

3. **SAT or ACT?** Each year thousands of high school students take either the SAT or the ACT, standardized tests used in the college admissions process. Combined SAT Math and Verbal scores go as high as 1600, while the maximum ACT composite score is 36. Since the two exams use very different scales, comparisons of performance are difficult. A convenient rule of thumb is $SAT = 40 \times ACT + 150$; that is, multiply an ACT score by 40 and add 150 points to estimate the equivalent SAT score. An admissions officer reported the following statistics about the ACT scores of 2355 students who applied to her college one year. Find the summaries of equivalent SAT scores.

Lowest score = 19 Mean = 27 Standard deviation = 3
Q3 = 30 Median = 28 IQR = 6

4. **Cold U?** A high school senior uses the Internet to get information on February temperatures in the town where he'll be going to college. He finds a Web site with some statistics, but they are given in degrees Celsius. The conversion formula is $^{\circ}F = 9/5 ^{\circ}C + 32$. Determine the Fahrenheit equivalents for the summary information below.

Maximum temperature = $11^{\circ}C$ Range = 33° Mean = 1°
Standard deviation = 7° Median = 2° IQR = 16°

5. **Mistake.** A clerk entering salary data into a company spreadsheet accidentally put an extra "0" in the boss's salary, listing it as \$2,000,000 instead of \$200,000. Explain how this error will affect these summary statistics for the company payroll:

- measures of center: median and mean.
- measures of spread: range, IQR, and standard deviation.

7. **Payroll.** A small warehouse employs a supervisor at \$1200 a week, an inventory manager at \$700 a week, six stock boys at \$400 a week, and four drivers at \$500 a week.

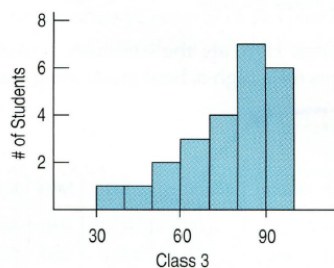
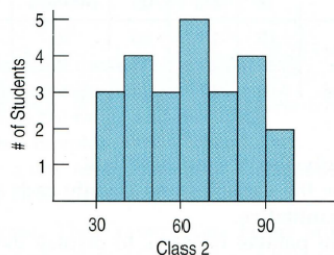
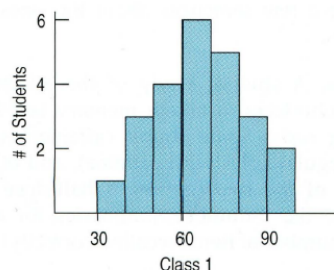
- Find the mean and median wage.
- How many employees earn more than the mean wage?
- Which measure of center best describes a typical wage at this company, the mean or the median?
- Which measure of spread would best describe the payroll, the range, the IQR, or the standard deviation? Why?

8. **Singers.** The frequency table shows the heights (in inches) of 130 members of a choir.

Height	Count	Height	Count
60	2	69	5
61	6	70	11
62	9	71	8
63	7	72	9
64	5	73	4
65	20	74	2
66	18	75	4
67	7	76	1
68	12		

- Find the 5-number summary for these data.
- Display these data with a boxplot.
- Find the mean and standard deviation.
- Display these data with a histogram.
- Write a few sentences describing the distribution of heights.

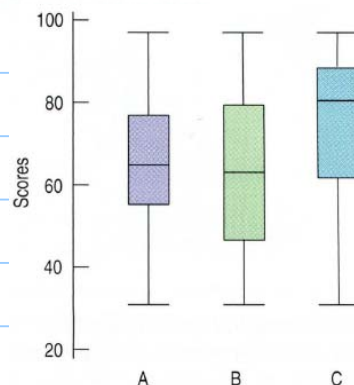
27. **Test scores.** Three Statistics classes all took the same test. Histograms of the scores for each class are shown below.



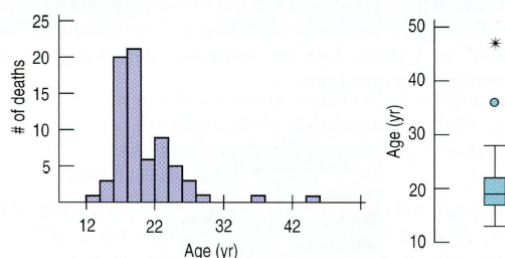
- Which class had the highest mean score?
- Which class had the highest median score?
- For which class are the mean and median most different? Which is higher? Why?
- Which class had the smallest standard deviation?
- Which class had the smallest IQR?

