

TRIGONOMETRY

$$\begin{aligned} \bullet \cos 2\theta &= 2\cos^2\theta - 1 = 1 - 2\sin^2\theta \\ &= \frac{1 - \tan^2\theta}{1 + \tan^2\theta} \end{aligned}$$

∴ Halfangle ∴

$$\bullet 2\cos^2\theta = 1 + \cos 2\theta$$

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

$$\bullet 2\sin^2\theta = 1 - \cos 2\theta$$

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

Ex:- $\cos 22\frac{1}{2}^\circ$ ↓ $\cos 22\frac{1}{2}^\circ = \sqrt{\frac{1 + \cos 45^\circ}{2}}$

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

$$\bullet \frac{\cos 2\theta}{1} = \frac{1 - \tan^2\theta}{1 + \tan^2\theta}$$

$$\frac{1}{\cos 2\theta} = \frac{1 + \tan^2\theta}{1 - \tan^2\theta}$$

apply C & D Rule

$$\frac{1 + \cos 2\theta}{1 - \cos 2\theta} = \frac{1}{\tan^2\theta}$$

$$\tan^2\theta = \frac{1 - \cos 2\theta}{1 + \cos 2\theta}$$

$$\tan\theta = \sqrt{\frac{1 - \cos 2\theta}{1 + \cos 2\theta}}$$

• $(45^\circ + \theta)$

$$\tan(45^\circ + \theta) = \frac{\tan 45^\circ + \tan \theta}{1 - \tan 45^\circ \tan \theta} = \left\{ \frac{1 + \tan \theta}{1 - \tan \theta} \right\}$$

$$\downarrow$$

$$\frac{1 + \frac{\sin \theta}{\cos \theta}}{1 - \frac{\sin \theta}{\cos \theta}}$$

$$\left\{ \frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta} \right\}$$

$$\frac{(\cos \theta + \sin \theta)^2}{\cos^2 \theta - \sin^2 \theta}$$

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

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

$$\boxed{\sec 2\theta + \tan 2\theta}$$

$$\star \tan(45^\circ + \theta) = \frac{1 + \tan \theta}{1 - \tan \theta} = \frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta} = \sec 2\theta + \tan 2\theta$$

$$\star \cot(45^\circ + \theta) = \frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \sec 2\theta - \tan 2\theta$$

Q) $\tan 54^\circ = ?$

$$\tan(45^\circ + 9^\circ)$$

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

Q) Simplify the expression: व्यंजक को सरल करें:

$$\frac{1 - \tan^2(22.5^\circ)}{1 + \tan^2(22.5^\circ)}$$

$$\cos 2\theta = \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}$$

$$\frac{1 - \tan^2(22.5^\circ)}{1 + \tan^2(22.5^\circ)} = \cos 45^\circ$$

$$\downarrow$$

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

Q) Find the value of $\frac{[1 + \tan^2 \frac{2\pi - \theta}{2}]}{[2 \cot \frac{\pi - \theta}{2}]}$?

$\frac{[1 + \tan^2 \frac{2\pi - \theta}{2}]}{[2 \cot \frac{\pi - \theta}{2}]}$ का मान ज्ञात कीजिये।

$$\frac{1 + \tan^2 (\pi - \frac{\theta}{2})}{2 \cot (\frac{\pi}{2} - \frac{\theta}{2})}$$

$$\frac{\sec^2 (\pi - \frac{\theta}{2})}{2 \tan \frac{\theta}{2}}$$

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

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

$$\frac{1}{\sin \theta} = \operatorname{cosec} \theta$$

Q) The value of $\frac{\sin 2^\circ}{\sqrt{(2 \cos^2 46^\circ - 1)^2}} + \frac{\sin 4^\circ}{\sqrt{(1 - 2 \sin^2 43^\circ)^2}}$ is

