

## Lembar Kerja Peserta Didik (LKPD)

**Mapel** : Matematika  
**Materi** : Limit Fungsi Trigonometri  
**Kelas / Semester** : XII MIPA .... / Ganjil  
**Tahun Ajaran** : 2024 / 2025  
**Alokasi Waktu** : 60 menit

Nama Anggota kelompok :

1. ....
2. ....
3. ....
4. ....
5. ....
6. ....



### Tujuan Pembelajaran :

Melalui kegiatan diskusi dan pembelajaran kelompok dalam pembelajaran **Limit Fungsi Trigonometri**. Diharapkan peserta didik dapat :

1. Memahami dan menentukan penyelesaian limit fungsi trigonometri
2. Menyelesaikan masalah berkaitan dengan limit fungsi trigonometri.

### Petunjuk :

1. Berdoalah sebelum mengerjakan LKPD
2. Tuliskan nama anggota kelompok dan kelas kalian
3. Kerjakan soal-soal yang tersedia
5. Tanyakan hal-hal yang kurang jelas kepada guru
6. Diskusikan pertanyaan-pertanyaan yang terdapat dalam LKPD dengan teman kelompokmu.

### Kegiatan 1.

Untuk mengetahui rumus limit fungsi trigonometri, lengkapi tabel berikut ini :

1.  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = \dots$

| x    | -3 | -2 | -1 | -0.5 | -0.1 | ... | 0 | ... | 0.1 | 0.5 | 1 | 2 | 3 |
|------|----|----|----|------|------|-----|---|-----|-----|-----|---|---|---|
| f(x) |    |    |    |      |      |     |   |     |     |     |   |   |   |

2.  $\lim_{x \rightarrow 0} \frac{\tan x}{x} = \dots$

| x    | -3 | -2 | -1 | -0.1 | -0.05 | ... | 0 | ... | 0.05 | 0.1 | 1 | 2 | 3 |
|------|----|----|----|------|-------|-----|---|-----|------|-----|---|---|---|
| f(x) |    |    |    |      |       |     |   |     |      |     |   |   |   |

3.  $\lim_{x \rightarrow 0} \frac{\cos x}{x} = \dots$

| x    | -3 | -2 | -1 | -0.1 | -0.01 | ... | 0 | ... | 0.01 | 0.1 | 1 | 2 | 3 |
|------|----|----|----|------|-------|-----|---|-----|------|-----|---|---|---|
| f(x) |    |    |    |      |       |     |   |     |      |     |   |   |   |

Kesimpulan :

$$1. \lim_{x \rightarrow 0} \frac{\sin x}{x} = \dots$$

$$3. \lim_{x \rightarrow 0} \frac{\cos x}{x} = \dots$$

$$2. \lim_{x \rightarrow 0} \frac{\tan x}{x} = \dots$$

Kegiatan 2

### Sifat-Sifat Limit Fungsi

1.  $\lim_{x \rightarrow c} k \cdot f(x) = k \cdot \lim_{x \rightarrow c} f(x)$
2.  $\lim_{x \rightarrow c} (f(x) \pm g(x)) = \lim_{x \rightarrow c} f(x) \pm \lim_{x \rightarrow c} g(x)$
3.  $\lim_{x \rightarrow c} (f(x) \cdot g(x)) = \lim_{x \rightarrow c} f(x) \cdot \lim_{x \rightarrow c} g(x)$
4.  $\lim_{x \rightarrow c} \frac{f(x)}{g(x)} = \frac{\lim_{x \rightarrow c} f(x)}{\lim_{x \rightarrow c} g(x)}$
5.  $\lim_{x \rightarrow c} (f(x))^n = \left( \lim_{x \rightarrow c} f(x) \right)^n$
6.  $\lim_{x \rightarrow c} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x \rightarrow c} f(x)}$



Dengan menggunakan sifat-sifat limit, tentukan :

$$1. \lim_{x \rightarrow 0} \frac{x}{\sin x} = \dots$$

Penyelesaian :

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{x}{\sin x} &= \lim_{x \rightarrow 0} \frac{1}{\frac{\sin x}{x}} \\ &= \frac{\lim_{x \rightarrow 0} 1}{\lim_{x \rightarrow 0} \frac{\sin x}{x}} = \frac{1}{\dots} = \dots \end{aligned}$$

$$2. \lim_{x \rightarrow 0} \frac{x}{\tan x} = \dots$$

Penyelesaian :

