Using the z-scores to calculate actual probabilities.

Need the z-score formula:

$$z = \frac{X - \mu}{\sigma}$$

e.g. 1

An unspecified test had a mean of 25 with a s.d. of 4.
Find the percentage of tests that scored less than 30.

e.g.2

Each month, a typical household in the USA generates about 28 pounds of newspapers for recycling. If the s.d. is 2 pounds, find the percent of households that generate more than 30.2 pounds.

e.g. 3
An automobile gets an average of 22 miles per gallon (mpg) in the city, with s.d. = 3mpg. Find the probability that a randomly selected car will get greater than 26 mpg in the city.

e.g.4

To qualify for entry into the Police Academy an applicant must score in the top 10% in an entrance exam.

If the scores are normally distributed with a mean of 200 and s.d. = 20, what is the cut off score?

e.g.5

A medical researcher wants to test her new heart disease drug on a large sample of fairly "normal" people. So she decides to select from the middle 60% of the population.

In the population generally the mean systolic blood pressure is 120 with s.d. = 8.

Find the upper and lower blood pressure readings that would qualify people for the study.

Your Turn...

1. To screen employees for a proof reading job a publishing company gives new applicants a speed reading test. Only the top 15% get interviews. Assume a normal distribution with mean 600 words per minute and s.d. 100 words per minute, find the minimum reading speed needed to be accepted for an interview.

2. The quality control people at your factory tell you that your new product, the Wundafone, has a mean lifetime of 25 months, with s.d. of 5 months. If you have to offer a replacement guarantee, how many months should you allow if you don't want to replace more than 8% of your Wundafones?

3. The length of human pregnancies is normal with mean 266 days and s.d. 16 days. What is the probability that a randomly selected pregnancy will last less than 260 days?

4. Since the 1900s the magnitude of earthquakes in California that measure 0.1 or higher on the Richter Scale is approx. normal with mean 6.2 and s.d. 0.5.

a. What range of Richter Scale values represent the 20% most powerful earthquakes in CA?

b. Determine the range of Richter Scale values that make up the middle 85% of earthquake magnitudes.

5. IQ scores on the Standford-Binet intelligence tests are normally distributed with mean 100 and s.d. 16.

a. In order to qualify for Mensa, you must score in the top 2%. What IQ score is required to qualify for Mensa?

b. What range of IQ scores make up the middle 50% of the population?