9x}{2}\right) = \sin 5x \sin\left(\frac{5x}{2}\right)$

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38. $\frac{\sin 8x \cos x - \sin 6x \cos 3x}{\cos 2x \cos x - \sin 4x \sin 3x} =$

A. $\sin 2x$

B. $\cos 2x$

C. $\tan 2x$

D. $\operatorname{cosec} 2x$

Answer: C

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39. Prove that: $\frac{\sin x - \sin y}{\cos x + \cos y} = \tan\frac{x-y}{2}$

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

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41. Prove that

$\cos\alpha + \cos\beta + \cos\gamma + \cos(\alpha+\beta+\gamma) = 4\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\beta+\gamma}{2}\right)\cos($

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42. Prove that: $\sin^2 6x - \sin^2 4x = \sin 2x \sin 10x$

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43. Prove that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$

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44. Prove that $\sin 10^\circ \sin 50^\circ \sin 60^\circ \sin 70^\circ = . \frac{\sqrt{3}}{16}$

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45. If $\sin x = -\frac{1}{2}$ and $\pi < x < . \frac{3\pi}{2}$ find the value of

$(i) \sin 2x, (ii) \cos 2x (iii) \tan 2x$

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46. If $\sec x = -\frac{13}{12}$ and $\frac{\pi}{2} < x < \pi$, find the value of $\sin 2x$

A. $\frac{60}{169}$

B. $\frac{-60}{169}$

C. $\frac{120}{169}$

D. $\frac{-120}{169}$

Answer: D

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47. If $\tan x = \frac{-3}{4}$ and $\frac{3\pi}{2} < x < 2\pi$ find the value of

(i) $\sin 2x$, (ii) $\cos 2x$, (iii) $\tan 2x$

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48. (i) if $\sin x = \frac{1}{3}$ find the value of sin 3x (ii) if $\cos x = \frac{1}{2}$, find the value of cos 3x

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49. If $\cos x = \frac{4}{5}$ and x is acute find the value of tan 2x.

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50. If $\tan x = \frac{1}{7}$ and $\tan y = \frac{1}{3}$ show that cos 2x = sin 4y

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51. Prove that

$(i)\ \sin\ .\frac{\pi}{6}.\ \cos\ .\frac{\pi}{6} = \frac{\sqrt{3}}{4}$ $(iii)\cos^2.\frac{\pi}{2} - \sin^2.\frac{\pi}{2} = \frac{\sqrt{3}}{2}$

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52. Prove that

$(i).\ \frac{\sin 2x}{1-\cos 2x} = \cot x$ $(ii).\ \frac{1-\cos 2x}{1+\cos 2x} = \tan^2 x$

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53. Prove that:$\cos 4x = 1 - 8\sin^2 x \cos^2 x$

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54. Prove that $\frac{1 + \sin 2x - \cos 2x}{1 + \sin 2x + \cos 2x} = \tan x$

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55. Prove that $\frac{1 - \sin 2x}{1 + \sin 2x} = \tan^2.\left(\frac{\pi}{4} - x\right)$

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56. Prove that $\frac{\cos x + \sin x}{\cos x - \sin x} - \frac{\cos x - \sin x}{\cos x + \sin x} = 2\tan x$

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57. Prove that: $\tan 4\theta = \dfrac{4tan\theta\left(1-\tan^2\theta\right)}{1-\tan^2\theta+\tan^4\theta}$

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58. Prove that $\dfrac{\tan 5\theta+\tan 3\theta}{\tan 5\theta-\tan 3\theta} = 4\cos 2\theta\cos 4\theta$

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59. Prove that $\dfrac{\sec 8\theta-1}{\sec 4\theta-1} = \dfrac{\tan 8\theta}{\tan 2\theta}$

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60. Show that $\sqrt{2+\sqrt{2+2\cos 4\theta}} = 2\cos\theta$

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61. Prove that $\cos 5x = 17\cos^5 x - 2\theta\cos^3 x + 5\cos x$

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62. Prove that:$\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$

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63. Prove that cot 2x cot x- cot 3x cot 2x - cot 3x cot x=1

