Students Enrolled in Probability and Statistics for the 2020-2021 School Year
Summer Packet

Name:

This packet is to help you review various topics that are considered to be prerequisite knowledge upon entering Probability and Statistics. In order to ensure that the good skills you developed in previous math courses do not disappear, working on this packet is highly recommended over the summer. A good habit would be to do at least one math problem every day. Enjoy your summer, but be sure to come prepared with the necessary knowledge to continue into Probability and Statistics next year. These skills and topics will be assessed in the fall.

Name _____ Class _____ Date _____

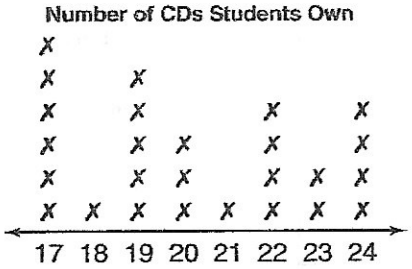
Frequency Tables, Line Plots, and Histograms

Aimee asked students in her grade how many CDs they own. She displayed her data in a **frequency table**. Each tally stands for 1 CD.

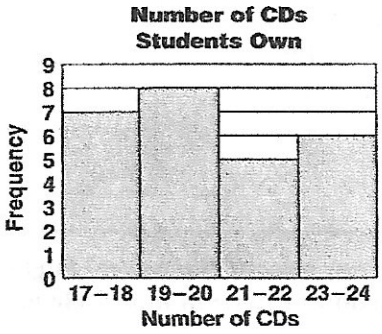
Students' CD Collections

Number of CDs	17	18	19	20	21	22	23	24
Tally	𝍸 |	|	𝍸	|||	|	||||	||	||||
Frequency	6	1	5	3	1	4	2	4

She displayed the same data in a **line plot**. Each ✗ stands for 1 CD.



She also made a **histogram** to show the frequencies. The bars represent intervals of equal size. The height of each bar gives the frequency of the data.



Use the frequency table for Exercises 1–3.

1. Ms. Ortiz's class is planning a school garden. She asked her students how many rose bushes they want in the garden. She recorded the data in a frequency table. Complete the table.
2. Use the frequency table to make a line plot for the data.
3. Draw a histogram of the students' data.

Number of Rose Bushes	1	2	3	4	5	6
Tally	|	||||	|||	𝍸	|	|
Frequency						

Name _____ Class _____ Date _____

Circle Graphs

The class took a survey of favorite foods.
The results are shown in the table and the circle graph.

To make a circle graph:

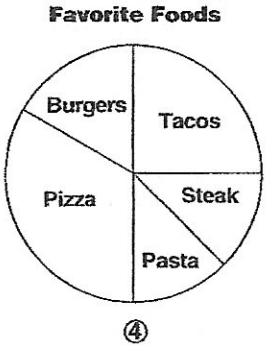
① Find the total number of votes.

② Find each part of the total as a fraction or percent.

③ Find the measure of each central angle in the circle graph.

④ Draw, label, and title the graph.

Food	Votes	② Fraction	%	③ Degrees
Burgers	8	$\frac{8}{48} = \frac{1}{6}$	$16\frac{2}{3}\%$	60°
Pizza	16	$\frac{1}{3}$	$33\frac{1}{3}\%$	120°
Steak	6	$\frac{1}{8}$	$12\frac{1}{2}\%$	45°
Tacos	12	$\frac{1}{4}$	25%	90°
Pasta	6	$\frac{1}{8}$	$12\frac{1}{2}\%$	45°
Total	① 48			360°



④

Find the measure of the central angle that represents each fraction or percent in a circle graph.

1. $\frac{1}{5}$ _____ 2. 40% _____ 3. $\frac{1}{2}$ _____ 4. 5% _____

5. 35% _____ 6. $\frac{1}{10}$ _____ 7. 20% _____ 8. $\frac{1}{12}$ _____

Display the data in each table in a circle graph.

