Explore/Explain 2: Grams of Fat

Purpose:
Generate equivalent representations of sets of data based on verbal descriptors of the data. Technology tools will be used to create the multiple representations of the data sets.

Descriptor:
Participants will be given descriptive statements about a set of data. Different groups of participants will receive different statements. Each group of participants will create a set of possible data and a graphical representation of the data based on these statements. Participants will also be given a graphical representation of a set of data. They will create a set of possible data and write descriptive statements about the data.

Duration:
2.25 hours

Mathematics TEKS Objectives:
6.10A The student uses statistical representations to analyze data. The student is expected to select and use an appropriate representation for presenting and displaying different graphical representations of the same data including line plot, line graph, bar graph, and stem and leaf plot.

6.10B The student uses statistical representations to analyze data. The student is expected to identify mean (using concrete objects and pictorial models), median, mode, and range of a set of data.

6.10D The student uses statistical representations to analyze data. The student is expected to solve problems by collecting, organizing, displaying, and interpreting data.

6.11A, 7.13A, 8.14A The student applies Grade 6/7/8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics.

6.11D, 7.13D, 8.14D The student applies Grade 6/7/8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems.

6.12A, 7.14A, 8.15A The student communicates about Grade 6/7/8 mathematics through informal and mathematical language, representations, and models. The student is expected to communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models.

6.12B, 7.14B, 8.15B The student communicates about Grade 6/7/8 mathematics through informal and mathematical language, representations, and models. The

student is expected to evaluate the effectiveness of different representations to communicate ideas.

6.13A, 7.15A, 8.16A The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to make conjectures from patterns or sets of examples and nonexamples.

6.13B, 7.15B, 8.16B The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to validate his/her conclusions using mathematical properties and relationships.

7.11A The student understands that the way a set of data is displayed influences its interpretation. The student is expected to select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection.

7.11B The student understands that the way a set of data is displayed influences its interpretation. The student is expected to make inferences and convincing arguments based on an analysis of given or collected data.

7.12A The student uses measures of central tendency and range to describe a set of data. The student is expected to describe a set of data using mean, median, mode, and range.

7.12B The student uses measures of central tendency and range to describe a set of data. The student is expected to choose among mean, median, mode, or range to describe a set of data and justify the choice for a particular situation.

8.12A The student uses statistical procedures to describe data. The student is expected to select the appropriate measure of central tendency or range to describe a set of data and justify the choice for a particular situation.

8.12C The student uses statistical procedures to describe data. The student is expected to select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, stem and leaf plots, circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology.

Technology Applications TEKS Objectives:

(1)(B) The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to compare, contrast, and appropriately use the various input , processing, output, and primary/secondary storage devices.

(1)(C) The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to demonstrate the ability to select and use software for a defined task according to quality, appropriateness, effectiveness, and efficiency.

(1)(E) The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to use technology terminology appropriate to the task.

(1)(F)	The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to perform basic software application functions including, but limited to, opening an application program and creating, modifying, printing, and saving documents.
(2)(A)	The student uses data input skills appropriate to the task. The student is expected to demonstrate proficiency in the use of a variety of input devices such as mouse/track pad, keyboard, microphone, digital camera, printer, scanner, disk/disc, modem, CD-ROM, or joystick.
(3)(B)	The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to demonstrate proper etiquette and knowledge of acceptable use while in an individual classroom, lab, or on the Internet and intranet.
(3)(E)	The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to demonstrate knowledge of the relevancy of technology to future careers, life-long learning, and daily living for individuals of all ages.
(5)(A)	The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to identify, create, and use files in various formats such as text, bitmapped/vector graphics, image, video, and audio files.
(6)(A)	The student evaluates the acquired electronic information. The student is expected to determine and employ methods to evaluate the electronic information for accuracy and validity.
(7)(B)	The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to create and edit spreadsheet documents using all data types, formulas and functions, and chart information.
(8)(E)	The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to integrate acquired technology applications skills, strategies, and use of the word processor, database, spreadsheet, telecommunications, draw, paint, and utility programs into the foundation and enrichment curricula.
(10)(E)	The student formats digital information for appropriate and effective communication. The student is expected to match the chart style to the data when creating and labeling charts.

