

CHAPTER 3

TRIGONOMETRY

IMPROVEMENT 2018

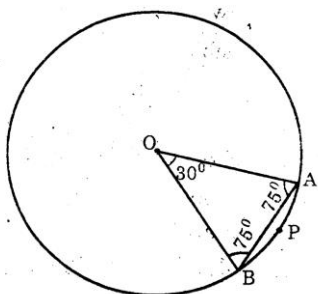
1. a) Prove that $\frac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = -\frac{\sin 2x}{\cos 10x}$. (2)

b) Evaluate: $\lim_{x \rightarrow 0} \frac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x}$ (1)

[Chapter 13]

2. a) Find the value of $\sin 75^\circ$ (2)

b) In the figure, $\angle AOB = 30^\circ$ and radius of the circle is 2 units. Find the length of chord AB. (2)



c) Find the length of chord AB. (2)

MARCH 2018

3. Solve $\sin 2x - \sin 4x + \sin 6x = 0$ (2)

4. In a triangle ABC, prove that $\tan\left(\frac{B-C}{2}\right) = \frac{b-c}{b+c} \cot \frac{A}{2}$ (3)

5. a) The maximum value of the function $f(x) = \sin x$ is (1)

i) 1 ii) $\frac{\sqrt{3}}{2}$ iii) $\frac{1}{2}$ iv) 2

b) Prove that $(\sin x + \cos x)^2 = 1 + \sin 2x$ (1)

c) Find the maximum value of $\sin x + \cos x$. (1)

IMPROVEMENT 2017

6. a) $\sin 765^\circ = \dots\dots\dots$ (1)

b) Prove that: $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$ (2)

c) Prove that $\cos 4x = 1 - 8\sin^2 x \cos^2 x$ (3)

OR

a) $\sin(\pi - x) = \dots\dots\dots$ (1)

b) Prove that $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$ (2)

c) In any triangle ABC, prove that $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ (3)

MARCH 2017

7. a) $\sin 405^\circ = \dots\dots\dots$

i) $\frac{1}{2}$ ii) $\frac{1}{\sqrt{2}}$

iii) $\frac{\sqrt{3}}{2}$ iv) 1 (1)

b) If $\sin x = \frac{3}{5}$, x lies in the second quadrant. Find the values $\cos x$, $\sec x$, $\tan x$ and $\cot x$ (2)

c) Solve: $\sin 2x - \sin 4x + \sin 6x = 0$ (3)

OR

a) $\frac{7\pi}{6}$ radian = degree

i) 210 ii) 300

iii) 240 iv) 120 (1)

b) Find the value of $\tan 75^\circ$ (2)

c) In any triangle ABC, prove that $a\sin(B-C) + b\sin(C-A) + c\sin(A-B) = 0$ (3)

IMPROVEMENT 2016

3. a) $40^{\circ} 20' = \dots\dots\dots$ radians
- i) $\frac{112\pi}{540}$ ii) $\frac{211\pi}{540}$
- iii) $\frac{122\pi}{540}$ iv) $\frac{121\pi}{540}$ (1)
- b) Prove that:
- $$3\sin\left(\frac{\pi}{6}\right)\sec\left(\frac{\pi}{3}\right) - 4\sin\left(\frac{5\pi}{6}\right)\cot\left(\frac{\pi}{4}\right) = 1$$
- (2)
- c) Solve: $\sin 2x - \sin 4x + \sin 6x = 0$ (3)

MARCH 2016

4. a) The degree measure of $\frac{7\pi}{6}$ radians is
-
- i) 120° ii) 102°
- iii) 201° iv) 210° (1)
- b) Prove that $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$ (2)
- c) 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. (3)

IMPROVEMENT 2015

5. a) Which of the following is equal to 520° ?
- i) $\frac{26\pi}{9}$ ii) 9π
- iii) 26π iv) $\frac{9\pi}{26}$ (1)
- b) Solve $\sin 2x - \sin 4x + \sin 6x = 0$ (2)

- c) In any triangle ABC, prove that

$$\tan\left(\frac{B-C}{2}\right) = \frac{b-c}{b+c} \cot \frac{A}{2} \quad (3)$$

MARCH 2015

6. a) Which one of the following values of $\sin x$ is incorrect?
- i) 0 ii) $\frac{1}{2}$
- iii) 3 iv) 1 (1)
- b) Prove that
- $$\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2} \cos x \quad (2)$$
- c) 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 of 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. (3)

OR

- a) $\sin 225^{\circ} = \dots\dots\dots$
- i) $\frac{1}{\sqrt{2}}$ ii) $\frac{\sqrt{3}}{2}$
- iii) $-\frac{1}{\sqrt{2}}$ iv) $\frac{1}{2}$ (1)
- b) Find the principal and general solution of
- $$\sin x = -\frac{\sqrt{3}}{2} \quad (2)$$
- c) Prove that $\tan\left(\frac{A-B}{2}\right) = \frac{a-b}{a+b} \cot \frac{C}{2}$ (3)

IMPROVEMENT 2014

7. a) $\frac{2\pi}{3}$ radians = degree. (1)
- b) $\cos(2\pi - x) = \dots\dots\dots$ (1)

