Mathematics Definitions and Formulas

DEFINITIONS

$a \to b$	a implies b	$\overline{A}$	complement of A
$a \leftrightarrow b$	a if and only if b	U	universal set
$a \wedge b$	a and b	$\{\ \}$	empty set
$a \vee b$	a or b	$[a, b]$	$a \le x \le b$
$\sim a$	not a	(a, b)	$a < x < b$
$A \cup B$	A union B	$\triangle ABC \sim \triangle DEF$	$\triangle ABC$ is similar to $\triangle DEF$
$A \cap B$	A intersect B	$\overline{AB} \cong \overline{CD}$	$\overline{AB}$ is congruent to $\overline{CD}$

FORMULAS

$A = \frac{(b_1 + b_2)h}{2}$	Area of a trapezoid
$V = \frac{1}{3}Bh$	Volume of a right cone and a pyramid
$V = Bh$	Volume of a cylinder and prism
$V = \frac{4}{3}\pi r^3$	Volume of a sphere
$A = 2\pi rh + 2\pi r^2$	Surface area of a cylinder
$A = 4\pi r^2$	Surface area of a sphere
$A = \pi r\sqrt{r^2 + h^2} = \pi r\ell$	Lateral surface area of a right cone

FORMULAS (continued)

$S_n = \frac{n}{2}[2a + (n-1)d] = \frac{n}{2}(a + a_n)$	Sum of an arithmetic series
$S_n = \frac{a(1-r^n)}{1-r}$	Sum of a finite geometric series
$\sum_{n=0}^{\infty} ar^n = \frac{a}{1-r}, \lvert r \rvert < 1$	Sum of an infinite geometric series
$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$	Law of sines
$c^2 = a^2 + b^2 - 2ab \cos C$	Law of cosines
$\sin^2(\theta) + \cos^2(\theta) = 1$	Pythagorean identity
$\sin(2\theta) = 2\sin(\theta)\cos(\theta)$ $\cos(2\theta) = \cos^2\theta - \sin^2\theta$ $\cos(2\theta) = 2\cos^2\theta - 1$ $\cos(2\theta) = 1 - 2\sin^2\theta$ $\tan(2\theta) = \frac{2\tan\theta}{1-\tan^2\theta}$	Double angle identities
$y = mx + b$ $Ax + By = C$ $y - y_1 = m(x - x_1)$	Equations of a line
$y = ax^2 + bx + c$	Equation of a parabola (standard form)
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	Quadratic formula
$n \times (n-1) \times (n-2) \times \ldots \times 1$	n factorial ($n!$)
$\frac{n!}{(n-r)!}$	Number of permutations (${}_nP_r$)
$\frac{n!}{(n-r)! \times r!}$	Number of combinations (${}_nC_r$)

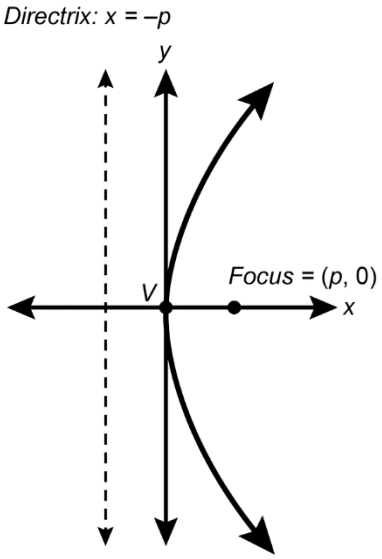
CONIC SECTIONS

Circle

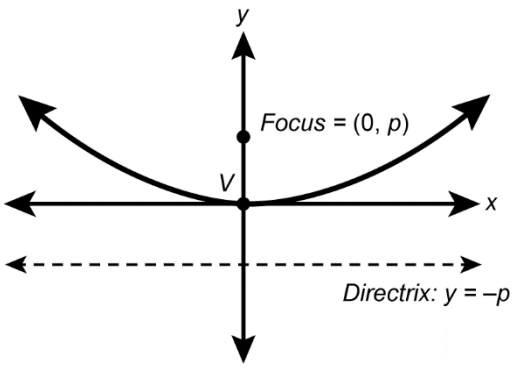
$(x - h)^2 + (y - k)^2 = r^2$ Equation of a circle

