

Actual Equation	Trial #1	Trial #2	Equation
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$			Quadratic Formula
$x - iy$			Complex conjugate of $x + iy$
$z = r \text{cis}\theta$			Mod-Arg Form
$r = \sqrt{x^2 + y^2}$			$ z $
$\tan \theta = \frac{y}{x}$			Arg z
$(r \text{cis}\theta)^n = r^n \text{cis } n\theta$			De Moivre's theorem
$R = r^{\frac{1}{n}}$ $\phi = \frac{\theta + 2k\pi}{n}$			nth roots of equation. Find R & ϕ
			Conics
$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$			General form of an ellipse
$x = a\cos\theta$ $y = b\sin\theta$			Parametric Form of an ellipse
$\frac{PS}{PM} = e$			Definition of a conic
$S = (\pm ae, 0)$			Foci in ellipse
$x = \pm \frac{a}{e}$			Equation of directrices in ellipse
$b^2 = a^2(1 - e^2)$			Definition equation
$\frac{xx_1}{a^2} + \frac{yy_1}{b^2} = 1$			Tangent to ellipse (Cartesian)

$\frac{a^2 x}{x_1} - \frac{b^2 y}{y_1} = a^2 - b^2$			Normal to ellipse (Cartesian)
$\frac{x \cos \theta}{a} + \frac{y \sin \theta}{b} = 1$			Tangent to ellipse (parametric)
$\frac{ax}{\cos \theta} - \frac{by}{\sin \theta} = a^2 - b^2$			Normal to ellipse (parametric)
$\frac{x}{a} \cos\left(\frac{\theta+\phi}{2}\right) + \frac{y}{b} \sin\left(\frac{\theta+\phi}{2}\right) = \cos\left(\frac{\theta-\phi}{2}\right)$			Chord of an ellipse
$\frac{xx_0}{a^2} + \frac{yy_0}{b^2} = 1$			Chord of contact on an ellipse
$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$			General equation of a hyperbola
$y^{-1} \pm \frac{bx}{a}$			Equations of asymptotes on hyperbola
$b^2 = a^2(e^2 - 1)$			Definition equation for hyperbola
$\frac{xx_1}{a^2} - \frac{yy_1}{b^2} = 1$			Tangent to hyperbola (Cartesian)
$\frac{a^2 x}{x_1} + \frac{b^2 y}{y_1} = a^2 + b^2$			Normal to hyperbola (Cartesian)
$\frac{x \sec \theta}{a} - \frac{y \tan \theta}{b} = 1$			Tangent to hyperbola (parametric)
$\frac{by}{\tan \theta} + \frac{ax}{\sec \theta} = a^2 + b^2$			Normal to hyperbola (parametric)
$\frac{x}{a} \cos\left(\frac{\theta-\phi}{2}\right) - \frac{y}{b} \sin\left(\frac{\theta+\phi}{2}\right) = \cos\left(\frac{\theta+\phi}{2}\right)$			Chord of a hyperbola
$\frac{xx_0}{a^2} - \frac{yy_0}{b^2} = 1$			Chord of contact on a hyperbola
$xy = c^2$ $x = ct$ $y = \frac{c}{t}$			Parametric form of a rectangular hyperbola

t Substitution			
t			$\tan\left(\frac{\theta}{2}\right) =$
$\frac{t}{\sqrt{1+t^2}}$			$\sin\left(\frac{\theta}{2}\right) =$
$\frac{1}{\sqrt{1+t^2}}$			$\cos\left(\frac{\theta}{2}\right) =$
$\frac{2t}{1+t^2}$			$\sin\theta =$
$\frac{1-t^2}{1+t^2}$			$\cos\theta =$
$\frac{2t}{1-t^2}$			$\tan\theta =$
$\frac{2}{1+t^2}$			$\frac{d\theta}{dt} =$
Integration			
$\int uv \, dx = uv - \int u'v \, dx$			Integration by parts formula
Motion			
$x = a \cos(nt + \hat{I})$			Displacement for SHM
$F = ma$			Force Equation
$\frac{d}{dx} \left(\frac{1}{2} v^2 \right)$			If $\ddot{x} = f(x)$, use
$\frac{dv}{dt}$ or $\frac{d^2x}{dt^2}$			If $\ddot{x} = f(t)$, use
$\frac{dv}{dt}$			If $\ddot{x} = f(v)$, use
$\omega = \frac{d\theta}{dt}$			Angular Velocity

$v = R\omega$			Circular motion velocity
$a = r\omega^2$			Circular motion acceleration
$\theta = \omega t$			Angle =
$T = \frac{2\pi}{\omega}$			Period of circular motion
			Conical Pendulum
$T \cos\theta - mg = 0$			Vertical Forces
$T \sin\theta = mr\omega^2$			Radial Forces
$\omega = 2\pi n$			Angular Velocity
$r = l \sin\theta$			Radius
$T = 4\pi^2 mn^2 l$			Tension
$h = \frac{g}{\omega^2}$			Height of pendulum
$\frac{v^2}{rg}$			$\tan\theta =$
			Banked Circular Track
$N \cos\theta - F \sin\theta - mg = 0$			Vertical Forces
$N \sin\theta + F \cos\theta = \frac{mv^2}{r}$			Radial Forces
$h = \frac{v^2 d}{rg}$			Height of outside wheel above inside wheel
$v = \sqrt{Rg \tan\theta}$			Optimum speed
$F = \frac{mv^2}{r} \cos\theta - mg \sin\theta$			Forces acting when not optimum speed