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Multiplication Tables for Number Bases

Base-Eight Times Table

	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7
2	0	2	4	6	10	12	14	16
3	0	3	6	11	14	17	22	25
4	0	4	10	14	20	24	30	34
5	0	5	12	17	24	31	36	43
6	0	6	14	22	30	36	44	52
7	0	7	16	25	34	43	52	61

Base-Five Times Table

	0	1	2	3	4
0	0	0	0	0	0
1	0	1	2	3	4
2	0	2	4	11	13
3	0	3	11	14	22
4	0	4	13	22	31

Base-Two Table

	0	1
0	0	0
1	0	1

Base-Sixteen Times Table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2	0	2	4	6	8	A	C	E	10	12	14	16	18	1A	1C	1E
3	0	3	6	9	C	F	12	15	18	1B	1E	21	24	27	2A	2D
4	0	4	8	C	10	14	18	1C	20	24	28	2C	30	34	38	3C
5	0	5	A	F	14	19	1E	23	28	2D	32	37	3C	41	46	4B
6	0	6	C	12	18	1E	24	2A	30	36	3C	42	48	4E	54	5A
7	0	7	E	15	1C	23	2A	31	38	3F	46	4D	54	5B	62	69
8	0	8	10	18	20	28	30	38	40	48	50	58	60	68	70	78
9	0	9	12	1B	24	2D	36	3F	48	51	5A	63	6C	75	7E	87
A	0	A	14	1E	28	32	3C	46	50	5A	64	6E	78	82	8C	96
B	0	B	16	21	2C	37	42	4D	58	63	6E	79	84	8F	9A	A5
C	0	C	18	24	30	3C	48	54	60	6C	78	84	90	9C	A8	B4
D	0	D	1A	27	34	41	4E	5B	68	75	82	8F	9C	A9	B6	C3
E	0	E	1C	2A	38	46	54	62	70	7E	8C	9A	A8	B6	C4	D2
F	0	F	1E	2D	3C	4B	5A	69	78	87	96	A5	B4	C3	D2	E1

Place Value (exponent) Table

10	9	8	7	6	5	4	3	2	1	0	
1024	512	256	128	64	32	16	8	4	2	1	2
					3125	625	125	25	5	1	5
					32768	4096	512	64	8	1	8
					100000	10000	1000	100	10	1	10
						65536	4096	256	16	1	16

**B
A
S
E**

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ASCII Code Table

Note: All codes are given in hexadecimal. Each hexadecimal digit can easily be converted to binary by using the table at the bottom of the page. For example, the character "n" has an ASCII hexadecimal code 6E. Looking at the bottom of the page, we see that 6 is 0110 and that E is 1110. Therefore, the binary ASCII code for "n" is 01101110. Note, also, that this table is incomplete. A full ASCII code table includes 256 codes, since there are 256 possible codes for one byte, which is an 8-digit binary code.

<u>Hex</u>	<u>Char</u>	<u>Hex</u>	<u>Char</u>	<u>Hex</u>	<u>Char</u>	<u>Hex</u>	<u>Char</u>	<u>Hex</u>	<u>Char</u>	<u>Hex</u>	<u>Char</u>
20	space	30	0	40	@	50	P	60	`	70	p
21	!	31	1	41	A	51	Q	61	a	71	q
22	"	32	2	42	B	52	R	62	b	72	r
23	#	33	3	43	C	53	S	63	c	73	s
24	\$	34	4	44	D	54	T	64	d	74	t
25	%	35	5	45	E	55	U	65	e	75	u
26	&	36	6	46	F	56	V	66	f	76	v
27	'	37	7	47	G	57	W	67	g	77	w
28	(	38	8	48	H	58	X	68	h	78	x
29	)	39	9	49	I	59	Y	69	i	79	y
2A	*	3A	:	4A	J	5A	Z	6A	j	7A	z
2B	+	3B	;	4B	K	5B	[	6B	k	7B	{
2C	,	3C	<	4C	L	5C	\	6C	l	7C	|
2D	-	3D	=	4D	M	5D	]	6D	m	7D	}
2E	.	3E	>	4E	N	5E	^	6E	n	7E	~
2F	/	3F	?	4F	O	5F	_	6F	o	7F	del

