XI Std - Trigonometry One / Two Marks Book Back

1. $\dfrac{1}{\cos 80} - \dfrac{\sqrt{3}}{\sin 80} =$ 1) $\sqrt{2}$ 2) $\sqrt{3}$ 3) 2 4) 4 ✓

Hint: $\dfrac{1}{\sin 10} - \dfrac{\sqrt{3}}{\cos 10}$

$\cos 80 = \cos(90-10) = \sin 10$

$\sin 80 = \sin(90-10) = \cos 10$

$= \dfrac{\cos 10 - \sqrt{3}\sin 10}{\sin 10 \cos 10} = \dfrac{2\left(\frac{1}{2}\cos 10 - \frac{\sqrt{3}}{2}\sin 10\right)}{\frac{1}{2}\cdot 2\sin 10\cos 10}$

$= \dfrac{2\left(\sin 30\cos 10 - \cos 30\sin 10\right)}{\frac{1}{2}\cdot\sin 20}$

$= \dfrac{4\left(\sin(30-10)\right)}{\sin 20} = 4$

2. If $\cos 28 + \sin 28 = k^3$ then $\cos 17$ is equal to

1) $\dfrac{k^3}{\sqrt{2}}$ ✓ 2) $-\dfrac{k^3}{2}$ 3) $\pm\dfrac{k^3}{\sqrt{2}}$ 4) $-\dfrac{k^3}{\sqrt{3}}$

Hint: $\cos 17 = \cos(45-28)$

$= \cos 45\cos 28 + \sin 45\sin 28$

$= \dfrac{1}{\sqrt{2}}\cos 28 + \dfrac{1}{\sqrt{2}}\sin 28$

$= \dfrac{1}{\sqrt{2}}\left(\cos 28 + \sin 28\right) = \dfrac{1}{\sqrt{2}}\cdot k^3$

3) The maximum value of $4\sin^2 x + 3\cos^2 x + \sin\frac{x}{2} + \cos\frac{x}{2}$ is

1) $4+\sqrt{2}$ ✓ 2) $3+\sqrt{2}$ 3) 9 4) 4.

Hint: $4\sin^2 x + 3\cos^2 x + \sin x/2 + \cos x/2$

$= 3\sin^2 x + 3\cos^2 x + \sin^2 x + \sin x/2 + \cos x/2$

$= 3 + \sin^2 x + \sin x/2 + \cos x/2$

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

$= 4 + \sqrt{2}$

$-1 \le \sin x \le +1$

$-1 \le \cos x \le 1$

$-\infty < \tan x \le +\infty$

$-1 \le \sec x \ge 1$

$-1 \le \operatorname{cosec} x \ge 1$

$\left(-1 \le a\sin x + b\cos x \le 1\right)$

4) $\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right) =$

1) $\dfrac{1}{8}$ ✓ 2) $\dfrac{1}{2}$ 3) $\dfrac{1}{\sqrt{3}}$ 4) $\dfrac{1}{\sqrt{2}}$

Hint: $\left(1+\cos\frac{\pi}{8}\right)\left(1-\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1-\cos\frac{3\pi}{8}\right)$

$= \left(1-\cos^2\frac{\pi}{8}\right)\left(1-\cos^2\frac{3\pi}{8}\right)$

$= \sin^2\pi/8 \cdot \sin^2\frac{3\pi}{8}$

$\frac{1}{4}\left(2\sin^2\pi/8\right)\left(2\sin^2 3\pi/8\right)$

$= \frac{1}{4}\left(1-\cos\frac{\pi}{4}\right)\left(1-\cos\frac{3\pi}{4}\right)$

$= \frac{1}{4}\left(1-\cos\pi/4\right)\left(1+\cos\pi/4\right)$

$= \frac{1}{4}\left(1-\frac{1}{\sqrt{2}}\right)\left(1+\frac{1}{\sqrt{2}}\right) = \frac{1}{4}\cdot\frac{1}{2} = \frac{1}{8}$

$\cos\frac{7\pi}{8} = \cos\left(\pi-\frac{\pi}{8}\right)$

$= -\cos\pi/8$

$\cos\frac{5\pi}{8} = \cos\left(\pi-\frac{3\pi}{8}\right)$

$= -\cos\frac{3\pi}{8}$

5) If $\pi \le 2\theta \le \frac{3\pi}{2}$ then $\sqrt{2+\sqrt{2+2\cos 4\theta}}$ is equal to

1) $-2\sin\theta$ 2) $-2\cos\theta$ 3) $2\cos\theta$ 4) $2\sin\theta$

Hint:

$\sqrt{2(1+\cos 2(2\theta))}$

$= \sqrt{2 \cdot 2\cos^2 2\theta}$

$= 2\cos 2\theta \Rightarrow -2\cos 2\theta$

$\because \pi \le 2\theta \le 3\pi/2$

$\cos 2\theta = -\cos 2\theta$

$\therefore \sqrt{2+\sqrt{2+2\cos 4\theta}} = \sqrt{2-2\cos 2\theta}$

$= \sqrt{2(1-\cos 2\theta)} = \sqrt{2 \cdot 2\sin^2\theta} = 2\sin\theta$

6) If $\tan 40 = \lambda$ then $\frac{\tan 140 - \tan 130^\circ}{1+\tan 140 \tan 130} =$

1) $\frac{1-\lambda^2}{\lambda}$ 2) $\frac{1+\lambda}{\lambda}$ 3) $\frac{1+\lambda^2}{2\lambda}$ 4) $\frac{1-\lambda^2}{2\lambda}$

Hint $\frac{\tan 140 - \tan 130}{1+\tan 140 \cdot \tan 130} = \frac{\tan(180-40) - \tan(90+40)}{1+\tan(180-40)\tan(90+40)}$

$= \frac{-\tan 40 + \cot 40}{1+\tan 40 \cot 40}$

$= \frac{-\lambda + \frac{1}{\lambda}}{1+\lambda \cdot \frac{1}{\lambda}} = \frac{\frac{-\lambda^2+1}{\lambda}}{2}$

$= \frac{1-\lambda^2}{2\lambda}$

7) $\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \dots + \cos 179^\circ =$

1) 0 2) 1 3) -1 4) 89.

