

## Worksheet 2-1

Date: \_\_\_\_\_ Period: \_\_\_\_\_

1) Determine the mean, median, and mode for each data set (round to one decimal place).

a) {2, 3, 5, 5, 7, 7, 7, 8, 9, 10}

6.3, 7, 7

b) {8, 7, 5, 6, 3, 2, 9, 8}

6, 6.5, 8

c) {210, 180, 188, 162, 170}

182, 180, none

d) {4.5, 20.7, 35.2, 28.8, 36.5, 40.5}

27.7, 32, none

e) {5.3, 8.4, 5.3, 9.2, 10.6, 9.2}

8, 8.8, 5.3+9.2

f) {2150, 1860, 2340, 1990}

2085, 2070, none

2) Invent a data set that matches each description.

a) Five values, mean=15, median=13, no mode.

11, 12, 13, 19, 20

b) Six values, mean=24, median=25, mode=28

18, 20, 24, 26, 28, 28

3) Suppose you have a data set containing 1000 test scores. How many scores would you expect to find matching each description?

a) Above the median

500

b) Below the first quartile

250

c) Between the first and third quartiles

500

d) Above the third quartile

250

e) Below the third quartile

750

f) Above the first quartile

750

g) Between the median and the third quartile

250

4) Give the five-number summary for each data set. And draw a box-and-whisker plot for each.

a) {10, 8, 6, 4, 2}

2, 3, 6, 9, 10

b) {0, 30, 45, 50, 75, 80, 95}

0, 30, 50, 80, 95

c) {8, 6, 8, 2, 9, 4, 4, 3, 1}

1, 2.5, 4, 8, 9

d) {32, 55, 16, 70, 65, 55, 40, 49}

16, 36, 52, 60, 70

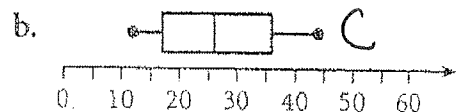
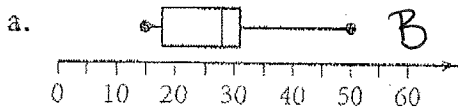
e) {19.3, 32.4, 20.5, 18.0, 26.6, 21.4, 16.7, 33.9}

16.7, 18.65, 20.95, 29.5, 33.9

f) {0.52, 3.91, 4.67, 2.20, 8.15, 5.91, 7.94, 1.11, 6.55, 4.03}

.52, 2.2, 4.35, 6.55, 8.15

5. Match each box plot to one of the data sets below.



A. {29, 16, 20, 28, 5, 50, 15}

B. {30, 18, 22, 28, 31, 15, 50}

C. {21, 12, 33, 44, 26, 15, 36}

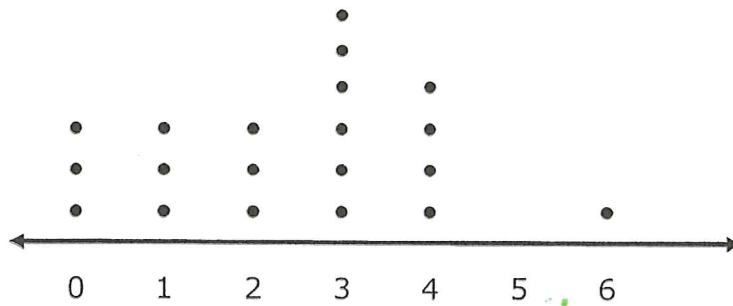
D. {48, 41, 35, 12, 15, 19, 26}

AFM Unit 2 Statistics  
Worksheet 2-2

Name Key

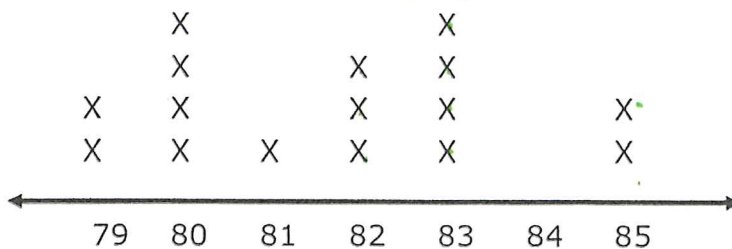
Dot Plot Worksheet

1. The students in one social studies class were asked how many brothers and sisters (siblings) they each have. The dot plot here shows the results.



