PC Math 12 - Formula Sheet

Arithmetic Sequences & Series

$a_n = a + (n - 1)d$ $\qquad S_n = \frac{n}{2}[2a + (n - 1)d]$ $\qquad$ or $\qquad S_n = \frac{n}{2}[a + a_n]$

Geometric Sequences & Series

$a_n = ar^{(n-1)}$ $\qquad S_n = \frac{a(1-r^n)}{1-r}$ $\qquad S = \frac{a}{1-r}$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Logarithms

1. Log and equivalent Exponential Form	$b^y = x$ is the same as $y = \log_b x$
2. Log of a Product	$log(x \times y) = \log x + \log y$
3. Log of a Quotient	$\log\left(\frac{x}{y}\right) = \log x - \log y$
4. Log of a Base Raised to a Power	$\log b^m = m \log b$
5. Log Change of Base	$\log_b x = \frac{\log_q x}{\log_q b}$
6. Log of an Exponential	$\log_b b^x = x$
7. Power of a Base	$b^{\log_b x} = x$
8. Solve for Exponent	If $b^x = y$ then $x = \frac{\log y}{\log b}$
9. Multiply Using Logs	$x \times y = 10^{(\log x + \log y)}$
10. Divide Using Logs	$\frac{x}{y} = 10^{(\log x - \log y)}$
11. Raise a Constant to a Power	If $b^{x/y} = q$ then $q = 10^{\frac{x}{y}\log b}$
12. Related Change of Base	$(\log_a b)(\log_b c) = \log_a c$
13. Other Rules	$\log_a b = \frac{1}{\log_b a}$

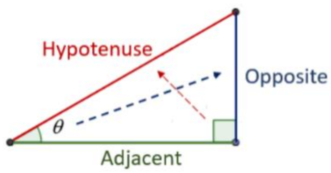
PC Math 12 - Formula Sheet

Exponential

	Format #1	Format #2
Finance	$A = P(1 \pm r)^t$	$A = P\left(1 \pm \frac{r}{n}\right)^{nt}$
Population	$P = P_o(1 \pm r)^t$	$P = P_o\left(1 \pm \frac{r}{n}\right)^{nt}$

Half Life (T)	$A = A_0\left(\frac{1}{2}\right)^{\frac{t}{T}}$
Continuous	$A = A_o e^{rt}$

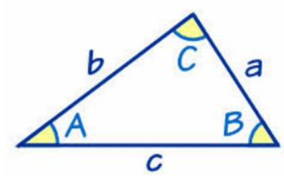
Trigonometry Review



SOH $\quad \sin\theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$

CAH $\quad \cos\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$

TOA $\quad \tan\theta = \frac{\text{Opposite}}{\text{Adjacent}}$



Sine Law

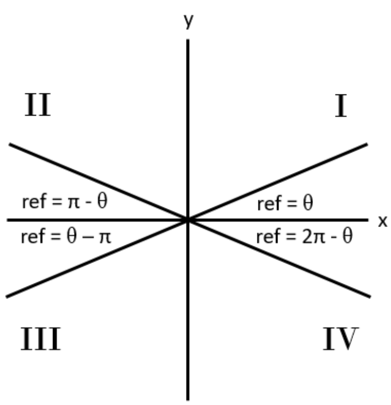
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine Law

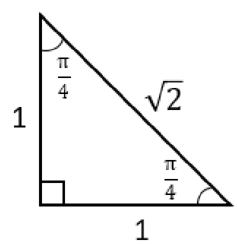
$$c^2 = a^2 + b^2 - 2ab\cos C$$

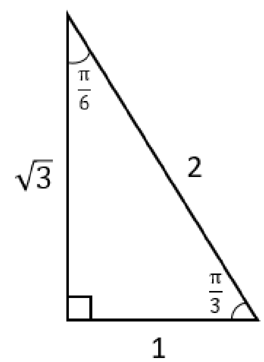
Angles

The reference angle is the smallest angle between the x-axis and the terminal arm.
These formulas work only for positive values of θ