Hint: $\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \dots \cos 89 + \cos 90^\circ + \cos(180-89) + \cos(180-88) \dots + \cos(180-1)$

$= \cancel{\cos 1^\circ} + \cancel{\cos 2^\circ} + \cos 3^\circ + \dots \cancel{\cos 89} + \cos 90^\circ - \cancel{\cos 89} - \cancel{\cos 88} \dots - \cancel{\cos 1}$

$= 0 + 0 + \dots + 0 + 0 + \dots + 0$

$= 0$

8) Let $f_k(x) = \frac{1}{k}[\sin^k x + \cos^k x]$ where $x \in R$, $k \ge 1$ then $f_4(x) - f_6(x) =$

1) $\frac{1}{4}$ 2) $\frac{1}{12}$ 3) $\frac{1}{6}$ 4) $\frac{1}{3}$

$f_4(x) - f_6(x) = \frac{1}{4}[\sin^4 x + \cos^4 x] - \frac{1}{6}[\sin^6 x + \cos^6 x]$

$= \frac{1}{4}\left[(\sin^2 x)^2 + (\cos^2 x)^2\right] - \frac{1}{6}\left[(\sin^2 x)^3 + (\cos^2 x)^3\right]$

$= \frac{1}{4}\left[(\sin^2 x + \cos^2 x)^2 - 2\cos^2 x \sin^2 x\right] - \frac{1}{6}\left[(\sin^2 x + \cos^2 x)^3 - 3\sin^2 x \cos^2 x (\sin^2 x + \cos^2 x)\right]$

$= \frac{1}{4}\left[1 - 2\sin^2 x \cos^2 x\right] - \frac{1}{6}\left[1 - 3\sin^2 x \cos^2 x\right]$

$= \frac{1}{4} - \frac{1}{2}\cancel{\sin^2 x \cos^2 x} - \frac{1}{6} + \frac{1}{2}\cancel{\sin^2 x \cos^2 x})$

$= \frac{1}{4} - \frac{1}{6} : \frac{3-2}{12} = \frac{1}{12}$

9) which of the following is not True:

1) $\sin\theta = -3/4$ 2) $\cos\theta = -1$ 3) $\tan\theta = 25$ 4) $\sec\theta = \frac{1}{4}$

Hint: $\because -1 \le \sin\theta \le 1, -1 \le \cos\theta \le +1, -\infty < \tan\theta < \infty$

$-\infty < \cot\theta < \infty, -1 \le \sec\theta \ge 1, -1 \le \csc\theta \ge 1$

$\sec\theta = \frac{1}{4}$ is not true.

10) $\cos 2\theta \cos 2\varphi + \sin^2(\theta - \varphi) - \sin^2(\theta + \varphi)$ is equal to

1) $\sin 2(\theta+\varphi)$ 2) $\cos 2(\theta+\varphi)$ 3) $\sin 2(\theta-\varphi)$ 4) $\cos 2(\theta-\varphi)$

Hint: $\cos 2\theta \cos 2\varphi + \sin^2(\theta-\varphi) - \sin^2(\theta+\varphi)$

$= \cos 2\theta \cos 2\varphi + \sin(\theta - \cancel{\varphi} + \theta + \cancel{\varphi}) \sin(\cancel{\theta} - \varphi - \cancel{\theta} - \varphi)$

$= \cos 2\theta \cos 2\varphi + \sin 2\theta \sin(-2\varphi)$

$= \cos 2\theta \cos 2\varphi - \sin 2\theta \sin 2\varphi$

$= \cos(2\theta + 2\varphi) = \cos 2(\theta + \varphi)$

11) $\frac{\sin(A-B)}{\cos A \cos B} + \frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A}$ is

1) $\sin A + \sin B + \sin C$ 2) 1, 3) 0 4) $\cos A + \cos B + \cos C$

Hint: $\frac{\sin A \cos B - \cos A \sin B}{\cos A \cos B} + \frac{\sin B \cos C - \cos B \sin C}{\cos B \cos C} + \frac{\sin C \cos A - \cos C \sin A}{\cos C \cos A}$

$= \cancel{\tan A} - \cancel{\tan B} + \cancel{\tan B} - \cancel{\tan C} + \cancel{\tan C} - \cancel{\tan A}$

$= 0$

12) If $\cos p\theta + \cos q\theta = 0$, $p \ne q$ then θ is equal to (n is any integer)

1) $\frac{n(3n+1)}{p-q}$ 2) $\frac{\pi(2n+1)}{p \pm q}$ 3) $\frac{\pi(n \pm 1)}{p \pm q}$ 4) $\frac{\pi(n+2)}{p+q}$

Hint $\cos p\theta + \cos q\theta = 0$

$$2\cos\frac{(p+q)\theta}{2}\cos\frac{(p-q)\theta}{2} = 0$$

$$\cos\left(\frac{p+q}{2}\right)\theta\cos\left(\frac{p-q}{2}\right)\theta = 0$$

$$\Rightarrow \cos\left(\frac{p+q}{2}\right)\theta = 0 = \cos\pi/2$$

$$\frac{p+q}{2}\cdot\theta = \left(2n\pi \pm \frac{\pi}{2}\right)$$

$$\theta = \frac{2\left(2n\pi \pm \frac{\pi}{2}\right)}{p+q}.$$

$$\cos\left(\frac{p-q}{2}\right)\theta = 0 = \cos\pi/2$$

$$\frac{p-q}{2}\theta = 2n\pi \pm \frac{\pi}{2}$$

$$\theta = \frac{2\cdot(2n\pi \pm \pi/2)}{p-q}$$

$$\theta = \frac{\pi(4n\pm1)}{p\pm q}$$

13) If $\tan\alpha$ and $\tan\beta$ are the roots of $x^2+ax+b=0$ then $\frac{\sin(\alpha+\beta)}{\sin\alpha\sin\beta}$ is equal to 1) $\frac{b}{a}$ 2) a/b 3) $-a/b$ 4) $-b/a$.

Hint: SR: $\tan\alpha+\tan\beta = -a$

PR: $\tan\alpha\tan\beta = b$

$$\frac{\sin(\alpha+\beta)}{\sin\alpha\sin\beta} = \frac{\sin\alpha\cos\beta+\cos\alpha\sin\beta}{\sin\alpha\sin\beta}$$

$$= \frac{\tan\alpha+\tan\beta}{\tan\alpha\tan\beta} = \frac{-a}{b}$$ ∴ Nr and Dr by $\cos\alpha\cos\beta$

14) In a $\triangle$le ABC $\sin^2A+\sin^2B+\sin^2C = 2$ then the $\triangle$le is
1) equilateral $\triangle$le 2) isosceles $\triangle$le 3) right $\triangle$le 4) Scalene $\triangle$le.