- a. How many of the students have six siblings? 1
- b. How many of the students have no siblings? 3
- c. How many of the students have three or more siblings? 11

2. The resting pulse rates were recorded for 16 boys in gym class before they exercised. The line plot here shows the results.



- a. What is the range of the pulse rates? 6
- b. How many boys had a pulse rate over 81? 9
- c. How many boys had a pulse rate of 83? 4

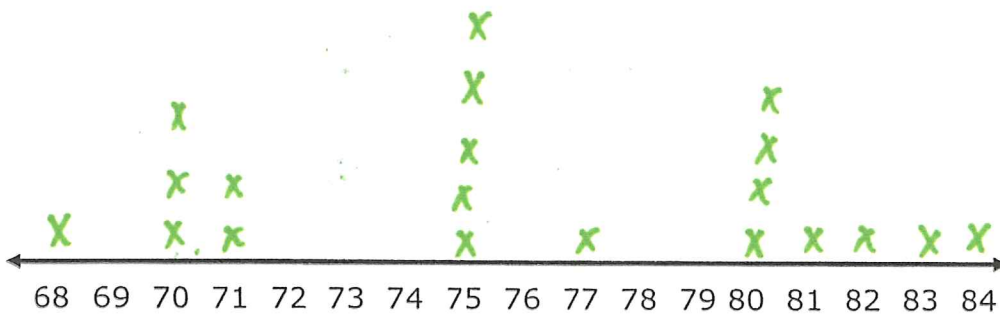
d. How many boys had a pulse rate of at most 82? 10

3. The height's of 20 basketball players, in inches, are given below.

68, 70, 70, 71, 75, 80, 81, 82, 84, 75

75, 80, 75, 77, 75, 80, 83, 80, 71, 70

a) Make a **dot plot** using the number line below.



b) What is the spread (range) of the data? 16

c) What is the mode of the data? 75

d) How many players are greater than 70 inches tall? 16

1) For each data set, find the mean, the deviation from the mean **for each value**, and the standard deviation of the data set. (Round to one decimal place.)

a) {12.4, 26.3, 9.8, 33.9, 7.6}

$\bar{x} = 18$

std dev = 11.49

b) {235, 413, 505, 111, 700, 626, 357}

$\bar{x} = 421$

std dev = 208.88

c) {0.5, 2.6, 1.8, 4.7, 0.9}

$\bar{x} = 2.1$

std dev = 1.67

2) For each data set, calculate the mean and standard deviation. Include appropriate units in your answers.

a) The heights, in inches, of eight children are 32, 45, 39, 51, 28, 54, 37, and 42.

41 in

8.9 in

b) The lengths, in centimeters, of six pencils are 8.5, 19.0, 11.8, 13.2, 16.4, and 6.1.

12.5 cm 4.86 cm

c) The prices of seven music CDs are \$13.50, \$10.95, \$9.95, \$16.00, \$12.50, \$15.95, and \$17.75.

\$13.80

\$2.88

3) For each data set, find the median, the range, and the IQR.

a) {18, 13, 15, 24, 20}

med: 18

range: 11

IQR: 8

b) {4, 9, 7, 6, 0, 11, 7}

med: 7

range: 11

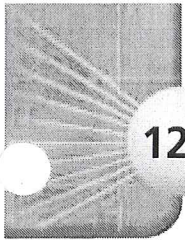
IQR: 5

c) {356, 211, 867, 779, 101, 543}

med 450

range ~~543~~ 567

IQR ~~211~~ 766



# 12-7 Practice

## The Normal Distribution

Determine whether the data in each table appear to be *positively skewed*, *negatively skewed*, or *normally distributed*.

