Skills Practice

Name _____ Date _____

Taking the PSAT
Measures of Central Tendency

Vocabulary

Complete each sentence with the appropriate term from the box.

distribution	median	measure of central tendency
mean	mode	stem-and-leaf plot

1. For a data set that is arranged in numerical order, the _____ of the data set is either the middle value (when the number of data values is odd) or the average of the two middle values (when the number of data values is even).

2. A _____ is a visual display of data that is organized by digits. Each data value is separated into two parts.

3. The _____ of a data set is the sum of all the values of the data set divided by the number of values in the data set.

4. The number (or numbers) that occurs most often in a data set is the _____.

5. A _____ is the way in which the data are distributed, such as being spread out or clustered together.

6. A _____ is a single value that represents a typical value in a data set.

Problem Set

Complete the stem-and-leaf plot for each data set.

1. Students in a math class received the following scores on a test:

   58, 75, 92, 63, 88, 97, 74, 81, 86, 90

Stem	Leaves	Key: 8|0 =	80 Points
5	8		
6	3		
7	4 5		
8	1 6 8		
9	0 2 7		

2. Sarah received the following scores on her assignments in World History:

   73, 78, 85, 82, 86, 79, 84, 88, 80, 92

Stem	Leaves	Key: 7|1 =
7		
8		
9		

3. Jorge recorded the average high temperature in degrees Fahrenheit each month for one year:

   68, 74, 78, 82, 85, 88, 93, 95, 91, 85, 79, 74

Stem	Leaves	Key: 8|6 =
6		
7		
8		
9		

4. A store tracked the number of customers who visited the store each day for two weeks:

45, 67, 58, 72, 79, 54, 62, 49, 53, 41, 64, 58, 62, 47

Stem	Leaves	Key: 5|6 = [ ]
4	[ ]	
5	[ ]	
6	[ ]	
7	[ ]	

Each stem-and-leaf plot has been rotated 90 degrees in a counterclockwise direction so that the leaves go up instead of to the right. Determine whether each data set is skewed left, skewed right, or symmetric.

5. Key: 1\|2 = 12

```
      6         8
      3   2   4
  4   3   1   2   6
 ─────────────────────
  0   1   2   3   4
```

The data set has a symmetric distribution.

6. Key: 1\|2 = 12

```
  8                   7
  4           6       5
  3   8   3   7   4
  1   4   3   5   2
 ─────────────────────
  0   1   2   3   4
```

7. Key: 1\|2 = 12

```
          6
  7   3   5   9
  2   1   4   2   5
 ─────────────────────
  2   3   4   5   6
```

8. Key: 1|2 = 12

7				
4	8		7	
1	4	6	4	
1	2	3	2	2
2	3	4	5	6

9. Key: 1|2 = 12

			8	
	9		7	9
	8	5	5	6
1	4	5	3	1
4	5	6	7	8

10. Key: 1|2 = 12

			6	
		8	4	
		8	4	7
5	9	4	3	2
4	5	6	7	8

Determine the mean of each data set. Round to the nearest tenth, if necessary.

11. A biologist recorded the number of birds that visited a pond each day for ten days:

37, 24, 16, 32, 19, 22, 19, 28, 21, 30

Mean: (37 + 24 + 16 + 32 + 19 + 22 + 19 + 28 + 21 + 30) ÷ 10
= 248 ÷ 10 = 24.8

The mean is 24.8 birds.

12. A park ranger recorded the number of visitors to the park each day for ten days:

102, 43, 37, 56, 64, 82, 114, 98, 52, 48

8

13. Sara recorded the number of miles she ran each day for one week:

10, 8, 7, 9, 6, 12, 8

14. Dmitri kept track of the amount he spent on food each week for eight weeks:

$16, $7, $25, $13, $11, $18, $14, $9

Determine the median of each data set.

15. A meteorologist recorded the amount of precipitation in inches each month for one year:

3, 5, 2, 6, 8, 9, 7, 4, 6, 4, 6, 3

Arrange the numbers in order: 2, 3, 3, 4, 4, 5, 6, 6, 6, 7, 8, 9

Because there is an even number of values in the data set, take the average of the two middle values: (5 + 6) ÷ 2 = 11 ÷ 2 = 5.5

The median is 5.5 inches of precipitation.