TAKS Objectives:

- Objective 5: Probability and Statistics
- Objective 6: Mathematical Processes and Tools

Technology:

- Spreadsheet software
- Handheld graphing technology
- Word-processing technology

Materials:

Advance Preparation: Copy Activity Masters: **Generating Data**, **Time To Play**, and **Comparison,** - one copy per group of 4-5 students, copy **Intentional Use of Data**, - one per participant, prepare Transparencies- **Survey Question**, **Guided Questions #1**, **Spreadsheet, Gallery Walk, Comparison**, **Guided Questions #2,** and **Gallery Walk 2**. Copy and cut out sets of **Data Statement Cards** (four cards per set, one set per group) and **Graph Cards** (one card per group) – you may need duplicates of these based on number of participants. Create a chart-paper sized version of **Guided Questions #1** and **Guided Questions #2**. Copy and cut out sets of **Collecting Data Cards** - one set per group. Purchase brown lunch bags. Check and load the Data Analysis Toolpak into Excel (see **Technology Tutorial**: Fat Grams Graph Activity 2.) Load and/or create **Middle School-Explore Explain 2 Spreadsheet** and **Middle School-Explore Explain 2 Spreadsheet #2** onto computers.

Presenter: Transparencies, Computer with data projection device or access to a computer lab, and Graphing calculator with presentation capabilities.

Per Group: **Data Statement Cards**, **Collecting Data Cards**, four brown bags, **Graph Card**, computer with spreadsheet capabilities, **Middle School-Explore Explain 2 Spreadsheet** and **Middle School-Explore Explain 2 Spreadsheet #2** spreadsheets, Post-it ™ notes, and **Technology Tutorial** flip chart.

Per Participant: Graphing calculator

Leader Notes:
Due to the number of topics present in this lesson, several Explore/Explain cycles occur. As each new topic is introduced, participants explore the topic. The Explain cycle then occurs. This is repeated several times throughout the lesson.

Activity 1 – Grams of Fat

*This part of the lesson requires computer stations for small groups of two participants. It is designed to actively involve participants in generating a data set given specific guidelines. Encourage participants to interact with each other. The presenter(s) should move around the room facilitating the activity. Use the **Facilitation Questions** to guide and redirect participants, as needed.*

1. *Place **Survey Question** transparency on the overhead or display Power Point slide 1 to set up scenario with participants. Have participants read the scenario*

and discuss how to use a scenario such as this in the classroom.

2. *Distribute a set of **Data Statement Cards** to each group. Place the **Guided Questions #1** transparency on the overhead or display Power Point slide 2, and display **Guided Questions #1** chart. Tell the participants to be ready to discuss each of the questions found on the transparency/slide with the whole group. Have groups discuss the information given in each card set. Participants are to use Post-it™ notes (labeled 1, 2, 3, and 4), one per question, to record their thoughts.*

3. *Debrief questions as a whole group, post participants' answers on the **Guided Questions #1** chart as they share answers. (If there is more than one presenter, one of other the other presenters can help facilitate the process by collecting Post-it™ notes and placing them on the chart as the group discussion continues.) Give each group of participants an opportunity to respond.*

   **** Guided Questions** with possible responses are on the next page.*

Transparency: Guided Questions

1. **What information have you been given?**
   Verbal descriptors that include percents, fractions, and decimals.
   Defined intervals of data.

2. **Which statement card(s) would make a good starting point(s) for creating a data set that would satisfy these statement cards? And why?**
   Answers may vary.
   Statements that contain a larger amount of data: 50%, 25%, etc.

3. **What type of data would be reasonable for the situation?**
   Numeral between 0 and 40.
   Make sure the conversation includes the difference between categorical and numerical data, and how this plays into the situation.

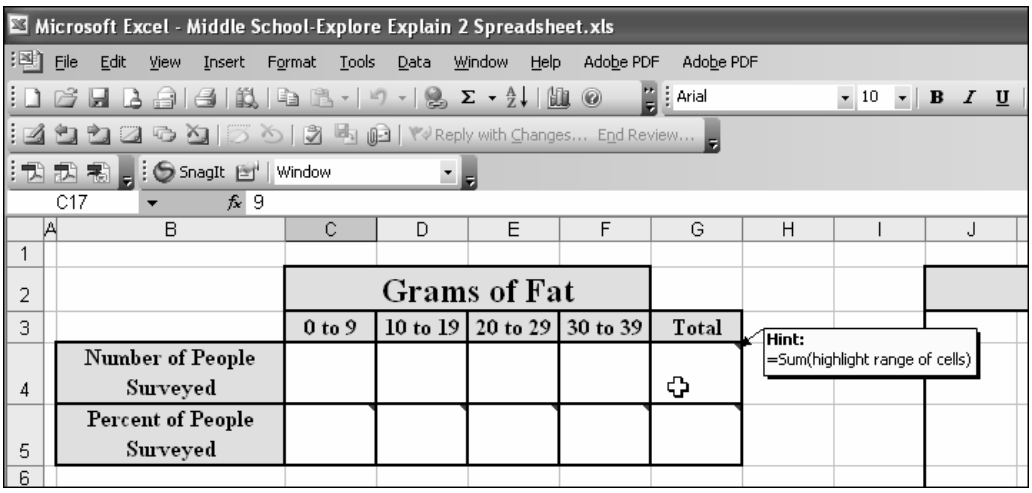
4. **What are the benefits of having your students generate data in this manner?**
   Answers may vary.
   The use of different numerical representation, such as fractions, decimals, and percents.
   Differentiating between categorical and numerical data.
   Requires thinking at the analysis and synthesis levels.

