MATHS

NCERT - FULL MARKS MATHEMATICS(TAMIL)

TRIGONOMETRIC FUNCTIONS

Example

1. Convert $40° 20'$ into radian meassure.

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2. Convert 6 radians into degree measure.

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3. Find the radius of the circle in which a central angle of $60°$ intercepts and arc of length $37.4cm$ use $\pi = \dfrac{22}{7}$.

4. the minute hand of a watch is 1.5 cm long . Find the distance covered by its tip in 40 minutes (use $\pi = 3.14$

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

6. If $\cos x = -\dfrac{3}{5}$, x lies in the third quadrant, find the vlaues of other five trigonometric functions.

7. If $\cot x = -\dfrac{5}{12}$, x lies in second quadrant, find the values of other five trignometric functions.

8. Find the value of $\sin \dfrac{31\pi}{3}$.

9. Find the value of $\cos(-1710°)$.

10. Prove that

$$3\sin\frac{\pi}{6}\sec\frac{\pi}{3} - 4\sin\frac{5\pi}{6}\cot\frac{\pi}{4} = 3 - 4 \times \frac{1}{2} = 1 = R.\,H.\,S.$$

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11. Find the value of $15°$

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12. Find the value of $\tan\dfrac{13\pi}{12}$.

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13. Prove that

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

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14. Show that

$$\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$$

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15. Prove that

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

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16. Prove that $\dfrac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$

17. Prove that $= \dfrac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$

18. Find the principal solutions of the equation $\text{six } x = \dfrac{\sqrt{3}}{2}$.

19. Find the principal solution of the equation $\tan x = -\dfrac{1}{\sqrt{3}}$.

20. Find the solution of $\sin x = -\dfrac{\sqrt{3}}{2}$.

21. Solve $\cos x = \dfrac{1}{2}$.

22. Solve: tan 2x = - cot $\left(x + \dfrac{\pi}{3} \right)$.

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

24. Solve $2\cos^2\theta + 3\sin\theta = 0$

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25. If $\sin x = \dfrac{3}{5}, \cos y = -\dfrac{12}{13},$ where x and y both lie in second quadrant, find the vlaue of $\sin(x+y)$.

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26. Prove that

$\cos 2x \cos \dfrac{x}{2} - \cos 3x \cos \ (9\text{x})/(2) = \sin 5x \sin \ \dfrac{5x}{2}.$

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27. Find the value of $\tan \dfrac{\pi}{8}.$

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28. If $\tan x = \dfrac{3}{4}, \pi < x < \dfrac{3\pi}{2}$, find the vlaue of sin $\dfrac{x}{2}, \cos \dfrac{\pi}{2}$ and $\tan \dfrac{x}{2}$.

29. Prove that $\cos^2 x + \cos^2\left(x + \dfrac{\pi}{3}\right) + \cos^2\left(x - \dfrac{\pi}{3}\right) = \dfrac{3}{2}$

Exercise 3 1

1. Find the radian measures corresponding to the following degree measures:

$(i)\, 25^\circ$

(ii) $-47°30$

(iii) $240°$

(iv) $520°$

2. Find the degree measures corresponding to the following radian measures (Use $\pi = \dfrac{22}{7}$).

(i) $\dfrac{11}{16}$

(ii) -4

(iii) $\dfrac{5\pi}{3}$

(iv) $\dfrac{7\pi}{6}$

3. A wheel markes 360 revolutions in one minute. Through how many radians does it turn in one second ?

4. Find the degree measure of the angle subtended at the centre of circle of radius 100 cm by an are of length 22 cm.

5. In a circle of diameter 40 cm, a chord is of length 20 cm. find the length of the minor are of the chord.

6. If in two circles, arcs of same length subtend angles $60°$ and $75°$ at the centre, find the ratio of their radii?

7. Find the angle in radian through which a pendulum swings if its length is 75 cm and the e tip describes an arc of length

(i) 10 cm

(ii) 15 cm

(iii) 21 cm

Exercise 3 2

1. $\cos x = -\dfrac{1}{2}$, x lies in third quadrant.

2. $\sin x = \dfrac{3}{5}$, x lies in second quadrant.

3. $\cot x = \dfrac{3}{4}$, x lies in third quadrant.

4. $\sec x = \dfrac{13}{5}$, x lies in fourth quadrant.

