Chapter

33 TRIGONOMETRICAL RATIOS OF STANDARD ANGLES

KEY FACTS

1. T-ratios of 0°

Consider the right angled ΔOMP, rt.$\angle d$ at M. Here, for acute$\angle O$, OP = hyp.= h, PM = perp. = p, OM = base = b.

When $\theta = 0°$, P coincides with M, so that

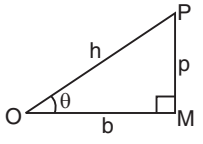
$p = 0$ and $b = h$

Then,

$$\sin\theta = \frac{p}{h} = \frac{0}{h} = 0$$

$$\cos\theta = \frac{b}{h} = \frac{h}{h} = 1$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{0}{1} = 0$$



Hence, **$\sin 0° = 0$, $\cos 0° = 1$, $\tan 0° = 0$.**

2. T-ratios of 90°

Again in the rt $\angle d$ ΔOMP, $\angle O$ is increased so that it becomes 90°. Hence $\angle P$ reduces, thus making side OM reduce such that the point O coincides with point M and $\angle P = 0°$.

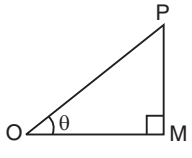
When $\theta = 90°$, base = 0 , perp. = hyp.

$\therefore$

$$\sin\theta = \frac{\text{perp.}}{\text{hyp.}} = \frac{\text{hyp.}}{\text{hyp.}} = 1$$

$$\cos\theta = \frac{\text{base}}{\text{hyp.}} = \frac{0}{\text{hyp.}} = 0$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{1}{0} = \text{not defined (approaches } \infty)$$



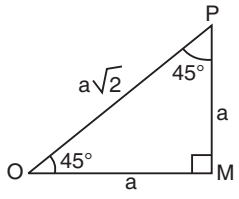
Hence, **$\sin 90° = 1$, $\cos 90° = 0$, $\tan 90°$ is not defined.**

Note .	$\sin\theta$ increases from 0 to 1 $\cos\theta$ decrease from 1 to 0 $\tan\theta$ increases from 0 to ∞

3. T-ratios of 45°

Draw ΔOPM right angled at M such that $\angle POM = 45°$. Then $\angle MPO = 45°$.

$\therefore$ ΔOPM is an isosceles triangle with $MP = MO = a$ (say)



Then, by Pythagoras' Theoram,

$$OP^2 = OM^2 + PM^2$$
$$= a^2 + a^2 = 2a^2$$

$\Rightarrow$ $OP = \sqrt{2}a$

Hence, $\mathbf{\sin 45° = \frac{PM}{OP} = \frac{a}{a\sqrt{2}} = \frac{1}{\sqrt{2}}}$; $\mathbf{\cos 45° = \frac{OM}{OP} = \frac{a}{a\sqrt{2}} = \frac{1}{\sqrt{2}}}$

$$\mathbf{\tan 45° = \frac{PM}{OM} = \frac{a}{a} = 1}$$

4. T-ratios of 30° and 60°

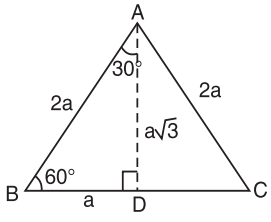
Let ABC be an equilateral triangle. Draw $AD \perp$ to BC. Then, D is the mid-point of BC. (*The altitude of an equilateral Δ co-incides with the median and bisects the vertical angle*)

Let $AB = AC = BC = 2a$. Then, $BD = a$

$\therefore$ In ΔADB, $AD^2 = AB^2 - BD^2$

$= 4a^2 - a^2 = 3a^2$

$AD = \sqrt{3}\,a$



Here, $\angle A = 30°$, $\angle B = 60°$

$\therefore$ In ΔABD,

$\mathbf{\sin 30° = \frac{BD}{AB} = \frac{a}{2a} = \frac{1}{2}}$; $\mathbf{\cos 30° = \frac{AD}{AB} = \frac{a\sqrt{3}}{2a} = \frac{\sqrt{3}}{2}}$; $\mathbf{\tan 30° = \frac{BD}{AD} = \frac{a}{a\sqrt{3}} = \frac{1}{\sqrt{3}}}$;