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64. Find the value of

$(i)\sin 18^\circ$ (ii) $\cos 18^\circ$

(iii) $\cos 36^\circ$ (iv) $\sin 36^\circ$

(v) $\sin 72^\circ$ (vi) $\cos 72^\circ$

(vii) $\sin 54^\circ$ (viii) $\cos 54^\circ$

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65. $\sin\frac{\pi}{10} + \sin\frac{13\pi}{10}$

A. -1

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

C. 0

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

Answer: B

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66. Prove that: $\cos^2 48^\circ - \sin^2 12^\circ = \frac{\sqrt{5}+1}{8}$

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67. Prove that : $\sin^2(72^\circ) - \sin^2(60^\circ) = \frac{\sqrt{5}-1}{8}$

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68. Prove that $\cos 6^\circ \cos 42^\circ \cos 66^\circ \cos 78^\circ = \frac{1}{16}$

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69. Prove that:

$$\sin\left(\frac{3pi}{8} - 5\right)\cos\left(\frac{pi}{8} + 5\right) + \cos\left(\frac{3pi}{8} - 5\right)\sin\left(\frac{pi}{8} + 7\right) = 1$$

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70. Find the value of

$(i)\sin 22^\circ 30' $ (ii) $\cos 22^\circ 30'$ (iii) $\tan 22^\circ 30'$

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71. If $\tan x = \frac{-4}{3}$ and $\frac{\pi}{2} < x < \pi$ find the values of

(i) $\sin \frac{x}{2}$ (ii) $\cos \frac{x}{2}$ (iii) $\tan \frac{x}{2}$

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72. If $\tan x = \frac{3}{4}$ and $\pi < x < . \frac{3\pi}{2}$ find the value of $(i)\sin. \frac{x}{2}, (ii)\cos. \frac{x}{2}, (iii)\tan. \frac{x}{2}$

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73. If $\cos x = -\frac{1}{3}$ and x lies in Quadrant III find the values of $(i)\ \sin\ \frac{x}{2}, (ii)\ \cos\ \frac{x}{2}, (iii)\ \tan\ \frac{x}{2}$

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74. Prove that $\frac{1+\cos x}{1-\cos x} = (\cos ecx + \cot x)^2$

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

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76. If $\alpha$and β be two distinct real numbers such that $(\alpha - \beta) \neq 2n\pi$ for any integer n satisfying the equations a cos $\theta + b$ sin $\theta = c$ then prove that

$(i)\cos\ (\alpha + \beta) = \frac{a^2 - b^2}{a^2 + b^2}$ $(ii)\sin\ (\alpha + \beta) = \frac{2ab}{a^2 + b^2}$

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Exercise 15 A

1. If cos $\theta = \frac{-\sqrt{3}}{2}$and θ lies in Quadrant III find the values of all the other five trigonometric functions .

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2. If sin $\theta = \frac{-1}{2}$ and θ lies in Quadrant IV , find the values of all the other five trigonometric fucntions.

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3. If $\text{cosec}\theta = \frac{5}{3}$ and θ lies in Quadrant II find the values of all the other five trigonometric functions.

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4. If $\sec\theta = \sqrt{2}$ and θ lies in Quadrant IV, find the values of all the other trigonometric functions.

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5. If $\sin x = \frac{-2\sqrt{6}}{5}$ and x lies Quadrant III find the values of cos x and cot x

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6. if $\cos x = \frac{-\sqrt{15}}{4}$ and $\frac{\pi}{2} < x < \pi$ find the value of sin x .

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7. if $\sec x = -2$ and $\pi < x < \frac{3\pi}{2}$. find the values of all the other five trigonometric functions .