16. Keisha recorded the number of meteors she saw each month for one year:

15, 0, 0, 24, 10, 0, 2, 13, 0, 6, 9, 19

17. Brendan recorded the number of kilometers he biked each day for one week:

20, 15, 62, 34, 20, 27, 31

18. Deepa recorded the number of minutes she spent practicing the trumpet each day for one week:

34, 45, 38, 24, 47, 42, 35

Determine the mode of each data set.

19. A teacher recorded the number of students who attended class each day for ten days:

31, 29, 28, 31, 27, 29, 30, 29, 28, 31

The values 29 and 31 each occur 3 times in the data set, so the modes are 29 students and 31 students.

Name _____   Date _____

20. A weather station recorded the number of storms each month for one year:

2, 1, 4, 3, 5, 5, 3, 6, 3, 1, 2, 1

21. A clinic recorded the number of patients who came to the clinic each day for ten days:

25, 21, 32, 25, 44, 22, 27, 36, 21, 25

22. A student tracked the number of minutes he spent online each day:

86, 42, 51, 32, 51, 63, 63, 24, 51, 45

Each stem-and-leaf plot has been rotated 90 degrees in a counterclockwise direction so that the leaves go up instead of to the right. Use the shape of the given distribution to determine which is greater—the median or the mean. Explain.

23. Key: 7|0 = 70

```
                    9
            8    5
            7    4    7
    5       1    2    4
    1   2   3   4   5
```
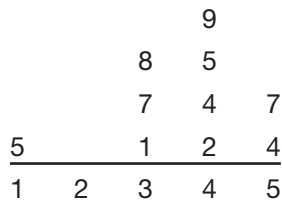
The distribution is skewed left. So, the median is greater than the mean.

24. Key: 7|0 = 70

			7	
			7	8
	9	5	4	3
6	2	3	3	1
1	2	3	4	5

25. Key: 7|0 = 70

8				
4	7			
3	5		6	
1	3	2	2	1
1	2	3	4	5

26. Key: 7|0 = 70

9	8			
7	6	5	3	
4	5	4	1	6
1	2	3	4	5

Skills Practice

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8

How Many People?
Population Data and Samples

Vocabulary

Define each term in your own words.

1. sample

2. absolute deviation

3. average absolute deviation

Problem Set

Calculate the mean of the sample described.

1. Use the first column of the data as a sample. What is the mean of the sample?

47	30	61	88	10
28	8	47	90	43
11	62	5	46	93
63	64	72	6	79
86	95	71	59	97
62	76	52	37	81
52	24	86	16	30
35	18	19	20	20
56	40	89	13	40
15	82	93	70	73

Mean = (47 + 28 + 11 + 63 + 86 + 62 + 52 + 35 + 56 + 15) ÷ 10
     = 455 ÷ 10 = 45.5

The mean of the sample is 45.5.

2. Use the fourth column of the data as a sample. What is the mean of the sample?

98	69	13	16	83
49	24	94	78	29
54	43	9	6	36
100	89	68	43	16
68	57	86	66	95
7	28	18	91	17
78	28	25	10	28
13	5	37	95	22
30	31	78	35	45
8	35	5	88	27

3. Use the third column of the data as a sample. What is the mean of the sample?

77	53	98	14	96
20	18	27	67	94
24	54	69	92	60
7	32	16	64	41
66	67	60	22	86
72	1	36	20	13
19	15	77	88	14
21	72	54	26	40
55	27	99	54	86
35	18	60	51	93

4. Use the second column of the data as a sample. What is the mean of the sample?

92	19	6	61	87
91	7	18	74	18
55	32	22	45	60
74	18	66	46	12
50	18	20	62	74
14	42	93	66	92
29	19	2	17	37
83	28	9	24	21
41	49	87	89	30
71	27	91	72	83

Calculate the median and quartiles of the given sample of data.

5. A survey tracked the age of each customer at a store. Ten values were picked at random for a sample:

12, 55, 58, 64, 34, 74, 49, 57, 34, 13

First, arrange the values in order:

12, 13, 34, 34, 49, 55, 57, 58, 64, 74

Median = (49 + 55) ÷ 2 = 104 ÷ 2 = 52

The median is 52 years.

The first quartile is 34 years.

The third quartile is 58 years.

6. A survey asked the age of each resident in a town. Ten values were picked at random for a sample:

   13, 54, 8, 31, 95, 74, 75, 50, 34, 72

8

7. A store recorded the amount that each customer spends. Ten values were picked at random for a sample:

   $76, $75, $67, $36, $80, $45, $95, $40, $86, $70

8. Meteorologists recorded the average yearly snowfall in inches for cities across the country. Ten values were picked at random for a sample:

28, 79, 45, 98, 25, 48, 15, 49, 40, 22

Construct a box-and-whisker plot of each data set.

