2009 Form B #1

As gasoline prices have increased in recent years, many drivers have expressed concern about the taxes they pay on gasoline for their cars. In the United States, gasoline taxes are imposed by both the federal government and by individual states. The boxplot below shows the distribution of the state gasoline taxes, in cents per gallon, for all 50 states on January 1, 2006.


0   5   10   15   20   25   30   35
State Gasoline Taxes (in cents per gallon)
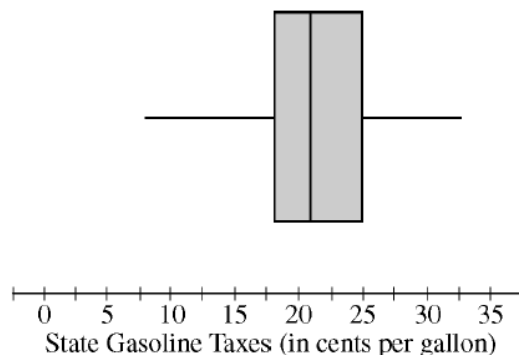
(a) Based on the boxplot, what are the approximate values of the median and the interquartile range of the distribution of state gasoline taxes, in cents per gallon? Mark and label the boxplot to indicate how you found the approximated values.

(b) The federal tax imposed on gasoline was 18.4 cents per gallon at the time the state taxes were in effect. The federal gasoline tax was added to the state gasoline tax for each state to create a new distribution of combined gasoline taxes. What are approximate values, in cents per gallon, of the median and interquartile range of the new distribution of combined gasoline taxes? Justify your answer.

As a part of the United States Department of Agriculture's Super Dump cleanup efforts in the early 1990s, various sites in the country were targeted for cleanup. Three of the targeted sites—River X, River Y, and River Z—had become contaminated with pesticides because they were located near abandoned pesticide dump sites. Measurements of the concentration of aldrin (a commonly used pesticide) were taken at twenty randomly selected locations in each river near the dump sites.

The boxplots shown below display the five-number summaries for the concentrations, in parts per million (ppm) of aldrin, for the twenty locations that were sampled in each of the three rivers.

Concentrations of Aldrin (ppm)
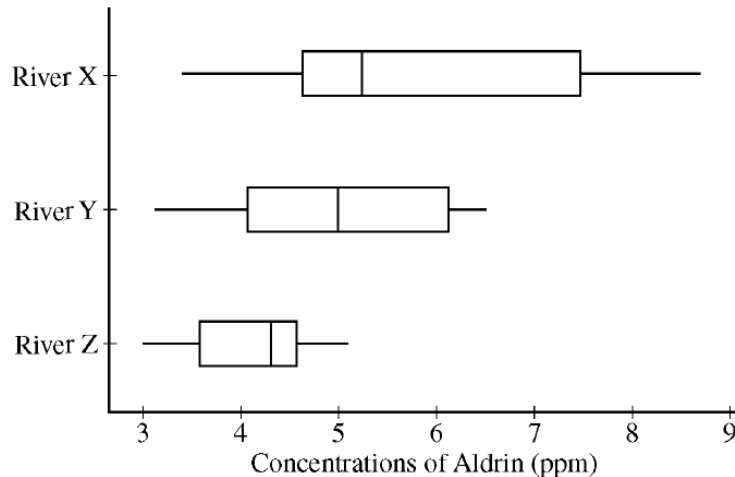
(a) Compare the distributions of the concentration of aldrin among the three rivers.

(b) The twenty concentrations of aldrin for River X are given below.

$$\begin{array}{cccccccccc}
3.4 & 4.0 & 5.6 & 3.7 & 8.0 & 5.5 & 5.3 & 4.2 & 4.3 & 7.3 \\
8.6 & 5.1 & 8.7 & 4.6 & 7.5 & 5.3 & 8.2 & 4.7 & 4.8 & 4.6
\end{array}$$

Construct a stemplot that displays the concentrations of aldrin for River X.

(c) Describe a characteristic of the distribution of aldrin concentrations in River X that can be seen in the stemplot but cannot be seen in the boxplot.