Binary/Hexadecimal Conversion Table

<u>Binary</u>	<u>Hexadecimal</u>	<u>Binary</u>	<u>Hexadecimal</u>
0000	0	1000	8
0001	1	1001	9
0010	2	1010	A
0011	3	1011	B
0100	4	1100	C
0101	5	1101	D
0110	6	1110	E
0111	7	1111	F

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Table of Squares

$1^2 = 1$	$21^2 = 441$	$41^2 = 1681$	$61^2 = 3721$
$2^2 = 4$	$22^2 = 484$	$42^2 = 1764$	$62^2 = 3844$
$3^2 = 9$	$23^2 = 529$	$43^2 = 1849$	$63^2 = 3969$
$4^2 = 16$	$24^2 = 576$	$44^2 = 1936$	$64^2 = 4096$
$5^2 = 25$	$25^2 = 625$	$45^2 = 2025$	$65^2 = 4225$
$6^2 = 36$	$26^2 = 676$	$46^2 = 2116$	$66^2 = 4356$
$7^2 = 49$	$27^2 = 729$	$47^2 = 2209$	$67^2 = 4489$
$8^2 = 64$	$28^2 = 784$	$48^2 = 2304$	$68^2 = 4624$
$9^2 = 81$	$29^2 = 841$	$49^2 = 2401$	$69^2 = 4761$
$10^2 = 100$	$30^2 = 900$	$50^2 = 2500$	$70^2 = 4900$
$11^2 = 121$	$31^2 = 961$	$51^2 = 2601$	$71^2 = 5041$
$12^2 = 144$	$32^2 = 1024$	$52^2 = 2704$	$72^2 = 5184$
$13^2 = 169$	$33^2 = 1089$	$53^2 = 2809$	$73^2 = 5329$
$14^2 = 196$	$34^2 = 1156$	$54^2 = 2916$	$74^2 = 5476$
$15^2 = 225$	$35^2 = 1225$	$55^2 = 3025$	$75^2 = 5625$
$16^2 = 256$	$36^2 = 1296$	$56^2 = 3136$	$76^2 = 5776$
$17^2 = 289$	$37^2 = 1369$	$57^2 = 3249$	$77^2 = 5929$
$18^2 = 324$	$38^2 = 1444$	$58^2 = 3364$	$78^2 = 6084$
$19^2 = 361$	$39^2 = 1521$	$59^2 = 3481$	$79^2 = 6241$
$20^2 = 400$	$40^2 = 1600$	$60^2 = 3600$	$80^2 = 6400$

Pythagorean Triples

3,4,5
5,12,13
8,15,17
7,24,25
20,21,29
12,35,37
9,40,41
28,45,53
11,60,61
16,63,65
33,56,65
48,55,73
13,84,85
36,77,85
39,80,89
65,72,97