Hint: Given $\sin^2A+\sin^2B+\sin^2C = 2$

$$\Rightarrow \sin^2A+\sin^2B+\sin^2C-2 = 0$$

But we know $\sin^2A+\sin^2B+\sin^2C = 2+2\cos A\cos B\cos C$

$$\sin^2A+\sin^2B+\sin^2C-2 = 2\cos A\cos B\cos C$$

$$0 = 2\cos A\cos B\cos C.$$

$$0 = \cos A\cos B\cos C \Rightarrow \cos A = 0$$

$$\Rightarrow \angle A = 90^\circ$$

$$\Rightarrow A+B+C = \pi$$

These are all not necessary only for verification.

$$A = \pi-(B+C)$$

$$\cos A = \cos(\pi-\overline{B+C}) = -\cos(B+C) = 0$$

$$\cos(B+C) = 0.$$

$$\cos B\cos C - \sin B\sin C = 0$$

$$\sin B\sin C = \cos B\cos C$$

$$\frac{\sin B}{\cos B} = \frac{\cos C}{\sin C} \Rightarrow \tan B = \tan\left(\frac{\pi}{2}-C\right)$$

$$B+C = \pi/2$$

15. $f(\theta) = |\sin\theta| + |\cos\theta|$, $\theta \in R$ then $f(\theta)$ is in the interval

1. $[0,2]$ 2) $[1, \sqrt{2}]$ 3) $[1,2]$ 4) $[0,1]$

as per Book answer.

16) $\dfrac{\cos 6x + 6\cos 4x + 15\cos 2x + 10}{\cos 5x + 5\cos 3x + 10\cos x}$ is equal to

1) $\cos 2x$ 2) $\cos x$ 3) $\cos 3x$ 4) $2\cos x$

Hint: $\dfrac{\cos 6x + 6\cos 4x + 15\cos 2x + 10\cos 0x}{\cos 5x + 5\cos 3x + 10\cos x}$

$= \dfrac{(\cos 6x + \cos 4x) + 5(\cos 4x + \cos 2x) + 10(\cos 2x + \cos 0x)}{\cos 5x + 5\cos 3x + 10\cos x}$

$= \dfrac{2\cos 5x \cos x + 5(\cos 3x \cdot \cos x) + 10\cos x \cdot \cos x}{\cos 5x + 5\cos 3x + 10\cos x}$

$= \dfrac{2\cos x\,(\cancel{\cos 5x + 5\cos 3x + 10\cos x})}{\cancel{\cos 5x + 5\cos 3x + 10\cos x}}$

$= 2\cos x$

17) The triangle of maximum area with constant perimeter 12 m

1) is an equilateral $\triangle$le with side 4m 2) is an isosceles $\triangle$le with sides 2m, 5m, 5m

3) is a triangle with sides 3m, 4m, 5m 4) Does not exist.

Note Page-142 TB For a fixed perimeter the equilateral $\triangle$le has maximum area with sides $a = b = c$. and also area is given by $\Delta = \dfrac{s^2}{3\sqrt{3}}$ sq. units. Where $2s = a + b + c$.

18) A wheel is spinning at 2 radians/second. How many seconds will it take to make 10 complete rotations.

1) 10π seconds 2) 20π seconds 3) 5π seconds 4) 15π seconds.

2 radian for 1 sec.

20π radian for: $\dfrac{1}{\cancel{2}} \times \cancel{20}^{10}\pi = 10\pi$ seconds.

Note: For 10 rounds $10 \times 2\pi = 20\pi$ radians.

19) If $\sin\alpha + \cos\alpha = b$ then $\sin 2\alpha$ is equal to

1) $b^2 - 1$ if $b \le 2$ 2) $b^2 - 1$ if $b > \sqrt{2}$ 3) $b^2 - 1$ if $b \ge 1$ 4) $b^2 - 1$ if $b \ge \sqrt{2}$

20) In a Δle ABC if

1) $\sin A/2 \sin B/2 \sin C/2 > 0$

2) $\sin A \sin B \sin C > 0$ then

1) Both (i) and (ii) are correct. 2) only (i) is correct 3) only (ii) is correct 4) Neither (i) Nor (ii) is True.

Hint: Suppose any one of $\sin A$, $\sin A/2$ - - - - are zero then $\angle A = 0$ we cannot construct such a Δle.

Trigonometric Eqn.	General Solution.
I 1. $\sin\theta = 0$	$\theta = n\pi \quad n \in Z$
2) $\cos\theta = 0$	$\theta = (2n+1)\frac{\pi}{2} \quad n \in Z$
3) $\tan\theta = 0$	$\theta = n\pi \quad n \in Z$.
II 1) $\sin\theta = \sin\alpha$	$\theta = n\pi + (-1)^n\alpha \quad n \in Z$.
2) $\cos\theta = \cos\alpha$	$\theta = 2n\pi \pm \alpha \quad n \in Z$.
3) $\tan\theta = \tan\alpha$	$\theta = n\pi + \alpha \quad n \in Z$.
III 1) $\left.\begin{array}{l}\sin^2\theta = \sin^2\alpha \\ \cos^2\theta = \cos^2\alpha \\ \tan^2\theta = \tan^2\alpha\end{array}\right\}$	$\theta = n\pi \pm \alpha$. $n \in Z$.

IV The Equation $a\cos\theta + b\sin\theta = c$ is solvable for $|c| \le \sqrt{a^2+b^2}$.

1. $\cos x \cdot \cos 2x \cdot \cos 2^2x \cdot \cos 2^3x \cdots \cos 2^{n-1}x = \dfrac{\sin 2^n x}{2^n \sin x}$.

2. $\sin x \sin(\pi/3 - x) \sin(\pi/3 + x) = \frac{1}{4}\sin 3x$

3. $\cos x \cos(\frac{\pi}{3} - x) \cos(\pi/3 + x) = \frac{1}{4}\cos 3x$.

Values: $\sin 18^\circ = \dfrac{\sqrt{5}-1}{4} = \cos 72^\circ$, $\sin 36^\circ = \dfrac{\sqrt{5}+1}{4} = \cos 54$

$\cos 18^\circ = \dfrac{\sqrt{10+2\sqrt{5}}}{4} = \sin 72^\circ$, $\cos 36 = \dfrac{\sqrt{10-2\sqrt{5}}}{4} = \sin 54$.

