



LEMBAR KERJA PESERTA DIDIK

Rumus Perkalian Sinus dan Cosinus

Nama Kelompok :
Kelas :

Identitas

Mata Pelajaran : Matematika Peminatan
Satuan Pendidikan : SMAN 1 Bawang
Materi Pokok : Rumus Perkalian Sinus dan Cosinus
Kelas/Semester : XI MIPA/1
Guru : Amanda Rossi Pratiwi, S.Pd.

Tujuan

Menentukan rumus perkalian sinus dan cosinus

ANGGOTA KELOMPOK :

1. _____
2. _____
3. _____
4. _____

Indikator

3.2.9 Menentukan rumus perkalian sinus dan cosinus

Amanda Rossi Pratiwi, S.Pd.

A. Petunjuk

1. Bacalah baik-baik petunjuk kegiatan yang diberikan
2. Kerjakan langkah-langkah kegiatan sesuai petunjuk kerja.
3. Jika mengalami kesulitan dalam melakukan kegiatan, dapat bertanya kepada Guru.
4. Selamat mengerjakan dengan rasa senang dan gembira.
5. Presentasikanlah hasil diskusi didepan kelas.

B. Uraian Materi



Kegiatan

Menentukan Perkalian Sinus dan Cosinus

1. Jumlahkan rumus $\sin(\alpha + \beta)$ dan $\sin(\alpha - \beta)$!

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\sin(\alpha + \beta) + \sin(\alpha - \beta) = \dots\dots\dots +$$

$$\frac{1}{2} \{ \sin(\alpha + \beta) + \sin(\alpha - \beta) \} = \dots\dots\dots \cos B$$

$$\dots\dots\dots = \frac{1}{2} \{ \dots\dots\dots + \sin(A - B) \}$$

Jadi, rumus yang diperoleh adalah:

$$\sin \alpha \cos \beta = \frac{1}{2} \{ \dots\dots\dots + \dots\dots\dots \}$$



2. Kurangkan rumus $\sin(\alpha + \beta)$ dan $\sin(\alpha - \beta)$!

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta \quad \underline{\hspace{1cm} - \hspace{1cm}}$$

$$\sin(\alpha + \beta) - \sin(\alpha - \beta) = \dots\dots\dots$$

$$\frac{1}{2} \{ \sin(\alpha + \beta) - \sin(\alpha - \beta) \} = \cos A \dots\dots\dots$$

$$\dots\dots\dots = \frac{1}{2} \{ \sin(A + B) - \dots\dots\dots \}$$

Jadi, rumus yang diperoleh adalah:

$$\cos \alpha \sin \beta = \frac{1}{2} \{ \dots\dots\dots - \dots\dots\dots \}$$

3. Jumlahkan rumus $\cos(\alpha + \beta)$ dan $\cos(\alpha - \beta)$!

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta \quad \underline{\hspace{1cm} + \hspace{1cm}}$$

$$\cos(\alpha + \beta) + \cos(\alpha - \beta) = \dots\dots\dots$$

$$\frac{1}{2} \{ \cos(\alpha + \beta) + \cos(\alpha - \beta) \} = \dots\dots\dots \cos B$$

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

Jadi, rumus yang diperoleh adalah:

$$\cos \alpha \cos \beta = \frac{1}{2} \{ \dots\dots\dots + \dots\dots\dots \}$$

4. Kurangkan rumus $\cos(\alpha + \beta)$ dan $\cos(\alpha - \beta)$!

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\cos(\alpha + \beta) - \cos(\alpha - \beta) = \dots\dots\dots$$

$$-\frac{1}{2}\{\cos(\alpha + \beta) - \cos(\alpha - \beta)\} = \sin A \dots\dots\dots$$

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

Jadi, rumus yang diperoleh adalah:

$$\sin \alpha \sin \beta = -\frac{1}{2}\{\dots\dots\dots - \dots\dots\dots\}$$



Contoh Soal

1. Tentukan nilai dari $\sin 75^\circ \cos 15^\circ$ adalah.....

Penyelesaian :

$$\begin{aligned}\sin 75^\circ \cos 15^\circ &= \frac{1}{2} \{ \sin(75^\circ + 15^\circ) + \sin(75^\circ - 15^\circ) \} \\ &= \frac{1}{2} (\sin 90^\circ + \sin 60^\circ) \\ &= \frac{1}{2} \left(1 + \frac{1}{2} \sqrt{3} \right) \\ &= \frac{1}{2} + \frac{1}{4} \sqrt{3}\end{aligned}$$

2. Tentukan nilai dari $6 \sin 7,5^\circ \sin 127,5^\circ$ adalah.....

Penyelesaian :

$$\begin{aligned}6 \sin 7,5^\circ \sin 127,5^\circ &= -\frac{1}{2} \times 6 \{ \cos(7,5^\circ + 127,5^\circ) - \cos(7,5^\circ - 127,5^\circ) \} \\ &= -3 \{ \cos 135^\circ - \cos(-120^\circ) \} \\ &= -3 \left(-\frac{1}{2} \sqrt{2} - \left(-\frac{1}{2} \right) \right) \\ &= -3 \left(-\frac{1}{2} \sqrt{2} + \frac{1}{2} \right) \\ &= \frac{3}{2} \sqrt{2} - \frac{3}{2}\end{aligned}$$

Catatan:

$$\cos(-\beta) = \cos \beta$$

$$\sin(-\beta) = -\sin \beta$$





Latihan Soal

1. Tentukan nilai $8 \sin 22,5^\circ \cos 112,5^\circ$!

$$= 8 \times \frac{1}{2} [\sin(A + B) + \sin(A - B)]$$

$$= 8 \times \frac{1}{2} [\sin(\dots^\circ + \dots^\circ) + \sin(\dots^\circ - \dots^\circ)]$$

$$= \dots [\sin(135^\circ) + \sin(-\dots^\circ)]$$

$$= 4 \left[\frac{1}{2}\sqrt{2} - \dots \right]$$

$$= 2\sqrt{2} - \dots$$

2. Tentukan nilai $12 \cos 37,5^\circ \sin 7,5^\circ$!

$$= 12 \times \frac{1}{2} [\sin(A + B) - \sin(A - B)]$$

$$= 12 \times \frac{1}{2} [\sin(\dots^\circ + \dots^\circ) - \sin(\dots^\circ - \dots^\circ)]$$

$$= \dots [\sin \dots^\circ + \sin 30^\circ]$$

$$= \dots \left[\frac{1}{2}\sqrt{2} - \frac{1}{2} \right]$$

$$= 3\sqrt{2} - \dots$$



Kegiatan Akhir

Berdasarkan kegiatan 1, 2, dan 3 kita dapatkan rumus perkalian sinus, cosinus dan tangen

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

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

$$3. \cos A \cos B = \frac{1}{2} \{ \cos(A+B) + \dots\dots\dots \}$$

$$4. \sin A \sin B = -\frac{1}{2} \{ \cos(\dots + \dots) - \cos(A-B) \}$$

$$5. \tan A \tan B = -\frac{\cos(A+B) - \cos(A-B)}{\cos(A+B) + \cos(A-B)}$$

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