

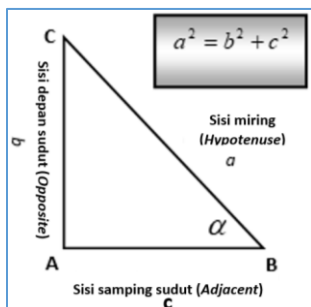
TRIGONOMETRI

PERBANDINGAN TRIGONOMETRI



Perbandingan trigonometri

menyatakan rasio antara panjang sisi-sisi dalam segitiga siku-siku.



PERBANDINGAN TRIGONOMETRI

SINUS

1. Sinus α merupakan perbandingan antara sisi depan sudut α (AC) dan sisi miring (BC).

$$\sin \alpha = \frac{AC}{BC}$$

2. Sinus α memiliki kebalikan yang disebut cosecan α .

$$\csc \alpha = \frac{1}{\sin \alpha} = \frac{BC}{AC}$$

PERBANDINGAN TRIGONOMETRI

COSINUS

1. Cosinus α merupakan hasil perbandingan antara sisi mendatar atau samping

sudut α (AB) dan sisi miring (BC).

$$\cos \alpha = \frac{AB}{BC}$$

2. Cosinus α memiliki kebalikan yang disebut secan α .

$$\sec \alpha = \frac{1}{\cos \alpha} = \frac{BC}{AB}$$

PERBANDINGAN TRIGONOMETRI

TANGEN

1. Tangen α merupakan hasil perbandingan antara sisi depan sudut α (AC) dan sisi samping sudut α (AB).

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha} = \frac{AC}{AB}$$

2. Tangen α memiliki kebalikan yang disebut cotangen α .

$$\cot \alpha = \frac{1}{\tan \alpha} = \frac{\cos \alpha}{\sin \alpha} = \frac{AB}{AC}$$

NILAI PERBANDINGAN TRIGONOMETRI UNTUK SUDUT-SUDUT ISTIMEWA

1. Kuadran I

α	0° 0	30° $\frac{\pi}{6}$	45° $\frac{\pi}{4}$	60° $\frac{\pi}{3}$	90° $\frac{\pi}{2}$
$\sin \alpha$	0	$\frac{1}{2}$	$\frac{1}{2}\sqrt{2}$	$\frac{1}{2}\sqrt{3}$	1
$\cos \alpha$	1	$\frac{1}{2}\sqrt{3}$	$\frac{1}{2}\sqrt{2}$	$\frac{1}{2}$	0

$\tan \alpha$	0	$\frac{1}{3}\sqrt{3}$	1	$\sqrt{3}$	~
$\cot \alpha$	~	$\sqrt{3}$	1	$\frac{1}{3}\sqrt{3}$	0
$\sec \alpha$	1	$\frac{2}{3}\sqrt{3}$	$\sqrt{2}$	2	~
$\csc \alpha$	~	2	$\sqrt{2}$	$\frac{2}{3}\sqrt{3}$	1

2. Kuadran II

α	120° $\frac{2\pi}{3}$	135° $\frac{3\pi}{4}$	150° $\frac{5\pi}{6}$	180° π
$\sin \alpha$	$\frac{1}{2}\sqrt{3}$	$\frac{1}{2}\sqrt{2}$	$\frac{1}{2}$	0
$\cos \alpha$	$-\frac{1}{2}$	$-\frac{1}{2}\sqrt{2}$	$-\frac{1}{2}\sqrt{3}$	-1
$\tan \alpha$	$-\sqrt{3}$	-1	$-\frac{1}{3}\sqrt{3}$	0
$\cot \alpha$	$-\frac{1}{3}\sqrt{3}$	-1	$-\sqrt{3}$	~
$\sec \alpha$	-2	$-\sqrt{2}$	$-\frac{2}{3}\sqrt{3}$	-1
$\csc \alpha$	$\frac{2}{3}\sqrt{3}$	$\sqrt{2}$	2	~