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{x}{\tan x} &= \lim_{x \rightarrow 0} \frac{1}{\frac{\tan x}{x}} \\ &= \frac{\lim_{x \rightarrow 0} 1}{\lim_{x \rightarrow 0} \frac{\tan x}{x}} = \frac{1}{\dots} = \dots \end{aligned}$$

$$3. \lim_{x \rightarrow 0} \frac{\sin 3x}{3x} = \dots$$

KESIMPULAN :

$$1. \lim_{x \rightarrow 0} \frac{x}{\sin x} = \dots$$

$$2. \lim_{x \rightarrow 0} \frac{x}{\tan x} = \dots$$

Penyelesaian :

Misal  $3x = y$ , jika  $x \rightarrow 0$ , maka  $y \rightarrow \dots$

Sehingga

$$\lim_{x \rightarrow 0} \frac{\sin 3x}{3x} = \lim_{y \rightarrow \dots} \frac{\sin y}{\dots} = \dots$$

$$4. \lim_{x \rightarrow 0} \frac{\tan 2x}{2x} = \dots$$

Penyelesaian :

Misal  $2x = y$ , jika  $x \rightarrow 0$ , maka  $y \rightarrow \dots$

Sehingga

$$\lim_{x \rightarrow 0} \frac{\tan 2x}{2x} = \lim_{y \rightarrow \dots} \frac{\dots}{\dots} = \dots$$

$$5. \lim_{x \rightarrow 0} \frac{\sin 3x}{5x} = \dots$$

Penyelesaian :

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{\sin 3x}{5x} &= \lim_{x \rightarrow 0} \frac{\sin 3x}{5x} \cdot \frac{3x}{3x} \\ &= \lim_{x \rightarrow 0} \frac{\sin 3x}{3x} \cdot \frac{3x}{\dots} \\ &= \lim_{x \rightarrow 0} \frac{\sin 3x}{3x} \cdot \lim_{x \rightarrow 0} \frac{3x}{\dots} \\ &= 1 \cdot \frac{\dots}{\dots} = \frac{\dots}{\dots} \end{aligned}$$

$$6. \lim_{x \rightarrow 0} \frac{\tan 2x}{3x} = \dots$$

Penyelesaian :

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{\tan 2x}{3x} &= \lim_{x \rightarrow 0} \frac{\tan 2x}{3x} \cdot \frac{\dots}{\dots} \\ &= \lim_{x \rightarrow 0} \frac{\tan 2x}{\dots} \cdot \frac{\dots}{\dots} \\ &= \lim_{x \rightarrow 0} \frac{\tan 2x}{\dots} \cdot \lim_{x \rightarrow 0} \frac{\dots}{\dots} \\ &= \dots \cdot \frac{\dots}{\dots} = \frac{\dots}{\dots} \end{aligned}$$

$$7. \lim_{x \rightarrow 0} \frac{\tan 5x}{\sin 2x} = \dots$$

Penyelesaian :

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{\tan 5x}{\sin 2x} &= \lim_{x \rightarrow 0} \frac{\tan 5x}{\sin 2x} \cdot \frac{5x}{\dots} \cdot \frac{\dots}{2x} \\ &= \lim_{x \rightarrow 0} \frac{\tan 5x}{\dots} \cdot \frac{\dots}{\sin 2x} \cdot \frac{\dots}{\dots} \\ &= \lim_{x \rightarrow 0} \frac{\tan 5x}{\dots} \cdot \lim_{x \rightarrow 0} \frac{\dots}{\sin 2x} \cdot \lim_{x \rightarrow 0} \frac{\dots}{\dots} \\ &= 1 \cdot 1 \cdot \frac{\dots}{\dots} = \frac{\dots}{\dots} \end{aligned}$$

KESIMPULAN :

$$3. \lim_{x \rightarrow 0} \frac{\sin ax}{ax} = \dots$$

$$4. \lim_{x \rightarrow 0} \frac{\tan ax}{ax} = \dots$$

$$5. \lim_{x \rightarrow 0} \frac{ax}{\sin ax} = \dots$$

$$6. \lim_{x \rightarrow 0} \frac{ax}{\tan ax} = \dots$$

$$7. \lim_{x \rightarrow 0} \frac{\sin ax}{bx} = \dots$$

$$8. \lim_{x \rightarrow 0} \frac{\tan ax}{bx} = \dots$$

$$9. \lim_{x \rightarrow 0} \frac{\sin ax}{\tan bx} = \dots$$

$$10. \lim_{x \rightarrow 0} \frac{\tan ax}{\sin bx} = \dots$$