CLASSMATE

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L.H.S = R.H.S

Converse of product formulae

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

(1). $\sin A\cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$

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

$\cos A\sin B = \frac{1}{2}[\sin(A+B) - \sin(A-B)]$

3. $\cos(A+B) + \cos(A-B) = 2\cos A\cos B$.

$\cos A\cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$

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

$\sin A\sin B = -\frac{1}{2}[\cos(A+B) - \cos(A-B)]$

Q.1 $\sin 5x\cos 3x$ as a sum or differnac

$\sin 5x\cos 3x = \frac{1}{2}[\sin(5x+3x) + \sin(5x-3x)]$

$= \frac{1}{2}(\sin 8x + \sin 2x)$

Q.2. $\cos 3\alpha\cos\alpha$ as a sum or differenale

$\cos 3\alpha\cos\alpha = \frac{1}{2}[\cos(3\alpha+\alpha) + \cos(3\alpha-\alpha)]$

$= \frac{1}{2}(\cos 4\alpha + \cos 2\alpha)$

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3. Show that $\sin 10 \sin 50 \sin 70 = 1/8$

$\sin 10[-1/2(\cos 120 - \cos 20)]$

$\sin 10[-1/2(\cos(90+30) - \cos 20)]$

$\sin 10[-1/2(-\sin 30 - \cos 20)]$

$\sin 10[-1/2(-1/2 - \cos 20)]$

$\sin 10[1/4 + 1/2 \cos 20]$

$\frac{1}{4}\sin 10 + \frac{1}{2}\sin 10 \cos 20$

$\frac{1}{4}\sin 10 + 1/2[1/2(\sin 30 + \sin -10)]$

$\frac{1}{4}\sin 10 + 1/2[1/2(1/2 - \sin 10)]$

$\frac{1}{4}\sin 10 + 1/2[1/4 - 1/2 \sin 10]$

$\frac{1}{4}\sin 10 + 1/8 - 1/4 \sin 10$

$= 1/8$ //

4. Show that $\cos 55 + \cos 65 + \cos 175 = 0$

$= \cos 55 + 2\cos\frac{65+175}{2}\cos\frac{65-175}{2}$

$= \cos 55 + 2\cos\frac{240}{2}\cos-\frac{110}{2}$

$= \cos 55 + 2\cos 120 \cos(-55)$

$= \cos 55 + 2\cos 120 \cos 55$

$= \cos 55(1 + 2\cos 120)$

$= \cos 55(1 + 2\cos(90+30))$

$= \cos 55(1 - 2\sin 30)$

$= \cos 55 (1 - 2 \times 1/2)$

$= \cos 55 (1-1)$

$= 0$

Q. Prove that $\sin 20 \sin 40 \sin 80 = \sqrt{3}/8$.

$\sin 20 [-1/2 (\cos 120 - \cos -40)]$

$\sin 20 [-1/2 (\cos 120 - \cos 40)]$

$\sin 20 [-1/2 (-\sin 30 - \cos 40)]$

$= \sin 20 [\frac{1}{2} \sin 30^\circ + 1/2 \cos 40^\circ]$

$= \sin 20 [1/2 \times 1/2 + \frac{1}{2} \cos 40^\circ]$

$= \frac{1}{4} \sin 20 + \frac{1}{2} \sin 20 \cos 40^\circ$.

$= \frac{1}{4} \sin 20 + \frac{1}{2} (1/2 [\sin 60 + \sin(-20)])$

$= \frac{1}{4} \sin 20 + \frac{1}{4} \times \sqrt{3}/2 + \frac{-1}{4} \sin 20$

$= \sqrt{3}/8$

Workout problems

1. Prove that $\frac{\cos 3A - \cos A}{\sin A - \sin 3A} = \tan 2A$
2. Prove that $\frac{\sin A + \sin 3A + \sin 5A}{\cos A + \cos 3A + \cos 5A} = \tan 3A$
3. Prove that $\sin 50 - \sin 70 + \sin 10 = 0$.
4. Prove that $\cos 80 + \cos 40 - \cos 20 = 0$
5. Prove that $\cos 20 \cos 40 \cos 80 = 1/8$