Powers of Two

If one grain of rice with a length of 1 centimeter is doubled 80 times then the length of that one line (with each grain placed end to end in a continuous line) would be:

2^{80} = 1,208,925,819,614,629,174,706,176 cm or 7,511,916,778,604,382,000 miles or 1,277,859.98 light years.

2^{93} = 9,903,520,314,283,042,199,192,993,792 cm (or 10,468,029,232 light years**).**
The diameter of the known universe is thought to be at least 10 billion light years.

That grain doubled in length 100 times would be:

2^{100} = 1,267,650,600,228,229,401,496,703,205,376 or (1,339,933,302,216.29 light years)

In terms of human population, if the world population were to double every 50 years, as it has since 1850, then by the year 2200 the world population would be 96,000,000,000 and in the year 3000 the population would be 412,000 trillion (412,000,000,000,000,000).

Powers of 2 Table

2^{0} = 1 cm
2^{1} = 2
2^{2} = 4
2^{3} = 8
2^{4} = 16
2^{5} = 32
2^{6} = 64
2^{7} = 128
2^{8} = 256
2^{9} = 512
2^{10} = 1,024
2^{11} = 2,048
2^{12} = 4,096
2^{13} = 8,192
2^{14} = 16,384
2^{15} = 32,768
2^{16} = 65,536
2^{17} = 131,072
2^{18} = 262,144
2^{19} = 524,288
2^{20} = 1,048,576
2^{21} = 2,097,152
2^{22} = 4,194,304
2^{23} = 8,388,608

2^{24} = 16,777,216
2^{25} = 33,554,432
2^{26} = 67,108,864
2^{27} = 134,217,728
2^{28} = 268,435,456
2^{29} = 536,870,912
2^{30} = 1,073,741,824
2^{31} = 2,147,483,648
2^{32} = 4,294,967,296
2^{33} = 8,589,934,592
2^{34} = 17,179,869,184
2^{35} = 34,359,738,368
2^{36} = 68,719,476,736
2^{37} = 137,438,953,472
2^{38} = 274,877,906,944
2^{39} = 549,755,813,888
2^{40} = 1,099,511,627,776
2^{41} = 2,199,023,255,552
2^{42} = 4,398,046,511,104
2^{43} = 8,796,093,022,208
2^{44} = 17,592,186,044,416
2^{45} = 35,184,372,088,832
2^{46} = 70,368,744,177,664
2^{47} = 140,737,488,355,328
2^{48} = 281,474,976,710,656
2^{49} = 562,949,953,421,312
2^{50} = 1,125,899,906,842,624
2^{51} = 2,251,799,813,685,248
2^{52} = 4,503,599,627,370,496
2^{53} = 9,007,199,254,740,992
2^{54} = 18,014,398,509,481,984
2^{55} = 36,028,797,018,963,968
2^{56} = 72,057,594,037,927,936
2^{57} = 144,115,188,075,855,872
2^{58} = 288,230,376,151,711,744
2^{59} = 576,460,752,303,423,488
2^{60} = 1,152,921,504,606,846,976
2^{61} = 2,305,843,009,213,693,952
2^{62} = 4,611,686,018,427,387,904
2^{63} = 9,223,372,036,854,775,808
2^{64} = 18,446,744,073,709,551,616
2^{65} = 36,893,488.147,419,103,232
2^{66} = 73,786,976,294,838,206,464
2^{67} = 147,573,952,589,676,412,928
2^{68} = 295,147,905,179,352,825,856
2^{69} = 590,295,810,358,705,651,712

