Математические формулы

1. **Arithmetic, college algebra and geometry.**

Common fractures

Числитель выражается количественным числительным (например, one, four, twenty-five и т.д.), а знаменатель — порядковым числительным (например, first, fourth, twenty-fifth и т.д.). Если числитель больше единицы, то знаменатель принимает окончание множественного числа s. Если дробь является буквенным выражением, то обычно используется конструкция “числитель” over “знаменатель”.

$\frac{1}{2}$	one half
$\frac{1}{3}$	one third
$\frac{2}{3}$	two thirds
$\frac{26}{38}$	twenty six thirty eights
$2\frac{1}{2}$	two and a half
$3\frac{4}{5}$	three and four fifth
$\frac{m}{n}$	m over n

Decimal fractions

В десятичных дробях целое число отделяется от дроби точкой, называемой “point”. Каждая цифра читается отдельно. Ноль читается либо как “o [ou]”, либо как “zero”. Ноль целых может совсем не читаться.

0.2	1. o point two 2. zero point two 3. point two
0.06	1. o point o six 2. zero point zero six 3. point o six 4. point zero six
1.25	1. one point twenty five 2. one point two five

Indexes, powers and roots

Верхние и нижние индексы в английском называются соответственно “subscript” и “superscript”. Например, произносится как “x sub n”, произносится как “z super k”. Часто, когда не возникает путаницы с верхними и нижними индексами, (например, если верхние индексы не используются) слова “sub” и “super” опускаются, и тогде произносится как “a two”.

a_m	a sub m (a m)
a_0	1. a zero 2. a naught
b^n	b super n (b n)
c_{mn}^{jk}	c sub m n super j k

Возведение в степень по-английски — “raise to the power”. Например x^2, произносится как “x raised to the fifth power”. Укороченными вариантами являются “x to the fifth power” или просто “x to the fifth”. Для второй и третьей степени обычно используются выражения “x squared” и “x cubed”. Корень n-ой степени читается как ‘the n-th root”. Корни 2-й и 3-й степени читаются как “square root” и “cube root” соответственно.

x^2	1. x squared 2. x raised to the second power 3. x to the second power 4. x to the second 5. the square of x 6. the second power of x
y^3	y cubed
z^{-10}	1. z to the negative tenth 2. z to the minus tenth
$t^{\frac{3}{2}}$	t to the three halves
$\sqrt{a}$	the square root of a
$\sqrt[3]{7}$	the cube root of seven
$\sqrt[n+k]{7}$	the root of the power n plus k of three

$\sqrt[5]{b^4}$	the fifth root of b to the fourth

Certain mathematical signs and expressions.

+	plus (the addition sign)
$a + b$	1. a plus b; 2. sum of a and b;
−	minus (the subtraction sign)
$a - b$	1. a minus b; 2. difference of a and b
$-x$	1. minus x; 2. negative x
$a \pm b$	a plus minus b
·	times (the multiplication sign)
$a \cdot b$ или ab	1. a times b; 2. a b 3. product of a and b
: или /	the division sign
$a : b$ или a/b	1. a divided by b; 2. a by b 3. ratio of a and b; 4. a over b
$d \equiv h$ или $h \mid d$	1. d is divisible by h 2. h is a divisor of d
=	the equality sign
$a = b$	1. a equals b; 2. a is equal to b
$a \neq b$	a is not equal to b
$a \approx b$	a is approximately equal to b
$\equiv$	the identity sign
$a \equiv b$	a is identically equal to b

$a < b$	a is greater than b
$a > b$	a is less than b
$a \leq b$	a is greater than or equal to b
$a \geq b$	a is less than or equal to b
$\|x\|$	1. absolute value of x; 2. magnitude of x
$n!$	n factorial
■	the “end of the proof” sign
правая [левая] часть (уравнения и т.д.)	right-hand [left-hand] side (of equation, etc.)