5. $\tan x = -\dfrac{5}{12}$, x lies in second quadrant.

6. $\sin 765^\circ$

7. $\cos ec(-1410°)$

8. $\tan \dfrac{19\pi}{3}$

9. Find the values of

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

10. $\cot \left(-\dfrac{15\pi}{4}\right)$

Exercise 3 3

1. $\sin^2 \ (\text{pi})/(6) + \cos \ \hat{}(2) \ (\text{pi})/(3) - \tan \ \hat{}(2) \ \dfrac{\pi}{4} = -\dfrac{1}{2}$

2. $2\sin^2 \dfrac{\pi}{6} + \cos ec^2 \dfrac{7\pi}{6} \cos^2 \dfrac{\pi}{3} = \dfrac{3}{2}$

3. $\cot^2 \dfrac{\pi}{6} + \cos ec\dfrac{5\pi}{6} + 3\tan^2 \dfrac{\pi}{6} = 6$

4. $2\sin^2\dfrac{3\pi}{4} + 2\cos^2\dfrac{\pi}{4} + 2\sec^2\dfrac{\pi}{3} = 10$

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5. Find the value of:

(i) $\sin 75°$

(ii) $\tan 15°$

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6. Prove that

$\cos\left(\dfrac{\pi}{4} - x\right)\cos\left(\dfrac{\pi}{4} - y\right) - \sin\left(\dfrac{\pi}{4} - x\right)\sin\left(\dfrac{\pi}{4} - y\right) = \sin(x + y)$

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

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8. $\dfrac{\cos(\pi + x)\cos(-x)}{\sin(\pi - x)\cos\left(\frac{\pi}{2} + x\right)} = \cot^2 x$

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9.

$\cos\left(\dfrac{3\pi}{2} + x\right)\cos(2\pi + x)\left[\cot\left(\dfrac{3\pi}{2} - x\right) + \cot(2\pi + x)\right] = 1$

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10. $\sin(n + 1)x\sin(n + 2)x + \cos(n + 1)x\cos(n + 2)x = \cos x$

11. Prove that $\cos\left(\dfrac{3\pi}{4} + x\right) - \cos\left(\dfrac{3\pi}{4} - x\right) = -\sqrt{2}\sin x$

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

13. $\cos^2 2x - \cos^2 6x = \sin 4x \sin 8x$

14. $\sin 3x + 2c\sin 4x + \sin 6x = 4\cos^2 x \sin 4x$

15. $\cot 4x (\sin 5x + \sin 3x) = \cot x (\sin 5x - \sin 3x)$

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

17. $\dfrac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$

18. $\dfrac{\sin x - \sin y}{\cos x + \cos y} = \tan \dfrac{x - y}{2}$

19. $\dfrac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$

20. $\dfrac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2\sin x$

21. $\dfrac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

22. $\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$

23. $\tan 4x = \dfrac{4\tan x\left(1 - \tan^2 x\right)}{1 - 6yan^2 x + \tan^4 x}$

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24. $\cos 4x = 1 - 8\sin^2 x\cos^2 x$

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25. $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$

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Exercise 3 4

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

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2. $\sec x = 2$

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3. $\cot x = -\sqrt{3}$

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4. $\cos ecx = -2$

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5. $\cos 4x = \cos 2x$

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

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

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8. find the general solution for $\sec^2 2x = 1 - \tan 2x$

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9. $\sin x + \sin 3x + \sin 5x = 0$

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Miscellaneous Examples

1. Prove that $2\cos\dfrac{\pi}{13}\cos\dfrac{9\pi}{13} + \cos\dfrac{3\pi}{13} + \cos\dfrac{15\pi}{13} = 0$

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2. $(\sin 3x + \sin x)\sin x + (\cos 3x - \cos x)\cos x = 0$

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3. $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2\dfrac{x+y}{2}$

4. $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4\sin^2 \dfrac{x-y}{2}$

5. $\sin x + \sin 3x + \sin 5x + \sin 7x = 4\sin^2 \dfrac{x-y}{2}$

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

7. $\sin 3x + \sin 2x - \sin = 4\sin x \cos \dfrac{x}{2} \cos \dfrac{3x}{2}$

8. $\tan x = -\dfrac{4}{3}$, x in quadrant II

9. $\cos x = -\dfrac{1}{3}$, x in quadrant III

10. $\sin x = \dfrac{1}{4}$, x in quadrant II