**Topic 7.5 Exponential Models**

## Essential Question:

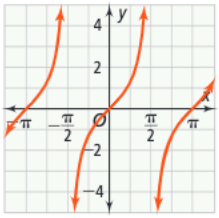
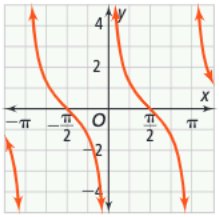
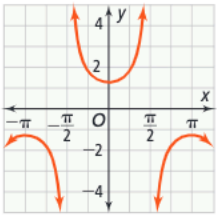
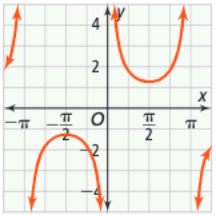
***How do key features of one trigonometric function relate to key features of other trigonometric functions?***

## Explore & Reason

Complete online.

## CONCEPT Summary

**CONCEPT SUMMARY** Graph Ratios and Reciprocals of Sine and Cosine

| | Tangent and Cotangent | | Secant and Cosecant | |
|---|---|---|---|---|
| **ALGEBRA** | $y = \tan x = \frac{\sin x}{\cos x}$ | $y = \cot x = \frac{\cos x}{\sin x}$ | $y = \sec x = \frac{1}{\cos x}$ | $y = \csc x = \frac{1}{\sin x}$ |
| **GRAPHS** |  |  |  |  |
| **KEY FEATURES** | • Zeros in denominators ⇔ vertical asymptotes<br>• tan $x$ increasing; cot $x$ decreasing<br>• Period = $\pi$ | | • Zeros in denominators ⇔ vertical asymptotes<br>• Sign of reciprocal matches sign of denominator<br>• Period = $2\pi$ | |

Q: How can you use transformations to describe the graph of $y = \cot x$, given the graph of $y = \tan x$? To describe the graph of $y = \csc x$, given the graph of $y = \sec x$?

## Notes:

## Examples & Questions

### Examples 1

Q: How can you use the unit circle to find the signs of points on the graph of the tangent function?

### Examples 2

Q: What do you notice about the graph of the tangent function?
Q: When is the function positive? Negative?
Q: How is a variable used to represent all values not in the domain of $y = \tan x$?

### Examples 3

Q: How does the value of *a* in $y = a \tan bx$ affect the graph of the parent function?
Q: How does the value of *b* in $y = a \tan bx$ affect the graph of the parent function?

### Examples 4

Q: Does the asymptote of the function change when *a*=3?

### Examples 5

Q: How are the secant and cosine functions related?
Q: How are the graphs of the cosine and secant functions similar? Different?

## Practice and Problem Solving

Complete MathXL for School: Practice and Problem Solving (online)
Complete MathXL for School: Enrichment (online)

Challenge: #14, 25 – key will be posted in Power School Learning.

## Lesson Quiz 7.5 & Notes