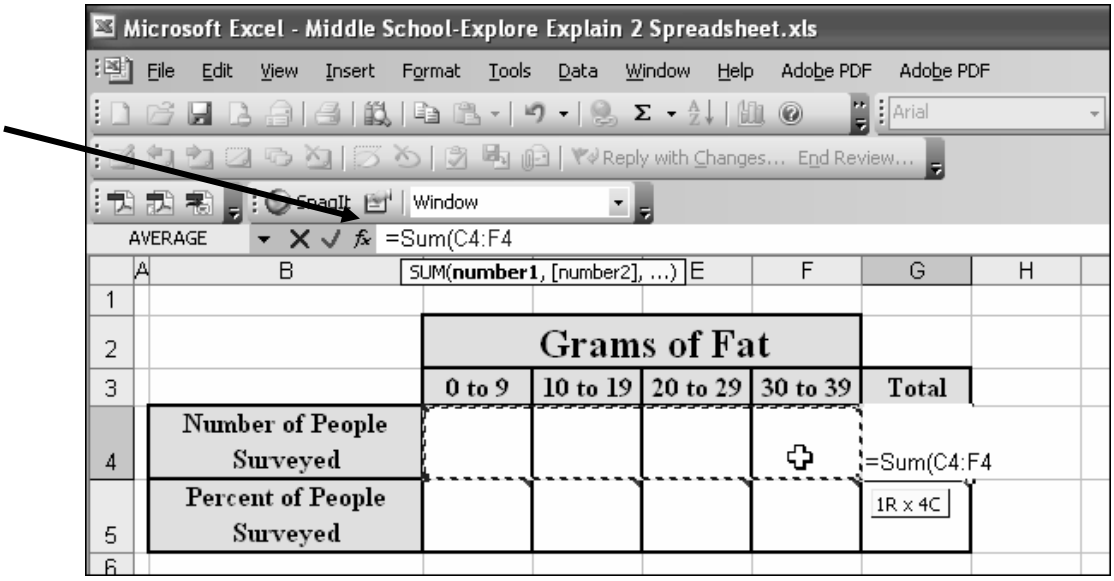
   Lead discussion into the non-use of a calculator to generate data.

4. *Place **Spreadsheet** transparency on the overhead or display Power Point slide 3. Have participants navigate and open **Middle School-Explore Explain 2 Spreadsheet.xls**.*

5. *Illustrate how the flags are used in the spreadsheet. Scroll over the hint flag in cell G4. Explain the Hint: the hint implies that the formula needed for that cell is "=Sum(highlight range of cells)," which means to enter **=Sum(** then highlight the cells necessary by clicking and dragging the mouse from cell C4 to cell F4.*

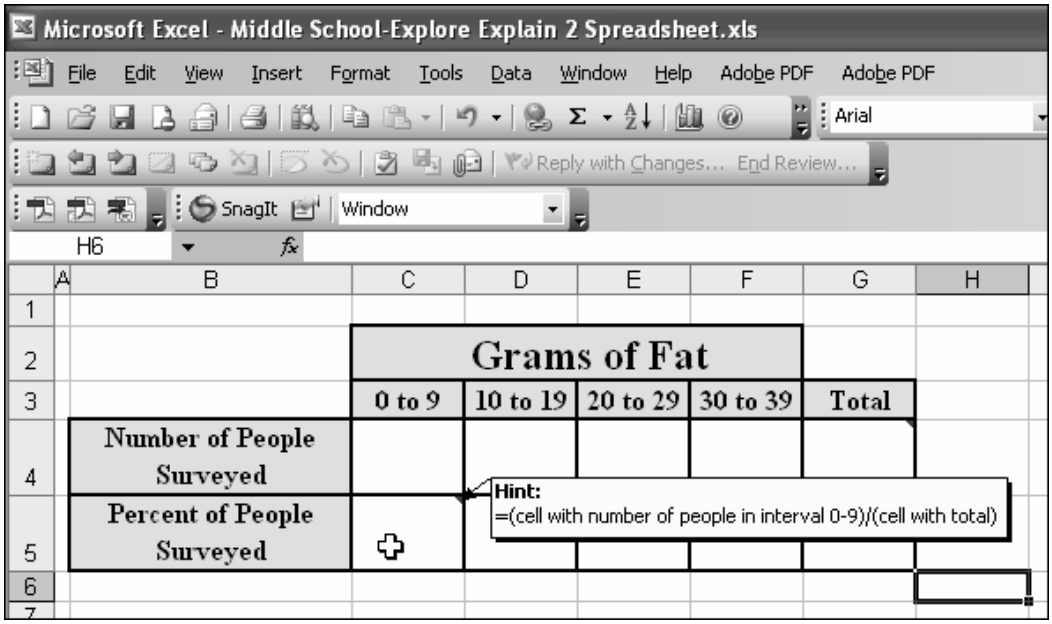
Example:

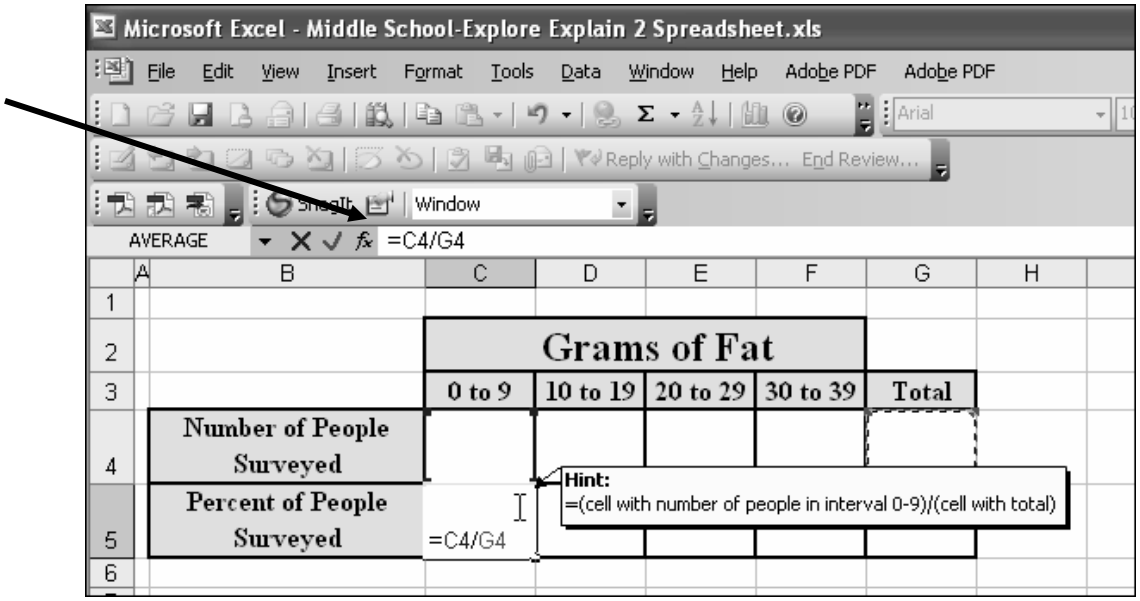




6. *Repeat step 5 for cell C5. Explain the Hint: the hint implies that the formula needed for that cell is "=(cell with number of people in interval 0 to 9)/(cell with total)," which means to enter =, then click on cell C4, followed by the backslash, and followed by cell G4.*

Example:





7. *If using the Power Point display Power Point slide 4. Have participants complete the activity* ***Generating Data****.*

   ** **Generating Data** activity with possible responses is on the next page followed by an example.*

8. *Presenter(s) should walk around the room and observe groups. Make sure the participants format the total and percent cells correctly using the red hint flags. They are not to use the sum or percent functions listed in the software at this time. Participants are to format the cells using a formula they create through discussion. Since the participants are setting up formulas without data being present in the cells, they may get an error message due to division by zero. Once they enter the data, the error message will go away. Use the* ***Facilitation Questions*** *to guide and redirect participants, as needed.*

Facilitation Questions

- Why would you set up a cell that calculates the total? What type of formula would you use? What data will you total?
  In order to calculate the percentage, you need a cell that calculates the total. To find the total, one could use: =Sum(Start Cell:Ending Cell) or =C4+D4+E4+F4 (or whichever cells contain the column totals.)
- Why would you set up cells that calculate percentages?
  Answers may vary. It makes it easy to see when you have generated the right amount of data for each interval.
- How would you want the percentages displayed (percent cells have been formatted to read as a percent in the spreadsheet)?
  As a percentage or as a decimal
- What type of formula would you use to calculate the percentage of each?
  Example one: (number of data pieces/ total pieces)
  Example two: (C4/G4) would be an appropriate formula for cell C5 if the number of data pieces is in C4 and the total pieces is in G4.
- How would you have your students think through creating the formulas?
  Answers will vary. Ask students how to find the percent without using a spreadsheet. Then transfer that knowledge to the spreadsheet.