1. Time Spent at a Museum Exhibit

Minutes	Frequency
0-25	27
26-50	46
51-75	89
75-100	57
100+	24

Normal

2. Average Age of High School Principals

Age in Years	Number
31-35	3
36-40	8
41-45	15
46-50	32
51-55	40
56-60	38
60+	4

Negative

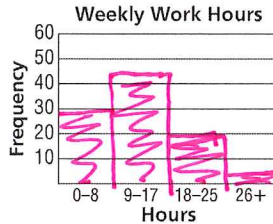
For Exercises 3 and 4, use the frequency table that shows the number of hours worked per week by 100 high school seniors.

Hours	Number of Students
0-8	30
9-17	45
18-25	20
26+	5

3. Make a histogram of the data.

4. Do the data appear to be *positively skewed*, *negatively skewed*, or *normally distributed*? Explain.

Positive

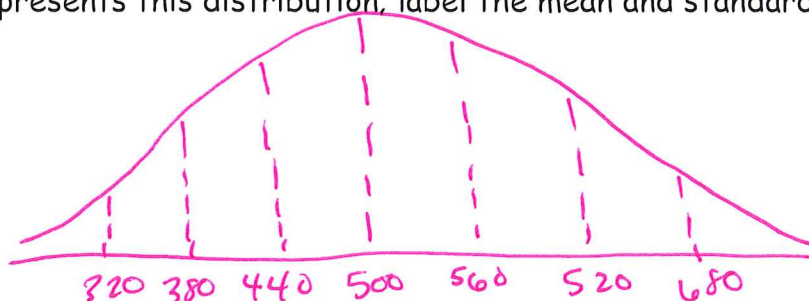


**TESTING** For Exercises 5-10, use the following information.

The scores on a test administered to prospective employees are normally distributed with a mean of 100 and a standard deviation of 15.

- About what percent of the scores are between 70 and 130?
- About what percent of the scores are between 85 and 130? *95%*
- About what percent of the scores are over 115? *81.5%*
- About what percent of the scores are lower than 85 or higher than 115? *16%*
- If 80 people take the test, how many would you expect to score higher than 130? *32*
- If 75 people take the test, how many would you expect to score lower than 85? *2*
- TEMPERATURE** The daily July surface temperature of a lake at a resort has a mean of 82° and a standard deviation of 4.2°. If you prefer to swim when the temperature is at least 77.8°, about what percent of the days does the temperature meet your preference? *84%*

1. The lifetimes of 10,000 watch batteries are normally distributed. The mean lifetime is 500 days. The standard deviation is 60 days. Sketch a normal curve that represents this distribution; label the mean and standard deviation.



Estimate how many watch batteries will last for each of the following intervals.

a.) 440 - 560 days

68.3% 6830 batteries

b.) 380 - 620 days

95.5% 9550 batteries

c.) 320 - 680 days

99.7% 9970 batteries

d.) 410-590 days? (In addition to your answer, also write down what you have to enter into your calculator.)

normalcdf(410,590,500,60)

8.66%

8660 batteries

2. A group of students weighs 500 US pennies. They find that the pennies have normally distributed weights with a mean of 3.1g and a standard deviation of 0.14g

a) What percentage of pennies will weigh between 2.8 and 3.3g?

90.7%

b) What percentage of pennies will weigh between 2.11 and 3.5g?

99.8%

c.) What percentage of pennies will weigh less than 2.96g?

15.7%

d.) What percentage of pennies will weigh more than 3.4g?

1.5%

3. A set of 1000 values has a normal distribution. The mean of the data is 120, and the standard deviation is 20.

a. What percent of the data is in the range 110 to 130?

38.3%

b. What percent of the data is in the range 90 to 110?

24.2%

c. How many values are within the limits 100 and 150?

775

d. How many values are greater than 140?

159

e. How many values are within one standard deviation from the mean?

683

f. Find the symmetric interval about the mean which includes 90% of the data.

73-147

g. Find the symmetric interval about the mean which includes 77% of the data.

96-144

h. Find the point below which 90% of the data lie.