9. 25, 40, 22, 42, 92, 43, 86, 88, 42, 92

First, arrange the values in order:
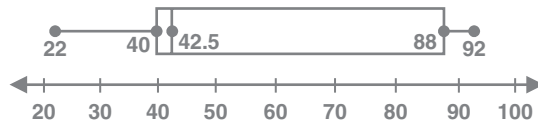
22, 25, 40, 42, 42, 43, 86, 88, 92, 92

Median = (42 + 43) ÷ 2 = 85 ÷ 2 = 42.5

The median is 42.5.

The first quartile is 40.

The third quartile is 88.

10. 26, 36, 98, 59, 43, 53, 85, 97, 60, 46

11. 39, 31, 25, 74, 66, 57, 33, 92, 21, 91

12. 38, 95, 33, 68, 36, 79, 46, 99, 93, 29

Use the box-and-whisker plots to answer each question about samples.

13. The box-and-whisker plots for two samples are shown.
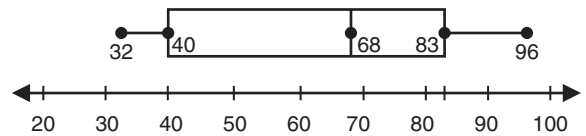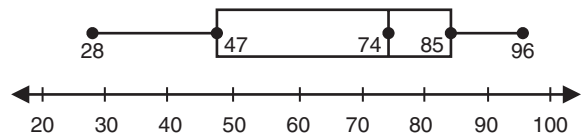
Sample 1:

Sample 2:

Which sample has a greater median?

Sample 2 has a greater median.

14. The box-and-whisker plots for two samples are shown.

Sample 3:

Sample 4:

Which sample has a greater median?

15. The box-and-whisker plots for two samples are shown.
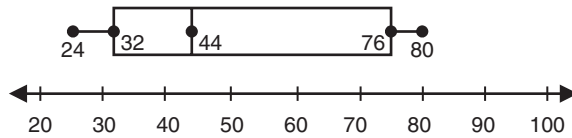
Sample 1:

Sample 2:

In which sample is the distance between
the first quartile and the third
quartile greater?

Name _____ Date _____

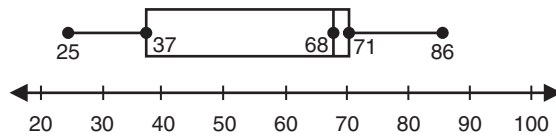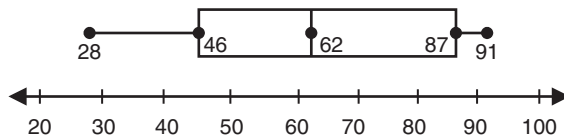**16.** The box-and-whisker plots for two samples are shown.

Sample 3:

23   36   48   67   84

20   30   40   50   60   70   80   90   100
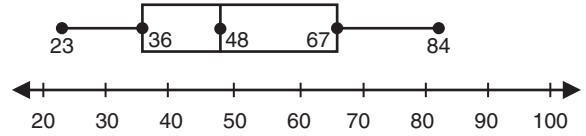
Sample 4:

In which sample is the distance between the first quartile and the third quartile greater?
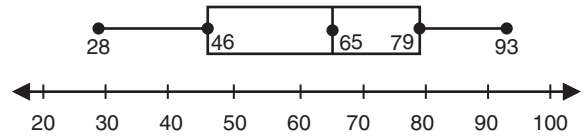
28   46   65   79   93

20   30   40   50   60   70   80   90   100

Complete the table by calculating the absolute deviation from the mean for each sample of data. Round your answer to the nearest tenth, if necessary.

17.

Minutes Spent Practicing Piano					
Value	48	32	30	34	32
Absolute deviation from the mean	$\|48 - 35.2\|$ = 12.8	$\|32 - 35.2\|$ = 3.2	$\|30 - 35.2\|$ = 5.2	$\|34 - 35.2\|$ = 1.2	$\|32 - 35.2\|$ = 3.2

Mean = (48 + 32 + 30 + 34 + 32) ÷ 5 = 176 ÷ 5 = 35.2 minutes

18.