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8. Find the value of $(i)\ \sin\left(\frac{31\pi}{3}\right)(ii)$" cos " ((17pi)/(2)) "

$(iii)\ \tan\left(\frac{-25\pi}{3}\right)$

$(iv)\ \cot\left(\frac{13\pi}{4}\right)$ $(v)\ \sec\left(\frac{-25\pi}{3}\right)$ $(vi)\ \text{cosec}\left(\frac{-41\pi}{4}\right)$

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9. Find the values of

$(i)\ \sin\ 405^\circ$ $(ii)\ \sec\ (-1470^\circ)$ $(iii)\ \tan\ (-300^\circ)$

$(iv)\ \cot\ (585^\circ)$ $(v)\ \text{cosec}\ (-750^\circ)$ $(vi)\ \cos\ (-2220^\circ)$

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10. Prove that

$(i)\ \tan^2.\frac{\pi}{3}+2\cos^2.\frac{\pi}{4}+3\sec^2.\frac{\pi}{6}+4\cos^2.\frac{\pi}{2}=8$

$(ii)\ \sin\ .\frac{\pi}{6}\ \cos\ 0+\sin\ .\frac{\pi}{4}\ \cos\ .(\pi)(4)+\ \sin\ .\frac{\pi}{3}\cos\ .\frac{\pi}{6}=\frac{7}{4}$

$(iii)\ 4\sin\ \frac{\pi}{6}\ \sin^2\frac{\pi}{3}+3\ \cos\ .\frac{\pi}{3}\ \tan\ .\frac{\pi}{4}=\ \operatorname{cosec}^2.\frac{\pi}{2}=4$

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Exercise 15 B

1. Find the value of `(i) cos 840 "(ii) sin 870

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2. Find the values of all trigonometric functions of 135°

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3. Prove that

$(i)\ \sin\ 80^\circ \cos\ 20^\circ - \cos\ 80^\circ\ \sin\ 20^\circ = \frac{\sqrt{3}}{2}$

$(ii)\ \cos\ 45^\circ\ \cos\ 15^\circ - \sin\ 45^\circ\ \sin\ 15^\circ = \frac{1}{2}$

$(iii)\ \cos\ 75^\circ\ \cos\ 15^\circ + \sin\ 75^\circ\ \sin\ 15^2 = \frac{1}{2}$

$(iv)\ \sin\ 40^\circ\ \cos\ 20^\circ + \cos\ 40^\circ\ \sin\ 20^\circ = \frac{\sqrt{3}}{2}$

$(v)\ \cos\ 130^\circ\ \cos\ 40^\circ l + \sin\ 130^\circ\ \sin\ 40^\circ = 0$

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4. Prove that

$(i)\ \sin\ (50^\circ + \theta)\ \cos\ (20^\circ + \theta) - \cos\ (50^\circ + \theta)\ \sin\ (20^\circ + \theta) =$

$(ii)\ \cos\ (70^\circ + \theta)\ \cos\ (10^\circ + \theta) + \sin\ (70^\circ + \theta)\ \sin\ (10^\circ + \theta) =$

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5. Prove that

(i) cos (n + 2) x cos (n+1) x +sin (n+2) x sin (n+1) x = cos x)

(ii)

$$\cos\ .\left(\frac{\pi}{4}-x\right)\ \cos\ .\left(\frac{\pi}{4}-y\right)\ -\sin\ \left(\frac{\pi}{4}-x\right)\ \sin\ \left(\frac{\pi}{4}-y\right)=\ s$$

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6. Prove that $\frac{\tan\left(\frac{\pi}{4}+x\right)}{\tan\left(\frac{\pi}{4}-x\right)}=\left(\frac{1+tanx}{1-tanx}\right)^2$

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7. Prove that

$$(i)\ \sin\ 75^\circ=\frac{\left(\sqrt{6}+\sqrt{2}\right)}{4}(ii)\frac{\cos 135^\circ-\cos 120^\circ}{\cos 135^\circ+\cos 120^\circ}=\left(3-2\sqrt{2}\right)$$

$$(iii)\ \tan\ 15^\circ+\ \cot\ 15^\circ=4$$

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8. Prove that

$$(i)\cos\ 15^\circ-\ \sin\ 15^\circ=\frac{1}{\sqrt{2}}$$

$(ii)\ \cot\ 105^\circ - \tan\ 105^\circ = 2\sqrt{3}$

$(iii)\ \dfrac{\tan 69^\circ + \tan 66^\circ}{1 - \tan 69^\circ \tan 66^\circ} = -1$

