

Height, in meters, is measured for each person in a sample. After the data are collected, all the height measurements are converted from meters to centimeters by multiplying each measurement by 100. Which of the following statistics will remain the same for both units of measure?

- (A) The mean of the height measurements
- (B) The median of the height measurements
- (C) The standard deviation of the height measurements
- (D) The maximum of the height measurements
- (E) The  $z$ -scores of the height measurements

A company currently uses Brand A lightbulbs, which have a mean life of 1,000 hours. A salesperson marketing Brand B, a new brand of bulb, contacts the company. The company will switch to the new brand of bulb only if there is convincing evidence that the mean life of Brand B is greater than 1,000 hours. Which of the following hypotheses should the company test?

- (A)  $H_0$  : The mean life of Brand B bulbs is 1,000 hours.  
 $H_a$  : The mean life of Brand B bulbs is more than 1,000 hours.
- (B)  $H_0$  : The mean life of Brand B bulbs is 1,000 hours.  
 $H_a$  : The mean life of Brand B bulbs is less than 1,000 hours.
- (C)  $H_0$  : The mean life of Brand A bulbs is 1,000 hours.  
 $H_a$  : The mean life of Brand A bulbs is more than 1,000 hours.
- (D)  $H_0$  : The mean life of Brand A bulbs is 1,000 hours.  
 $H_a$  : The mean life of Brand A bulbs is less than 1,000 hours.
- (E)  $H_0$  : The mean life of Brand A bulbs is equal to the mean life of Brand B bulbs.  
 $H_a$  : The mean life of Brand A bulbs is not equal to the mean life of Brand B bulbs.

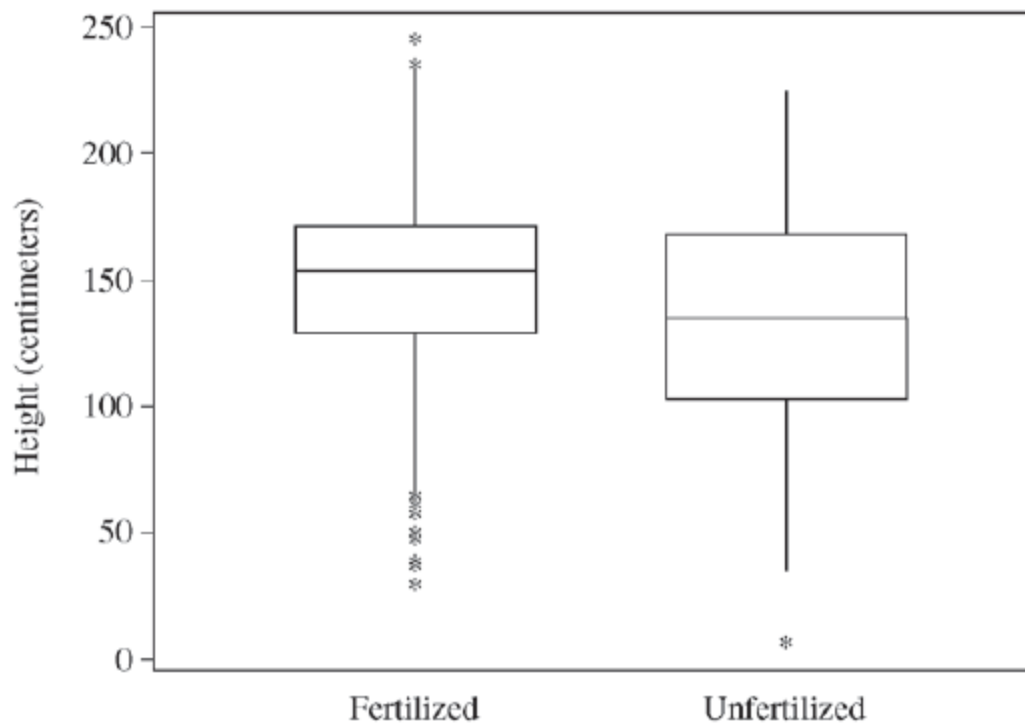
A graph (not shown) of the selling prices of homes in a certain city for the month of April reveals that the distribution is skewed to the left. Which of the following statements is the most reasonable conclusion about the selling prices based on the graph?

- (A) The mean is greater than the median.
- (B) The median is the average of the first quartile and the third quartile.
- (C) There are fewer selling prices between the first quartile and the median than there are between the median and the third quartile.
- (D) There are more selling prices that are less than the mean than selling prices that are greater than the mean.
- (E) The value of maximum minus third quartile is less than the value of first quartile minus minimum.

Jessica wanted to determine if the proportion of males for a certain species of laboratory animal is less than 0.5. She was given access to appropriate records that contained information on 12,000 live births for the species. To construct a 95 percent confidence interval, she selected a simple random sample of 100 births from the records and found that 31 births were male.

Based on the study, which of the following expressions is an approximate 95 percent confidence interval estimate for  $p$ , the proportion of males in the 12,000 live births?

