Степени и корни

Степени

	Свойства степеней	Примеры
1	$a^n \cdot a^m = a^{n+m}$	$x^5 \cdot x^{-8} = x^{5+(-8)}=x^{-3}=\frac{1}{x^3}$
2	$a^n : a^m = a^{n-m}$	$x^9 : x^{-4} =x^{9-(-4)}=x^{13}$
3	$(a \cdot b)^n= a^n \cdot b^n$	$(x^4 \cdot y^{10})^7=(x^4)^7 \cdot (y^{10})^7=x^{28} \cdot y^{70}$
4	$(a^n)^m= a^{n \cdot m}$	$(x^9)^7= x^{63}$
5	$a^0 = 1$	$5^0 = 1$
6	$a^{-1} = \frac{1}{a}$	$8^{-1} =\frac{1}{8}$
7	$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$	$\left(\frac{9}{11}\right)^{-2} = \left(\frac{11}{9}\right)^2 =\frac{121}{81} = 1\frac{40}{81}$
8	$a^{-n} = \left(\frac{a}{1}\right)^{-n} = \left(\frac{1}{a}\right)^n =\frac{1}{a^n}$	$10^{-6} = \left(\frac{10}{1}\right)^{-6} = \left(\frac{1}{10}\right)^6 = \frac{1}{1000000}$=0,000001

Корни

	Свойства корней	Примеры
1	$\sqrt{a} = a^{\frac{1}{2}}$	$\sqrt{12} = 12^{\frac{1}{2}}$
2	$\sqrt[n]{a} = a^{\frac{1}{n}}$	$\sqrt[4]{15} = 15^{\frac{1}{4}}$
3	$\sqrt[n]{a^m} = a^{\frac{m}{n}}$	$\sqrt[4]{7^9} = 7^{\frac{9}{4}}$
4	$a^{\frac{1}{n}} = \sqrt[n]{a}$	$5^{\frac{1}{4}} = \sqrt[4]{5}$
5	$a^{\frac{m}{n}} =\sqrt[n]{a^m}$	$5^{\frac{8}{9}} =\sqrt[9]{5^8}$
6	$\sqrt{а} \cdot \sqrt{в} = \sqrt{а \cdot в}$	$\sqrt{2} \cdot \sqrt{18} = \sqrt{2 \cdot 18} = \sqrt{36} = 6$
7	$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{a \cdot b}$	$\sqrt[3]{4} \cdot \sqrt[3]{2} =\sqrt[3]{4 \cdot 2} =\sqrt[3]{8} =\sqrt[3]{2^3} = 2$
8	$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$	$\frac{\sqrt{128}}{\sqrt{2}} = \sqrt{\frac{128}{2}} = \sqrt{64} = 8$
9	$\frac{\sqrt[n]{a}}{\sqrt[n]{b}}= \sqrt[n]{\frac{a}{b}}$	$\frac{\sqrt[4]{3}}{\sqrt[4]{48}}= \sqrt[4]{\frac{3}{48}} =\sqrt[4]{\frac{1}{16}} = \sqrt[4]{(\frac{1}{2})^4} = \frac{1}{2}$=0,5
10	$(\sqrt{a})^2 = a$	$(\sqrt{3})^2 = \sqrt{9}$ =3
11	$(\sqrt[n]{a})^n = a$	$(\sqrt[3]{9})^3 = (9^{\frac{1}{3}})^3$= 9

$1^3 = 1$	$\sqrt[3]{1} = \sqrt[3]{1^3} = 1$	$1^4 = 1$	$\sqrt[4]{1} = \sqrt[4]{1^4} = 1$
$2^3 = 8$	$\sqrt[3]{8} =\sqrt[3]{2^3} = 2$	$2^4 = 16$	$\sqrt[4]{16} = \sqrt[4]{2^4} = 2$
$3^3 = 27$	$\sqrt[3]{27} = \sqrt[3]{3^3} = 3$	$3^4 = 81$	$\sqrt[4]{81} = \sqrt[4]{3^4} = 3$
$4^3 = 64$	$\sqrt[3]{64} = \sqrt[3]{4^3} = 4$	$4^4 = 256$	$\sqrt[4]{256} = \sqrt[4]{4^4} = 4$
$5^3 = 125$	$\sqrt[3]{125} =\sqrt[3]{5^3} = 5$	$5^4 = 625$	$\sqrt[4]{625} = \sqrt[4]{5^4} = 5$
$6^3 = 216$	$\sqrt[3]{216} =\sqrt[3]{6^3} = 6$	$6^4 = 1296$	$\sqrt[4]{1296} = \sqrt[4]{6^4} = 6$
$7^3 = 343$	$\sqrt[3]{343} =\sqrt[3]{7^3} = 7$	$7^4 = 2401$	$\sqrt[4]{2401} = \sqrt[4]{7^4} = 7$
$8^3 = 512$	$\sqrt[3]{512} =\sqrt[3]{8^3} = 8$	$8^4 = 4096$	$\sqrt[4]{4096} = \sqrt[4]{8^4} = 8$
$9^3 = 729$	$\sqrt[3]{729} =\sqrt[3]{9^3} = 9$	$9^4 = 6561$	$\sqrt[4]{6561} = \sqrt[4]{9^4} = 9$
$10^3 = 1000$	$\sqrt[3]{1000} = \sqrt[3]{10^3} = 10$	$10^4 = 10000$	$\sqrt[4]{10000} = \sqrt[4]{10^4} = 10$

