

c. Does the door design with a height of 51.6 in. appear to be adequate? Why didn't the engineers design a larger door?

d. What doorway height would allow 60% of men to fit without bending?



**25. Water Taxi Safety** When a water taxi sank in Baltimore's Inner Harbor, an investigation revealed that the safe passenger load for the water taxi was 3500 lb. It was also noted that the mean weight of a passenger was assumed to be 140 lb. Assume a "worst-case" scenario in which all of the passengers are adult men. (This could easily occur in a city that hosts conventions in which people of the same gender often travel in groups.) Assume that weights of men are normally distributed with a mean of 182.9 lb and a standard deviation of 40.8 lb (based on Data Set 1 in Appendix B).

a. If one man is randomly selected, find the probability that he weighs less than 174 lb (the new value suggested by the National Transportation and Safety Board).

b. With a load limit of 3500 lb, how many male passengers are allowed if we assume a mean weight of 140 lb?

c. With a load limit of 3500 lb, how many male passengers are allowed if we use a new mean weight of 182.9 lb?

d. Why is it necessary to periodically review and revise the number of passengers that are allowed to board?



**26. Designing a Work Station** A common design requirement is that an environment must fit the range of people who fall between the 5th percentile for women and the 95th percentile for men. In designing an assembly work table, we must consider *sitting knee height*, which is the distance from the bottom of the feet to the top of the knee. Males have sitting knee heights that are normally distributed with a mean of 21.4 in. and a standard deviation of 1.2 in.; females have sitting knee heights that are normally distributed with a mean of 19.6 in. and a standard deviation of 1.1 in. (based on data from the Department of Transportation).

a. What is the minimum table clearance required to satisfy the requirement of fitting 95% of men? Why is the 5th percentile for women ignored in this case?

b. The author is writing this exercise at a table with a clearance of 23.5 in. above the floor. What percentage of men fit this table, and what percentage of women fit this table? Does the table appear to be made to fit almost everyone?

**27. Lengths of Pregnancies** The lengths of pregnancies are normally distributed with a mean of 268 days and a standard deviation of 15 days.

a. One classical use of the normal distribution is inspired by a letter to "Dear Abby" in which a wife claimed to have given birth 308 days after a brief visit from her husband, who was serving in the Navy. Given this information, find the probability of a pregnancy lasting 308 days or longer. What does the result suggest?

b. If we stipulate that a baby is *premature* if the length of pregnancy is in the lowest 3%, find the length that separates premature babies from those who are not premature. Premature babies often require special care, and this result could be helpful to hospital administrators in planning for that care.

**28. Body Temperatures** Based on the sample results in Data Set 3 in Appendix B, assume that human body temperatures are normally distributed with a mean of 98.20°F and a standard deviation of 0.62°F.

a. Bellevue Hospital in New York City uses 100.6°F as the lowest temperature considered to be a fever. What percentage of normal and healthy persons would be considered to have a fever? Does this percentage suggest that a cutoff of 100.6°F is appropriate?