$\mathbf{\sin 60° = \frac{AD}{AB} = \frac{a\sqrt{3}}{2a} = \frac{\sqrt{3}}{2}}$; $\mathbf{\cos 60° = \frac{BD}{AB} = \frac{a}{2a} = \frac{1}{2}}$; $\mathbf{\tan 60° = \frac{AD}{BD} = \frac{a\sqrt{3}}{a} = \sqrt{3}}$

Thus, the consolidated table of the t-ratios of some standard angles is

θ	sin θ	cos θ	tan θ
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	not defined

5. Trigonometric ratios of complementary angles

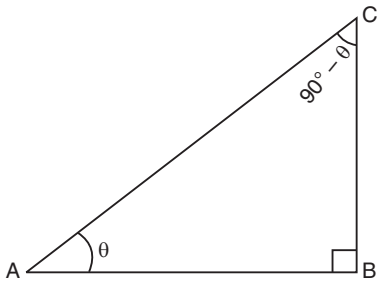
Theorem. If θ is an acute angle

(i) $\sin(90° - \theta) = \cos\theta$ **(ii) $\cos(90° - \theta) = \sin\theta$**

(iii) $\tan(90° - \theta) = \cot\theta$ **(iv) $\cot(90° - \theta) = \tan\theta$**

(v) $\sec(90° - \theta) = \operatorname{cosec}\theta$ **(vi) $\operatorname{cosec}(90° - \theta) = \sec\theta$**

Ex. $\sin(90° - 18°) = \cos 18° \Rightarrow \sin 72° = \cos 18°$
$\cos(90° - 36°) = \sin 36° \Rightarrow \cos 54° = \sin 36°$
$\tan(90° - 30°) = \cot 30° \Rightarrow \tan 60° = \cot 30°$
$\cot(90° - 25°) = \tan 25° \Rightarrow \cot 65° = \tan 25°$
$\sec(90° - 15°) = \operatorname{cosec} 15° \Rightarrow \sec 75° = \operatorname{cosec} 15°$
$\operatorname{cosec}(90° - 42°) = \sec 42° \Rightarrow \operatorname{cosec} 48° = \sec 42°$



Solved Examples

Ex. 1. ***Evaluate : $2\tan^2 45° + \cos^2 30° - \sin^2 60°$***

Sol. $2\tan^2 45° + \cos^2 30° - \sin^2 60° = 2\times(1)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2$

$= 2 + \frac{3}{4} - \frac{3}{4} = \mathbf{2}.$

Ex. 2. ***Prove that : $\frac{4}{3}\tan^2 30° + \sin^2 60° - 3\cos^2 60° + \frac{3}{4}\tan^2 60° - 2\tan^2 45° = \frac{25}{36}$***

Sol. Given exp $= \frac{4}{3}\times\left(\frac{1}{\sqrt{3}}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 - 3\times\left(\frac{1}{2}\right)^2 + \frac{3}{4}\times\left(\sqrt{3}\right)^2 - 2\times(1)^2$

$= \frac{4}{3}\times\frac{1}{3} + \frac{3}{4} - \frac{3}{4} + \frac{9}{4} - 2$

$= \frac{4}{9} + \frac{9}{4} - 2 = \frac{16 + 81 - 72}{36} = \mathbf{\frac{25}{36}}.$

Ex. 3. ***Find the value of x, if $\tan 3x = \sin 45° \cos 45° + \sin 30°$***

Sol. $\tan 3x = \sin 45° \cos 45° + \sin 30°$

$= \frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}} + \frac{1}{2} = \frac{1}{2} + \frac{1}{2} = 1$

$\Rightarrow \quad \tan 3x = \tan 45° \Rightarrow 3x = 45° \Rightarrow x = \mathbf{15°}$