60-146  $\text{invNorm}(.9, 120, 20) = 145.6$

4. The heights of a large group of men are normally distributed with a mean of 70in. and a standard deviation of 2.5 in. Find an interval about the mean that contains 75% of the heights.

67-73



Find the following percentiles of the data set displayed below.

27, 28, 29, 29, 30, 31, 32, 33, 34, 35,

36, 36, 37, 38, 39, 40, 40, 41, 42, 43

5. 45th percentile

35

6. 70th percentile

39

7. 25th percentile

31

8. 95th percentile

43

9. 80th percentile

40

10. 15th percentile

29

11. **Error Analysis** Your friend calculated the tenth percentile of the data set shown above and got 35. What error did your friend make? What is the correct answer?

Your friend found the 10<sup>th</sup> # in the list, not the 10<sup>th</sup> percentile; the correct answer is 29.

Ex 1: A group of students weighs 500 US pennies. They find that the pennies have normally distributed weights with a mean of 3.1g and a standard deviation of 0.14g

- a) What is the z-score for a penny that weighs 3.24g?

$$z = \frac{3.24 - 3.10}{0.14} = 1$$

- d) What is the z-score for a penny that weighs 2.96g?

$$z = \frac{2.96 - 3.10}{0.14} = -1$$

- c) What is the z-score for a penny that weighs 3.31g?

$$z = \frac{3.31 - 3.10}{0.14} = 1.5$$

- d) What is the z-score for a penny that weighs 2.89g?

$$z = \frac{2.89 - 3.10}{0.14} = -1.5$$

- e) What is the z-score for a penny that weighs 3.17g?

$$z = \frac{3.17 - 3.10}{0.14} = 0.5$$

- f) What is the z-score for a penny that weighs 2.72g?

$$z = \frac{2.72 - 3.10}{0.14} = -2.7$$

- g) What is the z-score for a penny that weighs 3.02g?

$$z = \frac{3.02 - 3.10}{0.14} = -0.6$$

- h) What is the z-score for a penny that weighs 3.41g?

$$z = \frac{3.41 - 3.10}{0.14} = 2.2$$

- i) What is the z-score for a penny that weighs 2.85g?

$$z = \frac{2.85 - 3.10}{0.14} = -1.8$$

Ex. 2: For the data set in Example 1:

a.) If a penny has a z-score of .64, how much does it weigh?

$$0.64 = \frac{x - 3.1}{0.14} \quad x = 3.2$$

b.) If a penny has a z-score of -2.8, how much does it weigh?

$$-2.80 = \frac{x - 3.1}{0.14} \quad x = 2.1$$

b.) If a penny has a z-score of 2.63, how much does it weigh?

$$2.63 = \frac{x - 3.1}{0.14} \quad x = 2.7$$

b.) If a penny has a z-score of -0.87, how much does it weigh?

$$-0.87 = \frac{x - 3.1}{0.14} \quad x = 3.0$$

b.) If a penny has a z-score of 1.56, how much does it weigh?

$$1.56 = \frac{x - 3.1}{0.14} \quad x = 3.3$$

b.) If a penny has a z-score of -1.73, how much does it weigh?

$$-1.73 = \frac{x - 3.1}{0.14} \quad x = 2.9$$

b.) If a penny has a z-score of 0.73, how much does it weigh?

$$0.73 = \frac{x - 3.1}{0.14} \quad x = 3.2$$

b.) If a penny has a z-score of -0.96, how much does it weigh?

$$-0.96 = \frac{x - 3.1}{0.14} \quad x = 3.0$$

b.) If a penny has a z-score of -2.03, how much does it weigh?

