

AP Calculus Trigonometry

These are some key trigonometric equations and concepts to be aware of for the AP Calculus exam (It is unlikely that you will see all of these on your exam, but knowing these can help you be more prepared—the most important are the basic trig definitions, reciprocal identities, pythagorean identities, and unit circle)

Basic Trig Definitions:

Sine: $\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}}$	Cosecant: $\csc(\theta) = \frac{\text{hypotenuse}}{\text{opposite}}$
Cosine: $\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}}$	Secant: $\sec(\theta) = \frac{\text{hypotenuse}}{\text{adjacent}}$
Tangent: $\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$	Cotangent: $\cot(\theta) = \frac{\text{adjacent}}{\text{opposite}}$

Reciprocal Identities:

$\sin(\theta) = \frac{1}{\csc(\theta)}$	$\csc(\theta) = \frac{1}{\sin(\theta)}$
$\cos(\theta) = \frac{1}{\sec(\theta)}$	$\sec(\theta) = \frac{1}{\cos(\theta)}$
$\tan(\theta) = \frac{1}{\cot(\theta)}$	$\cot(\theta) = \frac{1}{\tan(\theta)}$

Pythagorean Identities:

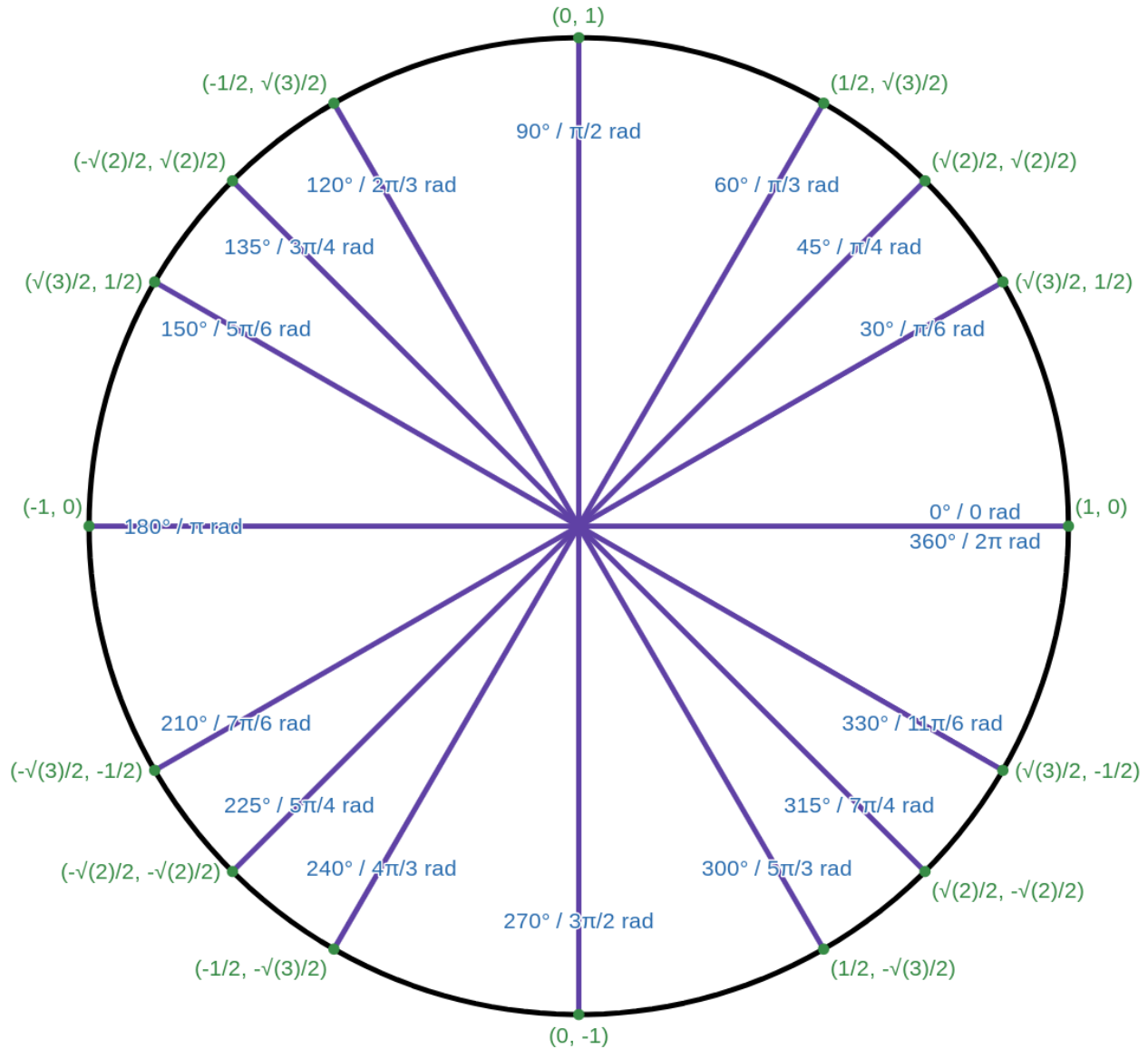
$\sin^2(\theta) + \cos^2(\theta) = 1$	$1 + \tan^2(\theta) = \sec^2(\theta)$	$1 + \cot^2(\theta) = \csc^2(\theta)$
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Double Angle Identities:

$\sin(2\theta) = 2\sin(\theta)\cos(\theta)$	$\cos(2\theta) = \begin{cases} \cos^2(\theta) - \sin^2(\theta) \\ 2\cos^2(\theta) - 1 \\ 1 - 2\sin^2(\theta) \end{cases}$
$\tan(2\theta) = \frac{\tan(\theta)}{1 - \tan^2(\theta)}$	

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Unit Circle:



Power Reducing Identities:

$\sin^2(\theta) = \frac{1 - \cos(2\theta)}{2}$	$\cos^2(\theta) = \frac{1 + \cos(2\theta)}{2}$	$\tan^2(\theta) = \frac{1 - \cos(2\theta)}{1 + \cos(2\theta)}$
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Quotient Identities:

$\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)}$	$\cot(\theta) = \frac{\cos(\theta)}{\sin(\theta)}$
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Sum and Difference Formulas:

$$\sin(a + b) = \sin(a)\cos(b) + \cos(a)\sin(b)$$

$$\sin(a - b) = \sin(a)\cos(b) - \cos(a)\sin(b)$$

$$\cos(a + b) = \cos(a)\cos(b) - \sin(a)\sin(b)$$

$$\cos(a - b) = \cos(a)\cos(b) + \sin(a)\sin(b)$$

$$\tan(a + b) = \frac{\tan(a) + \tan(b)}{1 - \tan(a)\tan(b)}$$

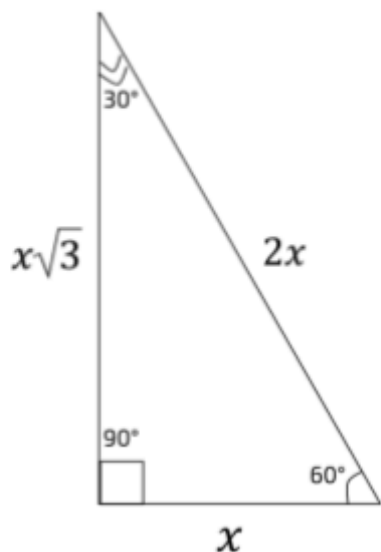
$$\tan(a - b) = \frac{\tan(a) - \tan(b)}{1 + \tan(a)\tan(b)}$$

Even & Odd Identities:

$\sin(-\theta) = -\sin(\theta)$	$\csc(-\theta) = -\csc(\theta)$
$\cos(-\theta) = \cos(\theta)$	$\sec(-\theta) = \sec(\theta)$
$\tan(-\theta) = -\tan(\theta)$	$\cot(-\theta) = -\cot(\theta)$

Special Right Triangles:

30-60-90



45-45-90

