1. Do Students Need Summer Development? For 108 randomly selected college applicants, the following frequency distribution for entrance exam scores was obtained. Construct a histogram, frequency polygon, and ogive for the data. (The data for this exercise will be used for Exercise 13 in this section.)

Class limits	Frequency
90–98	6
99–107	22
108–116	43
117–125	28
126–134	9
	Total 108

Applicants who score above 107 need not enroll in a summer developmental program. In this group, how many students do not have to enroll in the developmental program?

2. Bear Kills The number of bears killed in 2010 for 52 counties in Pennsylvania is shown in the frequency distribution. Construct a histogram, frequency polygon, and ogive for the data. Comment on the skewness of the distribution. How many counties had 75 or fewer bears killed? (The data for this exercise will be used for Exercise 14 of this section.)

Class limits	Frequency
1–25	18
26–50	12
51–75	7
76–100	6
101–125	2
126–150	3
151–175	0
176–200	2
201–225	0
226–250	2
	Total 52

Source: Pennsylvania State Game Commission.

3. Counties, Divisions, or Parishes for 50 States The number of counties, divisions, or parishes for each of the 50 states is given below. Use the data to construct a grouped frequency distribution with 6 classes, a histogram, a frequency polygon, and an ogive. Analyze the distribution.

67	27	15	75	58	64	8	67	159	5
102	44	92	99	105	120	64	16	23	14
83	87	82	114	56	93	16	10	21	33
62	100	53	88	77	36	67	5	46	66
95	254	29	14	95	39	55	72	23	3

Source: World Almanac and Book of Facts.

4. Number of College Faculty The number of faculty listed for a variety of private colleges that offer only bachelor's degrees is listed below. Use these data to construct a frequency distribution with 7 classes, a histogram, a frequency polygon, and an ogive. Discuss the shape of this distribution. What proportion of schools have 180 or more faculty?

165	221	218	206	138	135	224	204
70	210	207	154	155	82	120	116
176	162	225	214	93	389	77	135
221	161	128	310				

Source: World Almanac and Book of Facts.

5. Railroad Crossing Accidents The data show the number of railroad crossing accidents for the 50 states of the United States for a specific year. Construct a histogram, frequency polygon, and ogive for the data. Comment on the skewness of the distribution. (The data in this exercise will be used for Exercise 15 in this section.)

Class limits	Frequency
1–43	24
44–86	17
87–129	3
130–172	4
173–215	1
216–258	0
259–301	0
302–344	1
	Total 50

6. NFL Salaries The salaries (in millions of dollars) for 31 NFL teams for a specific season are given in this frequency distribution.
Construct a histogram, a frequency polygon, and an ogive for the data; and comment on the shape of the distribution. (The data for this exercise will be used for Exercise 16 of this section.)

Class limits	Frequency
39.9–42.8	2
42.9–45.8	2
45.9–48.8	5
48.9–51.8	5
51.9–54.8	12
54.9–57.8	5
	Total 31

Source: NFL.com

7. Super Bowl Scores The frequency distribution shows the total number of points scored in the Super Bowl games from 1967 to 2012. Construct a histogram, frequency polygon, and ogive for the distribution. If you were to predict the total number of points for the next Super Bowl game, what range of values would you choose? In how many games were the total points greater than 56?

Class limits	Frequency
21–29	5
30–38	10
39–47	13
48–56	10
57–65	4
66–74	3
75–83	1
	Total 46

8. Costs of Utilities The frequency distribution represents the cost (in cents) for the utilities of states that supply much of their own power. Construct a histogram, frequency polygon, and ogive for the data. Is the distribution skewed?

Class limits	Frequency
6–8	12
9–11	16
12–14	3
15–17	1
18–20	0
21–23	0
24–26	1
	Total 33

9. Air Pollution One of the air pollutants that is measured in selected cities is sulfur dioxide. This pollutant occurs when fossil fuels are burned. This pollutant is measured in micrograms per cubic meter ($\mu g/m^3$). The results obtained from a sample of 24 cities are shown in the frequency distributions. One sample was taken recently,

and the other sample of the same cities was taken 5 years ago. Construct a histogram and compare the two distributions.

Class limits	Frequency (now)	Frequency (5 years ago)
10–14	6	5
15–19	4	4
20–24	3	2
25–29	2	3
30–34	5	6
35–39	1	2
40–44	2	1
45–49	1	1
	Total 24	Total 24

10. Making the Grade The frequency distributions shown indicate the percentages of public school students in fourth-grade reading and mathematics who performed at or above the required proficiency levels for the 50 states in the United States. Draw histograms for each, and decide if there is any difference in the performance of the students in the subjects.

Class	Reading frequency	Math frequency
17.5–22.5	7	5
22.5–27.5	6	9
27.5–32.5	14	11
32.5–37.5	19	16
37.5–42.5	3	8
42.5–47.5	1	1
	Total 50	Total 50

Source: *National Center for Educational Statistics.*

11. Blood Glucose Levels The frequency distribution shows the blood glucose levels (in milligrams per deciliter) for 50 patients at a medical facility. Construct a histogram, frequency polygon, and ogive for the data. Comment on the shape of the distribution. What range of glucose levels did most patients fall into?