$\frac{\sin 2^\circ}{\sqrt{(2 \cos^2 46^\circ - 1)^2}} + \frac{\sin 4^\circ}{\sqrt{(1 - 2 \sin^2 43^\circ)^2}}$ का मान है।

$$\frac{\sin 2^\circ}{\cos 92^\circ} + \frac{\sin 4^\circ}{\cos 86^\circ}$$

$$\frac{\sin 2^\circ}{\cos (90 + 2)} + 1$$

$$\textcircled{1} \frac{\sin 2}{-\sin 2} + 1$$

$$-1 + 1 = 0$$

Q) Consider the following निम्नलिखित पर विचार कीजिए :

$$(1) \cos^4 \theta - \sin^4 \theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}, 0 < \theta < \frac{\pi}{2} \Rightarrow \frac{(\cos^2 \theta + \sin^2 \theta)(\cos^2 \theta - \sin^2 \theta)}{\cos 2\theta}$$

$$(2) \operatorname{cosec} \theta + \cot \theta = \frac{1}{\operatorname{cosec} \theta - \cot \theta}, 0 < \theta < \frac{\pi}{2}$$

$$(3) \cos^2 \theta - \sin^2 \theta = \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}, 0 < \theta < \frac{\pi}{2}$$

Which of the above equations are identities?

उपर्युक्त समीकरणों में से कौन - सी सर्वसमिकाएँ हैं ?

(a) केवल 1 और 2

(b) केवल 2 और 3

(c) केवल 1 और 3

(d) 1, 2 और 3

$$Q) \frac{1}{2} [\sqrt{3} \cos 23^\circ - \sin 23^\circ] = ?$$

$$\frac{1}{2} \left[\frac{\sqrt{3}}{2} \cos 23^\circ - \frac{1}{2} \sin 23^\circ \right]$$

$$\frac{1}{2} [\cos 30^\circ \cos 23^\circ - \sin 30^\circ \sin 23^\circ]$$

$$\therefore \cos A \cos B - \sin A \sin B = \cos (A+B)$$

$$\frac{1}{2} \cos (30+23)$$

$$\frac{1}{2} \cos 53^\circ$$

Q) Find the value of A for the given equation.

दिए गए समीकरण के लिए A का मान ज्ञात कीजिए।

$$\tan A + \tan 2A + \tan 3A = \tan A \tan 2A \tan 3A$$

$$\tan A + \tan 2A = -\tan 3A + \tan A \tan 2A \tan 3A$$

$$\tan A + \tan 2A = -\tan 3A [1 - \tan A \tan 2A]$$

$$\frac{\tan A + \tan 2A}{1 - \tan A \tan 2A} = -\tan 3A$$

$$\tan(A+2A) = -\tan 3A$$

$$\tan 3A = -\tan 3A$$

$$2 \tan 3A = 0$$

$$\tan 3A = 0$$

By option

$$\boxed{\frac{\pi}{3}, \frac{2\pi}{3}}$$

$$\tan 2 \times \frac{\pi}{3}$$

$$\tan \pi = 0$$

$$\tan \left(2 \times \frac{2\pi}{3} \right)$$

$$\tan 2\pi = 0$$

Q) Find the value of $\tan \frac{2\pi}{5} - \tan \frac{\pi}{15} - \sqrt{3} \tan \frac{2\pi}{5} \tan \frac{\pi}{15}$?

$\tan \frac{2\pi}{5} - \tan \frac{\pi}{15} - \sqrt{3} \tan \frac{2\pi}{5} \tan \frac{\pi}{15}$ का मान ज्ञात कीजिये।

$$\tan \left(\frac{2\pi}{5} - \frac{\pi}{15} \right) = \frac{\tan \frac{2\pi}{5} - \tan \frac{\pi}{15}}{1 + \tan \frac{2\pi}{5} \tan \frac{\pi}{15}} \quad \left\{ \begin{array}{l} \frac{2\pi}{5} + \frac{\pi}{15} = \frac{6\pi + \pi}{15} = \frac{7\pi}{15} \\ \frac{2\pi}{5} + \frac{\pi}{15} = \frac{6\pi - \pi}{15} = \frac{5\pi}{15} = \frac{\pi}{3} \end{array} \right.$$

$$\tan \frac{\pi}{3} = \sqrt{3} \left(1 + \tan \frac{2\pi}{5} \tan \frac{\pi}{15} \right) = \tan \frac{2\pi}{5} - \tan \frac{\pi}{15}$$

$$\sqrt{3} + \sqrt{3} \tan \frac{2\pi}{5} \tan \frac{\pi}{15} = \tan \frac{2\pi}{5} - \tan \frac{\pi}{15}$$

$$\tan \frac{2\pi}{5} - \tan \frac{\pi}{15} - \sqrt{3} \tan \frac{2\pi}{5} \tan \frac{\pi}{15} = \sqrt{3}$$

