

Applying Skills

In 11–14, select the numeral that precedes the choice that best completes the statement or answers the question.

11. The playing life of a Euclid mp3 player is normally distributed with a mean of 30,000 hours and a standard deviation of 500 hours. Matt's mp3 player lasted for 31,500 hours. His mp3 player lasted longer than what percent of other Euclid mp3 players?
(1) 68% (2) 95% (3) 99.7% (4) more than 99.8%
12. The scores of a test are normally distributed. If the mean is 50 and the standard deviation is 8, then a student who scored 38 had a z-score of
(1) 1.5 (2) -1.5 (3) 12 (4) -12
13. The heights of 10-year-old children are normally distributed with a mean of 138 centimeters with a standard deviation of 5 centimeters. The height of a 10-year-old child who is as tall as or taller than 95.6% of all 10-year-old children is
(1) between 138 and 140 cm. (2) between 140 and 145 cm.
(3) between 145 and 148 cm. (4) taller than 148 cm.
14. The heights of 200 women are normally distributed. The mean height is 170 centimeters with a standard deviation of 10 centimeters. What is the best estimate of the number of women in this group who are between 160 and 170 centimeters tall?
(1) 20 (2) 34 (3) 68 (4) 136
15. When coffee is packed by machine into 16-ounce cans, the amount can vary. The mean weight is 16.1 ounces and the standard deviation is 0.04 ounce. The weight of the coffee approximates a normal distribution.
 - a. What percent of the cans of coffee can be expected to contain less than 16 ounces of coffee?
 - b. What percent of the cans of coffee can be expected to contain between 16.0 and 16.2 ounces of coffee?

- 16.** The length of time that it takes Ken to drive to work represents a normal distribution with a mean of 25 minutes and a standard deviation of 4.5 minutes. If Ken allows 35 minutes to get to work, what percent of the time can he expect to be late?
- 17.** A librarian estimates that the average number of books checked out by a library patron is 4 with a standard deviation of 2 books. If the number of books checked out each day approximates a normal distribution, what percent of the library patrons checked out more than 7 books yesterday?
- 18.** The heights of a group of women are normally distributed with a mean of 170 centimeters and a standard deviation of 10 centimeters. What is the z-score of a member of the group who is 165 centimeters tall?
- 19.** The test grades for a standardized test are normally distributed with a mean of 50. A grade of 60 represents a z-score of 1.25. What is the standard deviation of the data?
- 20.** Nora scored 88 on a math test that had a mean of 80 and a standard deviation of 5. She also scored 80 on a science test that had a mean of 70 and a standard deviation of 3. On which test did Nora perform better compared with other students who took the tests?

More Exercises

1. The angiogram is a standard diagnostic test used in clinical medicine to detect stroke in patients. This test has some risks for the patient, and several noninvasive techniques have been developed that are hoped to be as effective as the angiogram. One such method utilizes that measurement of cerebral blood flow (CBF) in the brain, since stroke patients tend to have lower levels of CBF than normal. Among healthy people, CBF is normally distributed with mean 75 and standard deviation 17. Patients are classified as being at risk for stroke if their CBF is below 40. What proportion of normal patients will be mistakenly classified as being at risk for stroke?
2. Maple tree diameters in a forest area are normally distributed with mean 10 inches and standard deviation 2.2 inches. Find the proportion of trees having a diameter greater than 15 inches.
3. Our subjects are 35-44-year-old males whose blood pressures are normally distributed with mean 80 and standard deviation 12. A borderline hypertensive is defined as a person whose diastolic blood pressure is between 90 and 95 mm Hg inclusive; what proportion of subjects are borderline hypertensive? A hypertensive is a person whose diastolic blood pressure is above 95 mm Hg; what proportion of subjects are hypertensive?
4. White blood cell (WBC) count per cubic millimeter of whole blood has approximately the Normal distribution with mean 7500 and standard deviation 1750. The lowest 2% of all WBC counts are defined to be probable risks. How low must one's WBC count be to fall in the at-risk group?
5. The resting heart rate for healthy adult horses averages 46 beats per minute with a standard deviation of 8 beats per minute. A horse whose resting heart rate is in the upper 10% of the distribution of heart rates may have a secondary infection or illness that needs to be treated. How fast must a healthy horse's heart be beating to fall into this at-risk group?

7. In the diagram, the shaded region represents approximately 95% of the scores on a standardized test. If these scores ranged from 78 to 92, what would be the standard deviation?
8. In a standardized test with a normal distribution of scores, the mean is 63 and the standard deviation is 5. Which score could be expected to occur most often?
a) 45 b) 55 c) 65 d) 74
9. Battery lifetime is normally distributed for large samples. The mean lifetime is 500 days and the standard deviation is 61 days. Approximately what percent of batteries have lifetimes *longer than* 561 days?
(1) 16% (2) 68% (3) 34% (4) 84%
10. The national mean for verbal scores on an exam was 428 and the standard deviation was 113. Approximately what percent of those taking this test had verbal scores between 315 and 541?
(1) 68.2% (3) 38.2% (2) 52.8% (4) 26.4%
11. Twenty high school students took an examination and received the following scores:
70, 60, 75, 68, 85, 86, 78, 72, 82, 88, 88, 73, 74, 79, 86, 82, 90, 92, 93, 73
Determine what percent of the students scored within one standard deviation of the mean. Do the results of the examination approximate a normal distribution? Justify your answer.
12. Mrs. Ramírez is a real estate broker. Last month, the sale prices of homes in her area approximated a normal distribution with a mean of \$150,000 and a standard deviation of \$25,000. A house had a sale price of \$175,000. What is the percentile rank of its sale price, to the *nearest whole number*? Explain what that percentile means.
Mrs. Ramírez told a customer that most of the houses sold last month had selling prices between \$125,000 and \$175,000. Explain why she is correct.