2^{70} = 1,180,591,620,717,411,303,424
2^{71} = 2,361,183,241,434,822,606,848
2^{72} = 4,722,366,482,869,645,213,696
2^{73} = 9,444,732,965,739,290,427,392
2^{74} = 18,889,465,931,478,580,854,784
2^{75} = 37,778,931,862,957,161,709,568
2^{76} = 75,557,863,725,914,323,419,136
2^{77} = 151,115,727,451,828,646,838,272
2^{78} = 302,231,454,903,657,293,676,544
2^{79} = 604,462,909,807,314,587,353,088
2^{80} = 1,208,925,819,614,629,174,706,176
2^{81} = 2,417,851,639,229,258,349,412,352
2^{82} = 4,835,703,278,458,516,698,824,704
2^{83} = 9,671,406,556,917,033,397,649,408
2^{84} = 19,342,813,113,834,066,795,298,816
2^{85} = 38,685,626,227,668,133,590,597,632
2^{86} = 77,371,252,455,336,267,181,195,264
2^{87} = 154,742,504,910,672,534,362,390,528
2^{88} = 309,485,009,821,345,068,724,781,056
2^{89} = 618,970,019,642,690,137,449,562,112
2^{90} = 1,237,940,039,285,380,274,899,124,224
2^{91} = 2,475,880,078,570,760,549,798,248,448
2^{92} = 4,951,760,157,141,521,099,596,496,896
2^{93} = 9,903,520,314,283,042,199,192,993,792
2^{94} = 19,807,040,628,566,084,398,385,987,584
2^{95} = 39,614,081,257,132,168,796,771,975.168
2^{96} = 79,228,162,514,264,337,593,543,950,336
2^{97} = 158,456,325,028,528,675,187,087,900,672
2^{98} = 316,912,650,057,057,350,374,175,801,344
2^{99} = 633,825,300,114,114,700,748,351,602,688
2^{100} = 1,267,650,600,228,229,401,496,703,205,376 **(1,339,933,302,216.29** light years)

Massing all of the rice into one clump:

The mass of one grain of rice (at 1 cm) doubled 100 times (formed into rice ball) would form an object with the diameter of approximately 136,000,000 meters or 84,506.5 miles.

The rice ball diameter at 2^{80} is **1,320,000** meters which equals **820.21** miles.

The rice ball diameter at 2^{100} is **136,000,000** meters which equals **84,506.5** miles

The diameter of Jupiter is 88,865 miles (142,984 kilometers). The Sun's diameter is 870,000 miles (1.4 million km).

Below is a table with the approximate radius (found using the equation: $4/3\pi r^3$) of a rice ball where one grain of rice is doubled as indicated in the table below. The first number is the power of two and the second number is the approximate radius in meters:

2^1	2^2	2^3	2^4	2^5 .02	2^6	2^7	2^8	2^9	2^{10}
2^{11}	2^{12} .10	2^{13}	2^{14}	2^{15} .20	2^{16}	2^{17}	2^{18} .40	2^{19}	2^{20} .60
2^{21} .80	2^{22} 1.0	2^{23} 1.25	2^{24} 1.56	2^{25} 2.0	2^{26} 2.5	2^{27} 3.2	2^{28} 4.0	2^{29} 5.05	2^{30} 6.3
2^{31} 8	2^{32} 10	2^{33} 12	2^{34} 16	2^{35} 20	2^{36} 25	2^{37} 30	2^{38} 40	2^{39} 50	2^{40} 60
2^{41} 80	2^{42} 100	2^{43} 120	2^{44} 160	2^{45} 200	2^{46} 260	2^{47} 325	2^{48} 410	2^{49} 500	2^{50} 650
2^{51} 800	2^{52} 1,050	2^{53} 1,300	2^{54} 1,650	2^{55} 2,000	2^{56} 2,600	2^{57} 3,300	2^{58} 4,100	2^{59} 5,200	2^{60} 6,300
2^{61} 8,000	2^{62} 10,000	2^{63} 13,000	2^{64} 16,000	2^{65} 20,000	2^{66} 26,000	2^{67} 33,000	2^{68} 40,000	2^{69} 52,000	2^{70} 65,000
2^{71} 80,000	2^{72} 100,000	2^{73} 130,000	2^{74} 170,000	2^{75} 210,000	2^{76} 260,000	2^{77} 330,000	2^{78} 420,000	2^{79} 530,000	2^{80} 660,000
2^{81} 840,000	2^{82} 1,050,000	2^{83} 1,320,000	2^{84} 1,650,000	2^{85} 2,100,000	2^{86} 2,650,000	2^{87} 3,350,000	2^{88} 4,250,000	2^{89} 5,300,000	2^{90} 6,600,000
2^{91} 8,400,000	2^{92} 11,000,000	2^{93} 14,000,000	2^{94} 17,000,000	2^{95} 22,000,000	2^{96} 27,000,000	2^{97} 33,000,000	2^{98} 42,500,000	2^{99} 55,000,000	2^{100} 68,000,000

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