Participant Page: Generating Data

Part 1:

- Input formulas for all cells containing a red hint flag:
  Total Number of People Surveyed,
  Total Percent of People Surveyed,
  Percent of People Surveyed for each interval,

Part 2:

- Complete Grams of Fat table by entering data into the Number of People Surveyed using the Data Statement Cards. Manipulate data until all cards have been satisfied.
- Save as: JDoe_Grams_of_Fat_Spreadsheet

1. What approach did your group take to complete the table?
   Answer will vary dependent on their Data Statement Cards. Started with the largest interval first, converted all numbers to the same format, thought of a number of elements that would work well with the card set.

2. What type of manipulation did it take to make your data set fit the Data Statement Cards you were given?
   Answer will vary, changing the group size (number of elements in the data set.)

3. How would you manipulate the data when you have half or a third of a person represented in your data set? Is it okay to have half a person? Why, or why not?
   Double or triple the data depending on what fraction of a person you have.

4. What is the smallest meaningful value you can have for the total number of people surveyed for your data?
   For Data Set 1, the smallest number of data elements is 8. For Data Set 2, the smallest possible total is 12. For Data Set 3, the smallest possible total is 6. For Data Set 4, the smallest possible total is 12. Any smaller values would result in a fractional person.

5. How does using a dynamic spreadsheet encourage student learning and thinking?
   Answer may vary. It allows the student to watch the changes in data happen at a very fast rate, so the student is not tied down with computations.

6. How could you combine what you just did on the spreadsheet with what you do in the classroom?
   Answer may vary. Use it to create an understanding of number of elements in a data set and how it relates to the intervals of the data, etc.

Example Card Set 1: Answers may vary.

Data Statement Card Set 1:

Grams of Fat Consumed

50% of the people surveyed gave a response between 20 and 29 grams of fat per day.

Grams of Fat Consumed

Only 0.125 of the people surveyed gave a response between 0 and 9 grams of fat per day.

Grams of Fat Consumed

About $\frac{1}{2}$ as many people who answered between 20 and 29 grams of fat answered between 10 and 19 grams per day.

Grams of Fat Consumed

The same number of people responded between 30 and 39 grams of fat as did those people that responded between 0 and 9 grams.

	A	B	C	D	E	F	G
1							
2			Grams of Fat				
3			0-9	10-19	20-29	30-39	Total
4		Number of People Surveyed	25	50	100	25	200
5		Percent of People Surveyed	12.50%	25.00%	50.00%	12.50%	100.00%
6							

9. *Have groups "**Save As**" their work to the desktop and name it, **JDoe_Grams_of_Fat-Spreadsheet**.*

*This part of the lesson actively involves the participants in generating and manipulating the elements in a data set using the spreadsheet software. Encourage participants to interact with each other. The presenter(s) should be moving around the room facilitating the activity. Use the **Facilitation Questions** to guide and redirect participants, as needed.*

10. *If using the Power Point display Power Point slide 5. Have groups complete activity **Time To Play** part 1.*

11. *Have groups complete activity **Time To Play** part 2. Use the **Facilitation Questions** on the next page to guide and redirect participants, as needed.*

Facilitation Questions

- What type of changes did you make to your data set to create the same mean and mode? Were you able to make the changes to satisfy these parameters?
  Answers may vary (depends on the group's generated data set.) By using higher values in the lower intervals and lower values in the upper intervals moving data closer to the middle of the data set, and repeating the middle data more than any other.
- What type of changes did you make to your data set to create a situation where the median would be the best descriptor of the data set? Were you able to make changes to satisfy this condition?
  Answers may vary (depends on the group's generated data set.)The median is often the best descriptor when there are extreme values in the data set.
- What type of changes did you make to your data set to create a situation where the mode would be the best descriptor of the data set? Were you able to make changes to satisfy this condition?
  Answers may vary (depends on the group's generated data set.) Use the same value more than five or six times.
- Would making these changes in your data set change the measures of central tendencies?
  Answers may vary. Maybe, it would depend on the changes you make.
- How could you manipulate the data in order to change a specific measure? Mode? Mean? Median?
  Answer may vary. By changing specific pieces of data while keeping the same number of elements in each interval.
- Which of the measures of central tendencies best described your data set before all the changes occurred, and why?
  Answers will vary depending on the group's generated data set, and what studies/comparisons are being done with the data set.
- How does manipulating the data in this type of dynamic setting encourage student learning?
  It allows the student to watch the changes in data happen at a very fast rate, so the student is not tied down with computations.

