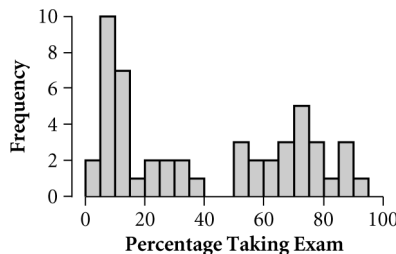


## Chapter 2 AP Practice Quiz

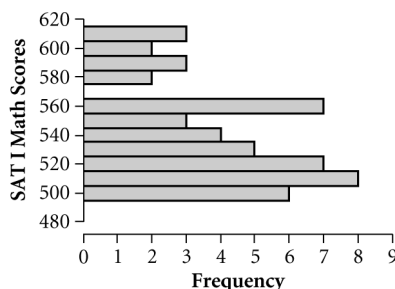
1. B. One out of the 25 ratings, or 4%.
2. C
3. C. The mean of 54.16 is greater than the median of 51.
4. D.  $63.5 + 1.5(63.5 - 47.5) = 87.5$
5. B. This boxplot shows a minimum at 32,  $Q_1$  at 47.5, median at 51,  $Q_3$  at 63.5, and a maximum at 71, with an outlier at 92.
6. *Note:* This is Chapter 2, E91.
  - a. The state with the lowest average income in dollars in 1980 had an average income of \$7,007.
  - b. There is at least one outlier for 1980 because  $Q_3 + 1.5 \cdot IQR = 10,746 + 3,489 = \$14,235$ , which is less than the maximum of \$14,866. Thus, the state with the maximum income is an outlier. There is also at least one outlier for 2000 because  $Q_3 + 1.5 \cdot IQR = 30,871 + 8,643 = \$39,514$ , which is less than the maximum of \$41,495. Other states on the high end may also be outliers. There are no outliers on the low end for either year.
  - c. No. Alabama remains below the lower quartile of the distribution, but you cannot say exactly where in the lowest quarter it lies. It is tempting to find Alabama's relative position using z-scores, but there is no indication that these incomes are normally distributed, and it is only appropriate to use z-scores for comparison in that case.

## Chapters 2–3 AP Practice Quiz

1. D. Because the standard deviation is 19.49, the variance is approximately 381.94.
2. C.  $\frac{7240}{19} \approx 1.68$ .
3. D. A scatterplot cannot be used because these are univariate data.
4. E. 80% of the distribution is at or to the left of the value.
5. E. Choice A shows a correct interpretation of the y-intercept; choice B shows a correct interpretation of the slope; choice C shows a correct substitution; choice D is correct because the correlation and the slope of the regression line have the same sign.
6. *Note:* This is Chapter 3, E4.
  - a. Iowa 5% and Illinois 10%; about 92% of New York students took the SAT I, and they averaged 511. Student answers will be estimates.
  - b. The overall trend is negative, moderately strong, and curved. The gap between 40 and 50% in the middle of the scatterplot suggests two groups of states—one with low percentages and high average scores and another with high percentages and low average scores. One state stands out a bit from the rest—West Virginia with only 20% taking the SAT I and a relatively low average score of 511. Student estimates will vary.
  - c. Yes, the distribution of the percentage taking the SAT I looks bimodal because there is a cluster of percentages below 10 and a second around 65 to 75. Visualizing all of the points dropping onto the x-axis reveals this distribution. A histogram of percentages is shown here.



The distribution of SAT I math scores also looks like it may be bimodal. There appears to be a cluster of scores around 510 and another cluster around 560. Visualizing all the points dropping onto the y-axis reveals this distribution.



In the histogram of the average SAT I scores, even though you can see two peaks around 510 and 560, the shape is skewed more toward the larger values than bimodal.

d. There are no more states to add, so this is the complete picture for the given year. What you see is all there is. You might generalize, however, to the previous year and the following year. In fact, the plot over the last 20 or so years looks similar to this one. These numbers do not change rapidly from year to year.

e. The Midwestern states are predominantly ACT states. In these states, only small percentages of students take the SAT I, and these tend to be the better students who are trying for admission to exclusive colleges, perhaps outside the Midwest. If only a few students in a state are taking the SAT I, they are probably the best students in the state, and their average scores would then be higher than the average scores for other states. Thus, as the percentage of students taking the SAT I increases, the average score tends to decrease. Although this explanation makes sense, you cannot be sure from these data alone.

## Chapters 2–4 AP Practice Quiz

1. C. A histogram and a bar chart are inherently different because the bar chart displays categories whose bars should not be touching. The bars of a histogram show the frequencies of measurements with intervals, usually of equal width, marked off on the real number line.
2. B
3. C. The quantity  $r^2$  gives the percentage of the variation explained by the equation.
4. D. This is the only graph to display random scatter and have all points falling in a constant horizontal band.
5. D, because some districts are larger than others. Choice C is correct because multistage cluster samples can be used to infer information about a population.
6. *Note:* This is Chapter 4, E16.
  - a. All the cookies must be numbered, which means buying all the bags in the store, numbering all the cookies, and taking the SRS using random digits.
  - b. Use bags as clusters. Number the bags and take an SRS of bags. Use all the cookies in those bags as the sample. A cluster sample is much more practical.
  - c. As in part b, number the bags and choose an SRS of bags. Then take an SRS of cookies from each bag in the cluster sample. Which method you prefer depends on the patterns of variation and on how much time and money you have. If you have lots of time and not much money, use a cluster sample: Buy a small number of bags and count the chips in every cookie. If money is no object but you do not have much time, you could use the two-stage cluster sample: Buy more bags and count fewer cookies from each bag. This would give better estimates if chip contents vary a lot from bag to bag but tend to be comparatively uniform from cookie to cookie within each bag.