Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

To find a z-score, use the formula:

**z =**



**Working with Z Scores**

1. The mean score on the SAT (math & verbal) is 1500, with a standard deviation of 240. The ACT, a different college entrance examination, has a mean score of 21 with a standard deviation of 6.

(a) If Bobby scored 1740 on the SAT, calculate his z-score.

(b) If Kathy scored 30 on the ACT, calculate her z-score.

(g) Who performed better on his or her admissions test compared to his or her peers? Explain.

2. The weight of an average 3 month child is 12.5 pounds with a standard deviation of 1.5 pounds.

Benjamin is a healthy 3 month old child who weighs 13.9 pounds.

1. Determine the z-score for Benjamin's weight at 3 months.
2. Interpret what the z-score means ﴾in context﴿ in a sentence.

(c) The weight of an average 6 month old is 17.25 pounds with a standard deviation of 2.0 pounds.

If Benjamin had the same z-score at 6 months as he did at 3 months, determine how much a 6 month old Benjamin would weigh.

3. The height of women aged 20 to 29 are approximately normal with mean 64 inches and standard deviation

2.7 inches. Men the same age have mean height 69.3 inches with standard deviation 2.8 inches. John and his sister June both play basketball for N. C. State University. John is 81 inches tall; June is 74 inches tall.

(a) Compared to their respective peers, who is the tallest?

(b) How tall would a woman be who has a z-score of 1.5?

(c) If a man has a z-score of -0.5 and a woman has a z-score of 1.2, which is tallest?

Answers:

1. (a) 240

(b) 9

(c) no, because the tests are scaled differently. A student could make a perfect score on the ACT and the numerical value would be substantially less than a low scoring SAT score.

(d) 240/240 = 1

(e) 9/6 = 1.5

(f) Kathy did

(g) Kathy did

(h) Peter: (1380 – 1500)/240 = -0.5 Kelly: (15 – 21)/6 = -1

(i) Peter has a higher score

(j) a negative z-score means that you are below the mean. Golf scores, track times, or swimming times would be examples of beneficial negative z-scores.

2. (a) (13.9 – 12.5)/1.5 = 0.933

(b) Benjamin’s weight is higher than the mean weight for children of his age, but he is within 1 standard deviation of the mean.

(c) 0.933 = (x – 17.25)/2.0 = 19.116 lbs

3. (a) John: (81 – 69.3)/2.8 = 4.18; June: (74 – 64)/2.7 = 3.703; John is taller

(b) 1.5 = (x – 64)/2.7 = approx 68 inches

(c) Man: -0.5 = (x – 69.3)/2.8 = 67.9 inches; woman: 1.2 = (x – 64)/2.7 = 67.24 inches; man is taller

4. (a)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test | Mean | Standard Deviation | Score | Z-Score |
| Clerical Ability | 50 | 15 | 41 | 0.6 |
| Logical Reasoning | 40 | 4 | 47 | 1.75 |
| Mechanical Ability | 120 | 25 | 100 | -0.8 |
| Numerical Reasoning | 100 | 10 | 105 | 0.5 |
| Spatial Relations | 70 | 20 | 90 | 1 |
| Verbal Fluency | 60 | 6 | 70 | 1.667 |

(b) Toni’s highest score was in logical reasoning. Her lowest was in Mechanical ability – this is the only test on which she was below the mean.