

Teacher Quick Sheet (Procedures) - Using Statistics to Uncover More Evidence

Detective _____

1. Review graphs and diary entries.
2. Complete the Printable Version of the Student Web Lesson All That Data, Tool!
3. Discuss answers, agree on the most popular, and then check on Web lesson.
4. Review how to use data displays to interpret results from a survey. What is the relationship between stem-and-leaf plots, range, and measures of central tendency?
 - The range of a set of data tells us the distance, or area, covered from low value to high value.
 - The mean allows us to summarize all the data with one number known also as the average.
 - The mode is the item or value listed most often in a set of data.
5. Go back to your groups from lesson #2 "Observing the Evidence." Review your results from the representative sample from the survey. Based on the data collected, identify the range and measures of central tendency from your section of the representative sample. This information should be labeled on the data displays create din the lesson "Looking for More Clues" (#3) and stored in you Diary as entry #6.
6. Detective Diary Enter #7: Following Mike and Marie's example from the Student Web Lesson, use a stem-and-leaf plot to display the data of the representative sample collected by the small groups. Identify the range and measures of central tendency of the representative sample. List 2-3 interpretations and/or statement that can be make based on the data displayed.
7. Peer assess your entries.

Developed by Gaynell Jones

Mock Survey Results

Name of student questioned:	How many hours out of 10 should a student spend doing homework in each subject?				Boy or Girl
	Math	English	Science	Social S	
Bobby	4	4	1	1	B
Billy	5	5	0	0	B
David	5	5	1	1	B
Daryl	3	3	3	3	B
Danny	3	3	2	2	B
Derrick	8	3	0	0	B
Gary	2	3	3	2	B
Harry	6	2	1	1	B
Jim	5	3	2	1	B
Kevin	4	4	2	1	B
Cindy	3	5	1	1	G
Candy	3	3	3	3	G
Denna	4	4	1	1	G
Donna	6	2	1	1	G
Delora	5	3	1	1	G
Eileen	4	3	2	1	G
Felicia	4	2	3	2	G
Ginger	3	3	3	1	G
Heather	4	2	2	2	G
Helen	4	2	3	1	G
Kay	4	3	2	2	G
Linda	5	3	2	1	G
Melinda	5	2	2	1	G
Mary	3	4	2	1	G
Mindy	3	3	2	4	G
Norm	9	1	0	0	B
Phillip	3	3	3	1	B
Paul	2	2	3	4	B
Ralph	5	3	2	0	B
Randy	4	2	2	2	B

Teacher Answer Key for Mock Survey Results

Math Boys	Math Girls	English Boys	English Girls
4	3	4	5
5	3	5	3
5	4	5	4
3	6	3	2
3	5	3	3
8	4	3	3
2	4	3	2
6	3	2	3
5	4	3	2
4	4	4	2
9	4	1	3
3	5	3	3
2	5	2	2
5	3	3	4
4	3	2	3

Mean = 4.53
 Median = 6
 Mode = 5
 Range = 7

Mean = 4
 Median = 4
 Mode = 6
 Range = 3

Mean = 3.06
 Median = 3
 Mode = 3
 Range = 4

Mean = 2.93
 Median = 3
 Mode = 3
 Range = 3

Science Boys	Science Girls	Social S. Boys	Social S. Girls
1	1	1	1
3	3	0	3
1	1	1	1
3	1	3	1
2	1	2	1
0	2	0	1
3	3	2	2
1	3	1	1
2	2	1	2
2	3	1	1
0	2	0	2
3	2	1	1
2	2	4	1
2	2	0	1
2	2	2	4

Mean = 1.8
 Median = 2
 Mode = 2
 Range = 3

Mean = 2
 Median = 2
 Mode = 2
 Range = 2

Mean = 1.26
 Median = 1
 Mode = 1
 Range = 4

Mean = 1.33
 Median = 1
 Mode = 1
 Range = 3

Each number represents the number of hours designated by students from the representative sample to complete homework.

Printable Version of the SWL "All That Data, Too!"



"Whew! I'm glad we're finally through analyzing All That Data! Those survey results really *piled up!*" sighed Mike.



"I can't believe we sorted through *mounds of data* just to find ONE fair price!" complained Marie.




"What did you just say, Marie?"
"What?" she asked, confused by Mike's question.

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"You said something about a *heap of data*," continued Mike.

"I SAID we sorted through *mounds of data*," replied Marie.



"Yes, that's it! Marie, I think there's more to learn about *all that data!*"

"What do you mean there's *MORE?*"
asked Marie.