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9. Prove that

$$\frac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \tan 54^\circ$$

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10. Prove that

$$\frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ} = \tan 37^\circ$$

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11. Prove that $\dfrac{\cos(\pi + \theta)\cos(-\theta)}{\cos(\pi - \theta)\cos\left(\frac{\pi}{2} + \theta\right)} = -\cot\theta$

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12. $\frac{\cos(\pi+\theta)}{\sin(90^\circ+\theta)}+\frac{\sin(-\theta)}{\sin(180^\circ+\theta)}-\frac{\tan(90^\circ+\theta)}{\cot\theta}=?$

A. $\sin\theta$

B. $-\sin\theta$

C. 1

D. -3

Answer: C

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13. Prove that:

$$\frac{s\in(180^0+\theta)\cos(90^0+\theta)tan(270^0-\theta)\cot(360^0-\theta)}{s\in(360^0-\theta)\cos(360^0+\theta)\cos ec(-\theta)\sin(270^0+\theta)}=1$$

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14. If θ and ϕ lie in the first quadrant such that $\sin\theta = \frac{8}{17}$ and $\cos\phi = \frac{12}{13}$ find the values of

$(i)\ \sin(\theta - \phi)$ $(ii)\ \cos(\theta + \phi)$ $(iii)\ \tan(\theta - \phi)$

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15. If x and y are acute angles such that $\sin x = \frac{1}{\sqrt{5}}$ and $\sin y = \frac{1}{\sqrt{10}}$ prove that $x + y = \frac{\pi}{4}$

A. $\frac{\pi}{6}$

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

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

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

Answer: B

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16. If x and y are acute angles such that $\cos x = \frac{13}{14}$ and $\cos y = \frac{1}{7}$, prove that $(x - y) = \frac{\pi}{3}$

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17. If $\sin x = \frac{12}{13}$ and $\sin y = \frac{4}{5}$ where $\frac{\pi}{2} < x < \pi$ and $0 < y < . \frac{\pi}{2}$ find the values of

(i) $\sin (x + y)$ (ii) $\cos (x + y)$ (iii) $\tan (x - y)$

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18. if $\cos x = \frac{3}{5}$ and $\cos y = \frac{-24}{25}$ where $. \frac{3\pi}{2} < x < 2\pi$ and $\pi < y < . \frac{3\pi}{2}$ find the values of

(i) sin (x+y) (ii) cos (x-y) (iii) tan (x+y)

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19. Prove that

$(i) \cos\left(\frac{\pi}{3}+x\right)=\frac{1}{2}(\cos x-\sqrt{3}\sin x)$

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

$(iii)\frac{1}{\sqrt{2}}\ \cos((\text{pi})/(4)+\text{x})=(1)/(2)\ (\cos x-\sin x)$

$(iv)\ \cos \text{x}+\cos\left(\frac{2\pi}{3}+x\right)+\cos\left(\frac{2\pi}{3}-x\right)=0$

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20. Prove that

$(i)\ 2\sin\frac{5\pi}{12}\sin\frac{\pi}{12}=\frac{1}{2}$

$(ii)\ 2\cos\frac{5\pi}{12}\cos.\frac{\pi}{12}=\frac{1}{2}$

$(iii)\ 2\sin.\frac{5\pi}{12}\cos\frac{\pi}{2}=\left(\frac{2+\sqrt{3}}{2}\right)$

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Exercise 15 C

1. $\sin\ (150^\circ + x) + \sin\ (150^\circ - x) = \cos\ x$

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2. $\cos\ x + \cos\ (120^\circ - x) + \cos\ (120^\circ + x) = 0$

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3. $\sin\ \left(x - \frac{\pi}{6}\right) + \cos\ \left(x - \frac{\pi}{3}\right) = \sqrt{3}\ \sin\ x$

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

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

A. $\tan\left(x-\frac{\pi}{4}\right)$

B. $\tan\left(x+\frac{\pi}{4}\right)$

C. $\tan\left(\frac{\pi}{4}-x\right)$

D. $\tan\left(\frac{\pi}{4}\right)-\tan(x)$

Answer: C

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6. Express each of the following as a product :

