

Sequences

Arithmetic Sequence	$An = A1 + D(n - 1)$
Geometric Sequence	$An = A1(r^{n-1})$
Finite Sum	$Sn = A1(1 - r^n) / 1 - r$
Infinite Sum ($ r < 1$)	$A1 / 1 - r$

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	$y - y1 = m(x - x1)$
Vertex of parabola:	$x = -b/2a$

Parabola

Vertex	(h, k)
Focus	$(h, k \pm p)$
Directrix	$y = k - p$

Ellipse

Center	(h, k)
Vertices	$(h, k \pm a)$
Foci	$(h, k \pm c)$
Major Axis	$2a$
Minor Axis	$2b$

Hyperbola

Center	(h, k)
Vertices	$(h, k \pm a)$
Foci	$(h, k \pm c)$
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

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



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