

Transformations of Trigonometric Functions

In general: $y = af[k(x - p)] + q$

For trigonometric functions, this becomes

$$y = a \sin[k(x - p)] + q$$

or

$$y = a \cos[k(x - p)] + q$$

or

$$y = a \tan[k(x - p)] + q$$



May 17-9:17 AM

(1) Graphing From Key Points

For sine and cosine, use points from the x- and y-axes on the unit circle.

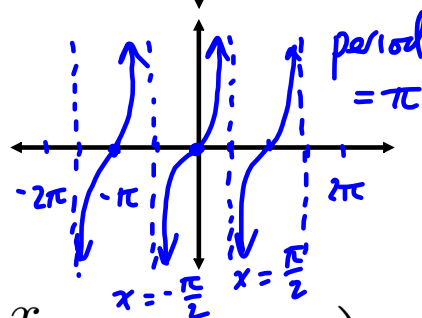
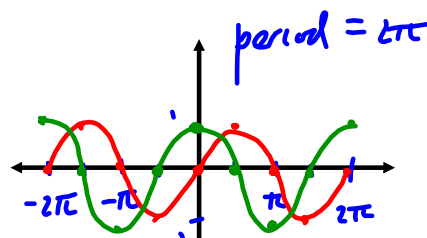
$$\theta \in \left\{ 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi \right\}$$

For tangent, use a cycle between two vertical asymptotes:

$$\theta \in \left\{ \frac{-\pi}{2}, \frac{-\pi}{4}, 0, \frac{\pi}{4}, \frac{\pi}{2} \right\}$$

Transform each point:

$$(x, y) \rightarrow \left(\frac{x}{k} + p, ay + q \right)$$



Oct 29-8:47 PM

(2) Graphing From Key Properties

a - vertical reflection and amplitude

k - horizontal reflection and period

sine and cosine: $\text{period} = \frac{2\pi}{k}$ *csc, sec*

tangent: $\text{period} = \frac{\pi}{k}$ *cot*

p - phase shift of starting point (from $x = 0$)q - axis of the curve, $y = q$

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(3) Determining Equations of Transformed Functions

1. Select parent function (sine or cosine, tangent).

2. Identify key properties of period and axis of the curve and use them to determine k and q. *repeating cycles* *line through middle*

3. Identify key properties of amplitude and phase shift and use them to determine a and p.

$$y = q \quad \begin{array}{c} \uparrow |a| \\ \hline \downarrow |a| \end{array}$$

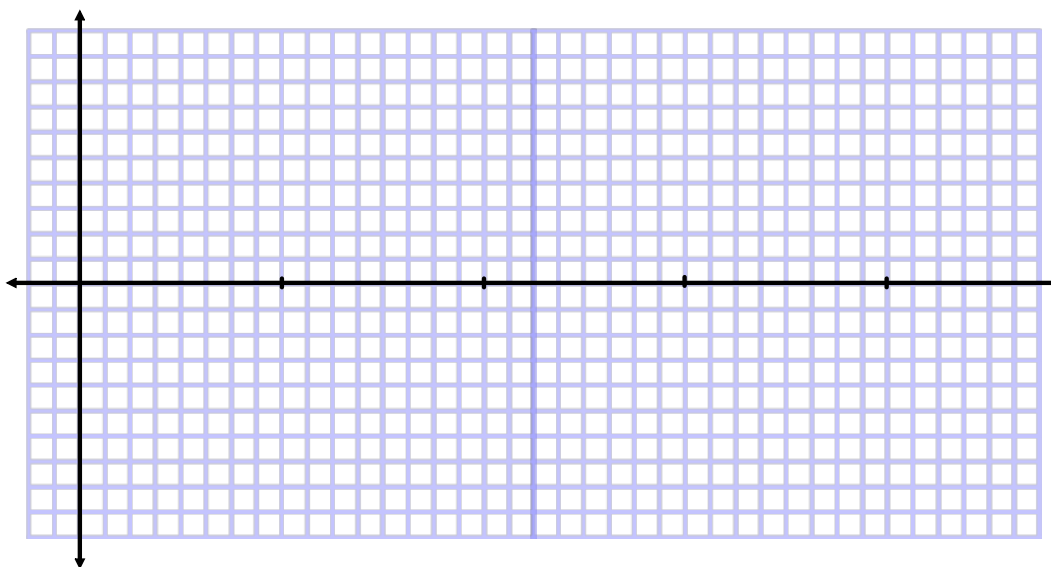
4. Write the equation, remembering that multiple answers may correctly represent the same graph.

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Assigned Work:

p.343 # 1bd, 3, 4, 5, 8ade, 9, 11, 12, 14

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May 16-9:08 AM