9. a monthly family budget

Monthly Family Budget	
Item	Amount
Rent	$425
Food	$150
Clothes	$50
Gas	$75
Phone	$25
Misc.	$100

10. number of children per family

Children per Family	
Children	Families
0	4
1	15
2	20
3	13
4	5
5	3

Name _____ Class _____ Date _____

Stem-and-Leaf Plots

A **stem-and-leaf** plot is an easy way to show data arranged in order.

8th Grade 100-M Dash
(Times to Nearest 0.1 s)

13.1	16.2	15.5	15.2	13.5
15.3	14.8	14.4	17.5	12.2
14.1	16.1	16.9	15.3	16.8
16.0	15.3	12.0	18.2	14.6
13.2	18.3	16.6	15.3	18.8

① Choose *stems*. The times range from 12.0 to 18.8. Choose 12 to 18 as stems.

② List the tenths digits as *leaves*.

18	2 3 8
17	5
16	0 1 2 6 8 9
15	2 3 3 3 3 5
14	1 4 6 8
13	1 2 5
12	0 2

③ Make a key to explain what each stem and leaf represents.

18 | 2 means 18.2

The **mode** is the most frequent number.
The mode is 15.3 seconds.

The **range** is the greatest number minus the least number.
The range is 18.8 − 12.0 = 6.8 seconds.

The **median** is the middle number or average of the middle two numbers. The median is 15.3 seconds.

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1. Complete the stem-and-leaf plot for the data.

8th Grade 200-M Dash
(Times to Nearest 0.1 s)

32.5	32.1	38.5	31.7	34.7
29.3	35.2	34.4	30.2	35.3
34.7	31.9	36.0	32.2	36.7
32.2	31.4	34.7	29.5	36.9
36.4	33.4	38.6	34.7	37.3

Times for the 200-M Dash

38	_____
37	_____
36	_____
35	_____
34	_____
33	_____
32	_____
31	_____
30	_____
29	_____

Use your stem-and-leaf plot for Exercises 2–5.

2. The mode is _____.
3. The range is _____.
4. The median is _____.
5. How many 8th grade students finished the race in less than 35 s?

_____

Name _____ Class _____ Date _____

Box-and-Whisker Plots

Make a box-and-whisker plot for the data set.

Percent of Federally Owned Land in Ten Western States				
45%	24%	52%	61%	28%
42%	34%	48%	63%	36%

Step 1: First list the data in order from least to greatest. Find the median.

24 28 34 36 42 | 45 48 52 61 63

Since there is an even number of percents (10), there are two middle numbers. Add them and divide by 2.

$\frac{42 + 45}{2} = \frac{87}{2} = 43.5$ The median is 43.5.

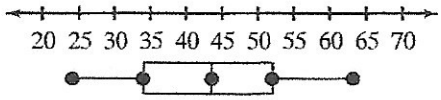
Step 2: Find the upper and lower quartiles.

The lower quartile is the median of the lower half. 24 28 [34] 36 42
The lower quartile is 34.

The upper quartile is the median of the upper half. 45 48 [52] 61 63
The upper quartile is 52.

Step 3: Draw a number line. Mark the least and greatest values, the median, and the quartiles. Draw a box from the first to the third quartiles. Draw whiskers from the least and greatest values to the box.

The data range from 24 to 63. A scale of 5 from 20 to 70 would have 11 marks.



Make a box-and-whisker plot for each data set.