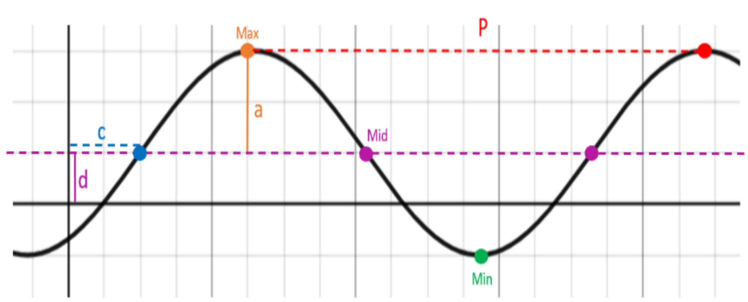


Special Triangles





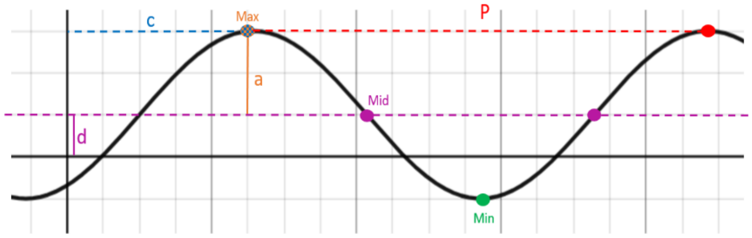
Sin Graphs



$$y = a\sin b(x - c) + d$$

$$b = \frac{2\pi}{P}$$

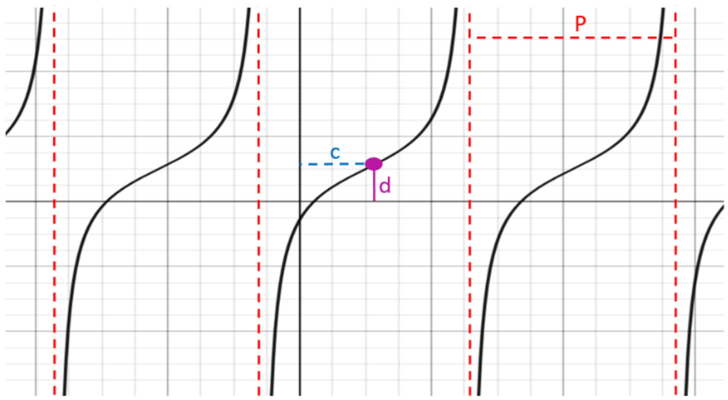
Cos Graphs



$y = a\cos b(x - c) + d$

$b = \dfrac{2\pi}{P}$

Tan Graphs



$y = \tan b(x - c) + d$

$b = \dfrac{\pi}{P}$

Trigonometric Identities

$\csc\theta = \dfrac{1}{\sin\theta}$

$\sec\theta = \dfrac{1}{\cos\theta}$

$\cot\theta = \dfrac{1}{\tan\theta}$

$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$

$\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

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

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

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

$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\tan(\alpha+\beta) = \dfrac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$

$\tan(\alpha-\beta) = \dfrac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$

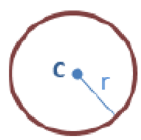
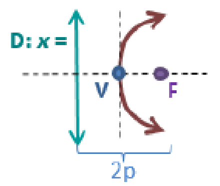
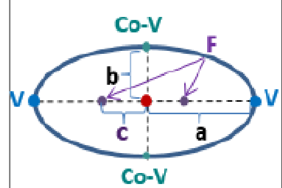
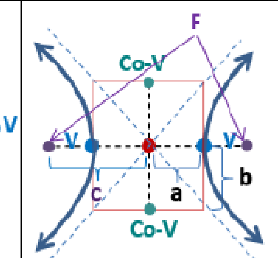
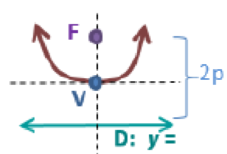
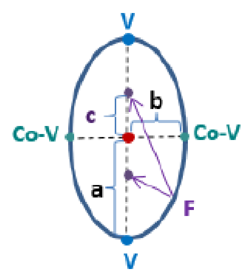
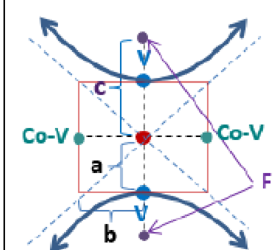
$\sin 2\theta = 2\sin\theta\cos\theta$

$$\begin{aligned}\cos 2\theta &= \cos^2\theta - \sin^2\theta \\ &= 2\cos^2\theta - 1 \\ &= 1 - 2\sin^2\theta\end{aligned}$$

$\tan 2\theta = \dfrac{2\tan\theta}{1 - \tan^2\theta}$

PC Math 12 - Formula Sheet

Conic Sections

Conic: / Equation:	**Circle** Center: (h, k)	**Parabola** Vertex: (h, k)	**Ellipse** Center: (h, k) ***a*** always larger than ***b***	**Hyperbola** Center: (h, k) ***a*** always before the "—"
Equation (Horizontal)	$(x-h)^2+(y-k)^2=r^2$	$x=a(y-k)^2+h$ or $x-h=a(y-k)^2$ or $b(x-h)=(y-k)^2$	$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$	$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$ Asymptotes: $y-k=\pm\frac{b}{a}(x-h)$
Graph (Horizontal)		**(Positive Coefficient)** 		
Equation (Vertical)	Same	$y=a(x-h)^2+k$ or $y-k=a(x-h)^2$ or $b(y-k)=(x-h)^2$	$\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$	$\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$ Asymptotes: $y-k=\pm\frac{a}{b}(x-h)$
Graph (Vertical)	Same	**(Positive Coefficient)** 		
Additional Information	To get ***r***: $y=\pm\sqrt{r^2-(x-h)^2}+k$	For $x-h=a(y-k)^2$: $p=\frac{1}{4a}$; $a=\frac{1}{4p}$ For $b(x-h)=(y-k)^2$: $b=4p$; $p=\frac{b}{4}$ **Negative Coefficients:** Flip parabola	$c^2=a^2-b^2$	$c^2=a^2+b^2$