- c) Find the general solution of

$$\sin 2x - \sin 4x + \sin 6x = 0. \quad (4)$$

MARCH 2014

8. a) The value of $\sin(\pi - x) = \dots\dots\dots$ (1)

- b) Find the principal and general solution of the

$$\text{equation } \sin x = \frac{\sqrt{3}}{2} \quad (2)$$

- c) Prove that $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$ (3)

IMPROVEMENT 2013

9. Show that

$$\text{a) } \tan 15^\circ = 2 - \sqrt{3} \quad (2)$$

$$\text{b) } \tan 15^\circ + \cot 15^\circ = 4 \quad (1)$$

10. Consider the trigonometric equation $\tan x = \sqrt{3}$.

- a) Write the general solution. (2)

- b) Write the principal solutions. (1)

MARCH 2013

11. Prove that $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$ (3)

$$12. \text{ Prove that } \frac{\tan\left(\frac{\pi}{4} + x\right)}{\tan\left(\frac{\pi}{4} - x\right)} = \left(\frac{1 + \tan x}{1 - \tan x}\right)^2 \quad (2)$$

IMPROVEMENT 2012

13. Show that

$$\tan x \tan 2x \tan 3x = \tan 3x - \tan 2x - \tan x \quad (3)$$

14. Solve: $\sin 2x - \sin 4x + \sin 6x = 0$ (3)

MARCH 2012

15. a) Evaluate $\tan\left(\frac{13\pi}{6}\right)$ (1)

- b) If $\tan x = \frac{1}{2}$ and x is in the third quadrant, find $\sin x$ and $\cos x$. (2)

16. Prove that $\frac{\cos 3x + \cos 7x - \cos 2x}{\sin 7x - \sin 3x - \sin 2x} = \cot 2x$ (3)

IMPROVEMENT 2011

17. If x is in the third quadrant, then

- a) Choose the possible values of $\operatorname{cosec} x$ from the bracket.

$$\left[\frac{-3}{5}, \frac{3}{5}, \frac{5}{3}, \frac{-5}{3} \right] \quad (1)$$

- b) Evaluate $\tan x \sec x$ for the x in part (a). (2)

18. Find the general solution of $\sin 6x - \sin 4x + \sin 2x = 0$ (3)

MARCH 2011

19. i) Find the value of $\sin\left(\frac{31\pi}{3}\right)$ (1)

- ii) Find the principal and general solutions of the equation $\cos x = -\frac{\sqrt{3}}{2}$ (2)

- iii) Show that $(\cos x + \cos y)^2 + (\sin x + \sin y)^2 = 4\cos^2\left(\frac{x-y}{2}\right)$ (3)

IMPROVEMENT 2010

20. a) Expand $\cos(x+y)$ and hence prove $\cos 2x = 1 - 2\sin^2 x$. (1)

- b) Solve the equation $\tan^2 \theta + \cot^2 \theta = 2$ (2)

21. Show that

$$\frac{\cos 8A \cdot \cos 5A - \cos 12A \cdot \cos 9A}{\sin 8A \cdot \cos 5A + \cos 12A \cdot \sin 9A} = \tan 4A \quad (3)$$

MARCH 2010

22. i) Find the degree measure corresponding to

$$\frac{11}{14} \text{ radians } \left(\text{Use } \pi = \frac{22}{7} \right) \quad (1)$$

- ii) If
- $\cos x = -\frac{1}{2}$
- ,
- x
- lies in the third quadrant,

$$\text{find } \sin x \text{ and } \tan x \quad (2)$$

$$23. \text{ Prove that } \frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x \quad (3)$$

IMPROVEMENT 2009

$$24. \text{ i) Convert } \frac{31}{3} \pi \text{ radian in to degree measure.} \quad (1)$$

$$\text{ii) Find the value of } \sin \frac{31}{3} \pi \quad (1)$$

- iii) Find the general solution of the equation

$$\sin x = \frac{-\sqrt{3}}{2}. \quad (2)$$

$$25. \text{ Prove that } \frac{\sin 5x - 2 \sin 3x + \sin x}{\cos 5x - \cos x} = \tan x \quad (4)$$

MARCH 2009

$$26. \text{ a) Convert } 20^\circ 40' \text{ into radian measure.} \quad (1)$$

$$\text{b) If } \sin x = \frac{12}{13} \text{ and } x \text{ is an acute angle, find the value of } \cos 2x. \quad (1)$$

- c) Show that:

$$\sin(40^\circ + x) \cos(10^\circ + x) - \cos(40^\circ + x) \times$$

$$\sin(10^\circ + x) = \frac{1}{2} \quad (2)$$

$$27. \text{ If } x + y = \frac{\pi}{4}, \text{ then prove that } (1 + \tan x)(1 + \tan y) = 2 \text{ and hence deduce } \tan \frac{\pi}{8}.$$

(4)

MARCH 2008

$$28. \text{ i) Prove that } \frac{\sin x}{1 + \cos x} = \tan \frac{x}{2} \quad (2)$$

$$\text{ii) Find the domain and range of } f(x) = \cos 2x. \quad (2)$$

$$29. \text{ i) Calculate } \cos 75^\circ \text{ and } \cos 15^\circ \text{ using the values of } \cos 45^\circ \text{ and } \cos 30^\circ \quad (2)$$

$$\text{ii) Draw the graph of } f(x) = \sin 2x \quad (3)$$



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