Ex. 4. ***Without using trigonometric tables, show that $\frac{\cos 70°}{\sin 20°} + \cos 49° \sin 41° = 2$***

Sol. $\frac{\cos 70°}{\sin 20°} + \cos 49° \operatorname{cosec} 41° = \frac{\cos(90° - 20°)}{\sin 20°} + \cos(90° - 41°)\operatorname{cosec} 41°$

$= \frac{\sin 20°}{\sin 20°} + \sin 41° \times \frac{1}{\sin 41°} = 1 + 1 = \mathbf{2.}$

Ex. 5. ***Evaluate: $\tan 7° \tan 23° \tan 60° \tan 67° \tan 83°$***

Sol. $\tan 7° \tan 23° \tan 60° \tan 67° \tan 83°$

$= \tan 7° \cdot \tan 23° \cdot \sqrt{3} \cdot \tan(90° - 23°) \cdot \tan(90° - 7°)$ $\quad (\because \tan(90° - \theta) = \cot\theta)$

$= \tan 7° \cdot \tan 23° \cdot \sqrt{3} \cdot \cot 23° \cdot \cot 7°$

$= \tan 7° \cdot \cot 7° \cdot \tan 23° \cdot \cot 23° \cdot \sqrt{3}$ $\quad (\because \tan\theta \cdot \cot\theta = 1)$

$= 1 \times 1 \times \sqrt{3} = \mathbf{\sqrt{3}}.$

Ex. 6. ***Without using trigonometric tables, prove that: tan 1° · tan 2° · tan 3° · .... tan 89° = 1***

Sol. Given exp. = tan (90° – 89°) tan (90° – 88°) tan (90° – 87°) ... tan 87° · tan 88° · tan 89°
= cot 89°·cot 88° · cot 87° ..... tan 87° · tan 88° · tan 89°
= (cot 89°·tan 89°) (cot 88°·tan 88°) .... (cot 44°·tan 44°).tan45°
= $1 \times 1 \times ..... \times 1 \times 1 = \mathbf{1}$ ($\because$ tan 45° = 1, cot θ. tan θ = 1)

Ex. 7. ***If sin 3θ = cos (θ – 6°), where 3θ and θ – 6° are acute angles, find the value of θ.***

Sol. sin 3θ = cos (θ – 6°)
$\Rightarrow$ cos (90° – 3θ) = cos (θ – 6°)
$\Rightarrow$ 90° – 3θ = θ – 6° $\Rightarrow 4\theta = 96° \Rightarrow \theta = \mathbf{24°}$.

Ex. 8. ***Show that*** $\frac{1}{1+\cos(90°-\theta)}+\frac{1}{1-\cos(90°-\theta)} = 2\,\text{cosec}^2(90°-\theta)$

Sol. L.H.S. $= \frac{1}{1+\sin\theta}+\frac{1}{1-\sin\theta}=\frac{1-\sin\theta+1+\sin\theta}{(1+\sin\theta)(1-\sin\theta)}$

$= \frac{2}{1-\sin^2\theta}=\frac{2}{\cos^2\theta}=2\sec^2\theta$

R.H.S.= 2 cosec^2 (90° – θ) = 2 sec^2 θ.

$\therefore$ L.H.S. = R.H.S

Question Bank–33

1. $\frac{1-\tan^2 45°}{1+\tan^2 45°} =$

(a) tan 90° (b) 1
(c) sin 45° (d) 0

2. If $x \tan 30° = \frac{\sin 30° + \cos 60°}{\tan 60° + \sin 60°}$, then the value of x is :

(a) $\frac{2}{3}$ (b) $\frac{2}{\sqrt{3}}$
(c) $\frac{2}{3\sqrt{3}}$ (d) $\frac{3}{2}$

