

Reporting Standardized Test Results

**Calculating Confidence Intervals
Conversion of Standard Scores to a Mean of 100
and a Standard Deviation of 15**

Calculating Confidence Intervals

Essential psychometric information that should be made available to other professionals users in reporting scores includes test mean and standard deviation, obtained standard score and confidence interval (or standard error of measurement). For consistency, it is recommended that all standard scores be converted to a scale with a mean of 100 and standard deviation of 15 (see Appendix –).

Confidence intervals indicate the likelihood that a student's "true score" falls within a certain range. The range recommended for these purposes is the 90 percent level, meaning that there is a 90 percent chance that a hypothetical true score falls within the specified range. The range is an interval on either side of the obtained score. The size of the interval depends on the amount of error associated with a given score—the lower the reliability, the more error inherent in the obtained score and the larger the confidence interval. The reliability coefficient is used to compute the standard error of measurement, which in turn is used to compute the confidence interval. Test manuals often provide the standard error of measurement (SE_m).

The 90 percent confidence interval can be computed as follows:

$$\text{confidence interval} = \text{obtained score} \pm (1.65) (SE_m)$$

Note: the constant 1.65 corresponds to the 90 percent confidence level. For an 85 percent confidence level, substitute 1.44; for a 68 percent confidence level substitute 1.00.

Example: Child's obtained score is 90. Test manual indicates SE_m is 3.6.

$$\begin{aligned}\text{confidence interval} &= 90 \pm (1.65) \times (3.6) \\ &= 90 \pm 5.94\end{aligned}$$

upper limit is approx. 96 (90 + 5.94)

lower limit is approx. 84 (90 - 5.94)

The chances that the range of scores from 84 to 96 includes the child's true score are about 90 out of 100.

If the standard error of measurement (SE_m) is not provided in the test manual, it can be computed from the reliability coefficient (r_{xx}) as follows:

$$(SE_m) = (\text{standard deviation}) \sqrt{1 - r_{xx}}$$

Example: Reliability coefficient for the test at the child's age level is .88.

$$\begin{aligned}(SE_m) &= (15) \sqrt{1 - .88} \\ &= 5.2\end{aligned}$$

Note: it is presumed that the standard deviation is 15, as recommended.

Listed below are 90 percent confidence intervals for tests with a mean of 100 and a standard deviation of 15 at specified reliability coefficients.

<u>Reliability coefficient</u>	<u>90 percent confidence interval</u>
.98	± 2.1
.97	± 2.6
.96	± 3.0
.95	± 3.4

.94	± 3.7
.93	± 4.0
.92	± 4.2
.91	± 4.5
.90	± 4.7

.89	± 5.0
.88	± 5.2
.87	± 5.4
.86	± 5.6
.85	± 5.8

Reliability coefficient 90 percent confidence interval

.84	± 6.0
.83	± 6.2
.82	± 6.4
.81	± 6.5
.80	± 6.7

.79	± 6.9
.78	± 7.0
.77	± 7.2
.76	± 7.3
.75	± 7.5

.74	± 7.6
.73	± 7.8
.72	± 7.9
.71	± 8.1
.70	± 8.2

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Conversion of Standard Scores to a Mean of 100 and a Standard Deviation of 15

Scores that are based upon normal curve distributions can be converted from one standard score type to another. This includes T scores (mean of 50, standard deviation of 10), z scores (mean of 0, standard deviation of 1), and other variations (e.g., mean of 50 and standard deviation of 16, as used with Standard Binet Fourth Edition composite scales). Percentiles and stanines can not be converted to standard scores.

The following formula is used to convert scores to a scale with a mean of 100 and standard deviation of 15:

Where X_{old} = score on old scale

M_{old} = mean of old scale

SD_{old} = standard deviation of old scale

$$\left(\frac{X_{old} - M_{old}}{SD_{old}} \right) 15 + 100 = \text{new standard score}$$

Example A.

The Stanford Binet Fourth Edition test composite is based on a mean of 100 and standard deviation of 16. The student obtains a test composite score of 64.

$$\left(\frac{64 - 100}{16} \right) 15 + 100 = 66.25$$

Example B.

The Basic Number Skills subtest of the Differential Ability Scales uses T scores, with a mean of 50 and standard deviation of 10. The student obtains a T score of 52 on Basic Number Skills.

$$\left(\frac{52 - 50}{10} \right) 15 + 100 = 103$$