

Speaking mathematics

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Fractions:

- $\frac{1}{2}$ is “one half” or “one over two” (American/British) or “one on two” (Australian).
- $\frac{1}{3}$ is “one third” or “one over three”.
- $\frac{2}{3}$ is “two thirds” or “two over three”.
- $\frac{1}{4}$ is “one fourth” or “one over four” or “one quarter”.
- $\frac{x}{y}$ is “X over Y”.

394 is “three hundred ninety-four” or just “three ninety-four”.

0.8 is “zero point eight” or “naught point eight” (Brit.) or just “point eight”.

57.94 is “fifty-seven point nine four”.

$1.\bar{3}$ and 1.333... are “one point three repeating”.

Operations:

- $a + b$ is “A plus B”. This *action* is adding or addition. The result is a sum.
- $a - b$ is “A minus B”. This *action* is called subtracting or subtraction, and the result is called a difference.
- $a \times b$ and $a \cdot b$ are both “A times B” if a and b are (real or complex) numbers. ab can be said as “A B” but means the same thing.
This *action* is multiplying or multiplication. The result is a product.
If \vec{a} and \vec{b} are vectors, then $\vec{a} \cdot \vec{b}$ is “A dot B” and $\vec{a} \times \vec{b}$ is “A cross B”.
- $a \div b$ and a/b and $\frac{a}{b}$ are all “A divided by B”.
This *action* is dividing or division, and the result is a quotient.

Powers and exponents:

- x^2 is “X to the power (of) two” or “X squared”.
- x^3 is “X to the power (of) three” or “X to the third” or “X cubed”.
- x^4 is “X to the power (of) four” or “X to the fourth”.
- x^5 is “X to the power (of) five” or “X to the fifth”.
- x^n is “X to the power (of) N” or “X to the Nth” or “X to the N”.
- “Power functions” include x^2 and x^{10} and $x^{-3.8}$.
- “Exponential functions” include 2^x and e^x .

Parentheses, etc.

- $()$ are parentheses. $[]$ are brackets. Often, either word can be used for either kind of symbol.
- $\{ \}$ are “curly brackets” or “curly braces”.
- $($ is a “left parenthesis” or “open parenthesis”, and $)$ is the “right” or “closed” version. Similarly for $[]$ and $\{ \}$.

Changing $2(x + y)$ into $2x + 2y$ is “distributing” (specifically, “distributing the two over the sum”). This is one type of “expanding”, which is removing brackets.

Changing $2x + 2y$ to $2(x + y)$ is “factoring” (specifically, “factoring two out of the sum”). This is one type of “simplifying”.

Changing from $\frac{xy}{3x}$ to $\frac{y}{3}$ is “cancelling out the X” from the numerator and denominator. Changing from $x + y - x$ to y is also “cancelling out the X”.

Roots:

- \sqrt{x} is “square root of X” or just “root X”.
 - $\sqrt{2}$ is usually said as “root two”, and $\sqrt{3}$ as “root three”.
- $\sqrt[3]{x}$ is “cube root of X” or “third root of X”.
- $\sqrt[n]{x}$ is “Nth root of X”.

Logarithms (or logs):

- $\log_b(x)$ is “log base B of X” or “log of X base B”.
- $\log(x)$ is “log X”.
Depending on context, this might mean $\log_{10}(x)$ or $\log_e(x)$ or $\log_2(x)$.
- $\ln(x)$ can also be said as just “log X”. You can say “L N X” or “natural logarithm of X” if you prefer.

Trigonometry (or trig):

- $\sin(x)$ is “sine of X” or “sine X” (you can also say “sinus”, which is Latin).
- $\cos(x)$ is “cosine of X” or “cosine X” or “kohs X”.
- $\tan(x)$ is “tangent of X” or “tan X”.
- $\arccos(x)$ and $\text{acos}(x)$ and $\cos^{-1}(x)$ all mean exactly the same thing.
They are the “inverse-cosine of X”.
- $\arctan(x)$ and $\text{atan}(x)$ and $\tan^{-1}(x)$ all mean exactly the same thing.
They are the “inverse-tangent of X”.

Functions in general:

- $f(x)$ is “F of X”, sometimes just said “F X”.
 - $f(g(x))$ is “F of G of X”.
 - $f^{-1}(x)$ is “F-inverse of X”, sometimes just said “F-inverse X”.
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Complex numbers and Linear Algebra:

- \bar{z} is “Z bar” or “Z conjugate”.
 - $|z|$ is “magnitude of Z” or “norm of Z” or “absolute value of Z”.
 - $\arg(z)$ is “argument of Z”.
 - $e^{\theta i}$ is “E to the theta I”. Note: “theta” is a Greek letter often used for angles.
 - $\deg(f)$ is “degree of F” (here $f(x)$ or $f(z)$ would be a polynomial).
 - $[8, 5]$ and $\begin{bmatrix} 8 \\ 5 \end{bmatrix}$ can both be said as “eight five” or “eight comma five”.
 - $\begin{bmatrix} 3 & 7 \\ -1 & 6 \end{bmatrix}$ is spoken as “three seven negative-one six”.
 - $\det(M)$ is “determinant of M” or just “det M”.
 - M^{-1} is “M inverse” of “inverse of M”.
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Analysis / Calculus (those words mean the same thing):

- $\lim_{x \rightarrow a}$ is “limit as X goes to A” or “limit as X approaches A”.
- $\lim_{x \rightarrow a^-}$ and $\lim_{x \nearrow a}$ are both “limit as X approaches A from the left”.
- $\lim_{x \rightarrow a^+}$ and $\lim_{x \searrow a}$ are both “limit as X approaches A from the right”.
- $f'(x)$ is “F-prime of X” or “F-prime X”.
- df/dx or $\frac{df}{dx}$ is “D F D X” (we *don't* say over or on).
- $\left. \frac{df}{dx} \right|_{x=a}$ is “D F D X when X equals A” or “D F D X at A”.
- $F \Big|_{x=a}^{x=b}$ is “capital-F from X equals A to X equals B” or “capital-F from A to B”.
This means $F(B) - F(A)$.
- $\int f dx$ is “integral of F D X” or “indefinite integral of F D X”
or “integral of F” or “indefinite integral of F”.
- $\int_a^b f dx$ is “integral of F D X from A to B” or “integral of F from A to B”
or “integral from A to B of F D X” or “integral from A to B of F”.