3. The value of sin 0° + cos 30° – tan 45° + cosec 60° + cot 90° is equal to

(a) $\frac{5\sqrt{3}-6}{6}$ (b) $\frac{-6+7\sqrt{3}}{6}$
(c) 0 (d) 2

4. If 2 sin^2 x + cos^2 45° = tan 45° and x is an acute angle, then the value of tan x is:

(a) 1 (b) $\sqrt{3}$
(c) $\frac{1}{\sqrt{3}}$ (d) 3

5. The value of a sin 0° + b cos 90° + c tan 45° is:

(a) $a + b + c$ (b) $b + c$
(c) $a + c$ (d) c

6. The value of $\frac{\sin 30° - \cos 60° + \tan 45°}{\cos 90° - \tan 45° + \sin 90°}$ is:

(a) $\frac{1}{2}$ (b) 1
(c) $\sqrt{3}$ (d) ∞

7. The value of $\frac{1}{2}$ sin^2 90° sin^2 30° cos^2 45° + 4 tan^2 30° + $\frac{1}{2}$ sin^2 90° – 2 cos^2 90° is:

(a) $\frac{45}{24}$ (b) $\frac{46}{24}$
(c) $\frac{47}{24}$ (d) $\frac{49}{24}$

8. The value of (cos 0° + sin 45° + sin 30°) (sin 90° – cos 45° + cos 60°) is:

(a) 0 (b) 1
(c) $\frac{7}{4}$ (d) $\frac{1}{2}$

9. $\frac{\tan 60° - \tan 30°}{1 + \tan 60° \tan 30°}$ equals

(a) tan 60° (b) tan 0°

(c) tan 30° (d) $\frac{1}{3}$

10. Find the value of x, if
$\sin 2x = \sin 60° \cos 30° - \cos 60° \sin 30°$
(a) 20° (b) 15°
(c) 30° (d) 45°

All the questions from Q.No. 11 – Q.No. 18. Should be attempted without using the trigonometric tables.

11. tan 26° – cot 64° equals
(a) –1 (b) 1
(c) 0 (d) 2

12. The value of $\frac{\sin 19°}{\cos 71°} + \frac{\cos 73°}{\sin 17°}$ is equal to :
(a) 0 (b) 1
(c) 2 (d) $\frac{1}{2}$

13. Consider the following equations:

1. $\frac{\cos 75°}{\sin 15°} + \frac{\sin 12°}{\cos 78°} - \frac{\text{cosec}\, 18°}{\sec 72°} = 1$

2. $\frac{\tan 50° + \sec 50°}{\cot 40° + \text{cosec}\, 40°} + \cos 40° \text{cosec}\, 50° = 2$

3. $\frac{\sin 80°}{\cos 10°} - \sin 59° \sec 31° = 0$

Which of these statements given below is correct?
(a) 1 only is correct
(b) 3 only is correct
(c) All 1, 2 and 3 are correct
(d) 2 and 3 are correct

14. $\sin^2 25° + \sin^2 65°$ is equal to
(a) 0 (b) $2 \sin^2 25°$
(c) $2 \cos^2 65°$ (d) 1

15. If $\sin (30° - \theta) = \cos (60° + \phi)$, then
(a) $\phi - \theta = 30°$ (b) $\phi - \theta = 0°$
(c) $\phi + \theta = 60°$ (d) $\phi - \theta = 60°$

16. The value of cot 15° cot 16° cot 17° .....cot 73° cot 74° cot 75° is:
(a) $\frac{1}{2}$ (b) 0
(c) 1 (d) –1

17. If $\sin \theta = \cos \theta$, then value of θ is:
(a) 60° (b) 0°
(c) 45° (d) 90°

18. Value of $\cos^2 5° + \cos^2 10° + \cos^2 80° + \cos^2 85°$ is:
(a) 1 (b) 0
(c) 2 (d) 3

19. If $\sin 3\theta = \cos (\theta - 2°)$ where 3θ and $(\theta - 2°)$ are acute angles, what is the value of θ?
(a) 22° (b) 23°
(c) 24° (d) 25°

20. If $\tan \theta = 1$ and $\sin \theta = \frac{1}{\sqrt{2}}$, then the value of $\cos (\theta + \phi)$ is:
(a) –1 (b) 0
(c) 1 (d) $\frac{\sqrt{3}}{2}$