Q) Find the value of $\tan 250^\circ$?

$\tan 250^\circ$ का मान ज्ञात कीजिये।

$$\tan (180 + 70)$$

$$= \tan 70^\circ$$

$$\tan (50 + 20) = \frac{\tan 50 + \tan 20}{1 - \tan 50 \tan 20}$$

$$\tan 70^\circ (1 - \tan 50^\circ \tan 20^\circ) = \tan 50^\circ + \tan 20^\circ$$

$$\tan 70^\circ - \tan 70^\circ \tan 50^\circ \tan 20^\circ = \tan 50^\circ + \tan 20^\circ$$

$$\tan 70^\circ - \tan 50^\circ = \tan 50^\circ + \tan 20^\circ$$

$$\tan 70^\circ = 2 \tan 50^\circ + \tan 20^\circ$$

TRIPLE ANGLE

- $\sin(A+B) = \sin A \cos B + \cos A \sin B$

$B=2A$

$$\sin 3A = \sin A \cos 2A + \cos A \sin 2A$$

$$\sin A (1 - 2\sin^2 A) + \cos A \cdot 2 \sin A \cos A$$

$$\sin A - 2\sin^3 A + (1 - \sin^2 A) \cdot 2 \sin A$$

$$\sin A - 2\sin^3 A + 2 \sin A - 2\sin^3 A$$

$$\boxed{\sin 3A = 3 \sin A - 4 \sin^3 A}$$

- $\sin 3A = 3 \sin A - 4 \sin^3 A$

$A=90+A$

$$\sin(270+3A)$$

$$-\cos 3A = 3 \sin(90+A) - 4 \sin^3(90+A)$$

$$3 \cos A - 4 \cos^3 A$$

$$\boxed{\cos 3A = 4 \cos^3 A - 3 \cos A}$$

- $\tan 3\theta$

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \cdot \tan B}$$

$$\tan(\theta + 2\theta) = \frac{\tan \theta + \tan 2\theta}{1 - \tan \theta \cdot \tan 2\theta}$$

$$\tan(3\theta)$$

$$\frac{\tan \theta + \frac{2 \tan \theta}{1 - \tan^2 \theta}}{1 - \tan \theta \cdot \frac{2 \tan \theta}{1 - \tan^2 \theta}}$$

$$\frac{1 - \tan \theta \cdot \frac{2 \tan \theta}{1 - \tan^2 \theta}}{1 - \tan^2 \theta}$$

$$\frac{\tan \theta - \tan^3 \theta + 2 \tan \theta}{1 - \tan^2 \theta - 2 \tan^2 \theta}$$

$$\boxed{\frac{3 \tan \theta - \tan^3 \theta}{1 - 3 \tan^2 \theta}}$$

Q) $\frac{3 \sin \theta - \sin 3\theta}{3 \cos \theta + \cos 3\theta} = ?$

$$\frac{3 \sin \theta - (3 \sin \theta - 4 \sin^3 \theta)}{3 \cos \theta + 4 \cos^3 \theta - 3 \cos \theta}$$

$$\frac{4 \sin^3 \theta}{4 \cos^3 \theta} = \tan^3 \theta$$

Ex:- $\sin 40^\circ \sin 20^\circ \sin 80^\circ = \frac{1}{4} \sin 60^\circ$

• $\sin (60^\circ - A) \sin A \sin (60^\circ + A) = \frac{1}{4} \sin 3A$

• $\cos (60^\circ - A) \cos A \cos (60^\circ + A) = \frac{1}{4} \cos 3A$

• $\tan (60^\circ - A) \tan A \tan (60^\circ + A) = \tan 3A$

Q) The value of $(\sin 10^\circ \sin 50^\circ \sin 70^\circ)$ is:

$(\sin 10^\circ \sin 50^\circ \sin 70^\circ)$ का मान है:

$\theta = 10^\circ$
 $\sin \theta \sin (60^\circ - \theta) \sin (60^\circ + \theta) = \frac{1}{4} \sin 3\theta$

$= \frac{1}{4} \sin 30^\circ$

$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

Q) The value of $\cos 20^\circ \cos 40^\circ \cos 80^\circ$ is:

$\cos 20^\circ \cos 40^\circ \cos 80^\circ$ का मान है:

$\cos 20^\circ \cos 40^\circ \cos 80^\circ$
 $\cos 20^\circ \cos 40^\circ \cos 80^\circ$
 $\cos 20^\circ \cos 40^\circ \cos 80^\circ$

$\frac{1}{4} \cos 3 \times 20^\circ$

$\frac{1}{4} \cos 60^\circ$

$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

Q) The value of $(\tan 20^\circ \tan 40^\circ \tan 80^\circ)$ is:

$(\tan 20^\circ \tan 40^\circ \tan 80^\circ)$ का मान है:

$\tan 20^\circ \tan 40^\circ \tan 80^\circ$
 $\tan 20^\circ \tan 40^\circ \tan 80^\circ$
 $\tan 20^\circ \tan 40^\circ \tan 80^\circ$

$\tan 3\theta$

$\tan 3 \times 20^\circ$

$\tan 60^\circ = \sqrt{3}$

Q) What is the value of $\cos 1^\circ \cdot \cos 2^\circ \cdot \cos 3^\circ \dots \cos 177^\circ \cdot \cos 178^\circ \cdot \cos 179^\circ$

$\cos 1^\circ \cdot \cos 2^\circ \cdot \cos 3^\circ \dots \cos 177^\circ \cdot \cos 178^\circ \cdot \cos 179^\circ$ का मान क्या है?

$\cos 90^\circ$

$\dots \times 0 \times \dots$

Ans = 0

Q) $\sin 1^\circ \cdot \sin 2^\circ \cdot \sin 3^\circ \dots \cdot \sin 180^\circ$ is equal to -
 $\sin 1^\circ \cdot \sin 2^\circ \cdot \sin 3^\circ \dots \cdot \sin 180^\circ$ किसके बराबर है?

 $\downarrow$
 $\times 0$

Ans = 0

1. $\sin 10^\circ + \sin 20^\circ + \sin 40^\circ + \sin 50^\circ = ?$

- (a) $2\sin 15^\circ \cos 5^\circ$
- (b) $2\cos 15^\circ \sin 5^\circ$
- (c) $2\sin 15^\circ \sin 5^\circ$
- (d) $2\cos 15^\circ \cos 5^\circ$

2. The value of $\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ$ is:

$\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ$ का मान है:

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

3. What is the average of the sixty terms given below?

$\cos^2 x, \cos^2 2x, \cos^2 3x, \dots, \cos^2 30x, \sin^2 x, \sin^2 2x, \sin^2 3x \dots \sin^2 30x$

नीचे दिए गए साठ पदों का औसत क्या होगा?

$\cos^2 x, \cos^2 2x, \cos^2 3x, \dots, \cos^2 30x, \sin^2 x, \sin^2 2x, \sin^2 3x \dots \sin^2 30x$

- (a) $\cos^2 x$
- (b) 0.5
- (c) 1
- (d) $\cos^2 x \sin^2 x$

4. $\operatorname{cosec}(67^\circ + \theta) - \sec(23^\circ - \theta) + \cos 15^\circ \cos 35^\circ \operatorname{cosec} 55^\circ \cos 60^\circ \operatorname{cosec} 75^\circ$

- (a) 2
- (b) 0
- (c) 1
- (d) 0.5

5. If $\sin x = \frac{1}{3}$, the value of $\sin 3x$ is:

यदि $\sin x = \frac{1}{3}$, तो $\sin 3x$ का मान है:

- (a) $\frac{11}{23}$
- (b) $\frac{13}{27}$
- (c) $\frac{19}{27}$
- (d) $\frac{23}{27}$

6. If $\cos x = \frac{1}{2}$, the value of $\cos 3x$ is:

यदि $\cos x = \frac{1}{2}$, तो $\cos 3x$ का मान है:

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

7. If the value of $\left(\frac{1}{\cot 20^\circ} \frac{1}{\cot 40^\circ} \frac{1}{\cot 80^\circ}\right)$ is:

$\left(\frac{1}{\cot 20^\circ} \frac{1}{\cot 40^\circ} \frac{1}{\cot 80^\circ}\right)$ का मान है:

(a) $\frac{\sqrt{3}}{2}$

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

(c) $\sqrt{3}$

(d) $\frac{1}{\sqrt{3}}$

8. If the value of $\left(\frac{1}{\operatorname{cosec} 10^\circ} \frac{1}{\operatorname{cosec} 50^\circ} \frac{1}{\operatorname{cosec} 70^\circ}\right)$

$\left(\frac{1}{\operatorname{cosec} 10^\circ} \frac{1}{\operatorname{cosec} 50^\circ} \frac{1}{\operatorname{cosec} 70^\circ}\right)$ का मान है:

(a) $\frac{1}{4}$

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

(c) $\frac{1}{8}$

(d) $\frac{3}{4}$

9. If the value of $\left(\frac{1}{\sec 20^\circ} \frac{1}{\sec 40^\circ} \frac{1}{\sec 80^\circ}\right)$

$\left(\frac{1}{\sec 20^\circ} \frac{1}{\sec 40^\circ} \frac{1}{\sec 80^\circ}\right)$ का मान है:

(a) 1

(b) $\frac{1}{4}$

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

(d) $\frac{1}{8}$

10. The value of $(\tan 10^\circ \tan 50^\circ \tan 70^\circ)$ is:

$(\tan 10^\circ \tan 50^\circ \tan 70^\circ)$ का मान है:

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

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

(c) $\frac{3}{8}$

(d) $\frac{\sqrt{3}}{8}$

ANSWER SHEET

1	2	3	4	5	6	7	8	9	10
D	A	B	D	D	D	C	C	D	B

Worksheet solution

sol 1

$$\begin{aligned} & \sin 10^\circ + \sin 20^\circ + \sin 40^\circ + \sin 50^\circ \\ &= (\sin 50^\circ + \sin 10^\circ) + (\sin 40^\circ + \sin 20^\circ) \\ &= 2 \sin \left(\frac{50^\circ + 10^\circ}{2} \right) \cos \left(\frac{50^\circ - 10^\circ}{2} \right) + 2 \sin \left(\frac{40^\circ + 20^\circ}{2} \right) \\ & \quad \cdot \cos \left(\frac{40^\circ - 20^\circ}{2} \right) \\ &= 2 \sin 30^\circ \cdot \cos 20^\circ + 2 \sin 30^\circ \cdot \cos 10^\circ \\ &= 2 \sin 30^\circ [\cos 20^\circ + \cos 10^\circ] \\ &= 2 \sin 30^\circ \left[2 \cos \left(\frac{20^\circ + 10^\circ}{2} \right) \cdot \cos \left(\frac{20^\circ - 10^\circ}{2} \right) \right] \\ &= 2 \times \frac{1}{2} [2 \cos 15^\circ \cdot \cos 5^\circ] = 2 \cos 15^\circ \cos 5^\circ \end{aligned}$$

sol 2

$$\begin{aligned} & \tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ \\ &= (\tan 5^\circ \cdot \tan 85^\circ) (\tan 25^\circ \cdot \tan 65^\circ) \cdot \tan 45^\circ \\ &= (\tan 5^\circ \cdot \cot 5^\circ) (\tan 25^\circ \cdot \cot 25^\circ) \cdot \tan 45^\circ \\ &= 1 \end{aligned}$$