Number of Geese Spotted					
Value	19	29	35	16	38
Absolute deviation from the mean					

19.

Grade Point Average					
Value	2.5	4.2	3.5	3.8	2.8
Absolute deviation from the mean					

20.

Inches of Rainfall per Month, April–August					
Value	4.4	2.6	3.5	5.6	5.8
Absolute deviation from the mean					

Complete the table by calculating the absolute deviation from the median for each sample of data.

21.

Days with Precipitation, October–February					
Value	10	9	4	5	9
Absolute deviation from the median	$\|10-9\|$ $=1$	$\|9-9\|$ $=0$	$\|4-9\|$ $=5$	$\|5-9\|$ $=4$	$\|9-9\|$ $=0$

Values in order: 4, 5, 9, 9, 10

Median = 9 days

22.

Minutes Spent Doing Mathematics Homework					
Value	38	39	29	31	40
Absolute deviation from the median					

23.

Number of Emails Sent					
Value	9	7	2	6	14
Absolute deviation from the median					

24.

Number of Customers					
Value	25	37	50	46	44
Absolute deviation from the median					

8

Calculate the average absolute deviation from the mean for each sample of data. Round your answer to the nearest tenth, if necessary.

25.

Age of Customers; Mean = 38.2					
Value	24	54	19	64	30
Absolute deviation from the mean	14.2	15.8	19.2	25.8	8.2

Average absolute deviation from the mean:

(14.2 + 15.8 + 19.2 + 25.8 + 8.2) ÷ 5 = 83.2 ÷ 5 ≈ 16.6

The average absolute deviation from the mean is 16.6.

26.

Number of Campsites Filled; Mean = 34.4					
Value	8	19	79	61	5
Absolute deviation from the mean	26.4	15.4	44.6	26.6	29.4

27.

Deer Spotted; Mean = 49					
Value	51	59	68	25	42
Absolute deviation from the mean	2	10	19	24	7

28.

Cans Recycled; Mean = 60.2					
Value	54	65	54	80	48
Absolute deviation from the mean	6.2	4.8	6.2	19.8	12.2

Calculate the average absolute deviation from the median for each sample of data. Round your answer to the nearest tenth, if necessary.

29.

Text Messages Sent per Week					
Value	53	73	78	49	113
Absolute deviation from the median	20	0	5	24	40

Average absolute deviation from the median:

(20 + 0 + 5 + 24 + 40) ÷ 5 = 89 ÷ 5 = 17.8

The average absolute deviation from the median is 17.8.

30.

Minutes Spent Online					
Value	90	84	33	11	85
Absolute deviation from the median	6	0	51	73	1

31.

Vehicles on the Ferry					
Value	91	87	130	70	75
Absolute deviation from the median	4	0	43	17	12

32.

Museum Visitors					
Value	114	99	86	122	95
Absolute deviation from the median	15	0	13	23	4

Skills Practice

Name _____ Date _____

Let's Compare!
Population and Sample Means

Vocabulary

Match each definition to its corresponding term.

1. a number that is generated at random   **a.** outlier

2. a non-representative data value   **b.** random sample

3. a sample that is created by selecting data values randomly   **c.** random number

Problem Set

Identify the data values in the sample described.

1. What sample would result from choosing the first and last columns of the data set?

42	21	9	26	30
26	29	32	49	10
39	47	42	48	25
42	46	29	44	28
9	47	5	33	14
47	3	15	21	34
22	11	25	44	5
50	7	1	3	29
15	42	17	41	18
24	19	26	31	48

The sample would consist of the following values:

42, 26, 39, 42, 9, 47, 22, 50, 15, 24, 30, 10, 25, 28, 14, 34, 5, 29, 18, 48

2. What sample would result from choosing the even-numbered columns of the data set?

34	48	24	4	12
5	4	34	49	39
30	12	41	9	12
49	9	40	47	49
27	36	4	49	7
47	30	49	36	43
3	5	31	17	17
2	26	50	40	28
12	34	45	41	22
37	47	38	12	22

3. What sample would result from choosing the rows from the data set that are multiples of three?

36	24	44	4	36
17	17	19	47	24
38	7	27	22	18
16	15	19	3	15
36	30	4	36	17
21	17	23	30	12
22	44	32	39	16
44	9	22	1	19
13	23	45	7	16
34	29	17	5	14

4. What sample would result from choosing the rows from the data set that are multiples of five?

16	17	28	14	33
17	42	46	19	18
2	35	20	36	42
47	7	19	24	36
31	14	33	31	18
17	47	7	48	5
15	33	14	2	40
43	24	30	38	46
20	31	11	20	6
24	43	39	12	30

Determine the mean of the given sample of data.