$-\sqrt{a^2+b^2} \le a\sin x + b\cos x \le \sqrt{a^2+b^2}$

(ie) The max. value of $a\sin x + b\cos x = \sqrt{a^2+b^2}$ and min. value of $a\sin x + b\cos x = -\sqrt{a^2+b^2}$. $0 \le \sin^2 x \le 1$, $0 \le \cos^2 x \le 1$

Other Collections.

1. Degree measure of an angle of π radians is

1) $90°$ 2) ✓ $180°$ 3) $\frac{180}{\pi}$ 4) none of these

π radian $= 180°$

2. If the length of the chord of a circle is equal to that of the radius of the circle then the angle subtended, in radians at the centre of the circle by the chord is

1) 1 2) $\pi/2$ 3) ✓ $\pi/3$ 4) $\pi/4$.

From the diag: $\pi/3$.

3) The length of an arc of a circle of radius r which subtends an angle of 1 radian at the centre of the circle.

1) ✓ r 2) $\pi/2$ 3) $r/2$ 4) $\frac{2r}{\pi}$

By the definition of radian it is r.

(i.e) The length of the arc which is equal to radius subtends the angle at the centre is known as one radian.

4) $\tan x$ is defined for all x in R

1) R 2) $R - \{n\pi : n \in I\}$ 3) ✓ $R - \{(2n+1)\pi/2 : n \in I\}$ 4) none of these

$\tan x = \frac{\sin x}{\cos x}$ is defined for all real except these for which $\cos x = 0$

(i.e) for all $R - \{(2n+1)\pi/2\}$.

5) $\cot x$ is defined for all x in R.

1) R 2) ✓ $R - \{n\pi : n \in I\}$ 3) $R - \{(2n+1)\pi/2 : n \in I\}$ 4) none of these

$\cot x = \frac{\cos x}{\sin x}$ is define for all real except these for which $\sin x = 0$

(i.e) For $R - n\pi$

6) which of the following is not correct

1) $\sin\theta = -1/5$ 2) $\cos\theta = 1$ 3) ✓ $\sec\theta = 1/2$ 4) $\tan\theta = 20$

$-1 \le \sin\theta \le 1$ $-1 \le \cos\theta \le 1$, $-\infty \le \tan\theta \le \infty$, $-1 \le \sec\theta \ge 1$ $-1 \le \operatorname{cosec}\theta \ge 1$

$\therefore$ $\sec\theta = 1/2$ is not correct.

7) If $\tan\theta = -\frac{4}{3}$ then $\sin\theta$ is

1) $-\frac{4}{5}$ but not $4/5$ 2) $-4/5$ or $4/5$ 3) $4/5$ but not $-4/5$ 4) non of these

$\tan\theta$: -ve $\therefore$ θ lies in II or IV $\sin\theta$ is +ve in II and -ve in IV

$\therefore$ $\sin\theta = \pm 4/5$.

8) The value of $\tan 1^\circ \tan 2^\circ \tan 3^\circ \cdots \tan 89^\circ$ is

1) 0 2) 1 3) 1/2 4) non of these

Hint
$(\tan 1 \tan 89)(\tan 2 \cdot \tan 88) \cdots \tan(44)\tan(46)\cdot \tan 45^\circ$

$= (\tan 1 \cdot \cot 1)(\tan 2 \cdot \cot 2) \cdots \tan 44\ \cot 44 \cdot \tan 45$

$= 1 \cdot 1 \cdot 1 \cdots 1 \cdot 1 = 1.$

9) The maximum and minimum values of $\sin^4\theta + \cos^4\theta$ are

1) 0, 2 2) 1, 1/2 3) −1, 1 4) none of these.

Hint
$\sin^4\theta + \cos^4\theta = [(\sin^2\theta) + (\cos^2\theta)]^2 - 2\sin^2\theta\cos^2\theta$

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

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

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

As $0 \le \sin^2 2\theta \le 1$

$0 \ge -\frac{1}{2}\sin^2 2\theta \ge -1/2$

$1+0 \ge 1 - \frac{1}{2}\sin^2 2\theta \ge 1 - 1/2$

$1 \ge \sin^4\theta + \cos^4\theta \ge 1/2$

10) Max value of $\sin x + \cos x$

a) 1 2) 2 3) $\sqrt{2}$ 4) $\frac{1}{\sqrt{2}}$

Hint $(\sin x + \cos x)^2 = \sin^2 x + \cos^2 x + 2\sin x \cos x$

$= 1 + 2\sin x \cos x$

$= -1+1 \le 1 + \sin 2x \le 1+1$

$= 0 \le 1 + \sin 2x \le 2$

$(\sin x + \cos x)^2 \le 2$

$|\sin x + \cos x| \le \sqrt{2}$

11) which of the following is correct.

1) $\sin 1^\circ > \sin 1$ 2) $\sin 1^\circ < \sin 1$ 3) $\sin 1^\circ = \sin 1$ 4) $\sin 1 = \frac{\pi}{180}\sin 1.$

12) The value of $\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \cdots + \cos 179^\circ + \cos 180^\circ$

1) 0 2) 1 3) −1 4) 2.

$(\cos 1 + \cos 179) + (\cos 2 + \cos 178) \cdots (\cos 89 + \cos 91) + \cos 90 + \cos 180^\circ$

$= (\cos 1 - \cos 1) + (\cos 2 - \cos 2) \cdots (\cos 89 - \cos 89) + \cos 90 + \cos 180$

$= 0 + 0 + \cdots 0 + 0 - 1 = -1$

12) The minimum value of $3\cos x + 4\sin x + 8$ is

1) 5 2) 9 3) 7 4) 3.

