

# NOTES--Sampling, Frequency Distributions, and Graphs

## Important terms

data-- numerical information

statistics-- a method for collecting, organizing, analyzing, and interpreting the data

→ descriptive statistics-- collect, analyze, summarize and present

inferential statistics-- make generalizations & draw conclusions

population-- set of all people to be analyzed

sample-- a subset of the population

random sample-- a sample in which every member of the population has an equal chance of being selected

Example 1 A telephone poll of 181 randomly selected American mothers with children under 18 in the household was taken by Time/CNN May 21-22, 2003. The data below are from the poll.

Do you think the war with Iraq has made terrorist attacks in the U.S. more likely or less likely, or hasn't it made any difference?

More likely	Less likely	No difference
47%	19%	31%

a. Describe the population and the sample of this poll.

b. For each person polled, what variable is measured?

perception of likelihood of terrorist attacks

pop. - American mothers with children under 18 in the household  
sample - 181 mothers surveyed for the poll

## Example 2

A group of hotel owners in a large city decide to conduct a survey among citizens of the city to discover their opinions about casino gambling.

a. Describe the population. citizens of the city

b. One of the hotel owners suggests obtaining a sample by surveying all the people at six of the largest nightclubs in the city on a Saturday night. Each person will be asked to express his or her opinion on casino gambling. Does this seem like a good idea?

no - bias - nightclubbers probably support gambling

Example 3 We return to the hotel owners in the large city who are interested in how the city's citizens feel about casino gambling. Which of the following would be the most appropriate way to select a random sample?

- a. Randomly survey people who live in the oceanfront condominiums in the city.
- b. Survey the first 200 people whose names appear in the city's telephone directory.
- c. Randomly select neighborhoods of the city and then randomly survey people within the selected neighborhoods.

Example 4 The government of a large city wants to know if its citizens will support a three-year tax increase to provide additional support to the city's community college system. The government decides to conduct a survey of the city's residents before placing a tax increase initiative on the ballot. To obtain a sample of the city's residents, would it be more appropriate to survey a random sample of persons within each geographic region of the city or to survey a random sample of professors at a local community college?

bias -- prob. support

Types of Data Displays

frequency distribution-- 2-column chart

Example 5 Construct a frequency distribution for the data of the age of maximum yearly growth for 35 boys:

12, 14, 13, 14, 16, 14, 14, 17, 13, 10, 13, 18, 12, 15, 14, 15, 15, 14, 14, 13, 15, 16, 15, 12, 13, 16, 11, 15, 12, 13, 12, 11, 13, 14, 14.

age	# boys
10	1
11	2
12	5
13	7
14	9
15	6
16	3
17	1
18	1

Example 6 Construct a frequency distribution for the data showing final course grades for students in a precalculus course, listed alphabetically by student name in a grade book:

F, A, B, B, C, C, B, C, A, A, C, C, D, C, B, D, C, C, B, C.

grade	# students
A	3
B	5
C	9
D	2
F	1

grouped frequency distribution-- uses "classes" to organize data

**Example 7**

82	47	75	64	57	82	63	93
76	68	84	54	88	77	79	80
94	92	94	80	94	66	81	67
75	73	66	87	76	45	43	56
57	74	50	78	71	84	59	76

scores	# students
40-49	3
50-59	6
60-69	6
70-79	11
80-89	9
90-99	5

Use the classes 40-49, 50-59, 60-69, 70-79, 80-89, and 90-99 to construct a grouped frequency distribution for the 40 test scores above.

**Example 8**

Use the classes to construct a grouped frequency distribution for the following 37 exam scores:

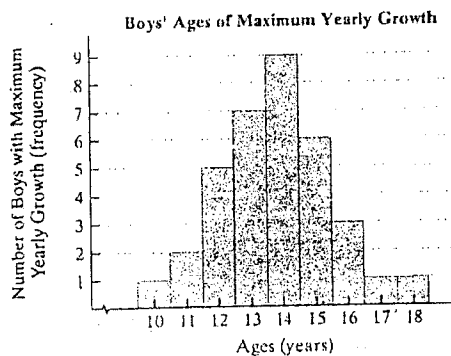
73	58	68	75	94	79	96	79
87	83	89	52	99	97	89	58
95	77	75	81	75	73	73	62
69	76	77	71	50	57	41	98
77	71	69	90	75			

