Formula

$$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$$

Step 1 - Getting the Data You Need

	Symbol	Example 1	Example 2
Have on Hand			
1A. IQ test standard score	x_i	103	98
1B. Achievement test standard score	y_i	83	82
Look Up			
1C. IQ test standard score mean	$\bar{x}_x$	100	100
1D. IQ test standard score standard deviation	s_x	15	15
1E. Achievement test standard score mean	$\bar{x}_y$	100	100
1F. Achievement test standard score standard deviation	s_y	15	15
1G. Reliability estimate for the IQ test score at the student's age	r_{xx}	.90	.92
1H. Reliability estimate for the achievement test score at the student's age	r_{yy}	.81	.89
1I. IQ to achievement test correlation at the student's age	r_{xy}	.52	.58
Calculate			
1J. IQ test z score equivalent	$\frac{x_i - \bar{x}_x}{s_x}$	$\frac{103 - 100}{15} = .200$	$\frac{98 - 100}{15} = -.133$
1K. Achievement test z score equivalent	$\frac{y_i - \bar{x}_y}{s_y}$	$\frac{83 - 100}{15} = -1.133$	$\frac{82 - 100}{15} = -1.200$

		Example 1	Example 2
Step 2. Calculate the correlation between tests, corrected for the unreliability of the tests.	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$		
2A. Find the square root of the reliability of the IQ test. $(\sqrt{1G})$	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$	0.949	0.959
2B. Find the square root of the reliability of the achievement test. $(\sqrt{1H})$	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$	0.900	0.943
2C. Multiply 2A by 2B. (2A • 2B)	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$	0.854	0.905
2D. Divide the correlation between tests by the correction factor. (1I / 2C)	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$	0.609	0.641

		Example 1	Example 2
Step 3. Calculate the standard error of prediction, corrected for unreliability of the tests.	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$		
3A. Square the corrected correlation between the tests to obtain the proportion of variance accounted for by the correlation between tests, corrected for unreliability of the tests. (2D • 2D)	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$	0.371	0.411
3B. Subtract 3A from 1 to obtain the error variance attributable to the correlation between tests, corrected for unreliability of the tests. (1-3A)	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$	0.629	0.589
3C. Find the square root of 3B to obtain the standard error of prediction z-score, corrected for unreliability of the tests.($\sqrt{3B}$)	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$	0.793	0.768
Step 4. Calculate the predicted achievement score.			
4A. Calculate the predicted achievement z-score. Multiply the IQ z-score by the correlation between the tests. (1J • 1I)	$z_{cut} = (z_x r_{xy}) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)^2}\right)$	0.104	-0.077

		Example 1	Example 2
Convert the predicted achievement z-score to standard score units.	$\left(\left(z_x r_{xy}\right)s_y\right) + \bar{x}_y$		
4B. Multiply the predicted achievement z-score by the standard deviation of the achievement score to obtain the deviation predicted achievement score. (4A • 1F)	$\left(\left(z_x r_{xy}\right)s_y\right) + \bar{x}_y$	2.000	-1.000
4C. Add the mean of the achievement score to the deviation predicted achievement score to obtain the predicted achievement score. (4B + 1E)	$\left(\left(z_x r_{xy}\right)s_y\right) + \bar{x}_y$	102.000	99.000
Step 5. Find the cutting score for the 93% confidence level.	$z_{cut} = \left(z_x r_{xy}\right) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}'}\sqrt{r_{yy}}}\right)^2}\right)$		
5A. Multiply the corrected standard error of prediction by the constant for the 93% confidence level, 1.476. (3C • 1.476)	$z_{cut} = \left(z_x r_{xy}\right) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}'}\sqrt{r_{yy}}}\right)^2}\right)$	1.171	1.133
5B. Subtract 5A from the predicted achievement z-score to obtain the cutting z-score. (4A - 5A)	$z_{cut} = \left(z_x r_{xy}\right) - \left(1.476 \sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}'}\sqrt{r_{yy}}}\right)^2}\right)$	-1.067	-1.210

		Example 1	Example 2
Convert the cutting z-score to standard score units.	$\left(z_{cut}s_y\right)+\bar{x}_y$		
5C. Multiply the cutting z-score by the standard deviation of the achievement score to obtain the deviation cutting score. (5B • 1F)	$\left(z_{cut}s_y\right)+\bar{x}_y$	-16.005	-18.154
5D. Add the mean achievement score to the deviation cutting score to obtain the unrounded cutting score. (1E + 5C)	$\left(z_{cut}s_y\right)+\bar{x}_y$	83.995	81.846
5E. Round the unrounded cutting score down to the nearest integer to obtain the cutting score.		83	81
Step 6. Find the confidence level.	$\dfrac{\left(z_x r_{xy}\right)-\left(\dfrac{y_i-\bar{\bar{x}}_y}{s_y}\right)}{\sqrt{1-\left(\dfrac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)}}$		
6A. Subtract the achievement z-score from the predicted achievement z-score to obtain the achievement discrepancy in z-score units. (4A - 1K)	$\dfrac{\left(z_x r_{xy}\right)-\left(\dfrac{y_i-\bar{\bar{x}}_y}{s_y}\right)}{\sqrt{1-\left(\dfrac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)}}$	1.237	1.123

		Example 1	Example 2
6B. Divide the achievement discrepancy in z-score units by the corrected standard error of prediction to obtain the normal score corrected error. (6A / 3C)	$\frac{(z_x r_{xy}) - \left(\frac{y_i - \bar{x}_y}{s_y}\right)}{\sqrt{1 - \left(\frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}\right)}}$	1.559	1.462
6C. Find the cumulative normal frequency distribution of the normal score corrected error (6B) from the normal distribution table or other source to obtain the proportion of the normal score distribution above the mean.		0.4406	0.4279
6D. Add .5 to 6C to account for the proportion of achievement scores about the predicted achievement score to obtain the unrounded one-tailed confidence level. (6C + .5)		0.9406	0.9279
6E. Convert 6D to percent and round down to the nearest percentage to obtain the confidence level. (100 • 9D)		94	92

	Example 1	Example 2
Step 7. Determine if there is a severe discrepancy between aptitude and achievement. If the value of the confidence level (6E) is equal to or greater than 93, then the criterion confidence has been met, indicating a severe discrepancy. If the value of the confidence level (6E) is less than 93, then the criterion confidence level has not been met, indicating that there is not a severe discrepancy.	Yes, the criterion has been met.	No, the criterion has not been met.