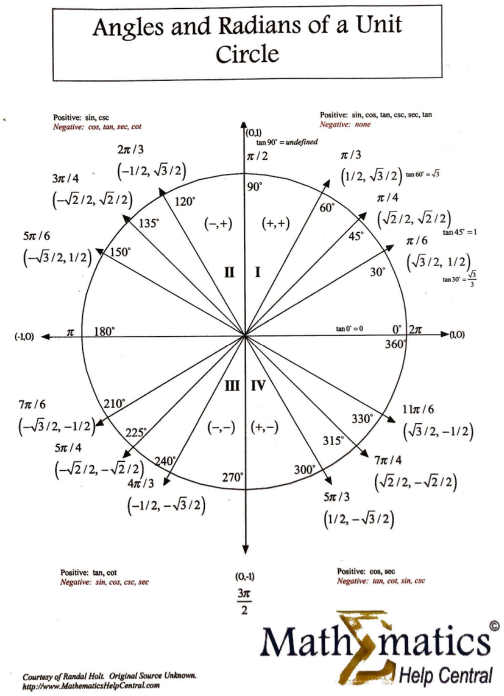
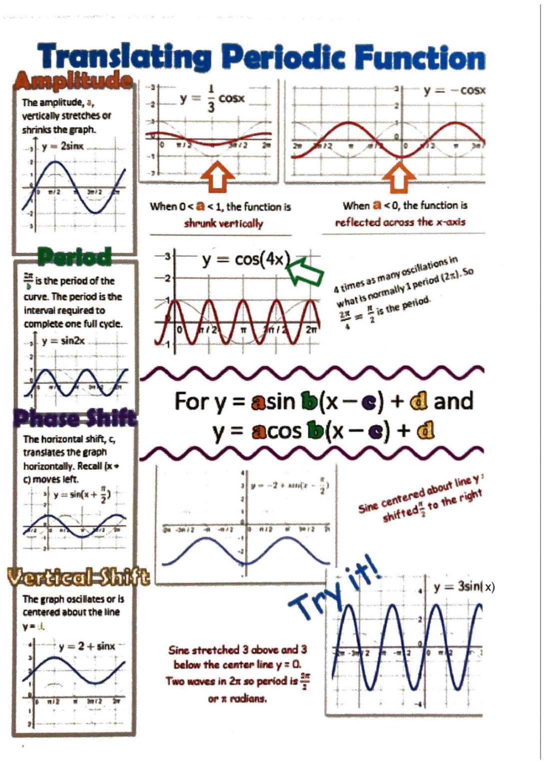
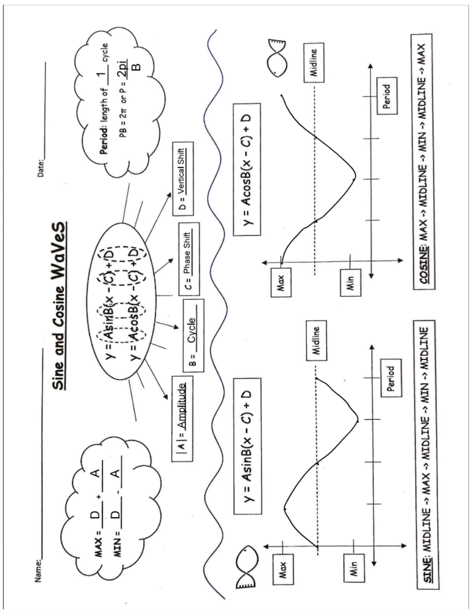
Final Information 2024

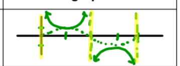
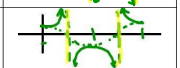
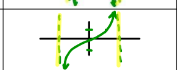
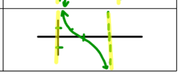






PreCalculus - Graphs of the Other Trig Functions

one phase
(bx - c = ?)

function	period	start	stop	graph
y=csc(x)	2π	0π	2π	
y=sec(x)	2π	0π	2π	
y=tan(x)	π	-π/2	π/2	
y=cot(x)	π	0π	π	

Final Information 2024

PreCalculus - Trig Identities

Reciprocal:

$\sin x = \frac{1}{\csc x}$ $\quad \csc x = \frac{1}{\sin x}$

$\cos x = \frac{1}{\sec x}$ $\quad \sec x = \frac{1}{\cos x}$

$\tan x = \frac{1}{\cot x}$ $\quad \cot x = \frac{1}{\tan x}$

Pythagorean:

$\sin^2 x + \cos^2 x = 1$

$1 + \tan^2 x = \sec^2 x$

$1 + \cot^2 x = \csc^2 x$

Cofunctions:

$\sin\theta = \cos(90° - \theta)$

$\cos\theta = \sin(90° - \theta)$

$\csc\theta = \sec(90° - \theta)$

$\sec\theta = \csc(90° - \theta)$

$\tan\theta = \cot(90° - \theta)$

$\cot\theta = \tan(90° - \theta)$

Quotient:

$\tan x = \frac{\sin x}{\cos x}$

$\cot x = \frac{\cos x}{\sin x}$

Even/Odd:

$\sin(-x) = -\sin x$ $\quad \cos(-x) = \cos x$ $\quad \tan(-x) = -\tan x$

$\csc(-x) = -\csc x$ $\quad \sec(-x) = \sec x$ $\quad \cot(-x) = -\cot x$

Sum/Difference Identities

1. $\sin(A+B) = \sin A\cos B + \cos A\sin B$
2. $\sin(A-B) = \sin A\cos B - \cos A\sin B$
3. $\cos(A+B) = \cos A\cos B - \sin A\sin B$
4. $\cos(A-B) = \cos A\cos B + \sin A\sin B$
5. $\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A\tan B}$
6. $\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A\tan B}$

Half-Angle Identities

$\cos\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1+\cos A}{2}}$

$\sin\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1-\cos A}{2}}$

$\tan\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1-\cos A}{1+\cos A}}$

$\tan\left(\frac{A}{2}\right) = \frac{\sin A}{1+\cos A}$

$\tan\left(\frac{A}{2}\right) = \frac{1-\cos A}{\sin A}$

Double-Angle Identities

$\cos(2A) = \cos^2 A - \sin^2 A$

$\cos(2A) = 1 - 2\sin^2 A$

$\cos(2A) = 2\cos^2 A - 1$

$\sin(2A) = 2\sin A\cos A$

$\tan(2A) = \frac{2\tan A}{1-\tan^2 A}$

Vectors Cheat Sheet

Vector Magnitude

$\|\langle a, b\rangle\| = \sqrt{a^2 + b^2}$

Unit Vector (Normalizing a Vector)

Divide by the magnitude: $\frac{\vec{u}}{\|\vec{u}\|}$

Adding Vectors

$\langle a, b\rangle + \langle c, d\rangle = \langle a+c, b+d\rangle$

$(a\hat{\imath} + b\hat{\jmath}) + (c\hat{\imath} + d\hat{\jmath}) = (a+c)\hat{\imath} + (b+d)\hat{\jmath}$

Scalar Multiplication

$a\langle b, c\rangle = \langle ab, ac\rangle$

$a(b\hat{\imath} + c\hat{\jmath}) = ab\hat{\imath} + ac\hat{\jmath}$

Vector Angles

Finding the direction of a single vector: $\tan\theta = \frac{y}{x}$

Law of Cosines:

$a^2 = b^2 + c^2 - 2bc\,\mathrm{Cos}\,A$