3. Kuadran III

α	210° $\frac{7\pi}{6}$	225° $\frac{5\pi}{4}$	240° $\frac{4\pi}{3}$	270° $\frac{3\pi}{2}$
$\sin \alpha$	$-\frac{1}{2}$	$-\frac{1}{2}\sqrt{2}$	$-\frac{1}{2}\sqrt{3}$	-1
$\cos \alpha$	$-\frac{1}{2}\sqrt{3}$	$-\frac{1}{2}\sqrt{2}$	$-\frac{1}{2}$	0
$\tan \alpha$	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	~
$\cot \alpha$	$\sqrt{3}$	1	$\frac{1}{3}\sqrt{3}$	1
$\sec \alpha$	$-\frac{2}{3}\sqrt{3}$	$-\sqrt{2}$	-2	~
$\csc \alpha$	-2	$-\frac{2}{3}\sqrt{3}$	$-\frac{2}{3}\sqrt{3}$	-1

4. Kuadran IV

α	300° $\frac{5\pi}{3}$	315° $\frac{7\pi}{4}$	330° $\frac{11\pi}{6}$	360° 2π
$\sin \alpha$	$-\frac{1}{2}\sqrt{3}$	$-\frac{1}{2}\sqrt{2}$	$-\frac{1}{2}$	0
$\cos \alpha$	$\frac{1}{2}$	$\frac{1}{2}\sqrt{2}$	$\frac{1}{2}\sqrt{3}$	1

$\tan \alpha$	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0
$\cot \alpha$	$-\frac{1}{3}\sqrt{3}$	-1	$-\sqrt{3}$	~
$\sec \alpha$	2	$\sqrt{2}$	$\frac{2}{3}\sqrt{3}$	1
$\csc \alpha$	$-\frac{2}{3}\sqrt{3}$	$-\sqrt{2}$	-2	~

RELASI SUDUT DALAM KUADRAN

1. **Kuadran 1** memiliki rentang sudut dari 0° – 90° dengan nilai sinus, cosinus dan tangen positif.

α	Kuadran I
$\sin \alpha$	$\cos (90^\circ - \alpha)$
$\cos \alpha$	$\sin (90^\circ - \alpha)$
$\tan \alpha$	$\cotan (90^\circ - \alpha)$
$\csc \alpha$	$\sec (90^\circ - \alpha)$
$\sec \alpha$	$\csc (90^\circ - \alpha)$
$\cot \alpha$	$\cot (90^\circ - \alpha)$

2. **Kuadran 2** memiliki rentang sudut dari 90° – 180° dengan nilai cosinus dan tangen negatif, sinus positif.

α	Kuadran II
$\sin \alpha$	$\sin (180^\circ - \alpha)$
$\cos \alpha$	$-\cos (180^\circ - \alpha)$
$\tan \alpha$	$-\tan (180^\circ - \alpha)$
$\csc \alpha$	$\csc (180^\circ - \alpha)$
$\sec \alpha$	$-\sec (180^\circ - \alpha)$
$\cot \alpha$	$-\cot (180^\circ - \alpha)$

3. **Kuadran 3** memiliki rentang sudut dari 180° – 270° dengan nilai sinus dan cosinus negatif, tangen positif.

α	Kuadran III
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$\sin \alpha$	$-\sin (180^\circ + \alpha)$
$\cos \alpha$	$-\cos (180^\circ + \alpha)$
$\tan \alpha$	$\tan (180^\circ + \alpha)$
$\csc \alpha$	$-\csc (180^\circ + \alpha)$
$\sec \alpha$	$-\sec (180^\circ + \alpha)$
$\cot \alpha$	$\cot (180^\circ + \alpha)$

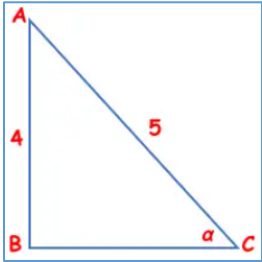
4. **Kuadran 4** memiliki rentang sudut dari $270^\circ - 360^\circ$ dengan nilai sinus dan tangen negatif, cosinus positif.