Minimum value of $a\cos x + b\sin x = -\sqrt{a^2+b^2}$

Hint " $3\cos x + 4\sin x = -\sqrt{9+16} = -5$

$\therefore$ Minimum value of. $3\cos x + 4\sin x + 8 = -5+8$
$= 3.$

13) If $5\sin\theta = 3$ Then $\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta}$ is equal to

1) $1/4$ 2) 4 3) 2 4) none of these

Hint: $5\sin\theta = 3$
$\sin\theta = 3/5$

$$\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = \frac{\frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta}}{\frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta}}$$

$$= \frac{1+\sin\theta}{1-\sin\theta} = \frac{1+3/5}{1-3/5}$$

$$= \frac{8/\cancel{5}}{2/\cancel{5}} = 4$$

$= 4.$

14) The value of $\tan\frac{\pi}{8} \cdot \tan\frac{3\pi}{8}$ is

1) 0 2) 1 3) $1/2$ 4) non of these

Hint: $\tan\frac{\pi}{8} \cdot \tan\left(\frac{3\pi}{8}\right) = \tan\frac{\pi}{8} \tan\left(\frac{\pi}{2} - \frac{\pi}{8}\right)$

$= \tan\frac{\pi}{8} \cdot \cot\pi/8$

$= 1$

15) If $\tan\theta = 1/2$ and $\tan\varphi = 1/3$ Then the value of $\theta + \varphi$

1) $\pi/6$ 2) π 3) 0 4) $\frac{\pi}{4}$.

$$\tan(\theta+\varphi) = \frac{\tan\theta + \tan\varphi}{1 - \tan\theta\tan\varphi} = \frac{\frac{1}{2}+\frac{1}{3}}{1-\frac{1}{2}\cdot\frac{1}{3}} = \frac{\frac{5}{6}}{5/6}$$

Hint

$= 1$

$\theta + \varphi = \tan^{-1}(1) = \pi/4$

16) The value of $\frac{1-\tan^2 15}{1+\tan^2 15}$. a) $\frac{\sqrt{3}}{2}$ 2) 1 3) $1/2$ 4) $\sqrt{3}$

Hint = $\cos 2A = \frac{1-\tan^2 A}{1+\tan^2 A}$ $\therefore$ $\frac{1-\tan^2 15}{1+\tan^2 15} = \cos(2\times 15) = \cos 30$
$= \sqrt{3}/2$

17) $\tan 3A - \tan 2A - \tan A$ is equal to

1) $-\tan 3A \tan 2A \tan A$ 2) $\tan A \tan 2A \tan 3A$

3) $\tan A \tan 2A - \tan 2A \tan 3A - \tan 3A \tan A$.

4) non of these

Hint $3A = 2A + A$

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

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

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

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

18) Minimum value of $\sin^6\theta + \cos^6\theta$ is

1) 0 2) 1 3) $\frac{1}{2}$ 4) $\frac{1}{4}$

Hint $\sin^6\theta + \cos^6\theta = (\sin^2\theta)^3 + (\cos^2\theta)^3$

$$= (\sin^2\theta + \cos^2\theta)^3 - 3\sin^2\theta\cos^2\theta(\sin^2\theta + \cos^2\theta)$$

$$= 1 - 3\sin^2\theta\cos^2\theta$$

$$= 1 - \frac{3}{4}(4\sin^2\theta\cos^2\theta)$$

$$= 1 - \frac{3}{4}(2\sin\theta\cos\theta)^2$$

$$= 1 - 3/4(\sin 2\theta)^2$$

As $0 \le \sin^2 2\theta \le 1$

$$0 \le \frac{3}{4}\sin^2 2\theta \le \frac{3}{4}$$

$$0 \ge -\frac{3}{4}\sin^2 2\theta \ge -3/4$$

$$1 \ge 1 - \frac{3}{4}\sin^2 2\theta \ge 1 - \frac{3}{4}$$

$$1 \ge 1 - \frac{3}{4}\sin^2 2\theta \ge 1/4$$

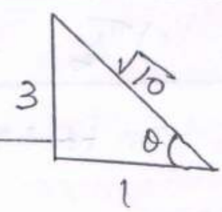
$\therefore$ Minimum value is $1/4$

19) If $\tan\theta = 3$ and θ lies in the third quadrant then the value of $\sin\theta$ is

1) $\frac{1}{\sqrt{10}}$ 2) $-\frac{1}{\sqrt{10}}$ 3) $-\frac{3}{\sqrt{10}}$ 4) $\frac{3}{\sqrt{10}}$.

$\sin\theta = \frac{3}{\sqrt{10}}$ $\because \theta$ lies in the third quadrant

$$\sin\theta = -\frac{3}{\sqrt{10}}$$



20) The value of $\tan 75^\circ - \cot 75^\circ$ is equal to

1) 1 2) $2+\sqrt{3}$ 3) $2-\sqrt{3}$ 4) $2\sqrt{3}$

$$\tan 75^\circ = \frac{\sqrt{3}+1}{\sqrt{3}-1} \quad \cot 75^\circ = \frac{\sqrt{3}-1}{\sqrt{3}+1}$$

$$\therefore \tan 75^\circ - \cot 75^\circ = \frac{\sqrt{3}+1}{\sqrt{3}-1} - \frac{\sqrt{3}-1}{\sqrt{3}+1} = \frac{(\sqrt{3}+1)^2 - (\sqrt{3}-1)^2}{(\sqrt{3}-1)(\sqrt{3}+1)}$$

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

21) Period of $\tan x$ is 1) $\pi/2$ 2) 2π 3) π 4) 4π

22) The value of $\sin(45+\theta)-\cos(45-\theta)$ is

1) $2\cos\theta$ 2) $2\sin\theta$ 3) 1 4) 0.

Hint $\sin(45+\theta)-\sin(90-(45-\theta))$

$=\sin(45+\theta)-\sin(45+\theta)$

$=0$

23) The value of $\sin\frac{\pi}{10}\sin\frac{13\pi}{10}$ is 1) $1/2$ 2) $1/4$ 3) $-1/4$ 4) $-1/2$

Hint: $\sin\frac{\pi}{10}\sin\left(\pi+\frac{3\pi}{10}\right)$

$=\sin\frac{\pi}{10}\left(-\sin\frac{3\pi}{10}\right)$

$=-\sin\frac{\pi}{10}\sin\frac{\pi}{5}=-\left(\frac{\sqrt{5}-1}{4}\right)\left(\frac{\sqrt{5}+1}{4}\right)$

$=-\frac{(5-1)}{16}=\frac{-4}{16}=-1/4$

$\sin\frac{\pi}{10}=\sin18^\circ=\frac{\sqrt{5}-1}{4}$

$\cos\frac{\pi}{5}=\cos36=\frac{\sqrt{5}+1}{4}$

$\sin\frac{3\pi}{10}=\sin\left(\frac{\pi}{2}-\frac{\pi}{5}\right)=\cos\pi/5$

24) The value of $\sin50-\sin70+\sin10$ is equal to

1) 1 2) 0 3) $1/2$ 4) 2

Hint: $\sin50+\sin10-\sin70$

$=2\sin30\cos20-\sin(90-20)$

$=2\sin30\cos20-\cos20$

$=\cos20(2\sin30-1)$

$=\cos20\left(2\cdot\frac{1}{2}-1\right)=0$

25) If $\alpha+\beta=\pi/4$ $(1+\tan\alpha)(1+\tan\beta)=$

1) 1 2) 2 c) -2 d) none of these

Book problem.