$$-2.03 = \frac{x - 3.1}{0.14} \quad x = 2.8$$

Name Key

Period \_\_\_\_\_

### Histograms and Dot Plots Worksheet

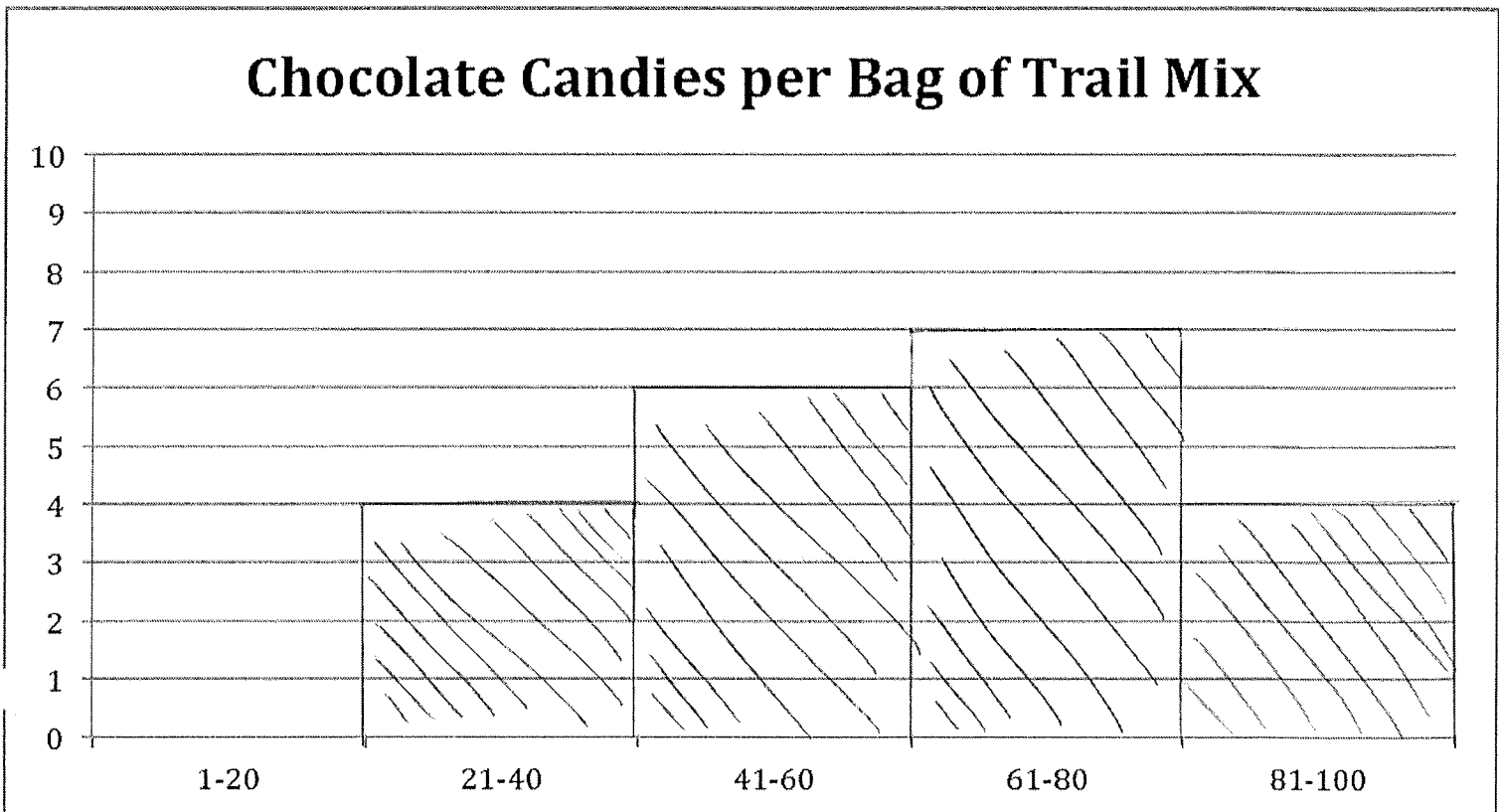
**Directions:** Create a histogram for each set of data. For the first problem, the graph is set up for you. For the second problem, you will need to determine the best way to number the axes. Do not forget to include a title as well.