21. If $x \cos 60° + y \cos 0° = 3$ and $4x \sin 30° - y \cot 45° = 2$, then what is the value of x?
(a) –1 (b) 0
(c) 1 (d) 2

22. Which one of the following is true?
(a) $\tan x > 1$; $45° < x < 90°$
(b) $\sin x > \frac{1}{2}$; $0° < x < 30°$
(c) $\cos x > \frac{1}{2}$; $60° < x < 90°$
(d) $\sin x = \cos x$ for some value of x; $30° < x < 45°$

23. If $x + y = 90°$, then what is
$\sqrt{\cos x \,\text{cosec}\, y - \cos x \sin y}$ equal to
(a) $\cos x$ (b) $\sin x$
(c) $\sqrt{\cos x}$ (d) $\sqrt{\sin x}$

24. If $0° < \theta < 90°$ and $\cos^2 \theta - \sin^2 \theta = \frac{1}{2}$, then what is the value of θ?
(a) 30° (b) 45°
(c) 60° (d) 90°

25. The value of $\sin^2 (90° - \theta) [1 + \cot^2 (90° - \theta)]$ is
(a) –1 (b) 0
(c) $\frac{1}{2}$ (d) 1

Answers

1. (d)	**2.** (a)	**3.** (b)	**4.** (c)	**5.** (d)	**6.** (d)	**7.** (c)	**8.** (c)	**9.** (c)	**10.** (b)
11. (c)	**12.** (c)	**13.** (c)	**14.** (d)	**15.** (b)	**16.** (c)	**17.** (c)	**18.** (c)	**19.** (b)	**20.** (b)
21. (d)	**22.** (a)	**23.** (b)	**24.** (a)	**25.** (d)					

Hints and Solutions

1. (d) $\frac{1-\tan^2 45°}{1+\tan^2 45°} = \frac{1-1}{1+1} = \frac{0}{2} = 0$ $(\because \tan 45° = 1)$

2. (a) $x \tan 30° = \frac{\sin 30° + \cos 60°}{\tan 60° + \sin 60°}$

$$= \frac{\frac{1}{2}+\frac{1}{2}}{\sqrt{3}+\frac{\sqrt{3}}{2}} = \frac{1}{\frac{2\sqrt{3}+\sqrt{3}}{2}} = \frac{2}{3\sqrt{3}}$$

$$x \times \frac{1}{\sqrt{3}} = \frac{2}{3\sqrt{3}} \Rightarrow x = \frac{2\sqrt{3}}{3\sqrt{3}} = \frac{2}{3}.$$

3. (b) Given exp. $= 0 + \frac{\sqrt{3}}{2} - 1 + \frac{2}{\sqrt{3}} + 0$

$$= \frac{\sqrt{3}}{2} - 1 + \frac{2}{\sqrt{3}} = \frac{3-2\sqrt{3}+4}{2\sqrt{3}} = \frac{7-2\sqrt{3}}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{7\sqrt{3}-6}{6}.$$

4. (c) $2 \sin^2 x + \cos^2 45° = \tan 45°$

$$\Rightarrow 2\sin^2 x + \left(\frac{1}{\sqrt{2}}\right)^2 = 1$$

$$\Rightarrow 2\sin^2 x = 1 - \frac{1}{2} = \frac{1}{2}$$

$$\Rightarrow \sin^2 x = \frac{1}{4} \Rightarrow \sin x = \frac{1}{2} = \sin 30° \Rightarrow x = 30°$$

$$\therefore \tan x = \tan 30° = \frac{1}{\sqrt{3}}.$$

5. (d) $a \sin 0° + b \cos 90° + c \tan 45°$

$= a \times 0 + b \times 0 + c \times 1 = c.$

6. (d) Given exp. $= \frac{\frac{1}{2}-\frac{1}{2}+1}{0-1+1} = \frac{1}{0} = \infty.$

7. (c) Given exp.