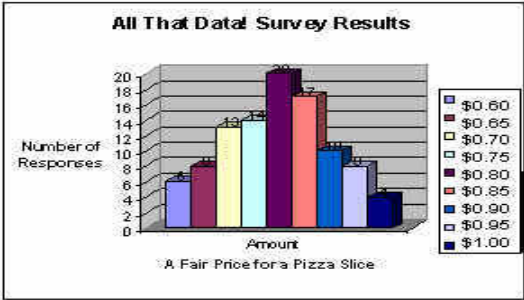
"Come with me and I'll show you," Mike pleaded.
 "Oh no! Here we go again!" moaned Marie.

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"Here, look at this graph."

"Yeah, so, it's the column bar graph you made from the "All That Data!" survey

"I know *that!* But look at the *shape* of the data. Doesn't it remind you of something?"






results.




Done

Type in how you think Marie will describe the shape of the data.


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<p>"Okay, so...what?" questioned Marie.</p>	<p>"Well, I think there may be a <u>pattern</u> in all that data!" continued Mike.</p>
 <p>"A pattern? Oh Mike, I thought you said we were <i>THROUGH!</i>"</p>	<p style="text-align: center;"><i>"Well, we were, but... I just thought of something else. Something that calls for two data detectives!"</i></p> 
<p>"Data WHO?"</p>	<p>Data Detectives! "The dynamic duo of Mike and Marie!" </p>


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<p>"Marie, I think there are clues hidden in our data displays," Mike explained. "Clues waiting to be discovered! To test my theory, we need several <u>column bar graphs</u>."</p>		<p>"Sounds like a plan! Let's get to work," said Mike. Mike needs several bar graphs. Type in what you think he hopes to find.</p> <div data-bbox="1047 913 1380 1081" style="border: 1px solid gray; height: 80px; width: 205px;"></div>
 <p>"We already have one," reminded Marie. "How about I graph the girls' survey results from 'All That Data'? <i>You</i> can graph the boys' results!"</p>		<p>Done </p>

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<div data-bbox="186 1281 641 1512"> <p>Girls' Survey Results</p> <p>A Fair Price for a Pizza Slice</p> </div> <div data-bbox="186 1522 641 1753"> <p>Boys' Survey Results</p> <p>A Fair Price for a Pizza Slice</p> </div>	<p>Describe the shape of the girls' data.</p> <div data-bbox="771 1312 1128 1449" style="border: 1px solid gray; height: 65px; width: 220px;"></div> <p>Done "Okay, here's my graph. Now show me yours!" said Marie.</p> <p>"Well, the boys' graph looks more like a <i>mountain range!</i> Look at all those peaks and valleys!" commented Mike. </p>
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"Mountain Range? *Range!* I wonder if the range has something to do with the shape of the data?"

"I don't know! Let's check the Data Detectives' Dictionary and see what it says about data and graphs!"





Marie read, "Data detectives, also called mathematicians, use three magnifying glasses to search for clues. One is used to find the RANGE of the data! To find the range, they ."



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"Highest and lowest extremes? Does that mean the highest peaks and lowest valleys?" questioned Mike.







"The lowest and highest extremes are the *beginning and ending points of the data.*"


Look at this picture. To reach the top, we start climbing at the *lowest extreme.*"



LOWEST
EXTREME






HIGHEST
EXTREME




"When we come off the mountain, we are at the *highest extreme.* It is called the *highest extreme* because it's the *highest value* listed in the range of data".  | 

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"That makes sense!" said Mike. "We can't have a mountain without a beginning and ending point, and we can't describe data without knowing where it *starts and ends.*"







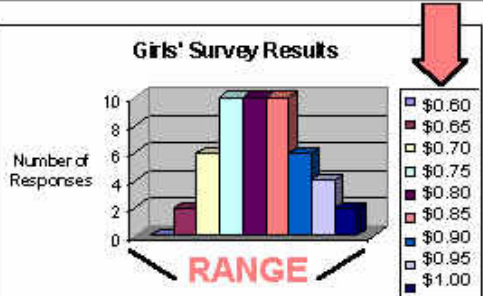
"Look! When I put this magnifying glass over my graph, the range appears!"

The *lowest extreme* is .

The *highest extreme* is .

 | 

Girls' Survey Results



Amount	Number of Responses
\$0.60	1
\$0.65	2
\$0.70	6
\$0.75	10
\$0.80	10
\$0.85	6
\$0.90	4
\$0.95	2
\$1.00	2

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Mike took the dictionary and read about the next magnifying glass.

"After describing the range, mathematicians look for clues at the *center* of the data."



"The *center* of the data?"

"You mean like *the peak* of the mountain?" asked Susan.

