



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

TRIGONOMETRIC EQUATIONS

Example

1. Solve $\sin x = -1$ for principal solution as well as general solution:

(i) $x \in \{ \text{angle with measures given in} \}$

radians}

(ii) $x \in$ {angle with measures given in degrees}.



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2. Solve for x , $\sin x = \frac{-\sqrt{3}}{2}$, $(0 < x < 2\pi)$.



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3. Find all values of x which satisfy

$$5 \sin x = 4 \cos x, (0^\circ < x < 360^\circ)$$



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4. Calculate the values of x between 0° and 360° which satisfy $\sin(270^\circ - x) = \cos 292^\circ$.



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5. Solve: $4 \cos^2 \theta = 3$. ($\theta^\circ \leq \theta < 360^\circ$).



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6. Find the general value of θ

$$2 \sin \theta - 1 = 0$$



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7. Find the general value of θ

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



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8. Find the general value of θ

$$\cos \theta = \frac{1}{\sqrt{2}}$$



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9. Find the general value of θ

$$\cos \theta = -\frac{1}{2}$$



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10. Find the general value of θ

$$4\sin^2 \theta = 1$$



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11. Find the general value of θ

$$\sqrt{3} \cos ec\theta = 2$$



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12. Find the general value of x

$$\tan 2x - \sqrt{3} = 0$$



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13. Find the general value of θ

$$2 \cot^2 \theta = \operatorname{cosec}^2 \theta$$



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14. Solve $2 \sin^2 \phi = \sin \phi$, ($0^\circ \leq \phi < 360^\circ$).



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15.

Solve:

$$\sin^2 x + \sin x - 2 = 0, (0^\circ < x < 360^\circ).$$



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16. Solve for the two smallest positive values of θ , to the nearest minute,

$$\cot^2 \theta - 3 \cot \theta - 2 = 0, (0^\circ < \theta < 360^\circ).$$



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17.

Solve

$$\cos^2 \theta - \sin \theta - \frac{1}{4} = 0 (0^\circ < \theta < 360^\circ).$$



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18. Find the values of θ between 0° and 360°

which satisfy the equation

$$3 \cos 2\theta - \sin \theta = 2.$$



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19.

Solve

$$2 \sin \theta \cos \theta = \cos \theta. \quad (0^\circ < \theta < 360^\circ).$$



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20. Solve $\sin^2 \theta - 2 \cos \theta + \frac{1}{4} = 0$ for the general solution.



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21. The number of solutions of the pair of equations

$2 \sin^2 \theta - \cos 2\theta = 0$, $2 \cos^2 \theta - 3 \sin \theta = 0$ in the interval $[0, 2\pi]$ is

- (a) zero
- (b) one
- (c) two
- (d) four



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22. Solve :

$$\tan^2 \alpha + \sec \alpha - 1 = 0, 0 \leq \alpha < 2\pi.$$



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23. Solve $\sin 3x = -\frac{1}{\sqrt{2}}, 0 < x < 2\pi$.



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24. Solve : $\tan 3\theta = 1$.



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25. Solve : $\sin 9\theta = \sin \theta$.



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26. Solve : $\cos p\theta = \sin q\theta$.



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27. Solve: $\sin 2\theta = \cos 3\theta$.



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28. What is the general value of θ which satisfies both the equations

$$\sin \theta = -\frac{1}{2} \text{ and } \cos \theta = -\frac{\sqrt{3}}{2} ?$$



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29. Solve $\sin 9\theta = \sin \theta$, for $0^\circ < \theta < 360^\circ$.



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30. Solve $\sin 3x = \cos 2x$. ($0 < x < 2\pi$).



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31. Solve: $\tan 3x = \cot 5x$, $(0 < x < 2\pi)$.



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32. Solve $\sin 3\theta + \sin \theta = \sin 2\theta$, $0 \leq \theta \leq 2\pi$.

Given the general solution.



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33. Solve :

$$\cos 3x + \cos 2x = \sin \frac{3}{2}x + \sin \frac{1}{2}x, 0 < x \leq \pi.$$



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34. Find the values of θ between 0° and 360° that satisfy the equation

$$\sin(\theta + 30^\circ) = 2 \cos(45^\circ + \theta)$$



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35. if $a \cos \theta + b \sin \theta = c$. then what is the value of $a \sin \theta - b \cos \theta$



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36. Solve : $\sqrt{3} \sin \theta - \cos \theta = \sqrt{2}$.



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37. Solve : $\tan \theta + \sec \theta = \sqrt{3}$.



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38.

Solve

$\cos x - \sqrt{3} \sin x = 1, 0^\circ \leq x \leq 360^\circ$.



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39. Express $2 \cos \theta + 3 \sin \theta$ in the form $r \cos(\theta - \alpha)$, where r is positive, stating the values of r and α . What is the maximum value of $2 \cos \theta + 3 \sin \theta$?



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40. Find all the values of θ satisfying the equation $\sin \theta + \sin 5\theta = \sin 3\theta$, such that $0 \leq \theta \leq \pi$.