Brackets

$( )$	1. parentheses (ед. число parenthesis) 2. round brackets
$[ ]$	1. brackets 2. square brackets
$\{ \}$	braces

Если некоторое выражение стоит в скобках, а к нему применяется какая-либо операция, то в данном случае употребляется слово “quantity”:

$(a+b)c = ac + bc$	a plus b quantity times c equals ac plus bc
$x + a^2$	x plus a squared
$(x+a)^2$	x plus a quantity squared
$a + \frac{b}{c}$	a plus b over c
$\frac{a+b}{c}$	a plus b quantity over c

Также полезными терминами являются следующие:

раскрывать скобки	to expand
выносить за скобки (разлагать на множители)	to factor out (to factor)

приводить подобные слагаемые	to combine like terms

Intervals

(a, b)	open interval from a to b
$[a, b]$	closed interval from a to b
$(a, b]$	1. open from the left interval from a to b 2. closed from the right interval from a to b
$[a, b)$	1. open from the right interval from a to b 2. closed from the left interval from a to b

Some geometric terms

$\bar{a}$	1. a bar; 2. vector a;
$\angle\alpha$	angle alpha
$\triangle ABC$	triangle ABC
$\|a\|$	norm of a
$a \| b$	a is parrallel to b
$a \perp b$	a is perpendicular to b

2. **Set theory.**

Set-theoretic operations.

$A \cup B$	1. A union B 2. union of A and B
$A \cap B$	1. A intersection B 2. intersection of A and B
$A \setminus B$	1. A minus B 2. set difference of A and B
$A \triangle B$	symmetric difference of A and B
$\bar{A}$	compliment of A

Operations of containment.

$a \in A$	1. a belongs to A 2. a is an element of A 3. A contains a
$a \notin A$	a does not belong to A
$A \subset B$ или $A \subseteq B$	A is a subset of B
$A \supset B$ или $A \supseteq B$	B is a subset of A
$A \not\subset B$	A is not a subset of B

List of standard sets.

$\varnothing$	the empty set
$\mathbb{N}$	the set of natural numbers
$\mathbb{Z}$	the set of integer numbers
$\mathbb{Q}$	the set of rational numbers
$\mathbb{R}$	the set of real numbers
$\mathbb{R} \setminus \mathbb{Q}$	the set of irrational numbers
$\mathbb{A}$	the set of algebraic numbers
$\mathbb{R} \setminus \mathbb{A}$	the set of transcendental numbers
$\mathbb{R}^{\kappa}$	the n-dimensional real space
$\mathbb{C}$	the set of complex numbers
$\mathbb{C}^{\kappa}$	the n-dimensional complex space
$\mathbb{P}^{\kappa}$	the n-dimensional projective space
2^A	the power ser of A

Operations in topological vector spaces.

$cl(A)$ или $\bar{A}$	closure of A
$\overset{0}{A}$	interior of A
∂A	boundary of A

$A \times B$	1. A cross B 2. direct product of A and B 3. Cartesian product of A and B
$A \oplus B$	1. A plus B 2. direct sum of A and B
$A \wedge B$	1. A wedge B 2. wedge product of A and B 3. interior product of A and B
A/B	1. quotient space A over B 2. factor space A over B

3. **Mathematical logic.**

$A \vee B$	A or B
$A \wedge B$ или $A\&B$	A and B
$\bar{A}$ или $\neg A$	not A
$A \Rightarrow B$	A implies B
$A \sim B$	A is equivalent to B

Quantifiers.

$\forall$	“for any” или “for all”
$\exists$	“there exists”
$:$	“such that”
$\forall r \in \mathbb{R} \exists n \in \mathbb{N} : n > r$	For any real r there exists a positive integer n such that n is greater than r.

4. **Calculus.**

Functions.

$y = f(x)$	1. y equals f of x 2. y is a function of x
$x = f^{-1}(y)$	1. x equals f inverse of y

	2. x is an inverse function of y
D_f	domain of the function f
E_f или R_f	range of the function f
$f \circ g$	composition of the functions f and g
сложная функция	composite function
неявная функция	implicit function
график функции	graph of a function

Sequences and series. Convergence.