"Well, it says here that the center of the data, or where the data peaks, is described by *Three Measures of Central Tendency*." 

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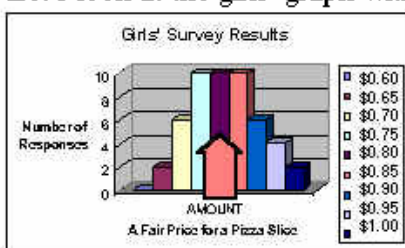
"Three *What?*" exclaimed Marie.

"Three Measures of Central Tendency: *Mean, Median, Mode.*"

"These terms are used to describe where the CENTER of the data TENDS to fall."



"Let's look at the girls' graph with this one," suggested Marie.




"Look, I found that the mean was \$0.81 and the median was \$0.80."

Check the mode of the data.

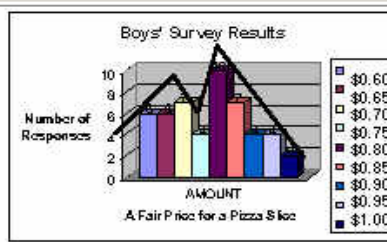
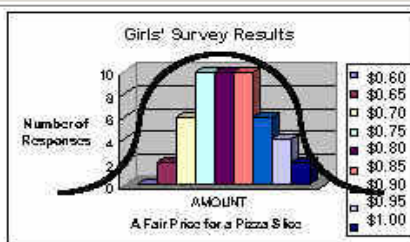
\$0.75 \$0.80 \$0.85



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"The third magnifying glass is used to examine how the data is *distributed*, or *shared*, within the range," Mike continued. 

"In the girls' graph, the data *seemed* to be evenly shared around the center. That's why we had a steady climb and a steady descent," Marie summarized.








"But in the boys' graph, the data went up and down. Look at those peaks and valleys. I wonder what all this means?" commented Mike. 

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 <p>"It says that when data is evenly shared around the center, it is called a normal distribution. So, I guess it means that girls are NORMAL!"</p>	<p>"Give me that book back! It SAYS that a normal distribution is identified by a bell-shaped curve, kind of like our mountain."</p> 
<p>"That's right! The girls' graph was normal, and the boys' graph was abnormal! Now we have mathematical proof that girls are normal and boys are not!</p>	
<p>"I can hardly call that logic mathematical! Now, let's get back to work!"</p>	
<p> "Oh, alright!" consented Marie. "Does the dictionary say anything else?" </p>	

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<p>"Mathematicians look carefully at the data in order to detect:</p>	
 The <u>RANGE</u> of the data,  The <u>MEASURES OF CENTRAL TENDENCY</u> , and  The <u>DISTRIBUTION</u> of the data."	<p>"Through careful inspection, they gather enough information to describe the data for others!" Mike concluded.</p> 
<p>"Our <i>Data Detective Kit</i> is now complete, and I'm ready for our first case!" declared Mike. "Let's look at the "<i>All That Data!</i>" survey results. I know there's a mystery hidden in that mound of data!"</p> <p> I'm Done!</p>	

Page 14 – The End

Long – Answer Question Rubric

	4	3	2	1	0
<p>Explaining & Interpreting your Answer MA.E.1.2.1.5.6 The student analyzes and explains orally or in writing the implications of the data. LA.B.2.2.1.5.1 The student writes notes, comments, and observations that reflect comprehension of fifth-grade or higher level content and experiences from a variety of media.</p>	<p>You explain the implications of the data so clearly and completely that someone else can find the answer in a new situation. The interpretations you give can be inferred from the information.</p>	<p>You explain the implications of the data so that someone else can find the answer. The interpretations you give can be supported by the information.</p>	<p>You may begin to explain the implications of the data, but you do not clearly show how to find the answer. The interpretations you give are not always supported by the information.</p>	<p>Your explanation of the implications of the data is incomplete or flawed. The interpretations you give cannot be supported by the information.</p>	<p>Your explanations and interpretations of the data are incorrect, misunderstood, or not given.</p>
<p>What each level means...</p>	<p>Your work shows a complete understanding of the concepts & critical thinking used in the problem.</p>	<p>Your work shows an essential understanding of the concepts & critical thinking used in the problem.</p>	<p>Your work shows a partial understanding of the concepts & critical thinking used in the problem.</p>	<p>Your work shows a limited understanding of the concepts & critical thinking used in the problem.</p>	<p>Your work shows no understanding of the concepts & critical thinking used in the problem.</p>

FCAT format adapted from Harcourt Brace & Company: The Math Advantage by Kristy Rousseau