28. **Test scores.** Look again at the histograms of test scores for the three Statistics classes in Exercise 27.

- Overall, which class do you think performed better on the test? Why?
- How would you describe the shape of each distribution?
- Match each class with the corresponding boxplot at the top of the next column.



29. **Still rockin'.** On pages 77–78, you read about the 66 deaths attributed to “crowd crush” at rock concerts during the years 1999 and 2000. Here are the histogram and boxplot of the victims’ ages that we saw earlier:



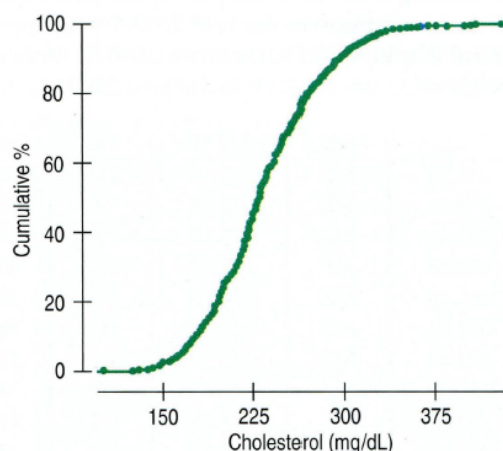
- What features of the distribution can you see in both the histogram and the boxplot?
- What features of the distribution can you see in the histogram that you could not see in the boxplot?
- What summary statistic would you choose to summarize the center of this distribution? Why?
- What summary statistic would you choose to summarize the spread of this distribution? Why?

31. **Graduation?** A survey of major universities asked what percentage of incoming freshmen usually graduate “on time” in 4 years. Use the summary statistics given to answer these questions.

	% on time
Count	48
Mean	68.35
Median	69.90
StdDev	10.20
Min	43.20
Max	87.40
Range	44.20
25th %tile	59.15
75th %tile	74.75

- Would you describe this distribution as symmetric or skewed? Explain.
- Are there any outliers? Explain.
- Create a boxplot of these data.
- Write a few sentences about the graduation rates.

36. **Cholesterol.** The Framingham Heart Study recorded the cholesterol levels of more than 1400 men. Here is an ogive of the distribution of these cholesterol measures. (Recall that an ogive shows the percentage of cases at or below a certain value.) Construct a boxplot for these data and write a few sentences describing the distribution.



45. **Customer database.** A philanthropic organization has a database of millions of donors that they contact by mail to raise money for charities. One of the variables in the database, *Title*, contains the title of the person or persons printed on the address label. The most common are Mr., Ms., Miss, and Mrs., but there are also Ambassador and Mrs., Your Imperial Majesty, and Cardinal to name a few others. In all there are over 100 different titles, each with a corresponding numeric code. Here are a few of them:

Code	Title
000	MR.
001	MRS.
002	MR. and MRS.
003	MISS
004	DR.
005	MADAME
006	SERGEANT
009	RABBI
010	PROFESSOR
126	PRINCE
127	PRINCESS
128	CHIEF
129	BARON
130	SHEIK
131	PRINCE AND PRINCESS
132	YOUR IMPERIAL MAJESTY
1035	M. ET MME.
1210	PROF.

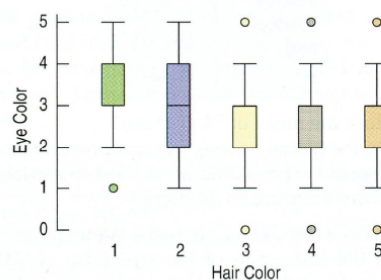
An intern who was asked to analyze the organization’s fundraising efforts presented these summary statistics for the variable *Title*:

Mean	54.41
StdDev	957.50
Median	1
IQR	2
n	94649

- What does the mean of 54.41 mean?
 - What are the typical reasons that cause measures of center and spread to be as different as those in this table?
 - Is that why these are so different?
47. **Eye and hair color.** A survey of 1021 school-age children was conducted by randomly selecting children from several large urban elementary schools. Two of the questions concerned eye and hair color. In the survey, the following codes were used:

Hair Color	Eye Color
1 = Blond	1 = Blue
2 = Brown	2 = Green
3 = Black	3 = Brown
4 = Red	4 = Grey
5 = Other	5 = Other

The Statistics students analyzing the data were asked to study the relationship between eye and hair color. They produced this plot:



Is their graph appropriate? If so, summarize the findings. If not, explain why not.