$\{x_n\}$	sequence x n
$\{x_n\}_{n=1}^{\infty}$	sequence x n as n goes from 1 to infinity
$\sum x_n$	series x n
$\sum_{n=1}^{\infty} x_n = S$	sum of x n as n goes from 1 to infinity is equal to S
$x_n \to A$	1. x n converges to A 2. sequence x n converges to A
$x_n \underset{n\to\infty}{\to} A$	1. x n converges to A as n tends to infinity 2. x n converges to A as n goes to infinity 3. x n converges to A as n approaches infinity
$x_n \to \infty$	1. x n diverges 2. x n diverges to infinity 3. x n goes to infinity 4. x n approaches infinity
$\sum x_n = A < \infty$	series x n converges to A
$\sum x_n = \infty$	series x n diverges
$\sum x_n = \mathrm{DNE}$	1. sum of the series x n does not exist 2. series x n diverges

Limits and convergence.

$\lim_{n\to\infty} x_n = A$	1. limit of x n as n tends to infinity is equal to A 2. x n converges to A as n tends to infinity
$\lim_{x\to a} f(x)$	limit of f of x as x approaches a
$\lim_{x\to a-0} f(x)$	limit of f of x as x approaches a from the left
$\lim_{x\to a+0} f(x)$	limit of f of x as x approaches a from the right
$\lim_{x\to\infty} f(x) = A$ или $f(x) \underset{x\to\infty}{\to} A$	1. limit of f of x as x approaches infinity is equal to A 2. limit of f of x as x goes to infinity is equal to A 3. f of x approaches A as x goes to infinity 4. f of x converges to A as x goes to infinity
$\lim_{x\to a} f(x) = \mathrm{DNE}$	limit of f of x as x approaches a does not exist

Derivatives.

f'	1. f prime; 2. derivative of f
f''	1. f double prime; 2. second derivative of f
f'''	1. f triple prime; 2. third derivative of f
$f^{(n)}$	1. n-th derivative of f 2. derivative of f of the order n
f'_x	1. f prime x 2. derivative of f with respect to x
Δx	1. delta x; 2. increment of x
dx	1. d x; 2. differential ot x

$\frac{df}{dx}$	1. d f by d x 2. derivative of f with respect to x
$\frac{d^2 f}{dx^2}$	1. d two f by d x squared 2. second derivative of f with respect to x
$\frac{\partial f}{\partial x}$	1. partial d f by d y 2. partial derivative of f with respect to y
f''_{xy} или $\frac{\partial^2 f}{\partial y \partial x}$	second partial derivative of f with respect to x and y

Integrals

$\int$	integral
$\iint$	double integral
$\iiint$	triple integral
$\int f(x)\,dx$	1. indefinite integral of f of x d x 2. general antiderivative of f of x
$\int_a^b$	integral from a to b
$\int_a^\infty$	(improper) integral from a to infinity
$\int_\Gamma \omega$	intergral of omega over gamma

Miscellaneous notations and terms.

Δf	1. the Laplace operator of f; 2. the Laplacian of f
∇f	1. gradient of f; 2. nabla f
$\mathbf{grad}$	gradient

$\mathbf{div}$	divergence
$\mathbf{rot}$	rotor
$\operatorname{Im} z$	imaginary part of z
$\operatorname{Re} z$	real part of z
$\operatorname*{res}_{z=a} f(z)$	residue of f of z at z equals a
$\min_{x \in A} f(x)$	minimum of f of x as x runs over A
$\max_{x \in A} f(x)$	maximum of f of x as x runs over A
$\sum_{n=1}^{m} x_n$	sum of x n as n goes from 1 to m
$\sum_{\alpha \in A} x_\alpha$	sum of x alpha as alpha runs over A
$\prod_{t>0} x_t$	product of x t as t is positive

5. **Greek alphabet.**

A,α	alpha	N,ν	nu
B,β	beta	Ξ,ξ	xi
Γ,γ	gamma	O,o	omicron
Δ,δ	delta	Π,π	pi
E,ε	epsilon	P,ρ	rho
Z,ζ	zeta	Σ,σ	sigma
H,η	eta	T,τ	tau
Θ,θ	theta	Y,υ	upsilon
I,ι	iota	Φ,φ	phi
K,κ	Kappa	X,χ	chi
Λ,λ	lambda	Ψ,ψ	psi
M,μ	Mu	Ω,ω	omega