5. 48, 33, 22, 40, 8, 7, 46, 32, 8, 15

(48 + 33 + 22 + 40 + 8 + 7 + 46 + 32 + 8 + 15) ÷ 10 = 259 ÷ 10 = 25.9

The mean of the sample is 25.9.

6. 41, 11, 10, 7, 22, 48, 27, 43, 29, 5

7. 21, 56, 22, 38, 89, 38, 66, 8, 51, 36

8. 94, 94, 94, 39, 60, 47, 80, 87, 27, 11

9. 373, 260, 144, 14, 441, 438, 470, 1, 448, 171

10. 300, 276, 67, 389, 302, 164, 350, 376, 404, 49

11. 215, 851, 367, 249, 841, 744, 100, 969, 862, 903

12. 657, 428, 905, 410, 244, 726, 21, 205, 73, 702

Answer each question about samples.

13. How is the mean of a random sample affected if the sample includes a very low outlier?

Including a very low outlier could make the mean of the random sample less than the mean of the population.

14. How is the mean of a random sample affected if the sample includes a very high outlier?

15. Would you expect the mean and median to be constant for different random samples?

16. What is the advantage of using a random sample?

Use your calculator to generate four random whole numbers within the given interval.

17. [0, 10]

Answers will vary. All numbers should be within the given interval.

18. [10, 20]

19. [15, 24]

20. [8, 36]

Name _____   Date _____

Given the data set and criterion for selecting a random sample, determine the mean and median of each sample. Round your answer to the nearest tenth, if necessary.

21. A principal wants to take a random sample of students' GPAs. Each GPA is assigned a random number. Calculate the mean and median of the sample of GPAs that has the assigned random numbers that are between (and including) 1 and 10.

Random Number	GPA	Random Number	GPA	Random Number	GPA
7	2.0	21	3.1	24	1.1
4	2.2	8	3.8	20	1.2
23	2.7	26	4.0	25	3.0
10	1.9	19	3.4	15	3.0
18	2.6	17	3.5	3	3.5
27	3.5	28	3.5	22	2.6
39	3.9	2	3.1	14	4.0
30	2.8	16	3.5	9	2.1
12	2.3	13	3.5	6	2.3
5	2.7	1	4.0	11	3.8

The sample consists of these values:

4.0, 3.1, 3.5, 2.2, 2.7, 2.3, 2.0, 3.8, 2.1, 1.9

Mean: (4.0 + 3.1 + 3.5 + 2.2 + 2.7 + 2.3 + 2.0 + 3.8 + 2.1 + 1.9) ÷ 10
= 27.6 ÷ 10 ≈ 2.8

The mean GPA is 2.8.

Sample in numerical order: 1.9, 2.0, 2.1, 2.2, 2.3, 2.7, 3.1, 3.5, 3.8, 4.0

Median: (2.3 + 2.7) ÷ 2 = 5 ÷ 2 = 2.5

The median GPA is 2.5.

22. A meteorologist records the amount of the snowfall in inches in different cities during December. He wants to take a random sample of the data set. Each city is assigned a random number. Find the mean and median of the snowfall in the sample of cities that has the assigned random numbers that are between (and including) 11 and 20.

Random Number	Snowfall	Random Number	Snowfall	Random Number	Snowfall
7	8.1	9	7.0	5	0.1
29	9.3	10	5.1	30	2.3
26	6.1	6	0.1	15	4.0
17	3.6	4	5.1	21	2.7
14	10.1	18	2.6	22	8.0
23	4.3	13	2.3	19	3.4
3	9.6	1	1.2	8	1.6
12	6.4	2	3.4	20	8.4
11	1.9	24	2.1	28	1.3
27	10.2	16	8.4	25	8.5

Name _____   Date _____

23. A biologist records the average number of fish caught per day in different lakes. She wants
to take a random sample of the data. Each day is assigned a random number. Calculate
the mean and median of the number of fish caught for the sample of days that has the
assigned random numbers that are between (and including) 1 and 9.