Table of Square Roots

$\sqrt{1} = 1.000$	$\sqrt{21} = 4.583$	$\sqrt{41} = 6.403$	$\sqrt{61} = 7.810$	$\sqrt{81} = 9.000$
$\sqrt{2} = 1.414$	$\sqrt{22} = 4.690$	$\sqrt{42} = 6.481$	$\sqrt{62} = 7.874$	$\sqrt{82} = 9.055$
$\sqrt{3} = 1.732$	$\sqrt{23} = 4.796$	$\sqrt{43} = 6.557$	$\sqrt{63} = 7.937$	$\sqrt{83} = 9.110$
$\sqrt{4} = 2.000$	$\sqrt{24} = 4.899$	$\sqrt{44} = 6.633$	$\sqrt{64} = 8.000$	$\sqrt{84} = 9.165$
$\sqrt{5} = 2.236$	$\sqrt{25} = 5.000$	$\sqrt{45} = 6.708$	$\sqrt{65} = 8.062$	$\sqrt{85} = 9.220$
$\sqrt{6} = 2.449$	$\sqrt{26} = 5.099$	$\sqrt{46} = 6.782$	$\sqrt{66} = 8.124$	$\sqrt{86} = 9.274$
$\sqrt{7} = 2.646$	$\sqrt{27} = 5.196$	$\sqrt{47} = 6.856$	$\sqrt{67} = 8.185$	$\sqrt{87} = 9.327$
$\sqrt{8} = 2.828$	$\sqrt{28} = 5.292$	$\sqrt{48} = 6.928$	$\sqrt{68} = 8.246$	$\sqrt{88} = 9.381$
$\sqrt{9} = 3.000$	$\sqrt{29} = 5.385$	$\sqrt{49} = 7.000$	$\sqrt{69} = 8.307$	$\sqrt{89} = 9.434$
$\sqrt{10} = 3.162$	$\sqrt{30} = 5.477$	$\sqrt{50} = 7.071$	$\sqrt{70} = 8.367$	$\sqrt{90} = 9.487$
$\sqrt{11} = 3.317$	$\sqrt{31} = 5.568$	$\sqrt{51} = 7.141$	$\sqrt{71} = 8.426$	$\sqrt{91} = 9.539$
$\sqrt{12} = 3.464$	$\sqrt{32} = 5.657$	$\sqrt{52} = 7.211$	$\sqrt{72} = 8.485$	$\sqrt{92} = 9.592$
$\sqrt{13} = 3.606$	$\sqrt{33} = 5.745$	$\sqrt{53} = 7.280$	$\sqrt{73} = 8.544$	$\sqrt{93} = 9.644$
$\sqrt{14} = 3.742$	$\sqrt{34} = 5.831$	$\sqrt{54} = 7.348$	$\sqrt{74} = 8.602$	$\sqrt{94} = 9.695$
$\sqrt{15} = 3.873$	$\sqrt{35} = 5.916$	$\sqrt{55} = 7.416$	$\sqrt{75} = 8.660$	$\sqrt{95} = 9.747$
$\sqrt{16} = 4.000$	$\sqrt{36} = 6.000$	$\sqrt{56} = 7.483$	$\sqrt{76} = 8.718$	$\sqrt{96} = 9.798$
$\sqrt{17} = 4.123$	$\sqrt{37} = 6.083$	$\sqrt{57} = 7.550$	$\sqrt{77} = 8.775$	$\sqrt{97} = 9.849$
$\sqrt{18} = 4.243$	$\sqrt{38} = 6.164$	$\sqrt{58} = 7.616$	$\sqrt{78} = 8.832$	$\sqrt{98} = 9.899$
$\sqrt{19} = 4.359$	$\sqrt{39} = 6.245$	$\sqrt{59} = 7.681$	$\sqrt{79} = 8.888$	$\sqrt{99} = 9.950$
$\sqrt{20} = 4.472$	$\sqrt{40} = 6.325$	$\sqrt{60} = 7.746$	$\sqrt{80} = 8.944$	$\sqrt{100} = 10.000$

Note: If there are ending zeroes inside the square root, then you can remove an even number of zeroes from inside, which will result in half as many zeroes (or moving the decimal place half as many places) in your answer.

Examples:

With $\sqrt{25000000}$ we remove 6 zeroes, then adding 3 zeroes to $\sqrt{25}$, gives an answer of 5000.

With $\sqrt{60000}$ we remove 4 zeroes. Since $\sqrt{6}$ is 2.449, we move 2 decimal places to get 244.9.

With $\sqrt{600000}$ we remove 4 zeroes. Since $\sqrt{60}$ is 7.746, we move 2 decimal places to get 774.6.

Note: This table should not be used if, after removing an even number of zeroes, there are more than two digits inside the square root. For example, it *can* be used for $\sqrt{58000000}$, but *cannot* be used for $\sqrt{58700}$ or for $\sqrt{580}$ or for $\sqrt{5800000}$.