1. Chocolate candies per bag of trail mix:

~~50~~      ~~42~~      ~~100~~      ~~45~~      ~~68~~      ~~32~~      ~~100~~  
~~67~~      ~~61~~      ~~31~~      ~~75~~      ~~39~~      ~~62~~      ~~64~~  
~~49~~      ~~55~~      ~~51~~      ~~33~~      ~~99~~      ~~96~~      ~~64~~

Frequency table:

Interval	# of values
1-20	
21-40	
41-60	
61-80	
81-100	

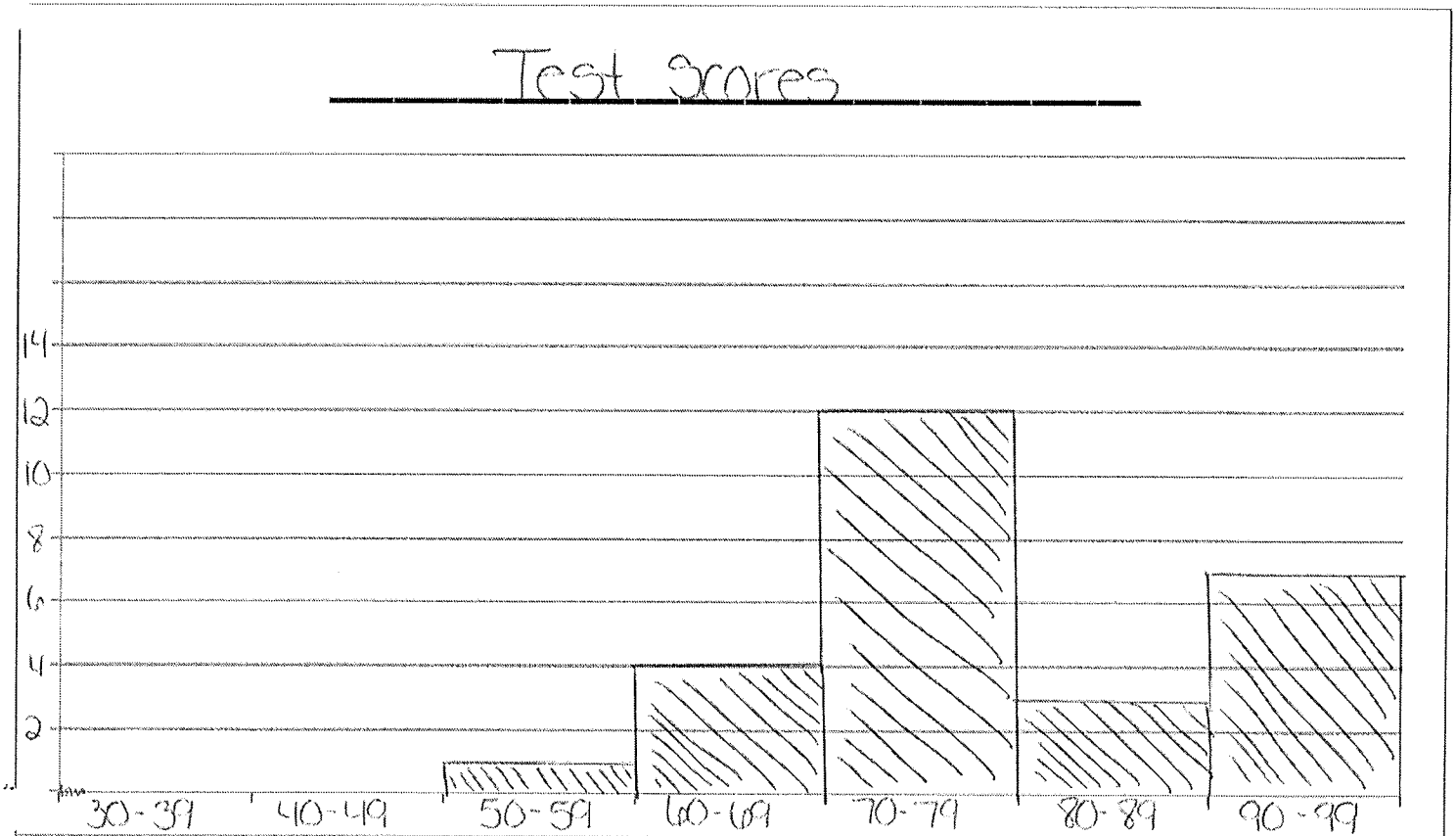


2. Test scores, out of 100 points

92   84   95   77   74   80   95   70   66  
 73   68   90   78   64   72   78   76   65  
 59   71   77   92   91   89   74   76   90