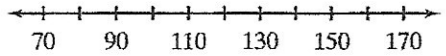
1. area in 1,000 mi^2 of 13 western states

122	164	71	98	84	147	114
111	98	85	104	71	77	

median: _____

lower quartile: _____

upper quartile: _____



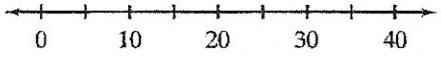
2. percent of area that is inland water for 11 northeastern states

13%	4%	26%	4%	32%	13%	
15%	3%	21%	7%	21%		

median: _____

lower quartile: _____

upper quartile: _____



Name _____ Class _____ Date _____

Scatter Plots and Trends

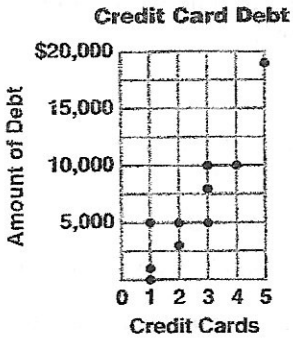
Gilbert is investigating the relationship between the number of credit cards a person has and the amount of credit card debt.

First, he made a table of his data.

Credit Cards and Credit Card Debt

Number of Cards	Amount of Debt
1	$0
1	$1,000
1	$5,000
2	$3,000
2	$5,000
3	$10,000
3	$5,000
3	$8,000
4	$10,000
5	$19,000

Then he plotted the data in a scatter plot.



Gilbert's scatter plot shows a **positive trend** in the data. That means as the number of credit cards goes up so does the amount of debt. As one value goes up, so does the other.

In a **negative trend,** one value goes up while the other goes down.

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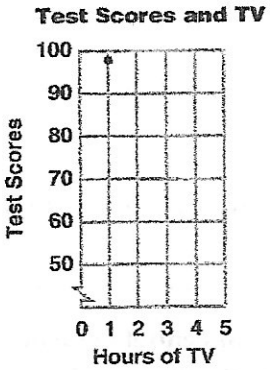
1. Dana surveyed her friends about how much TV they watch and their average test scores. Her results are shown below. Complete the scatter plot for the data.

Test Scores and TV

TV Hours Per Day	Average Test Score	TV Hours Per Day	Average Test Score
1	98	3	79
1	86	3	73
2	90	3	75
2	82	4	62
2	85	5	68



2. Is the trend in the data negative or positive? Explain.

_____

3. Describe the relationship Dana likely found between test scores and TV time.

_____

Name _____ Class _____ Date _____

Measures of Central Tendency

The **median** of this set of data is the middle value when the scores are ordered.

23 25 25 26 26 **26** **26** 26 27 27 28 29

Since there are two middle scores, add them and divide by 2.

$$\frac{26 + 26}{2} = 26$$

Number of Pages Read by Members of the Science Fiction Book Club

25	26	28	25
26	27	27	26
26	29	26	23

The **mean** is the sum of the scores divided by the number of scores.

$$25 + 26 + 28 + 25 + 26 + 27 + 27 + 26 + 26 + 29 + 26 + 23 = 314$$

$$\frac{314}{12} = 26.166667, \text{ or about } 26.2 \text{ pages}$$

The **mode** is the score that occurs the most.
The mode is 26 pages.

Choose a calculator, pencil and paper, or mental math. Find the mean, median, and mode of each set of data.

1. movies seen: 3 3 1 4 0 4 2 5 7 4 1 2

   _____

2. miles hiked: 5 10 9 12 8 4 5 7 5 13 11

   _____

3. runs scored: 0 0 8 4 15 9 1 1 6 7 10 2

   _____

4. costs of a ride:
   $3.25 $2.50 $4.00 $4.00 $3.50 $2.00 $4.00 $3.00 $2.50
   $3.00 $4.00

   _____

Name the measure of central tendency you would report to your parents. Give your reason.

5. test scores: 89 84 79 80 81 55

   _____

   _____

6. friends' allowances: $10 $15 $12 $15 $8

   _____

   _____

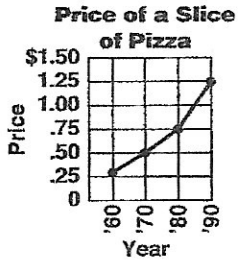
Name _____ Class _____ Date _____

Misleading Graphs

Data can be displayed on graphs in ways that are misleading.

The horizontal scales make these graphs seem different.