Class limits	Frequency
60–64	2
65–69	1
70–74	5
75–79	12
80–84	18
85–89	6
90–94	5
95–99	1
	Total 50

12. Waiting Times The frequency distribution shows the waiting times (in minutes) for 50 patients at a walk-in medical facility. Construct a histogram, frequency polygon, and ogive for the data. Is the distribution skewed? How many patients waited longer than 30 minutes?

Class limits	Frequency
11–15	7
16–20	9
21–25	15
26–30	9
31–35	5
36–40	3
41–45	2
	Total 50

13. Construct a histogram, frequency polygon, and ogive, using relative frequencies for the data in Exercise 1 of this section.

14. Construct a histogram, frequency polygon, and ogive, using relative frequencies for the data in Exercise 2 of this section.

15. Construct a histogram, frequency polygon, and ogive, using relative frequencies for the data in Exercise 5 of this section.

16. Construct a histogram, frequency polygon, and ogive, using relative frequencies for the data in Exercise 6 of this section.

17. Cereal Calories The number of calories per serving for selected ready-to-eat cereals is listed here. Construct a frequency distribution, using 7 classes. Draw a histogram, a frequency polygon, and an ogive for the data, using relative frequencies. Describe the shape of the histogram.

130	190	140	80	100	120	220	220	110	100
210	130	100	90	210	120	200	120	180	120
190	210	120	200	130	180	260	270	100	160
190	240	80	120	90	190	200	210	190	180
115	210	110	225	190	130				

Source: *The Doctor's Pocket Calorie, Fat, and Carbohydrate Counter.*

18. Protein Grams in Fast Food The amount of protein (in grams) for a variety of fast-food sandwiches is reported here. Construct a frequency distribution, using 6 classes. Draw a histogram, a frequency polygon, and an ogive for the data, using relative frequencies. Describe the shape of the histogram.

23	30	20	27	44	26	35	20	29	29
25	15	18	27	19	22	12	26	34	15
27	35	26	43	35	14	24	12	23	31
40	35	38	57	22	42	24	21	27	33

19. **Net Worth of Wealthy People** The net worth (in billions of dollars) of a sample of the richest people in the United States is shown. Find the mean, median, mode, and midrange for the data.

59	52	28	26	19
19	18	17	17	17

Source: *Forbes* magazine.

20. **Shark Attacks** The number of shark attacks and deaths over a recent 5-year period is shown. Find the mean, median, mode, and midrange for the data.

Attacks	71	64	61	65	57
Deaths	1	4	4	7	4

21. **Battery Lives** Twelve batteries were tested to see how many hours they would last. The frequency distribution is shown here.

Hours	Frequency
1–3	1
4–6	4
7–9	5
10–12	1
13–15	1

Find the mean and modal class.

22. **SAT Scores** The mean SAT math scores for selected states are represented. Find the mean class and modal class.

Score	Frequency
478–504	4
505–531	6
532–558	2
559–585	2
586–612	2

Source: *World Almanac.*

5. **Households of Four Television Networks** A survey showed the number of viewers and number of households of four television networks. Find the average number of viewers, using the weighted mean.

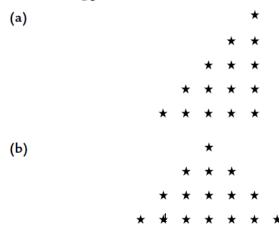| Households	1.4	0.8	0.3	1.6
Viewers (in millions)	1.6	0.8	0.4	1.8

Source: Nielsen Media Research.

6. **Investment Earnings** An investor calculated these percentages of each of three stock investments with payoffs as shown. Find the average payoff. Use the weighted mean.

Stock	Percent	Payoff
A	30	$10,000
B	50	3,000
C	20	1,000

Fruits Menu

	Cost per Pound. (in $)
1. Mango	5.00
2. Apple	3.00
3. Grapes	2.00
4. Exit	

(28) The following patterns with flexible dimensions as supplied by the uses:

(a)
```
        ★
      ★ ★
    ★ ★ ★
  ★ ★ ★ ★
★ ★ ★ ★ ★
```

(b)
```
      ★
    ★ ★ ★
  ★ ★ ★ ★ ★
★ ★ ★ ★ ★ ★ ★
```

(29) Read a six-digit positive integer. If the number is even, add up its digits. Otherwise, multiply the individual digits and print the result.

(30) Obtain the decimal equivalent of a binary number

(31) Display all characters represented by the ASCII numbers from 25 to 100

(32) Determine the value of an exponential expression of the form a^x, where a is any number and x is any integer

(33) Determine the HCF of n given numbers

(34) Determine the maximum and the minimum ones of n given numbers

(35) Determine all the permutations of the numbers less than or equal to some given number n.

For example, if $n = 123$, then the permutations are:

123

321

231

132

213

312

(36) Find a series of five consecutive numbers, the sum of the squares of the first three of which is equal to the sum of the squares of the last two. For example,

$$(-2)^2 + (-1)^2 + 0^2 = 1^2 + 2^2$$

(37) Limit the checking within 1000, to show all the triad numbers within 10,000. A number is said to be a triad number if the double and triple of the number contain all separate digits with no repetition of any one of them.

(38) Identify and show the integer values of x, y, and z that satisfy the equation: $Z^2 = X^2 + y^2$

(b)
```
            ★
          ★ ★ ★
        ★ ★ ★ ★ ★
      ★ ★ ★ ★ ★ ★ ★
```