12. *Place the **Comparison** transparency on the overhead or display Power Point slide 6. Have groups begin activity **Comparison**. At this point, the comparison should address both the mathematical aspect and the technological aspect of generating and manipulating data and the TEKS. Have participants reflect on their answers on the **Guided Question #1 Chart** .Use the **Facilitation Questions** to guide a whole group discussion.*

Facilitation Questions

- What TEKS does this activity address?
  Participants should brainstorm a list of TEKS that they believe they have covered in this activity. The Leader Notes contain a comprehensive list of the TEKS addressed in this phase of the professional development. If participants do not mention some of these TEKS, ask them if the activity also covers these TEKS.
- How does the technology that you used enhance the teaching of those TEKS?
  Answers may vary. However, participants should note that using technology enables them to explore a mathematical concept to a much deeper level. Technology makes rich mathematics accessible to a variety of learning styles.

Activity 2 – Fat Grams Graph

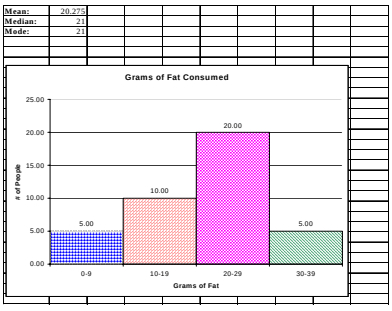
This part of the lesson actively involves the participants in generating a graphical representation by manipulating their data set using the spreadsheet software. Encourage participants to interact with each other. The presenter(s) should be moving around the room facilitating the activity. Use the ***Facilitation Questions*** *to guide and redirect participants, as needed.*

Participants may need to understand the distinction between a Bar Graph and a Histogram. A Bar graph shows the frequency of specific data, the data may be categorical or numerical. A Histogram is used when the data can be arranged into continuous intervals.

1. *Have each pair of participants open their saved document (JDoe_Grams_of_Fat_Spreadsheet.)*

2. *If using the Power Point display Power Point slide 7. Ask groups to create a graphical representation of their choice using the* ***Chart Wizard*** *found on the spreadsheet toolbar, and the "Number of People Surveyed" data and "Grams of Fat Intervals." If participants have never used the* ***Chart Wizard*** *in Excel, participants may use the* ***Technology Tutorial*** *flip chart* ***Fat Grams Graph Activity 2****:* ***Creating the Grams of Fat Graph*** *to create their graph.*

Sample Graph: Histogram.



3. *Display Power Point slide 8, and/or state thought questions:* ***Would you expect the graphs to be similar or different? What similarities would you expect to see? What differences would you expect to see?***

4. *Place transparency* ***Gallery Walk*** *on the overhead or display Power Point slide 9 and have participants read over questions. Tell participants to be ready to discuss each of the questions found on the transparency with the whole group at end of gallery walk. Set a timer (limiting time will help facilitate activity.)*

5. *Have groups do a computer gallery walk and observe the other groups work.*

6. *Lead whole group in a discussion with the focus on which graphical representation was the best to use and why. Use the* ***Gallery Walk****/Power Point slide 9 questions on next page to guide discussion, as needed.*

Transparency: Gallery Walk

- **Which type of graphical representation did you choose to display your data? Why did you choose to display the data in this way?**
  Answer may vary based on the type of graph the group chose.

- **Would it be better to consider one of the other types of graphical representation? Why or why not?**
  Best choices are a histogram or circle graph. Histograms show how data falls into different ranges and circle graphs show a part-whole relationship.

- **Compared to the other graphical representations, did you see a better choice for displaying the data? If so, which one and why?**
  Answer may vary based on the type of graph the group chose.

- **Can you determine the different measures of central tendencies with the type of graph you selected?**
  Answer may vary based on the type of graph the group chose. Also, it depends on which measure of central tendency you are looking for.

- **What are some of the strengths of using a dynamic spreadsheet to generate graphs?**
  Gives time to analyze the data in different graphical situations, is easy to switch from one graph to another, time saver, and allows for large data sets.

7. *Ask the groups to print (if printers are available) and save their work.*

8. *Place the **Comparison** transparency on the overhead or display Power point slide 10. Have groups add to **Comparison Activity**. The comparison should address both the mathematical aspect and the technology aspect of graphing data and the TEKS. Have participants reflect back on their answers using **Guided Question #1 Chart**. Use the **Facilitation Questions** to guide a whole group discussion.*

Facilitation Questions

- What TEKS does this activity address?
  Participants should brainstorm a list of TEKS that they believe they have covered in this activity. The Leader Notes contain a comprehensive list of the TEKS addressed in this phase of the professional development. If participants do not mention some of these TEKS, then ask if the activity also covers these TEKS.
- How does the technology that you used enhance the teaching of those TEKS?
  Answers may vary. However, participants should note that using technology enables them to explore a mathematical concept to a much deeper level. Technology makes rich mathematics accessible to a variety of learning styles.

Activity 3: Graphs Oh No!