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Exercise 6

1. Solve the equation for $0 \leq x \leq 2\pi$.

$$2 \sin x - 1 = 0$$



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2. Solve the equation for $0 \leq x \leq 2\pi$.

$$\sin x \cos x = 0$$



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3. Solve the equation for $0 \leq x \leq 2\pi$.

$$\tan \theta + \sqrt{3} = 0$$



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4. Solve the equation for $0 \leq x \leq 2\pi$.

$$\sin \theta \cos \theta = \frac{1}{2}$$



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5. Solve the equation for $0 \leq x \leq 2\pi$.

$$2 \sin^2 \theta = 3 \cos \theta$$



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6. Solve the equation for $0 \leq x \leq 2\pi$.

$$2 + 7 \tan^2 \theta = 3.25 \sec^2 \theta$$



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7. $\cos \theta + \sin \theta - \sin 2\theta = \frac{1}{2}, 0 < \theta < \frac{\pi}{2}$



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8. $\sin 5\theta = \cos 2\theta, 0^\circ < \theta < 180^\circ.$

Find value of θ



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9.

$$\cot^2 \theta - (1 + \sqrt{3}) \cot \theta + \sqrt{3} = 0, 0 < \theta < \frac{\pi}{2}$$



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10.

$$\sin x + \cos(x + 30^\circ) = 0, 0^\circ < x < 360^\circ$$



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11.

Solve

:

$$\cos 6\theta + \cos 4\theta + \cos 2\theta + 1 = 0, 0^\circ < \theta < 180^\circ$$



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12.

Solve:

$$\sin 7\theta + \sin 4\theta + \sin \theta = 0, 0 < \theta < \frac{\pi}{2}$$



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13. Solve the general vlaue.

$$2 \cos^2 \theta - 5 \cos \theta + 2 = 0$$



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14. Solve the general value.

$$2 \sin^2 x + \sqrt{3} \cos x + 1 = 0$$



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15. Solve the general value.

$$2 + \sqrt{3} \sec x - 4 \cos x = 2\sqrt{3}$$



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16. Solve the general value.

$$\tan^2 \theta - (1 + \sqrt{3})\tan \theta + \sqrt{3} = 0$$



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17. Solve the general value.

$$\tan \theta + 4 \cot 2\theta + 1 = 0$$



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18. Solve the general vlaue.

$$\tan \theta + \tan 2\theta + \sqrt{3} \tan \theta \tan 2\theta = \sqrt{3}$$



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19. Solve the general vlaue.

$$\cot \theta + \tan \theta = 2 \cos ec \theta$$



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20. Solve the general vlaue.

$$2 \cos \theta + \cos 3\theta = 0$$



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21. Solve the general vlaue.

$$2 \sin 2x - \sin x = 0$$



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22. Solve the general vlaue.

$$\tan 2x + 2 \tan x = 0$$



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23. Solve the general vlaue.

$$\sin 7\theta + \sin 4\theta + \sin \theta = 0$$



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24. Solve the general value.

$$\cos \theta + \cos 2\theta + \cos 3\theta = 0$$



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25. Solve the general value.

$$\sin \theta + \cos \theta = \sqrt{2}$$



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26. Solve the general vlaue.

$$\sin \theta + \sqrt{3} \cos \theta = \sqrt{2}$$



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27. Solve the general vlaue.

$$\sqrt{2} \sec \theta + \tan \theta = 1$$



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28. Solve the general vlaue.

$$3 - 2 \cos \theta - 4 \sin \theta - \cos 2\theta + \sin 2\theta = 0$$



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29. If the equation $a \cos 2\theta + b \sin 2\theta = c$ had

θ_1, θ_2 as its roots, prove that

$$(i) \tan \theta_1 + \tan \theta_2 = \frac{2b}{c + a}$$

$$(ii) \tan \theta_1 \tan \theta_2 = \frac{c - a}{c + a}$$



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30. If α, β are two different values of θ lying between 0 and 2π which satisfy the equation $6 \cos \theta + 8 \sin \theta = 9$, find the value of $\sin(\alpha + \beta)$.



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31. Find all the values of θ satisfying the equation $\cos 2\theta - \cos 8\theta + \cos 6\theta = 1$, such that $0 \leq \theta \leq \pi$.



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32. Find the general value of θ in

$$\sec \theta - \cos e\theta = \frac{4}{3}$$



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33. Find the smallest positive number p for

which the equation

$\cos(p \sin x) = \sin(p \cos x)$ has a solution

when $x \in [0, 2\pi]$.



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Chapter Test

1. Find the general value of θ which satisfies the equation $\sin^2 \theta = \frac{3}{4}$.



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2. Find the general solution of $\sin 2\theta = \cos \theta$.



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3.

Solve:

$$\sin 5x - \sin 3x - \sin x = 0, 0^\circ < x < 360^\circ.$$



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4. Find the general solution of $\tan^2 \theta = \frac{1}{3}$,
and hence find those values of θ for which
 $-\pi \leq \theta \leq \pi$.



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5. Solve : $\tan\left(\frac{\pi}{4} + \theta\right) + \tan\left(\frac{\pi}{4} - \theta\right) = 4$



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6. Solve the equation $\sqrt{3} \cos x + \sin x = 1$ for $-2\pi < x \leq 2\pi$.



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