(2)

(12)

Q. $\sin^2 42 - \cos^2 78^\circ = ?$

Ans →
$= -(\cos^2 A - \sin^2 B)$
$= -(\cos(A+B)\cdot\cos(A-B))$
$= -\cos 120^\circ \cdot \cos 36^\circ$
$= -\cos(90+30)\cdot\cos 36^\circ$
$= \sin 30^\circ \cdot \cos 36^\circ$
$= \frac{1}{2} \times \frac{\sqrt{5}+1}{4}$
$= \frac{\sqrt{5}+1}{8}$ Ans

Q. $3\sin 20 - 4\sin^3 20 = ?$

Ans → $3\sin x - 4\sin^3 x = \sin 3x$
$= \sin 60 = \frac{\sqrt{3}}{2}$

Q. $\sin^2\left(\frac{\pi}{8}+\frac{A}{2}\right) - \sin^2\left(\frac{\pi}{8}-\frac{A}{2}\right)$

A. $\sin(A+B)\cdot\sin(A-B)$
$= \sin\left(\frac{\pi}{8}+\frac{\pi}{8}\right)\sin\left(\frac{\pi}{8}+\frac{A}{2}-\frac{\pi}{8}+\frac{A}{2}\right)$
$= \sin\frac{\pi}{4}\cdot\sin A$
$= \frac{1}{\sqrt{2}}\sin A$ Ans

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$$\frac{\sin\theta_1 + \sin\theta_2 + \sin\theta_3 \cdots \sin\theta_n}{\cos\theta_1 + \cos\theta_2 + \cos\theta_3 \cdots \cos\theta_n} = \tan\frac{(\theta_1+\theta_2 \cdots n)}{n}$$

Ex ① $\frac{\sin x + \sin 2x + \sin 3x + \sin 4x}{\cos x + \cos 2x + \cos 3x + \cos 4x} = \tan\left(\frac{10x}{4}\right) = \tan\left(\frac{5x}{2}\right)$ Ans

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

Q. $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 = ?$

A. $= \left(2\cos\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2}\right)^2 + \left(2\sin\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2}\right)^2$

$= 4\cos^2\left(\frac{\alpha+\beta}{2}\right)\cos^2\frac{\alpha-\beta}{2} + 4\sin^2\frac{\alpha+\beta}{2}\cos^2\frac{\alpha-\beta}{2}$

$= 4\cos^2\left(\frac{\alpha-\beta}{2}\right)\underbrace{\left(\cos^2\frac{\alpha+\beta}{2} + \sin^2\frac{\alpha+\beta}{2}\right)}_{1} = 4\cos^2\left(\frac{\alpha-\beta}{2}\right)$ Ans

Q. $\dfrac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta} = ?$

Ans – $\dfrac{1+\tan\theta}{1-\tan\theta} = \tan\left(\dfrac{\pi}{4}+\theta\right)$

Q. $\dfrac{\sin(x+y)}{\sin(x-y)} = \dfrac{a+b}{a-b}$, then the ~~above~~ value of $\dfrac{\tan x}{\tan y}$ is

(a) a/b (b) b/a (c) $2a/b$ (d) $a/2b$

A. $\dfrac{\sin(x+y)+\sin(x-y)}{\sin(x+y)-\sin(x-y)} = \dfrac{a+\cancel{b}+a-\cancel{b}}{\cancel{a}+b-\cancel{a}+b}$ $\quad \dfrac{\text{अंश} + \text{हर}}{\text{अंश} - \text{हर}}$

$= \dfrac{\cancel{2}\sin x \cos y}{\cancel{2}\cos x \sin y} = \dfrac{a}{b}$

$= \dfrac{\tan x}{\tan y} = \dfrac{a}{b}$

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Q. If $\tan(\alpha+\beta) = p$ and $\tan(\alpha-\beta) = q$, then the value of 2β is –

A – $\tan(2\beta) = \tan\{(\alpha+\beta)-(\alpha-\beta)\}$

$= \dfrac{\tan(\alpha+\beta)-\tan(\alpha-\beta)}{1+\tan(\alpha+\beta)\tan(\alpha-\beta)} = \dfrac{p-q}{1+pq}$ Ans

Q. If $\tan\alpha = m\tan\beta$, then $\dfrac{\sin(\alpha-\beta)}{\sin(\alpha+\beta)} = ?$

A – $\dfrac{\tan\alpha}{\tan\beta} = \dfrac{m}{1}$ $\quad \dfrac{\sin\alpha\cos\beta}{\cos\alpha\sin\beta} = \dfrac{m}{1}$ $\quad \dfrac{\text{अंश} + \text{हर}}{\text{अंश} - \text{हर}}$

~~$\dfrac{\tan\alpha + \tan\beta}{\tan\alpha}$~~