Growth Rate Table $(1+r)^t$ giving values for $(1+r)^t$ from the formula $P = P_0(1+r)^t$

t	$(1+r)$																			
	1.01	1.02	1.025	1.03	1.035	1.04	1.05	1.06	1.07	1.08	1.09	1.1	1.15	1.2	1.25	1.3	1.4	1.5	2	
2	1.0201	1.0404	1.05063	1.0609	1.07123	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.21	1.3225	1.44	1.5625	1.69	1.96	2.25	4	
3	1.0303	1.06121	1.07689	1.09273	1.10872	1.12486	1.15763	1.19102	1.22504	1.25971	1.29503	1.331	1.52088	1.728	1.95313	2.197	2.744	3.375	8	
4	1.0406	1.08243	1.10381	1.12551	1.14752	1.16986	1.21551	1.26248	1.3108	1.36049	1.41158	1.4641	1.74901	2.0736	2.44141	2.8561	3.8416	5.0625	16	
5	1.05101	1.10408	1.13141	1.15927	1.18769	1.21665	1.27628	1.33823	1.40255	1.46933	1.53862	1.61051	2.01136	2.48832	3.05176	3.71293	5.37824	7.59375	32	
6	1.06152	1.12616	1.15969	1.19405	1.22926	1.26532	1.3401	1.41852	1.50073	1.58687	1.6771	1.77156	2.31306	2.98598	3.8147	4.82681	7.52954	11.3906	64	
7	1.07214	1.14869	1.18869	1.22987	1.27228	1.31583	1.4071	1.50363	1.60578	1.71382	1.82804	1.94872	2.66002	3.58318	4.76837	6.27485	10.5414	17.0859	128	
8	1.08286	1.17166	1.2184	1.26677	1.31681	1.36857	1.47746	1.59385	1.71819	1.85093	1.99256	2.14359	3.05902	4.29982	5.96046	8.15731	14.7579	25.6289	256	
9	1.09369	1.19509	1.24886	1.30477	1.3629	1.42331	1.55133	1.68948	1.83846	1.999	2.17189	2.35795	3.51788	5.15978	7.45058	10.6045	20.661	38.4434	512	
10	1.10462	1.21899	1.28008	1.34392	1.4106	1.48024	1.62889	1.79085	1.96715	2.15892	2.36736	2.58374	4.04556	6.19174	9.31323	13.7858	28.9255	57.665	1024	
11	1.11567	1.24337	1.31209	1.38423	1.45997	1.53945	1.71034	1.8983	2.10485	2.33164	2.58043	2.85312	4.65239	7.43008	11.6415	17.9216	40.4957	86.4976	2048	
12	1.12683	1.26824	1.34489	1.42576	1.51107	1.60103	1.79586	2.0122	2.25219	2.51817	2.81266	3.13843	5.35025	8.9161	14.5519	23.2981	56.6939	129.746	4096	
13	1.13809	1.29361	1.37851	1.46855	1.56396	1.66507	1.88665	2.13293	2.40985	2.71962	3.0658	3.45227	6.15279	10.6993	18.1899	30.2875	79.3715	194.62	8192	
14	1.14947	1.31948	1.41297	1.51259	1.61869	1.73168	1.97993	2.2609	2.57853	2.93719	3.34173	3.7975	7.07571	12.8392	22.7374	39.3738	111.12	291.929	18384	
15	1.16097	1.34587	1.4483	1.55797	1.67535	1.80094	2.07893	2.39656	2.75903	3.17217	3.64248	4.17725	8.13706	15.407	28.4217	51.1859	155.568	437.894	32768	
16	1.17258	1.37279	1.48451	1.60471	1.73399	1.87298	2.18287	2.54035	2.95216	3.42594	3.97031	4.59497	9.35762	18.4884	35.5271	66.5417	217.795	656.841	65536	
17	1.1843	1.40024	1.52162	1.65285	1.79468	1.9479	2.29202	2.69277	3.15882	3.70002	4.32763	5.05447	10.7613	22.1861	44.4089	86.5042	304.913	985.261	131072	
18	1.19615	1.42825	1.55966	1.70243	1.85749	2.02552	2.40662	2.85434	3.37993	3.99602	4.71712	5.55992	12.3755	26.6233	55.5112	112.485	426.879	1477.89	262144	
19	1.20811	1.45681	1.59865	1.75351	1.9225	2.10685	2.52895	3.0256	3.61653	4.3157	5.14166	6.11591	14.2318	31.948	69.3889	146.192	597.63	2216.84	524288	
20	1.22019	1.48595	1.63862	1.80611	1.98979	2.19112	2.6533	3.20714	3.86968	4.66096	5.60441	6.7275	16.3665	38.3376	86.7362	190.05	836.683	3325.26	1048576	
25	1.28243	1.64061	1.85394	2.09378	2.36324	2.66584	3.38635	4.29187	5.42743	6.84848	8.62308	10.8347	32.919	95.3962	264.698	705.641	4499.88	25251.2	3.4E+07	
30	1.34785	1.81136	2.09757	2.42726	2.80679	3.2434	4.32194	5.74349	7.61226	10.0627	13.2677	17.4494	66.2118	237.376	807.794	2620	24201.4	191751	1.1E+09	
40	1.48886	2.20804	2.68506	3.26204	3.95926	4.80102	7.03999	10.2857	14.9745	21.7245	31.4094	45.2593	267.864	1469.77	7523.16	36118.9	700038	1.1E+12	1.1E+15	
50	1.64463	2.69159	3.43711	4.38391	5.58493	7.10668	11.4674	18.4202	29.457	46.9016	74.3575	117.391	1083.66	9100.44	70064.9	497929	2E+07	6.4E+08	1.1E+15	
60	1.8167	3.28103	4.39979	5.8916	7.87809	10.5186	18.6792	32.9877	57.9464	101.257	176.031	304.482	4384	56347.5	652530	6864377	5.9E+08	3.7E+10	1.2E+18	
80	2.21672	4.87544	7.20957	10.6409	15.6757	23.0498	49.5614	105.796	224.234	471.955	986.552	2048.4	71750.9	2160228	5.7E+07	1.3E+09	4.9E+11	1.2E+14	1.2E+24	
100	2.70481	7.24465	11.8137	19.2186	31.1914	50.5049	131.501	339.302	867.716	2199.76	5529.04	13780.6	1174313	8.3E+07	4.9E+09	2.5E+11	4.1E+14	4.1E+17	1.3E+30	
150	4.44842	19.4996	40.605	84.2527	174.202	358.923	1507.98	6250	25560.3	103172	411126	1617718	1.3E+09	7.5E+11	3.4E+14	1.2E+17	8.3E+21	2.6E+26	1.4E+45	
200	7.31602	52.4849	139.564	369.356	972.904	2550.75	17292.6	115126	752932	4838950	3.1E+07	1.9E+08	1.4E+12	6.9E+15	2.4E+19	6.1E+22	1.7E+29	1.7E+35	1.6E+60	