$$= \left(\frac{1}{2}\right)^2 \times \left(\frac{1}{\sqrt{2}}\right)^2 + 4 \times \left(\frac{1}{\sqrt{3}}\right)^2 + \frac{1}{2} \times (1)^2 - 2 \times 0$$

$$= \frac{1}{4} \times \frac{1}{2} + 4 \times \frac{1}{3} + \frac{1}{2} = \frac{1}{8} + \frac{4}{3} + \frac{1}{2} = \frac{3+32+12}{24} = \frac{47}{24}$$

8. Do yourself.

9. Do yourself.

10. (b) $\sin 2x = \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} - \frac{1}{2} \times \frac{1}{2}$

$$= \frac{3}{4} - \frac{1}{4} = \frac{1}{2}$$

$$\therefore \sin 2x = \frac{1}{2} = \sin 30° \Rightarrow 2x = 30° \Rightarrow x = 15°.$$

11. (c) $\tan 26° - \cot 64°$

$= \tan (90° - 64°) - \cot 64°$

$= \cot 64° - \cot 64° = 0$ $(\because \tan (90° - \theta) = \cot \theta)$

12. (c) Given exp. $= \frac{\sin(90° - 71°)}{\cos 71°} + \frac{\cos 73°}{\sin(90° - 73°)}$

$$= \frac{\cos 71°}{\cos 71°} + \frac{\cos 73°}{\cos 73°} \quad (\because \sin (90° - \theta) = \cos \theta)$$

$= 1 + 1 = 2.$

13. (c) **1.** Do yourself.

2. Given exp. $= \frac{\tan(90° - 40°) + \sec(90° - 40°)}{\cot 40° + \text{cosec } 40°}$

$+ \cos (90° - 50°) \text{ cosec } 50°$

$$= \frac{\cot 40° + \text{cosec } 40°}{\cot 40° + \text{cosec } 40°} + \sin 50° \text{ cosec } 50°$$

$= 1 + 1 = 2.$

3. Do yourself.

14. (d) $\sin^2 25° + \sin^2 65° = \sin^2 (90° - 65°) + \sin^2 65°$

$= \cos^2 65° + \sin^2 65° = 1.$

15. (b) $\sin (30° - \theta) = \cos (60° + \phi)$

$\Rightarrow \cos (90° - (30° - \theta) = \cos (60° + \phi)$

$(\because \sin \theta = \cos (90° - \theta))$

$\Rightarrow \cos (60° + \theta) = \cos (60° + \phi)$

$\Rightarrow 60° + \theta = 60° + \phi \Rightarrow \theta - \phi = 0.$

16. Type Solved Example 5.

17. (c) $\sin \theta = \cos \theta \Rightarrow \cos (90° - \theta) = \cos \theta$

Now do yourself.

18. Do yourself.

19. (b) $\sin 3\theta = \cos (\theta - 2°)$

$\Rightarrow \cos (90° - 3\theta) = \cos (\theta - 2°)$

$\Rightarrow 90° - 3\theta = \theta - 2°$

$\Rightarrow 4\theta = 92° \Rightarrow \theta = 23°.$

20. (b) $\tan \theta = 1 \Rightarrow \tan \theta = \tan 45° \Rightarrow \theta = 45°$

$$\sin \phi = \frac{1}{\sqrt{2}} \Rightarrow \sin \phi = \sin 45° \Rightarrow \phi = 45°$$

$\therefore \cos (\theta + \phi) = \cos (45° + 45°)$

$= \cos 90° = 0$

21. (d) $x \cos 60° + y \cos \theta° = 3$

$$\Rightarrow x \times \frac{1}{2} + y \times 1 = 3$$

$$\Rightarrow x + 2y = 6 \qquad \text{...(i)}$$

and $4x \sin 30° - y \cot 45° = 2$

$$\Rightarrow 4x \times \frac{1}{2} - y \times 1 = 2$$

$\Rightarrow \quad 2x - y = 2 \quad ...(ii)$

Now solve for x and y.

22. (a) $\tan 45° = 1$ and $\tan 90°$ = undefined (∞)

$\therefore$ when x lies between 45° and 90°, $\tan x > 1$.