Class	# scores
40-49	1
50-59	5
60-69	4
70-79	15
80-89	5
90-99	7

histogram-- bar graph (bars touch)

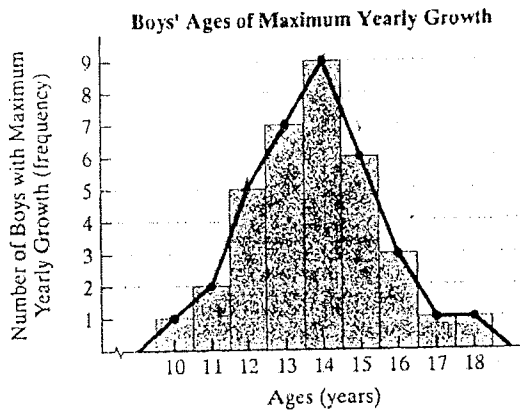
**A FREQUENCY DISTRIBUTION FOR A BOY'S AGE OF MAXIMUM YEARLY GROWTH**

Age of Maximum Growth	Number of Boys (Frequency)
10	1
11	2
12	5
13	7
14	9
15	6
16	3
17	1
18	1
Total: $n = 35$	

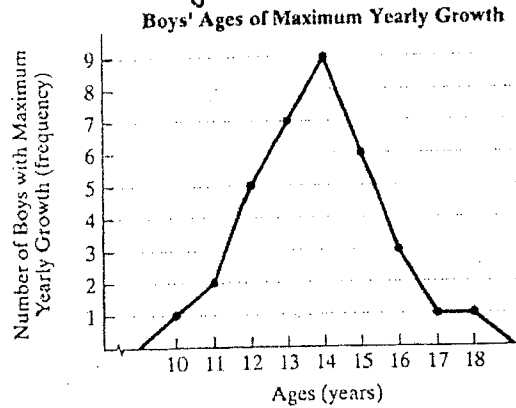


A histogram for a boy's age of maximum yearly growth

frequency polygon-- connects the midpts of the bars of a histogram



A histogram with a superimposed frequency polygon



A frequency polygon

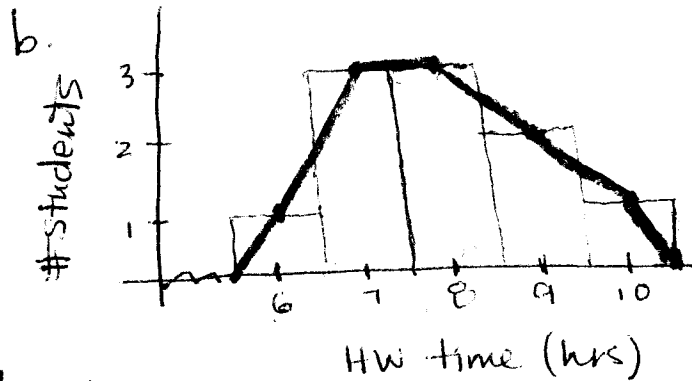
**Example 9** A random sample of ten high school students is selected and each student is asked how much time he or she spent on homework during the previous weekend. The following times, in hours, are obtained:

8, 10, 9, 7, 9, 8, 7, 6, 8, 7

- Construct a frequency distribution for the data
- Construct a histogram and a frequency polygon for the data.

a.

HW time (hrs)	# students
6	1
7	3
8	3
9	2
10	1



stem-and-leaf plot--  
2-columns ones digit

**Example 10** Use the data showing statistics test scores for 40 students to construct a stem-and-leaf plot:

240782410

82	47	75	64	57	82	63	93
76	68	84	54	88	77	79	80
94	92	94	80	94	66	81	67
75	73	66	87	76	45	43	56
57	74	50	78	71	84	59	76

stem	leaf
4	3 5 7
5	0 4 6 7 7 9
6	3 4 6 6 7 8
7	1 3 4 5 5 6 6 6
8	0 0 1 2 2 4 4 7
9	2 3 4 4 4

42443

4

753

704796

864637

65345861796