# Math Structure

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## Contents



## 1 Superscript and Subscript

$A_{ij} = 2^{i+j}$
$A_i^k = B_i^k$
$A_{i_k} = B^{k_i}$
$3^{3^{\cdot^{\cdot^{\cdot^3}}}}$
$a = a'$, $b_0' = b_0''$
$c'^2 = (c')^2$
$A = 90^\circ$
$A = 90^\circ$

$$\max_n f(n) = \sum_{i=0}^{n} A_i$$

$$\int_0^1 f(t)\,\mathrm{d}t = \iint_D g(x,y)\,\mathrm{d}x\,\mathrm{d}y$$

$$\iiint_D \mathrm{d}f = \max_D g$$

$\sum\limits_{i=0}^{n} A_i$ is worse than $\sum_i^n A_i$.

${}_{m}^{n}H_{i}^{j} < L$ is better than ${}_{m}^{n}H_{i}^{j} < L$

$$\sum_{i=0}^{n}{}_{a}^{b}{}_{c}^{d} A_i = \prod_{k}^{'} f_i$$

$\overset{*}{X}$
$\overset{\dagger}{M}{}_{b}^{a}{}_{e}^{cd}$ ${}_{b}^{a}{}_{d}^{c}M_{b}^{a}{}_{d}^{c}$
$A_m{}^n$ is worse than $A_m{}^n$

## 2 Line and Brace

$\overline{a+b} = \overline{a} + \overline{b}$
$\underline{a} = (a_0, a_1, a_2, \dots)$
$\overline{\overline{a} + \overline{b}^2 - c^{\underline{n}}}$
$\overleftarrow{a+b}$
$a+b$
$\overleftrightarrow{a+b}$
$\vec{x} = \overrightarrow{AB}$
$\overbrace{a+b+c} = \underbrace{1+2+3}$

$$(\overbrace{a_0, a_1, \dots, a_n}^{totallynelements}) = (\underbrace{0, 0, \dots, 0}_{n}, 1)$$

$$\underbrace{\boxed{1+2}+3}_{3}$$

## 3 Fraction

Equation: $\frac{1}{3} + \frac{2}{x} = \frac{2+x}{2x}$

$$\tfrac{1}{2}f(x) = \frac{1}{dfrac1a + dfrac1b + c}$$

$$\frac{1}{1+\dfrac{2}{1+\dfrac{3}{1+x}}} = \frac{1}{1+\dfrac{2}{1+\dfrac{3}{1+x}}}$$

$1/a + b$ and $1/a + b$

$$(a+b)^2 = \binom{2}{0}a^2 + \binom{2}{1}ab + \binom{2}{2}b^2$$

$$\begin{bmatrix} n \\ 1 \end{bmatrix} = (n-1)!, \qquad n > 0$$

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# 4 Square Root

$\sqrt{4} = \sqrt[3]{8} = 2$

$$\sqrt[n]{\frac{x^2 + \sqrt{2}}{x + y}}$$

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$$\sqrt{\tfrac{1}{2}} < \sqrt{2}$$

$\sqrt{b}\sqrt{y} \qquad \sqrt{b}\sqrt{y}$

# 5 Matrix

$$A = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ 0 & a_{22} & a_{23} \\ 0 & 0 & a_{33} \end{pmatrix}$$

$$A = \begin{bmatrix} a_{11} & \dots & a_{1n} \\ & \ddots & \vdots \\ 0 & & a_{nn} \end{bmatrix}$$

$$\begin{bmatrix} 1 & \frac{1}{2} & \dots & \frac{1}{n} \\ \dots & \dots & \dots & \dots \\ m & \frac{m}{2} & \dots & \frac{m}{n} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & & \\ 0 & 1 & & 0 \\ & & & \\ \text{Large } 0 & & 1 & 0 \\ & & 0 & 1 \end{bmatrix}$$

The matrix $\left(\begin{smallmatrix} x & -y \\ y & x \end{smallmatrix}\right)$

$$\sum_{\substack{0<i<n \\ 0<j<i}} A_{ij}$$

$$\sum_{\substack{i<10 \\ j<100 \\ k<1000}} X(i,j,k)$$

$$\begin{pmatrix} 10 & -10 \\ -20 & 3 \end{pmatrix}$$

$$\begin{array}{c} \\ 1 \\ 2 \end{array} \begin{array}{c} \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ \begin{pmatrix} A & B & C \\ D & E & F \end{pmatrix} \end{array}$$