

LKPD

TRIGONOMETRI

IDENTITAS TRIGONOMETRI



NAMA :

KELAS :

IDENTITAS LEMBAR KERJA PESERTA DIDIK

Mata Pelajaran : Matematika

Fase/Kelas : E/X

Materi : Identitas Trigonometri

Tujuan Pembelajaran

1. Peserta didik dapat mengingat identitas trigonometri dasar (C1)
2. Peserta didik dapat menerapkan identitas trigonometri untuk menyederhanakan ekspresi trigonometri sederhana (C3)
3. Peserta didik dapat menganalisis langkah-langkah pembuktian identitas trigonometri menggunakan rasio dasar atau identitas lain (C4)

Petunjuk Pengerjaan

1. Baca soal dengan cermat;
2. Gunakan jaringan internet untuk mengakses Liveworksheet;
3. Kerjakan soal secara berurutan;
4. Kerjakan soal secara individu.



Perhatikan video youtube berikut!



Buktikan setiap identitas trigonometri berikut

1. $(1 + \tan^2 x)(1 - \cos^2 x) = \tan^2 x$

Gunakan identitas dasar:

$$1 + \tan^2 x = \sec^2 x$$

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

$$(1 + \tan^2 x)(1 - \cos^2 x) = \tan^2 x$$

$$\sec^2 x \cdot \sin^2 x = \tan^2 x$$

$$\left(\frac{1}{\cos^2 x} \right) \cdot \sin^2 x = \tan^2 x$$

$$\frac{\sin^2 x}{\cos^2 x} = \tan^2 x$$

Terbukti $(1 + \tan^2 x)(1 - \cos^2 x) = \tan^2 x$

$$2. \frac{1 - \cos^2 x}{\sin^2 x - 1} = 1 - \sec^2 x$$

• Ruas kiri

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

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

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

• Ruas Kanan

$$1 - \sec^2 x = 1 - \frac{1}{\cos^2 x} = \frac{\cos^2 x - 1}{\cos^2 x} = -\frac{\sin^2 x}{\cos^2 x} = -\tan^2 x$$

$$\text{Terbukti } \frac{1 - \cos^2 x}{\sin^2 x - 1} = 1 - \sec^2 x$$

$$3. \frac{\cos \alpha}{1 - \sin \alpha} - \frac{\cos \alpha}{1 + \sin \alpha} = 2 \tan \alpha$$

Samakan penyebutnya terlebih dahulu,

$$\frac{\cos \alpha (1 + \sin \alpha) - \cos \alpha (1 - \sin \alpha)}{(1 - \sin \alpha)(1 + \sin \alpha)} = 2 \tan \alpha$$

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

$$\frac{\cos \alpha (2 \sin \alpha)}{2 \sin^2 \alpha} = 2 \tan \alpha$$

$$\frac{\sin \alpha}{\cos \alpha} = 2 \tan \alpha$$

$$2 \tan \alpha = 2 \tan \alpha$$

$$\text{Terbukti } \frac{\cos \alpha}{1 - \sin \alpha} - \frac{\cos \alpha}{1 + \sin \alpha} = 2 \tan \alpha$$

$$4. \sin^2 \alpha (1 + \cot^2 \alpha) = 1$$

Gunakan identitas dasar:

$$\cot^2 \alpha + 1 = \csc^2 \alpha$$

Sehingga:

$$\sin^2 \alpha \cdot \frac{1}{\sin^2 \alpha} = 1$$

$$\text{Terbukti } \sin^2 \alpha (1 + \cot^2 \alpha) = 1$$

$$5. (\sin \theta + \cos \theta)^2 - 2 \tan \theta \cos^2 \theta = 1$$

Langkah 1:

Gunakan rumus berikut:

$$(\alpha + b)^2 = \alpha^2 + 2ab + b^2$$

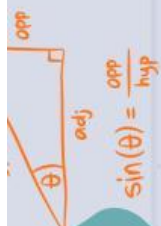
$$(\sin \theta + \cos \theta)^2 = \sin^2 \theta + 2 \sin \theta \cos \theta + \cos^2 \theta$$

Gunakan identitas dasar:

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

Maka:

$$(\sin \theta + \cos \theta)^2 = 1 + 2 \sin \theta \cos \theta$$



$$\frac{x}{a} + \frac{y}{b} = 1$$

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

Langkah 2:

Ubah $\tan \theta$ jadi $\sin \theta$ dan $\cos \theta$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

Maka:

$$2 \tan \theta \cos^2 \theta = 2 \cdot \frac{\sin \theta}{\cos \theta} \cdot \cos^2 \theta = 2 \cdot \sin \theta \cdot \cos \theta$$

Langkah 3:

$$(\sin \theta + \cos \theta)^2 - 2 \tan \theta \cos^2 \theta = 1$$

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

=

$$\text{Terbukti } (\sin \theta + \cos \theta)^2 - 2 \tan \theta \cos^2 \theta = 1$$