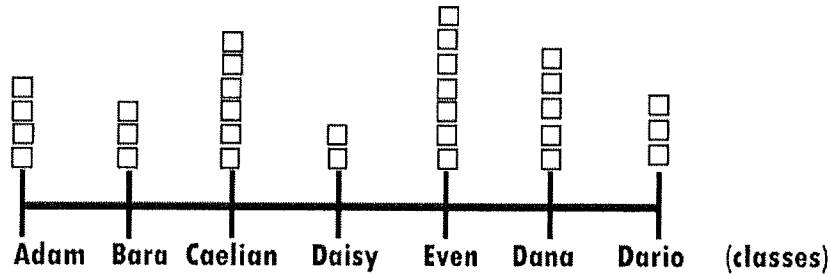
Frequency table:

Interval	# of values
30-39	
40-49	
50-59	1
60-69	
70-79	<del>    </del>
80-89	
90-99	<del>    </del>



**Directions: Answer the following questions based on each of the dot plots.**

1. The dot plot below shows the number of students in each of the teacher's class.



a. How many total students are there in all classes?

$$4 + 3 + 6 + 2 + 7 + 5 + 3 = 30 \text{ students}$$

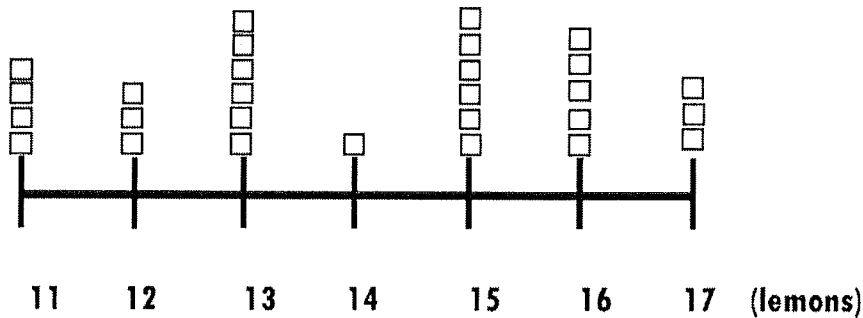
b. Which class has the least number of students?

Daisy

c. Which class has the most number of students?

Even

2. The dot plot shows the number of lemons each person has.



a. How many total individuals are represented in the dot plot?

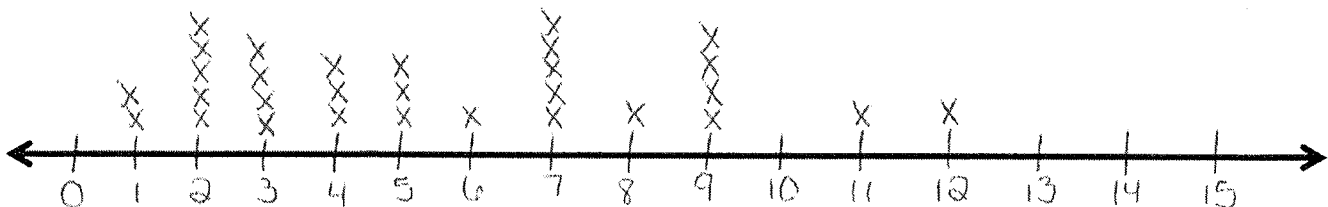
$$4 + 3 + 6 + 1 + 6 + 5 + 3 = 28 \text{ individuals}$$

b. What is the total number of lemons that the individuals have?

$$11 + 11 + 11 + 11 + 12 + 12 + 12 + 13 + 13 + 13 + 13 + 13 + 13 + 14 + 15 + 15 + 15 + 15 + 15 + 15 + 16 + 16 + 16 + 16 + 16 + 17 + 17 + 17 = 393 \text{ lemons}$$

3. The following data shows the amount of chocolate Mrs. Latimer ate over the last 30 days. Create a dot plot to show how much chocolate she ate.