26) The value of $\cos^2 48-\sin^2 12$ is

1) $\frac{\sqrt{5}+1}{2\sqrt{2}}$ 2) $\frac{\sqrt{5}-1}{8}$ 3) $\frac{\sqrt{5}+1}{8}$ 4) $\frac{\sqrt{5}+1}{5}$

$\cos(A+B)\cdot\cos(A-B)=\cos^2A-\sin^2B.$

$\cos36^\circ=\frac{\sqrt{5}+1}{4}.$

$\cos^2 48-\sin^2 12=\cos60\cdot\cos36$

$=\frac{1}{2}\cdot\frac{\sqrt{5}+1}{4}=\frac{\sqrt{5}+1}{8}$

27) $\sin^2\frac{\pi}{8}+\sin^2\frac{3\pi}{8}+\sin^2\frac{5\pi}{8}+\sin^2\frac{7\pi}{8}$ is

1) 2 2) 1 3) 0 4) none of these.

Hint: $\sin^2\frac{5\pi}{8} = \sin^2\left(\frac{\pi}{2}+\frac{\pi}{8}\right) = \cos^2\frac{\pi}{8}$

$\sin^2\frac{7\pi}{8} = \sin^2\left(\pi/2 + \frac{3\pi}{8}\right) = \cos^2 3\pi/8$

$\therefore \sin^2\frac{\pi}{8} + \sin^2\frac{3\pi}{8} + \cos^2\frac{\pi}{8} + \cos^2 3\pi/8 = 1+1 = 2$

28) $8\sin\frac{x}{8}\cos\frac{x}{2}\cos\frac{x}{4}\cos\frac{x}{8}$ is equal to

1) $8\sin x$ 2) $\sin x$ 3) $\cos x$ 4) $8\cos x$.

Hint: $\left(2\sin\frac{x}{8}\cos\frac{x}{8}\right)\left(\cos\frac{x}{4}\cos\frac{x}{2}\right)$

$= \left(\sin\frac{2x}{\cancel{8}4}\right)\left(4\cos\frac{x}{4}\cos x/2\right) = \left(2\sin\frac{x}{4}\cos\frac{x}{4}\right)2\cos x/2$

$= 2\sin x/2 \cos x/2$

$= \sin x$

29) The value of $\cos 12^\circ + \cos 84^\circ + \cos 156^\circ + \cos 132^\circ$ is equal to

1) $1/2$ 2) 1 3) $-1/2$ 4) $1/8$.

$\cos 132 + \cos 12 + \cos 156 + \cos 84$

$= 2\cos 72\ \cos 60 + 2\cos 120\ \cos 36$

$\cos 120 = \cos(180-60) = -\cos 60^\circ = -1/2$

$\cancel{2}\sin 18 \cdot \frac{1}{\cancel{2}} + \cancel{2}(-1/2)\cdot\cos 36$

$= \sin 18 - \cos 36$

$= \frac{\sqrt{5}-1}{4} - \frac{\sqrt{5}+1}{4} = \frac{-\cancel{2}}{\cancel{4}2} = -1/2$

30) The value of $\sin\frac{\pi}{18} + \sin\frac{\pi}{9} + \sin\frac{2\pi}{9} + \sin\frac{5\pi}{9}$ is given by

1) $\sin\frac{7\pi}{18} + \sin\frac{4\pi}{9}$ 2) 1 3) $\cos\frac{\pi}{6} + \cos\frac{3\pi}{7}$ 4) $\cos\frac{\pi}{9} + \sin\frac{\pi}{9}$.

Hint $= \sin 10 + \sin 20 + \sin 40 + \sin 50$

$= (\sin 50 + \sin 10) + (\sin 40 + \sin 20)$

$= \cancel{2\sin 30}\cos 20 + \cancel{2\sin 30}\cos 10$

$= \sin 70 + \sin 80$

$= \sin\frac{7\pi}{18} + \sin\frac{4\pi}{9}$.

31) The value of $\sin 20\sin 40\sin 60\sin 80 =$

1) $-\frac{3}{16}$ 2) $\frac{5}{16}$ 3) $\frac{1}{16}$ 4) $\frac{3}{16}$

Text Book problem.

32) The value of $\tan 81 - \tan 63 - \tan 27 + \tan 9$ is equal to

1) 1 2) 2 3) 3 4) 4.

Hint: $(\tan 81 + \tan 9) - (\tan 63 + \tan 27)$

$\tan\theta + \cot\theta = 2\operatorname{cosec} 2\theta$.

$\sin 18 = \frac{\sqrt{5}-1}{4}$

$\cos 36 = \frac{\sqrt{5}+1}{4}$.

$= (\tan 9 + \cot 9) - (\tan 27 + \cot 27)$

$= 2\operatorname{cosec} 18 - 2\operatorname{cosec} 54$

$= \frac{2}{\sin 18} - \frac{2}{\sin 54} = \frac{2\times 4}{\sqrt{5}-1} - 2\cdot\frac{4}{\sqrt{5}+1}$

$= \frac{2}{\sin 18} - \frac{2}{\cos 36} = \frac{8(\sqrt{5}+1) - 8(\sqrt{5}-1)}{4}$

$= \frac{16}{4} = 4$.

33) If $\cos(\alpha-\beta) + \cos(\beta-\gamma) + \cos(\gamma-\alpha) = -3/2$ then $\sin\alpha + \sin\beta + \sin\gamma$ is equal to

1) 0 2) 1 3) 2 4) none of these

Let $x = \sin\alpha + \sin\beta + \sin\gamma$.