*This part of the lesson is designed for small groups of two to four participants. Encourage participants to interact with each other and refer to the Technology Tutorial flip chart. The presenter(s) should be moving around the room facilitating the activity. Use the **Facilitation Questions** to guide and redirect participants, as needed.*

1. *Display **Guided Questions #2** chart. Distribute a set of **Graph Cards** to each group, and place the **Guided Questions #2** transparency on the overhead or display Power Point slide 11. Tell the participants to be ready to discuss each of the questions found on the transparency with the whole group. Have groups discuss the information given in each card set. Participants are to use Post-it™ notes, one per question (labeled 1, 2, 3, and 4), to record their thoughts.*

2. *Debrief questions as a whole group posting participants' answers on the **Guided Questions #2** chart as they share answers. (If there is more than one presenter, one of the other presenters can help facilitate the process by collecting Post-it™ notes and placing them on the chart as the group discussion continues.) Give each group of participants an opportunity to respond.*

**** Guided Questions** with possible responses are on the next page.*

Transparency: Guided Questions #2

1. **What information have you been given?**
   Graphical: Histograms, Circle graphs, Box-and-Whisker plot
   Percents
   Decimals
   Fractions

2. **What can you infer from the graph you were given?**
   Numerical data is missing,
   There are missing values, labels and intervals,
   Meaning of graph has not been defined,
   Identification and labeling will need to be done before a data set can be created, etc.

3. **Do you need to define missing information or labels before you can create your data set? Why is this important?**
   Yes, because some of the graphs are missing critical information such as interval, tick marks, labeling, etc.

4. **What are the benefits of having your students generate data in this manner?**
   Students will see the need for labels. Student must use critical thinking skills, demonstrate a deep understanding of the concept, etc.

3. *Place **Spreadsheet** on the overhead or display Power Point slide 12. Have each pair of participants open their saved document.*

4. *Ask groups to create a numerical set of data that satisfies the conditions of their graphs, using the **Middle School-Explore Explain 2 Spreadsheet #2**. They may refer to the **Technology Tutorial** flip chart **Fat Grams Graph Activity 2: Creating the Grams of Fat Graph** as needed. Use the **Facilitation Questions** to guide and redirect participants, as needed.*

5. *Display Power Point slide 13 and/or state thought questions: **Would you expect the graphs to be similar or different? What similarities would you expect to see? What differences would you expect to see?***

6. *Place **Gallery Walk #2** transparency on the overhead or display Power Point slides 14 and 15, and have participants read the questions. Tell participants to be ready to discuss each of the questions found with the whole group at end of gallery walk. Set a timer (limiting time will help facilitate activity.)*

7. *Have groups do a computer gallery walk and observe the other groups work.*

8. *Lead whole group in a discussion with the focus on which graphical representation was the best to use and why. Use the **Gallery Walk #2**/Power Point slides 14 and 15 questions on the next page to guide discussion, as needed.*

Transparency: Gallery Walk 2

- **What are some of the benefits of generating data from generic graphs for the student?**
  Creates a situation where the students are analyzing, synthesizing, and evaluating the information they have previously learned.
- **What are some of the benefits of generating the verbal descriptors of different types of graphical representations?**
  Students verbalize learning. This will allow the teacher to assess students' understanding of the concepts.
- **Which type of graphical representation did you choose to display your data? Why did you choose to display the data in this way?**
  Answer may vary based on the type of graph the group chose.
- **Would it be better to consider a different type of graphical representation? Why or why not?**
  Best choices are a histogram or circle graph. Histograms show how data falls into different ranges and circle graphs show a part-whole relationship.
- **Compared to the other graphical representations, did you see a better choice for displaying the data? If so, which one and why?**
  Answer may vary based on the type of graph the group chose.
- **Can you determine the different measures of central tendencies with the type of graph you selected?**
  Answer may vary based on the type of graph the group chose. Also, it depends on which measure of central tendency you are looking for.
- **What are some of the strengths of using a dynamic spreadsheet to generate graphs?**
  Gives time to analyze the data in different graphical situations, is easy to switch form one graph to another, saves time, and allows for large data sets.

9. *Distribute the **Intentional Use of Data** activity sheet to each participant.*

10. *Prompt the participants to work in pairs to identify those TEKS that received greatest emphasis during this activity. Prompt the participants to identify two key questions emphasized during this activity. Allow four minutes for discussion.*

Facilitation Questions

- Which mathematical TEKS formed the primary focus of this activity?
  6.10D, 7.11B, 8.12A
- What additional math TEKS supported the primary TEKS?
  6.11, 6.12, 6.13; 7.13, 7.14, 7.15; 8.14, 8.15, 8.16
- What Technology Applications TEKS are addressed during this activity?
  1B, C;E ,and F; 2A; 3B, and E; 5A; 6A; 7B; 8E; 10E
- How do these TEKS translate into guiding questions to facilitate student exploration of the content?
  Answers may vary. These TEKS allow for application and problem solving type questions at the analysis, synthesis and evaluate levels.
- How do your questions reflect the depth and complexity of the TEKS?
  Answers may vary.
- How do your questions support the use of technology?
  Answers may vary.

