

Student Workbook

Graphs of the Other Trigonometric Functions

Name: _____

Date: _____

Period: _____

Learning Target: I can find the period and vertical asymptotes of tangent, cotangent, secant, and cosecant, and graph their transformations.

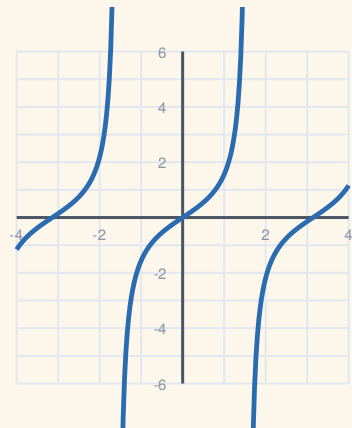
Vocabulary

Term	Meaning
Vertical Asymptote	A vertical line the graph approaches but never crosses, where the function is undefined.
Period (tan/cot)	$\pi/ B $ — HALF the period of sine/cosine for the same B.
Period (sec/csc)	$2\pi/ B $ — the same period formula as sine/cosine.

Key Concept: Tangent & Cotangent Graphs

$y = \tan(x)$: period π , asymptotes at $x = \pi/2 + n\pi$ Unlike sine/cosine, tangent and cotangent have NO amplitude — their range is all real numbers.

EXAMPLE 1



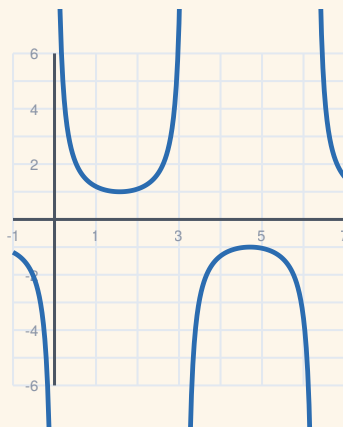
$y = \tan(x)$

Period: π . Vertical asymptotes at $x = \pm\pi/2, \pm3\pi/2, \dots$

Key Concept: Secant & Cosecant Graphs

$\sec(x) = 1/\cos(x)$, $\csc(x) = 1/\sin(x)$ Asymptotes occur exactly where the reciprocal function (cos or sin) equals ZERO.

EXAMPLE 2



$y = \csc(x)$ (asymptotes where $\sin(x)=0$)

Period: 2π . Vertical asymptotes at $x = 0, \pi, 2\pi, \dots$

COMMON MISTAKE

The period formula for $\tan/\cot$ is $\pi/|B|$, NOT $2\pi/|B|$ like sine and cosine! Using the wrong formula is the most common error in this chapter.

Key Concept: Finding Asymptotes After a Shift

EXAMPLE 3

Find the vertical asymptotes of $y = \sec(x - \pi/4)$.

$$\cos(x - \pi/4) = 0 \rightarrow x - \pi/4 = \pi/2 + n\pi \rightarrow x = \underline{\hspace{2cm}}$$

Guided Practice — Part A: Period of Tangent & Cotangent

A1 Find the period of $y = \tan(3x)$.

A2 Find the period of $y = \cot(x/2)$.

Guided Practice — Part B: Asymptotes of Tangent & Cotangent

- B1** Find the vertical asymptotes of $y = \tan(x)$ on $[0, 2\pi)$.

- B2** Find the vertical asymptotes of $y = \cot(x - \pi/4)$ (list two consecutive ones).

Guided Practice — Part C: Secant & Cosecant

- C1** Find the period of $y = \sec(2x)$.

- C2** Find the vertical asymptotes of $y = \csc(x)$ on $[0, 2\pi)$.

Guided Practice — Part D: Transformations

- D1** Describe the transformation of $y = 2\tan(x) - 1$ from the parent $y = \tan(x)$.

- D2** Describe the transformation of $y = \sec(x) + 3$ from the parent $y = \sec(x)$.

BEFORE YOU MOVE ON

Check with a partner: did you use $\pi/|B|$ for $\tan/\cot$ period, and $2\pi/|B|$ for $\sec/\csc$ period?