$y = \cos\alpha + \cos\beta + \cos\gamma$

$x^2 + y^2 = (\sin\alpha + \sin\beta + \sin\gamma)^2 + (\cos\alpha + \cos\beta + \cos\gamma)^2$

$= 1 + 1 + 1 + 2\cos(\alpha-\beta) + 2\cos(\beta-\gamma) + 2\cos(\gamma-\alpha)$

$= 3 + 2(-3/2)$

$x^2 + y^2 = 0 \Rightarrow x = 0,\ y = 0.$

(ie) $\sin\alpha + \sin\beta + \sin\gamma = 0$.

34) If $a=2, b=3, c=5$ in a Δle ABC then $C =$

1) $\pi/6$ 2) $\pi/3$ 3) $\pi/2$ 4) non of these.

$c^2 = a^2 + b^2 - 2ab\cos C$.

$\Rightarrow \cos C = \frac{a^2+b^2-c^2}{2ab} = \frac{4+9-25}{2\times 2\times 3} = \frac{-12}{12} = -1$

$\cdot C = \cos^{-1}(-1) = \pi$ whic is not possible.

35) The angle between the hands of a clock at quarter past one

1) 60° 2) $52\frac{1}{2}^\circ$ 3) $\pi/3^c$ 4) none of these

Hint If the short hand were at 1 and long hand at 3, then the angle between them would have been $2 \times 30^\circ = 60^\circ$. In 15 minutes of hand the short have turns an angle of $\frac{15^\circ}{2} = 7.5^\circ$

Hence the angle between the hands $= 60 - 7.5$

$= 52\frac{1}{2}$

36) The value of $\cot 5^\circ \cot 10^\circ \ldots \cot 85^\circ$ is

1) 1 ✓ 2) $\frac{1}{\sqrt{2}}$ 3) $\frac{1}{2}$ 4) 0

Hint: $\cot 5 \cdot \cot 85 \cdot \cot 10 \cdot \cot 80 \ldots$ 9 sets. $\cot 45$

$= \cot 5\,(\cot 90-5) \cdot \cot 10 \cot (90-10) \ldots \cot 45$

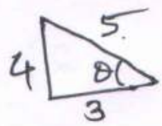
$= \cot 5 \cdot \tan 5 \cdot \cot 10 \cdot \tan 10 \ldots 1.$

$= 1 \cdot 1 \cdot 1 \ldots 1 = 1.$

37) If $\tan\theta = -4/3$ Then $\sin\theta$ is

1) $-4/5$ (or) but not $4/5$ 2) $-4/5$ or $4/5$ ✓

3) $4/5$ but not $-4/5$ none of these



Hint: As $\tan\theta > 0$ so θ lies either in 2nd or 4th quadrant

$\sin\theta > 0$ in 2nd $\sin\theta < 0$ in 4th quadrant

$\therefore -4/5$ (or) $4/5$

38) Find the value of $\log(\tan 1^\circ \tan 2^\circ \tan 3^\circ \ldots \tan 88 \cdot \tan 89)$.

Sol: $\log(\tan 1^\circ \tan 2^\circ \ldots \tan 89 \cdot \cancel{\tan 90})$

$\log(1 \cdot 1 \cdot 1 \cdot 1)$ Already done.

$= 0.$

39) If A, B, C, D are angles of a cyclic quadrilateral P.T

$\cos A + \cos B + \cos C + \cos D = 0.$

In a cyclic quadrilateral $A + C = 180^\circ$ $A = 180 - C$ $\cos A = \cos(180 - C)$ $= -\cos C$ $\cos A + \cos B = 0$	$B + D = 180$ $B = 180 - D.$ $\cos B = \cos(180 - D)$ $= -\cos D$ $\cos B + \cos D = 0 \Rightarrow \cos A + \cos B + \cos C + \cos D = 0.$

40. P.T $\sin^2\frac{2\pi}{3} + \cos^2\frac{5\pi}{6} - \tan\frac{3\pi}{4} = 1/2$

Hint: $\sin^2 120 + \cos^2 150^\circ - \tan^2 135^\circ$

$= \sin^2(180-60) + \cos^2(180-30) - \tan^2(180-45)$

$= \sin^2 60 - \cos^2 30 + \tan^2 45$

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

41) P.T 1) $\sin(45+A)\cos(45-B) + \cos(45+A)\sin(45-B) = \cos(A-B)$

2) $\cos(\frac{\pi}{4}-\theta)\cos(\frac{\pi}{4}-\varphi) - \sin(\frac{\pi}{4}-\theta)\sin(\frac{\pi}{4}-\varphi) = \sin(\theta+\varphi)$

Hint. 1) $\sin(45+A+45-B)$

$= \sin[90+(A-B)]$

$= \cos(A-B)$

2) $\cos(\frac{\pi}{4}-\theta+\frac{\pi}{4}-\varphi)$

$= \cos[\frac{\pi}{2}-(\theta+\varphi)]$

$= \sin(\theta+\varphi)$

42) The value of $\sin(45+\theta) - \cos(45-\theta)$ is

1) $2\cos\theta$ 2) $2\sin\theta$ 3) 1 4) 0.

Hint: $(\sin 45\cos\theta + \cos 45\sin\theta) - (\cos 45\cos\theta + \sin 45\sin\theta)$

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

$= 0$

43) The value of $\cot(\frac{\pi}{4}+\theta)\cot(\pi/4-\theta)$

1) -1 2) 0 3) 1 4) none of these

$= \frac{\cot\pi/4\cot\theta - 1}{\cot\pi/4 + \cot\theta} \cdot \frac{\cot\pi/4\cot\theta + 1}{\cot\theta - \cot\pi/4}$ $\cot(A+B) = \frac{\cot A\cot B - 1}{\cot A + \cot B}$

$= \frac{\cot\theta - 1}{1+\cot\theta} \times \frac{\cot\theta + 1}{\cot\theta - 1} = 1$