Random Number	Fish Caught	Random Number	Fish Caught	Random Number	Fish Caught
5	17	12	90	26	4
29	23	1	72	15	30
8	70	7	73	27	67
20	18	22	57	10	59
13	34	11	53	21	59
3	89	17	13	9	16
24	22	4	55	6	73
19	87	25	9	16	84
14	21	18	33	2	98
30	50	28	68	23	17

24. Students divide a field into 1-square-meter areas and record the number of insects in each area. They want to take a random sample of the data. Each area is assigned a random number. Calculate the mean and median of the insects in the sample of areas that has the assigned random numbers that are between (and including) 11 and 19.

Random Number	Insects	Random Number	Insects	Random Number	Insects
28	4	30	32	29	54
25	19	2	48	14	15
24	52	3	12	1	7
21	16	4	46	9	29
17	8	15	60	26	21
11	6	13	39	5	8
10	38	27	13	12	1
8	47	16	57	22	49
18	2	6	32	19	22
23	2	20	59	7	39

Skills Practice

8

Name _____ Date _____

An Experiment of Your Own
Collecting and Analyzing Sample Data

Vocabulary

Describe similarities and differences between each pair of terms.

   1. population and sample

   2. mean and median

Problem Set

8

Calculate the mean of the sample described. Round your answer to the nearest tenth, if necessary.

1. Use the first column as your sample.

21	34	49	49	28
2	0	57	37	40
37	3	20	7	33
14	10	24	43	37
22	4	20	60	15
4	27	27	43	50
32	3	18	25	12
59	17	12	39	20

Sample: 21, 2, 37, 14, 22, 4, 32, 59

Mean: (21 + 2 + 37 + 14 + 22 + 4 + 32 + 59) ÷ 8 = 191 ÷ 8 ≈ 23.9

The mean of the sample is 23.9.

2. Use the second column as your sample.

12	23	37	40	37
20	36	15	50	0
10	9	48	18	6
21	29	21	52	13
30	38	13	31	55
54	54	41	46	38
16	47	9	39	22
35	37	12	50	7

8

3. Use the third column as your sample.

6	46	1	26	5
28	5	6	59	14
55	60	2	11	7
15	23	14	18	36
0	3	27	16	38
51	9	14	21	59
8	32	43	15	3
59	34	30	26	17

4. Use the fourth column as your sample.

41	52	19	48	48
45	25	45	3	4
22	53	57	20	5
34	53	19	12	38
48	30	39	49	49
25	48	56	49	48
36	11	30	12	10
12	34	46	46	19

5. Use the fifth column as your sample.

1	4	36	26	30
6	19	4	32	8
40	29	30	14	34
16	19	25	11	18
19	8	16	10	7
32	24	38	3	16
16	36	11	33	7

6. Use the third column as your sample.

28	36	33	20	19
27	40	32	11	15
15	2	36	28	29
26	24	21	16	35
11	17	32	3	8
39	21	23	19	10
31	2	36	15	18

7. Use the second column as your sample.

29	32	60	74	17
42	14	58	25	22
17	57	12	4	53
26	63	20	11	73
57	65	49	55	23
28	75	4	21	75
63	57	65	28	66

8. Use the third column as your sample.

26	58	48	70	80
45	6	34	50	70
49	56	56	34	40
15	54	77	14	56
29	75	46	66	63
63	70	56	53	29
78	16	80	41	11

9. Use the first column as your sample.

168	170	153	135	130
30	182	32	107	121
152	114	117	194	139
156	140	153	101	94
146	173	128	127	175
138	119	5	42	165
24	63	66	101	154

10. Use the fourth column as your sample.

69	153	193	34	63
44	191	32	137	45
52	93	131	166	57
180	166	188	41	86
189	171	139	21	184
157	10	23	194	192
62	4	98	90	158

Use the given information to answer each question.

11. A biology class collects data each day for several weeks on the wildlife found in the school forest. In a sample of the data, the mean number of raccoons reported per day was 10.4. What should students expect the mean number of raccoons reported per day in the entire population to be?

If the sample is representative, the mean for the entire population will be about 10.4 raccoons per day. (But it might be different, depending on the sample.)

12. An economics class records how much each student spends per day for several months. In a sample of the data, the median value was $4. What should students expect the median value of the entire population to be?

13. Teachers at a high school recorded students' absences each year. In a sample, the median number of absences was 4. If the size of the entire student body is 486, about how many students would you expect to have 4 or fewer absences?

14. Guidance counselors recorded students' SAT scores. In a sample, the median score was 450. If the size of the population is 2562, about how many students would you expect to score 450 or above?

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