$1^2 = 1$	$\sqrt{1} = 1$	$11^2 = 121$	$\sqrt{121} = 11$
$2^2 = 4$	$\sqrt{4} = 2$	$12^2 = 144$	$\sqrt{144} = 12$
$3^2 = 9$	$\sqrt{9} = 3$	$13^2 = 169$	$\sqrt{169} = 13$
$4^2 = 16$	$\sqrt{16} = 4$	$14^2 = 196$	$\sqrt{196} = 14$
$5^2 = 25$	$\sqrt{25} = 5$	$15^2 = 225$	$\sqrt{225} = 15$
$6^2 = 36$	$\sqrt{36} = 6$	$16^2 = 256$	$\sqrt{256} = 16$
$7^2 = 49$	$\sqrt{49} = 7$	$17^2 = 289$	$\sqrt{289} = 17$
$8^2 = 64$	$\sqrt{64} = 8$	$18^2 = 324$	$\sqrt{324} = 18$
$9^2 = 81$	$\sqrt{81} = 9$	$19^2 = 361$	$\sqrt{361} = 19$
$10^2 = 100$	$\sqrt{100} = 10$	$20^2 = 400$	$\sqrt{400} = 20$

$0{,}1^2 = 0{,}01$	$\sqrt{0{,}01} = 0{,}1$	$0{,}1^3 = 0{,}001$	$\sqrt[3]{0{,}001} = 0{,}1$
$0{,}2^2 = 0{,}04$	$\sqrt{0{,}04} = 0{,}2$	$0{,}2^3 = 0{,}008$	$\sqrt[3]{0{,}008} = 0{,}2$
$0{,}3^2 = 0{,}09$	$\sqrt{0{,}09} = 0{,}3$	$0{,}3^3 = 0{,}027$	$\sqrt[3]{0{,}027} = 0{,}3$
$0{,}4^2 = 0{,}16$	$\sqrt{0{,}16} = 0{,}4$	$0{,}4^3 = 0{,}064$	$\sqrt[3]{0{,}064} = 0{,}4$
$0{,}5^2 = 0{,}25$	$\sqrt{0{,}25} = 0{,}5$	$0{,}5^3 = 0{,}125$	$\sqrt[3]{0{,}125} = 0{,}5$
$0{,}6^2 = 0{,}36$	$\sqrt{0{,}36} = 0{,}6$	$0{,}6^3 = 0{,}216$	$\sqrt[3]{0{,}216} = 0{,}6$
$0{,}7^2 = 0{,}49$	$\sqrt{0{,}49} = 0{,}7$	$0{,}7^3 = 0{,}343$	$\sqrt[3]{0{,}343} = 0{,}7$
$0{,}8^2 = 0{,}64$	$\sqrt{0{,}64} = 0{,}8$	$0{,}8^3 = 0{,}512$	$\sqrt[3]{0{,}512} = 0{,}8$
$0{,}9^2 = 0{,}81$	$\sqrt{0{,}81} = 0{,}9$	$0{,}9^3 = 0{,}729$	$\sqrt[3]{0{,}729} = 0{,}9$
$0{,}1\cancel{0}^2 = 0{,}01$	$\sqrt{0{,}01} = 0{,}1\cancel{0}$	$0{,}1\cancel{0}^3 = 0{,}001$	$\sqrt[3]{0{,}001} = 0{,}1\cancel{0}$

$0{,}1^4 = 0{,}0001$	$\sqrt[4]{0{,}0001} = 0{,}1$	$0{,}01^2 = 0{,}0001$	$\sqrt{0{,}0001} = 0{,}01$
$0{,}2^4 = 0{,}0016$	$\sqrt[4]{0{,}0016} = 0{,}2$	$0{,}02^2 = 0{,}0004$	$\sqrt{0{,}0004} = 0{,}02$
$0{,}3^4 = 0{,}0081$	$\sqrt[4]{0{,}0081} = 0{,}3$	$0{,}03^2 = 0{,}0009$	$\sqrt{0{,}0009} = 0{,}03$
$0{,}4^4 = 0{,}0256$	$\sqrt[4]{0{,}0256} = 0{,}4$	$0{,}04^2 = 0{,}0016$	$\sqrt{0{,}0016} = 0{,}04$
$0{,}5^4 = 0{,}0625$	$\sqrt[4]{0{,}0625} = 0{,}5$	$0{,}05^2 = 0{,}0025$	$\sqrt{0{,}0025} = 0{,}05$
$0{,}6^4 = 0{,}1296$	$\sqrt[4]{0{,}1296} = 0{,}6$	$0{,}06^2 = 0{,}0036$	$\sqrt{0{,}0036} = 0{,}06$
$0{,}7^4 = 0{,}2401$	$\sqrt[4]{0{,}2401} = 0{,}7$	$0{,}07^2 = 0{,}0049$	$\sqrt{0{,}0049} = 0{,}07$
$0{,}8^4 = 0{,}4096$	$\sqrt[4]{0{,}4096} = 0{,}8$	$0{,}08^2 = 0{,}0064$	$\sqrt{0{,}0064} = 0{,}08$
$0{,}9^4 = 0{,}6561$	$\sqrt[4]{0{,}6561} = 0{,}9$	$0{,}09^2 = 0{,}0081$	$\sqrt{0{,}0081} = 0{,}09$
$0{,}1\cancel{0}^4 = 0{,}0001$	$\sqrt[4]{0{,}0001} = 0{,}1\cancel{0}$	$0{,}01\cancel{0}^2 = 0{,}0001$	$\sqrt{0{,}0001} = 0{,}01\cancel{0}$