44) P.T. $\sin^2 6x - \sin^2 4x = \sin 2x\sin 10$

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

Find 3) $\cos^2 45^\circ - \sin^2 45$

1) $\sin^2 6x - \sin^2 4x = \sin(6x+4x)\cdot\sin(6x-4x)$

$= \sin 10x \sin 2x$

2) $\cos^2 2x - \cos^2 6x = (1-\sin^2 x) - (1-\sin^2 6x)$

$= \sin^2 6x - \sin^2 2x$

$= \sin 8x \cdot \sin 4x.$

3) $\cos^2 45 - \sin^2 15^\circ = \cos(45+15)\cos(45-15)$

$= \cos 60^\circ \cos 30^\circ$

$= \frac{1}{2}\cdot\frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}.$

45) 1) P.T $\tan\left(\frac{\pi}{4}+\theta\right)\tan(\pi/4-\theta) = 1$

2) $\tan(\pi/4+\theta)\tan\left(\frac{3\pi}{4}+\theta\right) = -1.$

Sol: 1) $\tan\left(\frac{\pi}{4}+\theta\right)\tan(\pi/4-\theta) = \frac{1+\tan\theta}{1-\tan\theta} \times \frac{1-\tan\theta}{1+\tan\theta} = 1$

2) $\tan(\pi/4+\theta)\tan\left(\frac{3\pi}{4}+\theta\right) = \tan\left(\frac{\pi}{4}+\theta\right)\tan\left[\pi/2+(\pi/4+\theta)\right]$

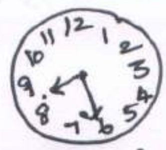
$= -\tan(\pi/4+\theta)\cot(\pi/4+\theta)$

$= -1$

46) The angle between the minute and hour hands of a clock at 8.30 is

1) 80° 2) 75° 3) 60° 4) 105°

If the short hand were at 8 and long hand were at 6 the angle between them $2\times 30^\circ = 60^\circ$

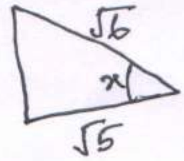


In thirty minutes the short hand have turns $\frac{30}{2} = 15^\circ$ $\therefore$ The angle between the two hands is $60+15 = 75^\circ.$

47) If $\tan x = -\frac{1}{\sqrt{5}}$ and x lies in IV quadrant then the value of $\cos x$ is

1) $\sqrt{5/6}$ 2) $2/\sqrt{6}$ 3) $1/2$ 4) $1/\sqrt{6}$.

Since x lies in the IV quadrant $\cos x$ is +ve $\therefore \cos x = \frac{\sqrt{5}}{\sqrt{6}} = \sqrt{5/6}$



48) which of the following is incorrect.

1) $\sin x = -\frac{1}{5}$ 2) $\cos x = 1$ 3) $\sec x = \frac{1}{2}$ 4) $\tan x = 20$

Hint

$-1 \le \sin x \le 1$, $-1 \le \cos x \le 1$, $-\infty < \tan x < \infty$, $-\infty < \cot x < \infty$

$\sec x \ge 1$, $\operatorname{cosec} \ge 1$, and $\sec x \le -1$ $\operatorname{cosec} x \le -1$

49) If $\tan A = \frac{a}{a+1}$ $\tan B = \frac{1}{2a+1}$ Then the value of $A+B$ is

1) 0 2) $\pi/2$ 3) $\pi/3$ 4) $\pi/4$

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} = \frac{\frac{a}{a+1} + \frac{1}{2a+1}}{1 - \frac{a}{a+1}\cdot\frac{1}{2a+1}}$$

$$= \frac{\frac{a(2a+1) + 1(a+1)}{\cancel{(a+1)(2a+1)}}}{\frac{(a+1)(2a+1) - a}{\cancel{(a+1)(2a+1)}}} = \frac{2a^2+a+a+1}{2a^2+\cancel{a}+2a+1-\cancel{a}}$$

$$= \frac{2a^2+2a+1}{2a+2a+1}$$

$$\tan(A+B) = 1$$

$$A+B = \pi/4$$

50) The value of $\sin^2\frac{5\pi}{12} - \sin^2\frac{\pi}{12}$ is

1) $1/2$ 2) $\frac{\sqrt{3}}{2}$ 3) 1 4) 0.

$$\sin^2 75 - \sin^2 15 = \cos^2 15 - \sin^2 15 \qquad \sin^2 75 - \sin^2 15$$

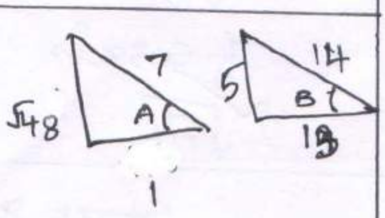
$$= \cos 30 \cdot \cos 0 \qquad \cos^2 A - \sin^2 A = \cos(A+B)\cos(A-B)$$

$$= \sqrt{3}/2 \cdot 1 = \sqrt{3}/2$$

51) $\cos A = \frac{1}{7}$ and $\cos B = \frac{13}{14}$ Then $A-B$ is

1) $\frac{\pi}{6}$ 2) $\pi/3$ 3) $\pi/4$ 4) $\frac{5\pi}{12}$

$\sin A = \frac{\sqrt{48}}{7}$ $\sin B = 5/14$



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

$$= \frac{\sqrt{48}}{7}\cdot\frac{13}{14} - \frac{1}{7}\cdot\frac{5}{14}.$$

$$= \frac{4\sqrt{3}\cdot 13 - 5}{98}$$

52) $\cos 35^\circ + \cos 85^\circ + \cos 155^\circ =$

1) 0 2) $\frac{1}{\sqrt{3}}$ 3) $\frac{1}{\sqrt{2}}$ 4) $\cos 275^\circ$.

$\cos 155 + \cos 35 + \cos 85$

$\cancel{2} \cos 95 \cancel{\cos 60} + \cos 85$

$= \cos 95 + \cos 85$

$= \cos(90+5) + \cos(90-5)$

$= -\sin 5 + \sin 5$

$= 0$

53) If the sides of a $\triangle$le are in the ratio $1:\sqrt{3}:2$ Then the measure of its greatest angle is

1) $\pi/6$ 2) $\pi/3$ 3) $\pi/2$ 4) $\frac{2\pi}{3}$ already done.

54) P.T $\tan 36^\circ + \tan 9^\circ + \tan 36 \tan 9 = 1$

$\tan 36^\circ + \tan 9 = 1 - \tan 36 \tan 9$.

$\frac{\tan 36 + \tan 9}{1 - \tan 36 \tan 9} = 1$

$\tan(36+9) = 1$

$\tan 45 = 1$.

55) Find the value of $\sin 22 \cos 38 + \cos 22 \sin 38^\circ$

$\sin 22 \cos 38 + \cos 22 \sin 38 = \sin(22+38)$
$= \sin 60^\circ = \sqrt{3}/2$

T. G. Venkatesan
9444209677.