Parabola

$(y - k) = 4p(x - h)^2$ Equation of a parabola (vertex form)



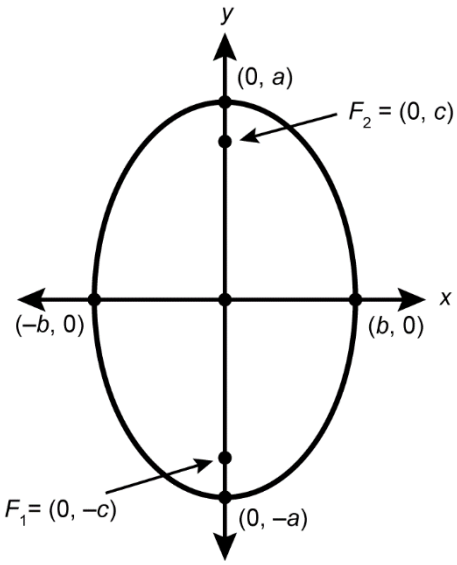
$y^2 = 4px$



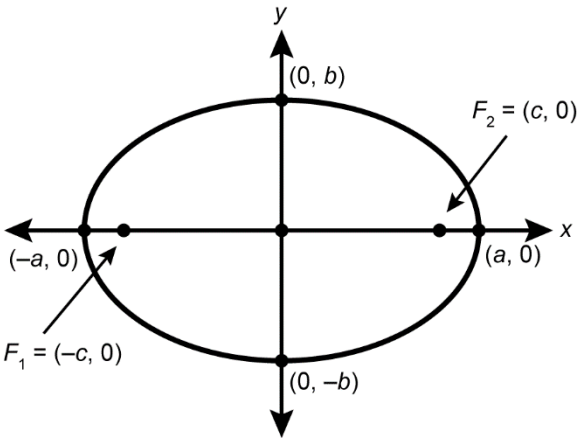
$x^2 = 4py$

Ellipse

$$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$$ Equation of an ellipse



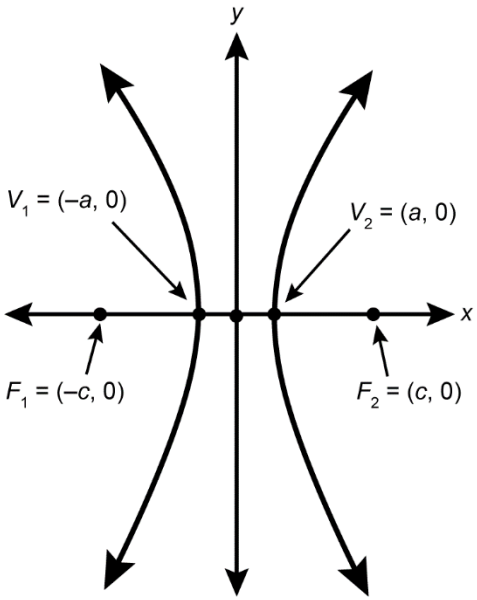
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1,\ a < b$$



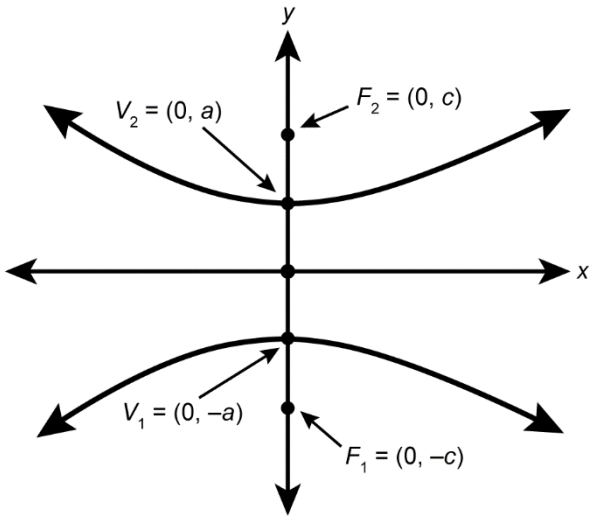
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1,\ a > b$$

Hyperbola

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$ Equation of a hyperbola



$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$



$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$