As the numbers are moved farther apart, it appears that the change over time is less.



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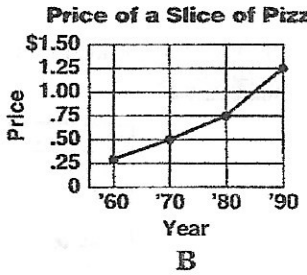
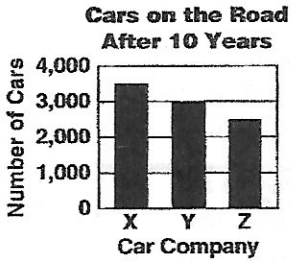


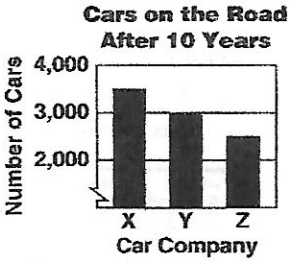
B

These graphs may seem different because of how the vertical scales are drawn.

The break in the vertical scale makes the differences seem greater than they really are.



C



D

Use the graphs above to answer Exercises 1–6.

1. Which graph might be used to convince someone that the price of pizza has risen too quickly over the years?

   _____

2. Which graph might be used to convince someone that pizza makers should raise their prices?

   _____

3. Name 2 ways in which the pizza graphs differ.

   _____

   _____

4. Which graph would Car Company X use to show that its cars last longer than the competition?

   _____

5. Which graph of cars still on the road after 10 years would Car Company Z prefer?

   _____

6. Name 2 ways in which graphs C and D differ.

   _____

   _____

TI-83/TI-83 Plus Procedure 21: *Calculating Statistics*

Example

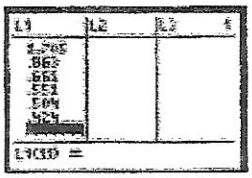
Enter the data from the table at the right. Find the mean, median, standard deviation, and the first and third quartiles.

The 10 Most America-Loving Countries

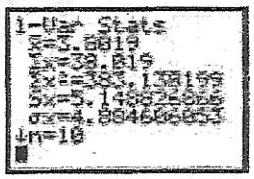
Country	Tourists (in millions)
Canada	15.0
Mexico	11.325
Japan	4.065
Britain	2.921
Germany	1.705
France	0.863
Brazil	0.661
Italy	0.551
South Korea	0.504
Venezuela	0.424

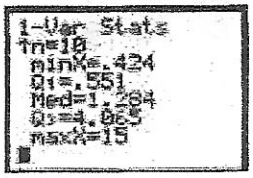
Source: *Time Magazine*

STEP 1: Enter the tourist data into list L1 by pressing STAT ENTER.



STEP 2: View the statistics for the tourists visiting the United States by pressing STAT ▶ 1 ENTER. Press ▼ five times to scroll to the bottom of the statistics.





Note: By default the TI-83/TI-83 Plus looks for data in L1. If the data is stored elsewhere, the list name must follow 'L-VAR Stats'.

STATISTICS: The following table identifies the statistical symbols.

$\bar{x}$:	mean of entries	Sx:	sample standard deviation	Q1:	first quartile of entries
Σx:	sum of entries	σx:	population standard deviation	Med:	median of entries
Σx^2	sum of the squares of entries	n:	total number of entries	Q3:	third quartile of entries
		minX:	smallest entry	maxX:	largest entry

Exercises

Enter the data. Find the mean, median, standard deviation, and the first and third quartiles.

1. **State Gasoline Taxes in 1992 (¢/gal)**

State	AK	AR	CO	DE	FL	HI	IL	IA	KY	ME	MA	MN
Tax	8	18.5	22	19	4	16	19	20	15	19	21	20
State	MO	NE	NH	NM	NC	OH	OR	RI	SD	TX	VT	WA
Tax	13	23.7	18	16	22.3	21	22	23	18	20	15	23

Source: *The Universal Almanac 1996*