sol 3

$$\begin{aligned} & \cos^2 n, \cos^2 2n, \cos^2 3n, \dots, \cos^2 30n, \sin^2 n, \\ & \sin^2 2n, \sin^2 3n, \dots, \sin^2 30n \\ &= \frac{(\cos^2 n + \sin^2 n) + \dots + (\cos^2 30n + \sin^2 30n)}{60} \\ &= \frac{30}{60} = \frac{1}{2} = 0.5 \end{aligned}$$

sol 4

$$\operatorname{cosec}(67^\circ + \theta) - \sec(23^\circ - \theta) + \cos 15^\circ \cos 35^\circ$$
$$\operatorname{cosec} 55^\circ \cdot \cos 60^\circ \cdot \operatorname{cosec} 75^\circ$$

$$\theta = 0^\circ \text{ रखने पर}$$

$$= \operatorname{cosec} 67^\circ - \sec(90^\circ - 67^\circ) + \cos 15^\circ \cos 35^\circ \cdot \frac{1}{\sin 55^\circ}$$

$$\times \cos 60^\circ + \frac{1}{\sin 75^\circ}$$
$$= \operatorname{cosec} 67^\circ - \operatorname{cosec} 67^\circ + \cos 15^\circ \cos 35^\circ \frac{1}{\cos 35^\circ}$$
$$\times \frac{1}{2} \times \frac{1}{\cos 15^\circ}$$

$$= \frac{1}{2} = 0.5$$

sol 5

$$\sin 3x = 3\sin x - 4\sin^3 x$$

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

$$= 1 - \frac{4}{27} = \frac{23}{27}$$

sol 6

$$\cos 3x = 4\cos^3 x - 3\cos x$$

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

sol 7

$$\frac{1}{\cot 20^\circ} \cdot \frac{1}{\cot 40^\circ} \cdot \frac{1}{\cot 60^\circ}$$

$$= \tan 20^\circ \cdot \tan 40^\circ \cdot \tan 60^\circ$$

$$= \tan 20^\circ \cdot \tan(60^\circ - 20^\circ) \cdot \tan(60^\circ + 20^\circ)$$

$$= \tan 3\theta = \tan 3 \times 20^\circ = \tan 60^\circ = \sqrt{3}$$

Sol 8

$$\begin{aligned} & \frac{1}{\operatorname{Cosec} 10^\circ} \cdot \frac{1}{\operatorname{Cosec} 50^\circ} \cdot \frac{1}{\operatorname{Cosec} 70^\circ} \\ &= \sin 10^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ \\ &= \sin 10^\circ \cdot \sin(60^\circ - 10^\circ) \cdot \sin(60^\circ + 10^\circ) \\ &= \frac{1}{4} \sin 3A \\ &= \frac{1}{4} \times \sin 3 \times 10^\circ = \frac{1}{4} \sin 30^\circ = \frac{1}{4} \times \frac{1}{2} = \frac{1}{8} \end{aligned}$$

Sol 9

$$\begin{aligned} & \frac{1}{\sec 20^\circ} \cdot \frac{1}{\sec 40^\circ} \cdot \frac{1}{\sec 80^\circ} \\ &= \cos 20^\circ \cos 40^\circ \cos 80^\circ \\ &= \cos 20^\circ \cdot \cos(60^\circ - 20^\circ) \cos(60^\circ + 20^\circ) \\ &= \frac{1}{4} \cos 3A \\ &= \frac{1}{4} \cos 3 \times 20^\circ = \frac{1}{4} \cos 60^\circ = \frac{1}{4} \times \frac{1}{2} = \frac{1}{8} \end{aligned}$$

Sol 10

$$\begin{aligned} & \tan 10^\circ \cdot \tan 50^\circ \cdot \tan 70^\circ \\ &= \tan 10^\circ \cdot \tan(60^\circ - 10^\circ) \cdot \tan(60^\circ + 10^\circ) \\ &= \tan 3A \\ &= \tan 3 \times 10^\circ = \tan 30^\circ = \frac{1}{\sqrt{3}} \end{aligned}$$