- (A)  $0.31 \pm 1.96\sqrt{\frac{(0.31)(0.69)}{12,000}}$
- (B)  $0.31 \pm 1.645\sqrt{\frac{(0.31)(0.69)}{12,000}}$
- (C)  $0.31 \pm 1.96\sqrt{\frac{(0.5)(0.5)}{12,000}}$
- (D)  $0.31 \pm 1.645\sqrt{\frac{(0.5)(0.5)}{100}}$
- (E)  $0.31 \pm 1.96\sqrt{\frac{(0.31)(0.69)}{100}}$

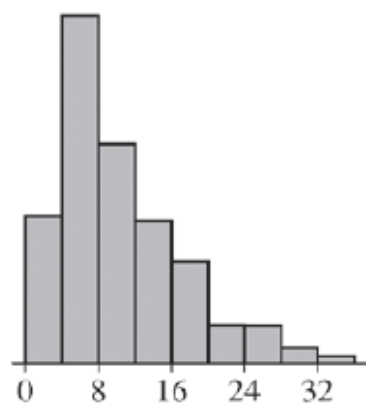


The figure above summarizes the heights, in centimeters, of approximately 400 pine seedlings six years after they were planted at a center for environmental study. Approximately half of the trees were fertilized yearly, and the remaining trees were never fertilized. Which of the following statements about the medians and interquartile ranges (IQRs) of the heights of the two groups of trees 6 years after being planted is true?

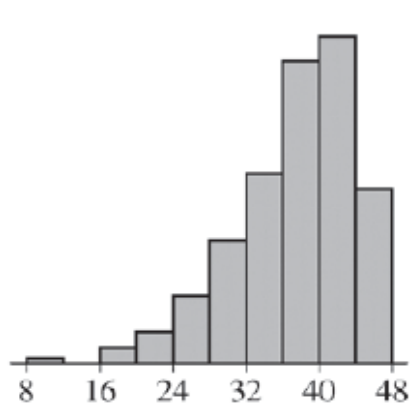
- (A) The medians and IQRs are the same for the unfertilized trees and the fertilized trees.
- (B) The median for the unfertilized trees is greater than the median for the fertilized trees, and the IQR is also greater for the unfertilized trees.
- (C) The median for the unfertilized trees is the same as the median for the fertilized trees, and the IQR is greater for the unfertilized trees.
- (D) The median for the unfertilized trees is less than the median for the fertilized trees, and the IQR is greater for the unfertilized trees.
- (E) The median for the unfertilized trees is less than the median for the fertilized trees, and the IQR is less for the unfertilized trees.

The distribution of heights of 6-year-old girls is approximately normally distributed with a mean of 46.0 inches and a standard deviation of 2.7 inches. Aliyaah is 6 years old, and her height is 0.96 standard deviation above the mean. Her friend Jayne is also 6 years old and is at the 93rd percentile of the height distribution. At what percentile is Aliyaah's height, and how does her height compare to Jayne's height?

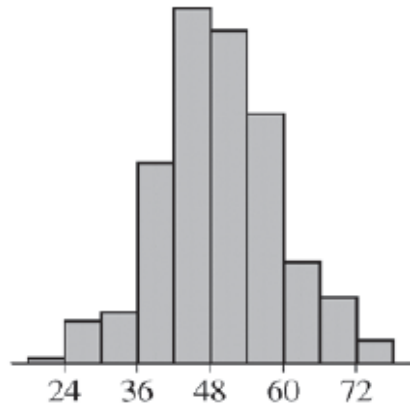
- (A) Aliyaah's height is at the 17th percentile of the distribution, and she is shorter than Jayne.
- (B) Aliyaah's height is at the 67th percentile of the distribution, and she is shorter than Jayne.
- (C) Aliyaah's height is at the 67th percentile of the distribution, and she is taller than Jayne.
- (D) Aliyaah's height is at the 83rd percentile of the distribution, and she is shorter than Jayne.
- (E) Aliyaah's height is at the 83rd percentile of the distribution, and she is taller than Jayne.



Histogram J



Histogram K



Histogram L

For the three histograms above, which of the following correctly orders the histograms from the one with the smallest proportion of data above its mean to the one with the largest proportion of data above its mean?

- (A) J, K, L
- (B) J, L, K
- (C) K, L, J
- (D) L, K, J
- (E) All three histograms have the same proportion of data above their respective means.

A group of students wanted to investigate the claim that the average number of text messages sent yesterday by students in their school was greater than 100. They asked each student in a random sample of 50 students how many text messages he or she sent yesterday. An appropriate  $t$ -test was conducted and resulted in a  $p$ -value of 0.0853. Assuming the conditions for the  $t$ -test were met, which of the following is an appropriate conclusion?

- (A) Because  $p < 0.10$ , at the 10% significance level, it can be concluded that the mean number of text messages sent yesterday by students in the school is less than 100.
- (B) Because  $p < 0.10$ , at the 10% significance level, it cannot be concluded that the mean number of text messages sent yesterday by students in the school is greater than 100.
- (C) Because  $p > 0.05$ , at the 5% significance level, it can be concluded that the mean number of text messages sent yesterday by students in the school is greater than 100.
- (D) Because  $p > 0.05$ , at the 5% significance level, it can be concluded that the mean number of text messages sent yesterday by students in the school is less than 100.
- (E) Because  $p > 0.05$ , at the 5% significance level, it cannot be concluded that the mean number of text messages sent yesterday by students in the school is greater than 100.