α	Kuadran IV
$\sin \alpha$	$-\sin (360^\circ - \alpha)$
$\cos \alpha$	$\cos (360^\circ - \alpha)$
$\tan \alpha$	$-\tan (360^\circ - \alpha)$
$\csc \alpha$	$-\csc (360^\circ - \alpha)$
$\sec \alpha$	$\sec (360^\circ - \alpha)$
$\cot \alpha$	$-\cot (360^\circ - \alpha)$

Contoh:

1. Jika nilai $\sin \alpha = \frac{4}{5}$, berapakah nilai $\cos \alpha$?

Penyelesaian:



Teorema Pythagoras:

$$BC = \sqrt{AC^2 - AB^2}$$

$$BC = \sqrt{5^2 - 4^2}$$

$$BC = \sqrt{25 - 16}$$

$$BC = \sqrt{9}$$

$$BC = 3$$

Nilai $\cos \alpha$:

$$\cos \alpha = \frac{BC}{AC}$$

$$\cos \alpha = \frac{3}{5}$$

Jadi, nilai $\cos \alpha = \frac{3}{5}$.

2. Diketahui P merupakan sudut lancip. Jika $\tan P = \frac{5\sqrt{11}}{11}$, maka nilai $\sin P = \dots$

Penyelesaian:

Ket:

de = depan

sa = samping

mi = miring

$$\tan P = \frac{5\sqrt{11}}{11} = \frac{de}{sa}$$

Teorema Pythagoras:

$$mi = \sqrt{(de)^2 + (sa)^2}$$

$$mi = \sqrt{(5\sqrt{11})^2 + (11)^2}$$

$$mi = \sqrt{275 + 121}$$

$$mi = \sqrt{396}$$

$$mi = 6\sqrt{11}$$

Nilai $\sin P$:

$$\sin P = \frac{de}{mi} = \frac{5\sqrt{11}}{6\sqrt{11}} = \frac{5}{6}$$

Jadi, nilai $\sin P = \frac{5}{6}$

3. Hitunglah nilai dari:

- a. $\sin 120^\circ$
- b. $\cos 135^\circ$
- c. $\tan 150^\circ$
- d. $\csc 240^\circ$
- e. $\sec 225^\circ$
- f. $\cot 210^\circ$

Penyelesaian:

- a. $\sin 120^\circ = \sin(180^\circ - 60^\circ)$
 $\Rightarrow \sin 120^\circ = \sin 60^\circ$
 Jadi, $\sin 120^\circ = \frac{1}{2}\sqrt{3}$
- b. $\cos 135^\circ = \cos(180^\circ - 45^\circ)$
 $\Rightarrow \cos 135^\circ = -\cos 45^\circ$
 Jadi, $\cos 135^\circ = -\frac{1}{2}\sqrt{2}$
- c. $\tan 150^\circ = \tan(180^\circ - 30^\circ)$
 $\Rightarrow \tan 150^\circ = -\tan 30^\circ$
 Jadi, $\tan 150^\circ = -\frac{1}{3}\sqrt{3}$
- d. $\csc 240^\circ = \csc(180^\circ + 60^\circ)$
 $\Rightarrow \csc 240^\circ = -\csc 60^\circ$
 Jadi, $\csc 240^\circ = -\frac{2}{3}\sqrt{3}$
- e. $\sec 225^\circ = \sec(180^\circ + 45^\circ)$
 $\Rightarrow \sec 225^\circ = -\sec 45^\circ$
 Jadi, $\sec 225^\circ = -\sqrt{2}$
- f. $\cot 210^\circ = \cot(180^\circ + 30^\circ)$
 $\Rightarrow \cot 210^\circ = \cot 30^\circ$
 Jadi, $\cot 210^\circ = \sqrt{3}$