3, 5, 9, 2, 4, 5, 3, 8, 7, 4, 2, 9, 7, 1, 2, 2, 5, 7, 12, 6, 3, 7, 9, 2, 1, 7, 4, 3, 9, 11



## 11-7

## Practice

Form K

## Samples and Surveys

Identify the sampling methods used in each of the following situations.

Then state whether the sampling method has any bias.

1. A television station invites viewers to call in and name their favorite game show.

This is a self-selected sample. All of the sample members will be viewers, so the entire population will not be accurately represented.
2. A school principal gathers an alphabetical list of all the students at her school. Then she selects every 15th student to take a survey about the cafeteria's lunch menu.

This is a systematic sample. There is most likely no bias in this sample.
3. A reporter asks people leaving a movie theater to take a survey about their television viewing habits.

This is a convenience sample. Because the members of the sample are leaving a movie theater, they may have different television viewing habits than most other members of the population.
4. A psychologist uses a computer program to randomly select names from a list of students at a university. The members of the sample will take a survey about student housing at the university.

This is a random sample. There is most likely no bias in this sample.
5. **Writing** A group of television producers plans to survey 10-year-olds to determine their opinions about a new cartoon. Describe a sampling method that could be used to gather a biased sample in this situation. Then describe a method to gather an unbiased sample. Answers may vary. Sample: In order to gather a biased sample, the producers could stand outside of a toy store and give the survey to the children entering and exiting. To gather an unbiased sample, the producers could randomly select children from elementary schools across the country.
6. **Multiple Choice** A school psychologist sits in a school cafeteria and takes notes on students' behavior while they eat lunch. Which of the following types of studies is the researcher conducting? B

(A) controlled experiment       (B) observational study       (C) survey
7. **Open-Ended** Your classmate is randomly selecting a sample of students at his high school to take a survey. You say that your classmate's sample is biased because it only contains high-school students. In what case might you be wrong?

Answers may vary. Sample: Your classmate's sample is not biased if the survey deals only with issues pertaining to the high school.

## 11-7

**Practice** (continued)

Form K

## Samples and Surveys

Identify and describe the bias in the following survey questions.

8. Isn't summer a much more pleasant season than winter?  
This is a leading question. The question suggests that summer is more pleasant than winter.
9. Are college students better off studying useful subjects such as math or impractical subjects such as art history?  
This is a loaded question. Positive terms are used to describe one option and negative terms are used to describe the other option.
10. Do you believe that this year's class field trip was fun and educational?  
This question combines two issues. Whether or not the field trip was fun and whether or not it was educational are two separate issues.
11. Do you agree that Mrs. Regis's class is more interesting than Mr. Wright's class?  
This is a leading question. The question suggests that Mrs. Regis's class is more interesting than Mr. Wright's class.

Rewrite the following survey questions so that they are no longer biased.

12. Do you prefer the excitement of rock and roll or the tediousness of classical music?  
Answers may vary. Sample: Do you prefer rock and roll or classical music?
13. Would you agree that dogs make better pets than cats?  
Answers may vary. Sample: Which pet would you prefer, a dog or a cat?
14. Do you believe that Mayor Johnson is friendly and effective?  
Answers may vary. Sample: Do you believe that Mayor Johnson is effective?
15. **Writing** A supervisor wants to determine what percent of people in his office building believe it is important to have an Internet connection at home. What sampling method can he use to gather an unbiased sample? What is an example of a survey question that is likely to yield unbiased information?  
He could ask every eighth person leaving the building at the end of the day whether or not he or she believes it is important to have an Internet connection at home; "Do you believe that it is important to have an Internet connection at home?"