

Sequences	
Arithmetic Sequence	$A_n = A_1 + D(n - 1)$
Geometric Sequence	$A_n = A_1(r^{n-1})$
Finite Sum	$S_n = A_1(1 - r^n) / 1 - r$
Infinite Sum ($ r < 1$)	$A_1 / 1 - r$

Volumes	
Sphere	$V = (4/3)\pi r^3$ $A = 4\pi r^2$
Cone	$V = (1/3)\pi r^2 h$
Pyramid	$V = (1/3)bh$
Cylinder	$\pi r^2 h$

Sin/Cos	
Law of Cosines	$c^2 = a^2 + b^2 - 2ab(\cos(C))$
Arc Length	$L = r\theta$
Double angle:	$\sin 2x = 2\cos x \sin x$ $\cos 2x = \cos^2 x - \sin^2 x$ $\cos 2x = 2\cos^2 x - 1$ $\cos 2x = 1 - 2\sin^2 x$ $\tan 2x = 2\tan x / 1 - \tan^2 x$
Half angle:	$\sin x/2 = \pm \sqrt{(1 - \cos x) / 2}$ $\cos x/2 = \pm \sqrt{(1 + \cos x) / 2}$ $\tan x/2 = \pm \sqrt{(1 - \cos x) / (1 + \cos x)}$ $\tan x/2 = (1 - \cos x) / \sin x$

Vertical line test	
If a vertical line intersects a supposed function at two different points, it is not a function.	

Probability	
Combinations:	Order doesn't matter $8C5 = 8! / (8-5)!5!$
Permutations:	Order matters $8P5 = 8! / 5!$
Probability:	$P(A \text{ and } B) = P(A) * P(B)$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ If A and B are mutually exclusive: $P(A \text{ or } B) = P(A) + P(B)$

Coordinates	
Point-slope form	$y - y_1 = m(x - x_1)$
Vertex of parabola:	$x = -b/2a$

Parabola	
Vertex	(h, k)
Focus	(h, k +/- p)
Directrix	$y = k - p$

Ellipse	
Center	(h, k)
Vertices	(h, k +/- a)
Foci	(h, k +/- c)
Major Axis	2a
Minor Axis	2b

Hyperbola	
Center	(h, k)
Vertices	(h, k +/- a)
Foci	(h, k +/- c)
Asymptotes	$y = k \pm (a/b)(x-h)$

Sin/Cos/Tangent equations	
$A \sin(Bx+C)+D$	A = Amplitude B = Period C = Phase shift D = Vertical shift
\sin or $\cos(Bx)$	Period = $2\pi/b$
$\tan(Bx)$	Period = π/b

Binomial Theorem	
$(a + b)^n = \sum_{k=0}^n \binom{n}{k} a^{n-k} b^k$	

More binomial theorem	
$\binom{n}{k} = \frac{n!}{k!(n-k)!}$	