A. $\sin 10x+\sin 6x$

B. $\sin 7x$ - $\sin 3x$

C. $\cos 7x+\cos 5x$

D. $\cos 2x$ - $\cos 4x$

Answer: B::C

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7. Express each of the following as an algebraic sum of sines or cosines :

A. 2 sin 6x cos 4x

B. 2 cos 5x sin 3x

C. 2 cos 7x cos 3x

D. 2 sin 8x sin 2x

Answer: A::B::C::D

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8. $\frac{\sin x + \sin 3x}{\cos x - \cos 3x} = ?$

A. $\tan x$

B. $\tan 2x$

C. $\cot x$

D. $\cot 2x$

Answer: C

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9. $\frac{\sin 7x - \sin 5x}{\cos 7x + \cos 5x} = \tan x$

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

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11. $\frac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = \frac{-\sin 2x}{\cos 10x}$

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

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13. $\frac{(\sin 7x + \sin 5x) + (\sin 9x + \sin 3x)}{(\cos 7x + \cos 5x) + (\cos 9x + \cos 3x)} = \tan 6x$

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14. Prove that:

$\cot 4x (s \in 5x + s \in 3x) = \cot x (s \in 5x$

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15. (sin 3x + sin x) sin x + (cos 3x - cos x) cos x =0

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16. Prove that: $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4\sin^2\frac{x-y}{2}$

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17. $\frac{\sin 2x - \sin 2y}{\cos 2y - \cos 2x} = \cot(x+y)$

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18. $\frac{\cos x + \cos y}{\cos y - \cos x} = \cot\left(\frac{x+y}{2}\right)\cot\left(\frac{x-y}{2}\right)$

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19. $\frac{\sin x + \sin y}{\sin x - \sin y} = \tan\left(\frac{x+y}{2}\right)\cdot\cot\left(\frac{x-y}{2}\right)$

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20. Prove that: $s \in 3x + s \in 2x \quad s \in x = 4 \quad s \in x \cos\frac{x}{2}\cos\frac{3x}{2}$

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21. $\frac{\cos 4x \sin 3x - \cos 2x \sin x}{\sin 4x \sin x + \cos 6x \cos x} = \tan 2x$

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22. $\frac{\cos 2x \sin x + \cos 6x \sin 3x}{\sin 2x \sin x + \sin 6x \sin 3x} = \cot 5x$

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23. The value of $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ$ is

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

B. $\frac{1}{4}$

C. $\frac{1}{8}$

D. $\frac{1}{16}$

Answer: D

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24. $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$

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25. $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$

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26. If $\cos x + \cos y = \frac{1}{3}$ and $\sin x + \sin y = \frac{1}{4}$ prove that $\tan\left(\frac{x+y}{2}\right) = \frac{3}{4}$

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27. Prove that

$(i)\ \ 2\cos\ \ 45^\circ\ \ \cos\ \ 15^\circ = \dfrac{\left(\sqrt{3}+1\right)}{2}$ $(ii) 2\ \ \sin\ \ 75^\circ\ \ \sin\ \ 15^\circ = \dfrac{1}{2}$

$(iii)\ \ \cos\ \ 15^\circ - \ \ \sin\ \ 15 = \dfrac{1}{\sqrt{2}}$

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Exercise 15 D

1. If $\sin x = \dfrac{\sqrt{5}}{3}$ and $0 < x < . \dfrac{\pi}{2}$ find the values of

$(i)\ \ \sin\ \ 2x$ (ii) $\cos$ 2x (iii) $\tan$ 2x

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2. If $\cos x = \dfrac{-3}{5}$ and $\pi < x < . \dfrac{3\pi}{2}$ find the value of

$(i)\sin$ 2x (ii) $\cos$ 2x (iii) $\tan$ 2x

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3. If $\tan x = \frac{-5}{12}$ and $\frac{\pi}{2} < x < \pi$ find the value of $\cos 2x$

A. $-\frac{7}{17}$

B. $\frac{7}{17}$

C. $-\frac{119}{169}$

D. $\frac{119}{169}$

Answer: D

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4. If $\sin x = \frac{1}{6}$ find the value of $\sin 3x$.