23. (b) $x + y = 90° \Rightarrow y = 90° - x$

$$\therefore \sqrt{\cos x \operatorname{cosec} y - \cos x \sin y}$$

$$= \sqrt{\cos x \operatorname{cosec}(90° - x) - \cos x \sin(90° - x)}$$

$$= \sqrt{\cos x \sec x - \cos x \cos x}$$

$$= \sqrt{1 - \cos^2 x} = \sqrt{\sin^2 x} = \sin x$$

24. (a) $\cos^2\theta - \sin^2\theta = \frac{1}{2}$

$$\Rightarrow (1 - \sin^2\theta) - \sin^2\theta = \frac{1}{2}$$

$$\Rightarrow 1 - 2\sin^2\theta = \frac{1}{2}$$

$$\Rightarrow 2\sin^2\theta = \frac{1}{2} \Rightarrow \sin^2\theta = \frac{1}{4}$$

$$\Rightarrow \sin\theta = \frac{1}{2} = \sin 30° \Rightarrow \theta = 30°$$

25. (d) Given exp. $= \cos^2\theta\,[1 + \tan^2\theta]$

$= \cos^2\theta \cdot \sec^2\theta = 1$

$\left[\because \sin(90° - \theta) = \cos\theta,\ \cot(90° - \theta) = \tan\theta\right]$

Self Assessment Sheet–32

1. Which of the following is not defined?

(a) $\sin 90°$ (b) $\tan 0°$

(c) $\cot 90°$ (d) $\operatorname{cosec} 0°$

2. What is the value of $\frac{\sin 60°}{\cos^2 45°} - 3\tan 30° + 5\cos 90°$

(a) 1 (b) –1

(c) $\frac{2}{5}$ (d) 0

3. The value of $2\sqrt{2}\cos 45° \cdot \cos 60° + 2\sqrt{3}\sin 30° \cdot \tan 60° - \cos 0°$ is

(a) $\frac{1}{3}$ (b) 3

(c) –3 (d) 0

4. If $2\cos\theta = \sqrt{3}$, evaluate $3\sin\theta - 4\sin^3\theta$

(a) 3 (b) $\frac{4}{3}$

(c) 1 (d) 2

5. What is the value of

$$\frac{\sin 2° \sin 4° \sin 6° ..... \sin 88°}{\cos 88° \cos 86° \cos 84° .... \cos 2°}$$

(Do not use trigonometric tables)

(a) 0 (b) 1

(c) 2 (d) 4

6. If $x + y = 90°$, then what is the value of $\left(1 + \frac{\tan x}{\tan y}\right)\sin^2 y$?

(a) 0 (b) $\frac{1}{2}$

(c) 1 (d) 2

7. If $\sin A = \cos A$ and A is acute, $\tan A - \cot A$ is equal to :

(a) 2 (b) 1

(c) $\frac{1}{2}$ (d) 0

8. Without using trigonometric tablels, find the value of: $\frac{2}{3}\left(\frac{\sec 56°}{\operatorname{cosec} 34°}\right) - 2\cos^2 20° + \frac{1}{2}\cot 28° \cot 35° \cot 45° \cot 62° \cot 55° - 2\cos^2 70°$

(a) $\frac{4}{5}$ (b) $-\frac{3}{4}$

(c) $-\frac{5}{6}$ (d) 1

9. If $11x$ is an acute angle and $\tan 11x = \cot 7x$, then what is the value of x?

(a) 5° (b) 6°

(c) 7° (d) 8°

10. Evaluate $\sin(50° + \theta) - \cos(40° - \theta) + \tan 1° \tan 15° \tan 20° \tan 70° \tan 65° \tan 89° + \sec(90° - \theta) \cdot \operatorname{cosec}\theta - \tan(90° - \theta)\cot\theta$.

(a) 0 (b) 1

(c) 2 (d) 3

Answers

1. (d) **2.** (d) **3.** (b) **4.** (c) **5.** (b) **6.** (c) **7.** (d) **8.** (c) **9.** (a) **10.** (c)