Note: The cell on the bottom right (1.6E+60) means $1.6 \cdot 10^{60}$ in scientific notation.
 The last column is where $(r+1)$ is 2, or $r = 1$, which means 100% annual growth, or doubling.

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Conversion Table

* Denotes that it should be memorized as given in parentheses.

Weight

- * 1 lb = 16 oz
- * 1 kg \approx 2.2046 (2.2) lb
- * 1 oz \approx 28.35 g
- 1 g \approx 0.0353 oz
- 1 lb \approx 0.4536 kg
- * 1 U.S. ton = 2000 lb
- * 1 metric ton = 1000 kg

Volume

- * 1 tablespoon = 3 teaspoons
- * 1 fl oz = 2 tablespoons
- * 1 cup = 8 fl oz
- * 1 pt = 2 cups = 16 fl oz
- * 1 qt = 2 pt = 32 fl oz
- * 1 gal = 4 qt = 128 fl oz \approx 3.785 *l*
- * 1 ml = 1 cm³ (exactly!)
- * 1 *l* \approx 1.0567 (1.06) qt \approx 33.8 fl oz
- 1 fl oz \approx 29.58 ml \approx 1.804 in³
- 1 qt \approx 57.75 in³ \approx 0.9464 *l*
- 1 gal \approx 231.0 in³ \approx 0.134 ft³
- 1 ft³ = 1728 in³ \approx 7.481 gal
- 1 in³ \approx 0.554 fl oz \approx 16.39 cm³
- 1 m³ = 1000 *l* \approx 35.31 ft³
- 1 cord (of wood) = 128 ft³

