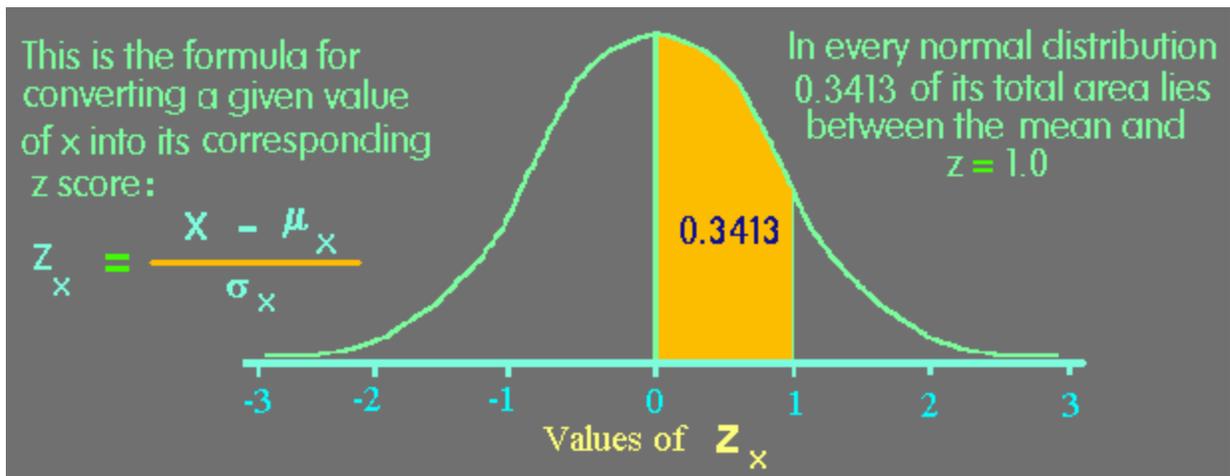


UPDATED: What is a Z score?

Z scores are sometimes called "standard scores". They represent what we call a "standard distribution" of values about a mean of zero (0). The z score transformation is especially useful when seeking to compare the relative standings of items from distributions with different means and/or different standard deviations.

Z scores are especially informative when the distribution to which they refer is normal. In every normal distribution, the distance between the mean and a given Z score cuts off a fixed proportion of the total area under the curve. Statisticians have provided us with tables indicating the value of these proportions for each possible Z score (this table is on the back).



So, to apply this, let's say that we have a population of adults that we are interested in with a mean score on some kind of test of 75 with a standard deviation of 15. Let us assume that this is a valid test and that there is a normal distribution of scores and people where approximately half of the scores are above the mean or below.

Now, we want to calculate some Z values or scores for the person who scored a 45 on the test and for someone who scored a 90 on the test. The person that scored a 45 would have a $Z = (45 - 75) / 15 = -2.0$. If we look at the table on the opposite page (using just the first column for now), that means that, of this distribution, this person's score or ranking in the group was 47.7 percentage points below the mean value. Stated differently, 97.7 percent of the total area of scores was above 45 (47.7 percent below the mean plus the 50 percent above). For a person scoring 90, the $Z = (90 - 75) / 15 = 1.0$. This person's position was 34.13 percentage points above the mean. Stated differently, 84.13 percent of the scores were below 90 and 15.87 percent were above.

Z scores are important for many things, but they are, for our purposes one of the values that we will use for determining sample sizes.

Table of Z scores: This table tells us how much area is above (or below, if the z value is negative) the mean. So, for a Z score of 1.15 we would read down to 0.00 column to 1.1, and then read over to the .05 column: 1.1 + .05 = 1.15. The area under the curve is 35.31 percent. As the mean value represents the 50th percent score, then 50 + 35.31 percent = 85.31 percent. Interpreting, then, about 14.7 percent of the scores were above that value, and 85.3 percent were below. Or you could say that score represented the 85.3rd percentile.

Percent of Shaded Area Compared to Entire Area Under the Curve - Probability										
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.00	0.40	0.8	1.2	1.6	1.99	2.39	2.79	3.19	3.59
0.1	3.98	4.38	4.78	5.17	5.57	5.96	6.36	6.75	7.14	7.53
0.2	7.93	8.32	8.71	9.1	9.48	9.87	10.26	10.64	11.03	11.41
0.3	11.79	12.17	12.55	12.93	13.31	13.68	14.06	14.43	14.8	15.17
0.4	15.54	15.91	16.28	16.64	17.00	17.36	17.72	18.08	18.44	18.79
0.5	19.15	19.50	19.85	20.19	20.54	20.88	21.23	21.57	21.90	22.24
0.6	22.57	22.91	23.24	23.57	23.89	24.22	24.54	24.86	25.17	25.49
0.7	25.80	26.11	26.42	26.73	27.04	27.34	27.64	27.94	28.23	28.52
0.8	28.81	29.10	29.39	29.67	29.95	30.23	30.51	30.78	31.06	31.33
0.9	31.59	31.86	32.12	32.38	32.64	32.89	33.15	33.4	33.65	33.89
1	34.13	34.38	34.61	34.85	35.08	35.31	35.54	35.77	35.99	36.21
1.1	36.43	36.65	36.86	37.08	37.29	37.49	37.70	37.90	38.10	38.30
1.2	38.49	38.69	38.88	39.07	39.25	39.44	39.62	39.8	39.97	40.15
1.3	40.32	40.49	40.66	40.82	40.99	41.15	41.31	41.47	41.62	41.77
1.4	41.92	42.07	42.22	42.36	42.51	42.65	42.79	42.92	43.06	43.19
1.5	43.32	43.45	43.57	43.7	43.82	43.94	44.06	44.18	44.29	44.41
1.6	44.52	44.63	44.74	44.84	44.95	45.05	45.15	45.25	45.35	45.45
1.7	45.54	45.64	45.73	45.82	45.91	45.99	46.08	46.16	46.25	46.33
1.8	46.41	46.49	46.56	46.64	46.71	46.78	46.86	46.93	46.99	47.06
1.9	47.13	47.19	47.26	47.32	47.38	47.44	47.5	47.56	47.61	47.67
2	47.72	47.78	47.83	47.88	47.93	47.98	48.03	48.08	48.12	48.17
2.1	48.21	48.26	48.30	48.34	48.38	48.42	48.46	48.50	48.54	48.57
2.2	48.61	48.64	48.68	48.71	48.75	48.78	48.81	48.84	48.87	48.9
2.3	48.93	48.96	48.98	49.01	49.04	49.06	49.09	49.11	49.13	49.16
2.4	49.18	49.20	49.22	49.25	49.27	49.29	49.31	49.32	49.34	49.36
2.5	49.38	49.4	49.41	49.43	49.45	49.46	49.48	49.49	49.51	49.52
2.6	49.53	49.55	49.56	49.57	49.59	49.60	49.61	49.62	49.63	49.64
2.7	49.65	49.66	49.67	49.68	49.69	49.70	49.71	49.72	49.73	49.74
2.8	49.74	49.75	49.76	49.77	49.77	49.78	49.79	49.79	49.80	49.81
2.9	49.81	49.82	49.82	49.83	49.84	49.84	49.85	49.85	49.86	49.86
3	49.87	49.87	49.87	49.88	49.88	49.89	49.89	49.89	49.90	49.90