A. $-\frac{13}{27}$

B. $-\frac{7}{18}$

C. $\frac{13}{27}$

D. $\frac{7}{18}$

Answer: C

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

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

A. $\tan(x)$

B. $\cot(x)$

C. $2\tan(2x)$

D. $\tan\left(\frac{\pi}{4} + x\right)$

Answer: A

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7. $\frac{\sin 2x}{1-\cos 2x} = \cot x$

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8. $\frac{\tan 2x}{1+\sec 2x} = \tan x$

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9. $\sin 2x(\tan x + \cot x) = ?$

A. $\sin x \cos x$

B. $\cos ecx \sec x$

C. $2\tan(2x)$

D. 2

Answer: D

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10. $\text{cosec}\ 2x + \cot 2x = \cot x$

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11. $\cos 2x + 2\sin^2 x = 1$

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12. $(\sin x - \cos x)^2 = 1 - \sin 2x$

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13. $\cot x - 2\cot 2x = \tan x$

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14. prove that : $\sin^4 x + \cos^4 x = 1 - \frac{1}{2}\sin^2 2x$

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15. (cos^(3) x- sin^(2) x)/(cos x - sin x)=(1)/(2) (2 + sin 2x)`

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16. $\frac{1 - \cos 2x + \sin x}{\sin 2x + \cos x} = \tan x$

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17. $\cos x \cos 2x \cos 4x \cos 8x = \frac{\sin 16x}{16 \sin x}$

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18. Prove that

A. $2 \sin 22.\frac{1^\circ}{2}\cos 22.\frac{1^\circ}{2} = \frac{1}{\sqrt{2}}$

B. $2\cos^2 15^\circ - 1 = \frac{\sqrt{3}}{2}$

C. $8\cos^3 20^\circ - 6\cos 20^\circ = 1$

D. $3\sin 40^\circ - 4\sin^3 40^\circ = \frac{\sqrt{3}}{2}$

Answer:

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19. Prove that

$(i)\sin^2 24^\circ - \sin^2 6^\circ = \frac{\left(\sqrt{5}-1\right)}{8}$ $(ii)\sin^2 72^\circ - \cos^2 30^\circ = \frac{\sqrt{5}-1}{8}$

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20. Prove that $\cos 6^\circ \cos 42^\circ \cos 66^\circ \cos 78^\circ = \frac{1}{16}$

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21. If $\tan\theta = \frac{a}{b}$ prove that $a\sin 2\theta + b\cos 2\theta = b$

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Exercise 15 E

1. If $\sin x = \frac{\sqrt{5}}{3}$ and $. \frac{\pi}{3} < x < \pi$ find the values of

$(i)\ \sin\ \frac{x}{2}$ $(ii)\ \cos\ \frac{x}{2}$ $(iii)\ \tan\ \frac{x}{2}$

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2. If $\cos x = \frac{-3}{5}$ and $. \frac{\pi}{2} < x < \pi$ find the values of

$(i)\ \sin .(\mathrm{x})/(2)$ (ii) $\cos\ (\mathrm{x})/(2)$ (iii) $\tan\frac{x}{2}$

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3. If $\sin x = \frac{-1}{2}$ and x lies in Quadrant IV find the values of

$(i) \quad \sin . \frac{x}{2} \qquad (ii) \quad \cos \frac{x}{2} \qquad (iii) \quad \tan \frac{x}{2}$

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4. If $\cos \frac{x}{2} = \frac{12}{13}$ and x lies in Quadrant I find the value of $\sin x$

A. $\frac{119}{169}$

B. $\frac{120}{169}$

C. $\frac{5}{13}$

D. $\frac{60}{169}$

Answer: B

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5. If sin x $= \frac{3}{5}$ and $0 < x < \frac{\pi}{2}$ find the value of tan $\frac{x}{2}$

A. $\frac{1}{3}$

B. $\frac{4}{5}$

C. $\frac{3}{4}$

D. None of these

Answer: A

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6. Prove that $\cot\left(\frac{\theta}{2}\right) - \tan\left(\frac{\theta}{2}\right) = 2\cot\theta$

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7. Provet that

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

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

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9. Provet that

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

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10. Prove that $\frac{\sin x}{1+\cos x} = \tan\left(\frac{x}{2}\right)$

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