Area

- * 1 acre \approx area of square with side of 70 yards
- * 1 hectare = 10,000 m² (100m·100m) \approx 2.471 acres
- 1 acre = 4840 yd² \approx 0.405 hectare
- 1 mile² = 640 acres \approx 2.590 km²
- 1 ft² = 144 in²
- 1 m² = 10,000 cm² \approx 10.764 ft²
- 1 in² \approx 6.452 cm²

Length

- * 1 yd = 36 in
- * 1 in \approx 2.5400 (2.54) cm
- * 1 m \approx 3.2808 (3.28) ft
- * 1 mile = 5280 ft \approx 1.6093 (1.61) km
- * 1 km \approx 0.6214 (0.62) mi
- 1 cm \approx 0.39370 in
- 1 m \approx 39.370 in \approx 1.093 yd
- 1 ft \approx 0.3048 m

Speed

1 m/s = 3.6 km/h \approx 2.237 mph \approx 3.281 ft/sec

Density¹

Density conversion factors:

$$1 \frac{\text{g}}{\text{cm}^3} = 1000 \frac{\text{kg}}{\text{m}^3} \approx 62.43 \frac{\text{lb}}{\text{ft}^3} \approx 0.578 \frac{\text{oz}}{\text{in}^3}$$

$$1 \frac{\text{oz}}{\text{in}^3} \approx 1.73 \frac{\text{g}}{\text{cm}^3}$$

Water¹ (at a maximum density of 4°C)

$$= 1 \frac{\text{g}}{\text{cm}^3} \text{ or } 1 \frac{\text{kg}}{\text{liter}} \text{ or } 1000 \frac{\text{kg}}{\text{m}^3}$$

$$\approx 0.578 \frac{\text{oz}}{\text{in}^3} \text{ or } 1.043 \frac{\text{oz}}{\text{fl oz}}$$

$$\approx 62.43 \frac{\text{lb}}{\text{ft}^3} \text{ or } 8.345 \frac{\text{lb}}{\text{gal}}$$

Air $1.29 \frac{\text{oz}}{\text{ft}^3}$ or $1.29 \frac{\text{kg}}{\text{m}^3}$ (coincidentally!)

Aluminum $169 \frac{\text{lb}}{\text{ft}^3}$ or $2.70 \frac{\text{g}}{\text{cm}^3}$

Iron $443 \frac{\text{lb}}{\text{ft}^3}$ or $7.10 \frac{\text{g}}{\text{cm}^3}$

Mercury $843 \frac{\text{lb}}{\text{ft}^3}$ or $13.5 \frac{\text{g}}{\text{cm}^3}$

Gold $1204 \frac{\text{lb}}{\text{ft}^3}$ or $19.3 \frac{\text{g}}{\text{cm}^3}$

Useful Distances

Radius of the Earth:	3960 mi (6371 km)
Circumference of the Earth:	24880 mi (40,030 km)
Surface Area of the Earth:	197,000,000 mi ² (510,000,000 km ²)
Total land area of the Earth:	57,500,000 mi ² (149,000,000 km ²)
Radius of the Sun:	432,000 mi (696,000 km)
Radius of the Moon:	1080 mi (1738 km)
Distance to the Moon:	239,000 mi (384,400 km)
Distance to the Sun:	93,000,000 mi (150,000,000 km)
One light year:	5.8784×10^{12} mi (9.46×10^{12} km)
Distance to the nearest star:	2.53×10^{13} mi (4.07×10^{13} km)

Temperature Conversions

$$C = \frac{5}{9} (F - 32)$$

$$F = \frac{9}{5} C + 32$$

¹ Density always reads as weight per volume. For example, the density of gold is 1204 lb/ft³, which tells us that a cubic foot of gold weighs 1204 pounds. The density of gold can also be given as 19.3 g/cm³, which says that a cubic centimeter weighs 19.3 grams.

- Note that water has a density of exactly 1 oz/fl.oz. at 212°F when it is *least* dense.
- It is perhaps more useful to give densities in terms of g/cm³ because we can easily compare it to water, which has a density of exactly 1 g/cm³ (1 cm³ of water weighs 1 gram). For example, with gold's density of 19.3 g/cm³, we can say that gold is 19.3 times heavier than water.