

# Interpreting Stanine Scores

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Many schools use stanine scores for posting students' test results in permanent records. They are convenient for that purpose because they take little space on the record form. However, not all teachers are confident about going to the record for a student and figuring out what those stanine scores signify. Mistakes are made, and some teachers simply avoid dealing with stanines if they can. Perhaps the following quiz and its explanations can help make these scores more useful in practice. Try the following questions. The correct answers and brief explanations appear on page 27. This "test" may be reproduced without written permission. Please cite *Educational Measurement: Issues and Practice* as the source.

## Hills' Handy Hints: Stanines

Please circle Y or N, yes or no, for each question. Mark a response for each question as there is no penalty for guessing. This is an untimed test.

- Y N 1. Mary is a sixth grader. She received a stanine score of zero on her standardized test in mathematics. This means that Mary's score was very low compared to other sixth graders. Is that correct?
- Y N 2. Bill received a stanine score of 5 on the same standardized mathematics test that Mary took. He is also in the sixth grade. The score of 5 means that Bill is doing average work in mathematics, and he would be at the 50th percentile for sixth graders. Is that correct?

Y N 3. Pedro received a stanine score of 6.5 on the mathematics test. This score should be interpreted as being midway between the sixth and seventh stanines.

Y N 4. Cindy is in the same class as Bill, Mary, and Pedro. On the mathematics test, she received a stanine score of 9. Her mother wants to know just how high that score is—what percent of pupils perform less well than Cindy. Ms. Billingsley tells Cindy's mother that 96 percent of students in Cindy's grade performed less well than Cindy. Is this an accurate statement of Cindy's percentile rank?

Y N 5. Alfonso's stanine score is 7. Mr. Rivera is more familiar with standard scores than stanines. He asked Ms. Billingsley how many standard deviations above the mean a stanine score of 7 was. Ms. Billingsley immediately responded, "One." Does Ms. Billingsley have a trick for remembering such things so well?

Y N 6. Mr. Rivera decided that Ms. Billingsley really knew her stanines. So he pushed his luck and asked her what percent of students got stanine scores of 7. Ms. Billingsley thought for a moment. Then she replied, "In a normal distribution, 12 percent of the scores will be in the seventh stanine." Taken aback

by the speed of her response, Mr. Rivera asked whether another trick was involved. Was there?

Y N 7. Mr. Tatnall overheard the conversation between Ms. Billingsley and Mr. Rivera and decided to contribute another guide. He suggested that stanines were the same as deciles. So, he said, the first stanine would be the same as the first decile, the second stanine and the second decile would be equivalent, and so on. Is Mr. Tatnall correct?

Y N 8. Mr. Rivera decided to ask one more question. He has found that most of his students receive the same stanine scores in the fifth grade that they got in the fourth grade or even the third grade. He concluded that they are not making much progress in school. Is that correct?

Y N 9. Mr. Tatnall asked what should he do about Patricia, who went down from the fifth stanine last year to the fourth stanine this year in reading comprehension? Should Mr. Tatnall be worried about this?

Y N 10. Mr. Rivera then asked about his student, Elena, whose stanine score in reading comprehension went up from the fourth stanine to the sixth stanine. Is that big a difference important?



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## Hills' Handy Hints: Stanines

### Explanations:

1. No. Stanine scores are numbers from 1 to 9. There is no such thing as a stanine score of zero. A zero score reported as a stanine indicates that an error has been made.

2. Yes and no. Stanine 5 is in the middle of the scale, and in that sense Bill got an average score on the test. However, each stanine represents a band of scores, not a specific score. The 5th stanine extends from the 40th to the 60th percentile. So Bill might be performing as low as the 40th percentile or as high as the 60th percentile but still receive a stanine of 5. However, because the stanine scale reflects a normal curve, the 40th percentile is usually only a few raw score points lower than the 60th percentile.

3. No. Stanines are represented by the single digit whole numbers, such as 1, 2, and 3, never by numbers with decimal points. Except for the first and ninth stanines, each stanine represents a narrow band of scores on the test. (The first and ninth stanines may be very wide in terms of raw score points. Each extends to the beginning or end of the test, however far that may be.) Thus, a stanine of 6.5 does not exist. Anyone who uses such a number for a stanine has made an error.

4. No. The ninth stanine is not the 96th percentile. The lower limit of the ninth stanine is the 96th percentile, but the upper limit is plus infinity. Any performance above the 96th percentile is the 9th stanine. Cindy may have scored far above the 96th percentile and received a stanine of 9. The same is true at the other end of the scale for a stanine of 1. A person with a stanine score of 1 may be as high as the 4th percentile, or very much lower.

5. Yes. Three easy landmarks for relating stanines to standard scores are the mean and plus and minus one standard deviation. The mean is in the middle of the fifth stanine. Plus one standard deviation is in the middle of the seventh stanine. Minus one standard deviation is in the middle of the third stanine.

6. Yes. Ms. Billingsley used the *Rule of Four*. With stanines, a close approximation to the distribution of scores can be remembered as starting with 4 percent in either stanine 1 or 9, then adding 4 percent for the next stanine each time up to stanine 5 and then subtracting 4 percent for each to the end of the scale. Thus, the percent of the scores that are assigned 1, 2, 3, . . . 9 are very close to 4, 8, 12, 16, 20, 16, 12, 8, and 4, respectively. So Ms. Billingsley said to herself, "Four percent for stanine 9, 8 percent for stanine 8, and 12 percent for stanine 7." Then she had her answer. She could have started with stanine 5, saying to herself,

"Twenty percent in stanine 5, 16 percent in stanine 6, and 12 percent in stanine 7," reaching the same result.

7. No. First, to be correct a decile is a point, not a range. The first decile is the score that separates the lowest scoring 10 percent of scores from the highest scoring 90 percent, for example. The name for the lowest 10 percent is the lowest *tenth*, or the first *tenth*, not the first *decile*. Beyond that, the first tenth is the lowest scoring 10 percent, but the first stanine is the lowest scoring 4 percent, a much lower scoring group, on the average. In general, the only correspondence between tenths of a distribution (or "deciles") and stanines is that tenths and stanines above 5 are high scoring and below 5 are low scoring. The differences between tenths and stanines reflect different assumptions about the distribution of scores. Tenths are based on the assumption that scores have a rectangular or flat distribution. Stanines are based on the more realistic assumption that scores are distributed normally.

8. No. Tests that use stanine scores refer these scores to students in a particular grade, not to students in general or to people in general. So a student who regularly receives stanine scores of 5 in a subject from year to year can be assumed to be making normal progress. He stays in the middle of the distribution. Another student who continually makes scores of stanine 7 stays about 1 standard deviation above the mean and makes normal progress also. Normal progress with stanines (or with percentiles or standard scores) is shown by earning the same score over time, not higher scores year by year.

9. No. Mr. Tatnall does not need to worry much about a change from one stanine score to the adjacent stanine score. One question fewer correct could move a person one stanine down if his score was at the bottom of the range for that stanine. This is one of the problems with stanine scores. A person's performance can be anywhere in a range of scores but receive the same stanine. If Patricia scored at the lower edge of the fifth stanine, a trivial difference in performance could change her score to the next lower stanine.

10. Yes. When scores differ by two stanines, we tend to think of there being a real difference, not an error of measurement. Other things being equal, for tests with satisfactory reliabilities (.90), such differences are expected to occur only about one time in ten. Therefore, differences that large deserve further investigation. Perhaps Elena has benefitted from some effective teaching, or she may have become more motivated, or she may have found more time to read, or something in her life that was impeding her progress may have been removed. A difference that large is unlikely to be an accident. ■