11. *As a whole group, share responses for two to three minutes.*

12. *As a whole group, identify the level(s) of rigor (based on Bloom's taxonomy) addressed, the types of data, the setting, and the data sources used during this Explore/Explain cycle. Allow three minutes for discussion.*

Facilitation Questions

- What attributes of the activity support the level of rigor that you identified?
  Answers may vary. The exploring and questioning.

13. *As a whole group, discuss how the participants could implement this activity in other settings. Allow five minutes for discussion.*

Facilitation Questions

- How would this activity change if we had access to one computer per participant?
  The student could independently generate the data set.
- How would this activity change if we had access to one computer for the entire group of participants?
  The students could generate data sets using a calculator and then manipulate the data using the one computer and/or interactive software.
- How would this activity change if we had used graphing calculators instead of computer-based applications?
  Answers may vary. The students could use the list function of the graphing calculators to record data, and manipulate it.
- How might we have made additional use of available technologies during this activity?
  Answers may vary. Use of a graphing calculator
- Why was technology withheld during the first part of the *Time to Play* activity part of this activity?
  To provide the students with hands-on experience, and provide the students with conceptual understanding of generating data.
- How does technology enhance learning?
  Technology enhances the learning by allowing for large set of data, a variety of was to look at data, easy manipulation of the data, and higher levels of questioning can accrue.

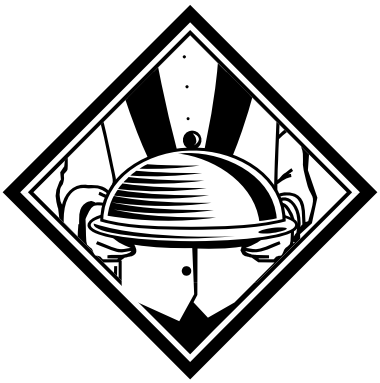
14. Prompt the participants to set aside the completed Intentional Use of Data activity sheet for later discussion. These completed activity sheets will be used during the elaborate phase as prompts for generating attributes of judicious users of technology.

Answers may vary.

Explore/Explain 2: Intentional Use of Data

TEKS	*6.10A,B,D; 6.11A,D; 6.12A,B; 6.13A,B* *7.11A,B; 7.12A,B; 7.13A,D; 7.14A,B; 7.15A,B* *8.12A,C; 8.14A,D; 8.15A,B; 8.16A,B*	
Question(s) to Pose to Students	*What is the relationship between the measures of central tendency?*	
	How did the use of a computer help determine the relationship between the measures of central tendency?	
Cognitive Rigor	Knowledge	
	Understanding	√
	Application	√
	Analysis	√
	Evaluation	√
	Creation	√
Data	Real-Time	√
	Archival	
	Categorical	
	Numerical	√
Setting	Computer Lab	√
	Mini-Lab	√
	One Computer	√
	Graphing Calculator	√
	Measurement Based Data	
Data Source(s)	*Answers may vary.*	

Transparency: Survey Question



Ms. Grant's Health Education class took a field trip to the local mall to conduct various health surveys. One of the surveys was to generate information about the amount of fat a person thinks he or she eats each day. The question was stated in the following manner:

How many grams of fat do you think you eat in each day?

Transparency: Guided Questions #1

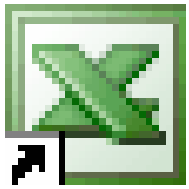
1. **What information have you been given to generate your data?**

2. **Which statement card(s) would make a good starting point(s) for creating a data set that would satisfy these statements? Why?**

3. **What type of data would be reasonable for the situation?**

4. **What are the benefits of having your students generate data in this manner?**

Transparency: Spreadsheet



Middle School-Explore Explain 2 Spreadsheet.xls

Middle School-Explore Explain 2 Spreadsheet #2.xls

Transparency: Gallery Walk

- **Which type of graphical representation did you choose to display your data? Why did you choose to display the data in this way?**

- **Would it be better to consider one of the other types of graphical representation? Why or why not?**

- **Compared to the other graphical representations, did you see a better choice for displaying the data? If so, which one and why?**

- **Can you determine the different measures of central tendencies with the type of graph you selected?**

- **What are some of the strengths of using a dynamic spreadsheet to generate graphs?**

Transparency: Comparison

How does using the spreadsheet software compare to manipulating data and graphing data by hand?

Software Justification:

By Hand Method Justification:

Student Value:

Student Value:

Transparency: Guided Questions #2

1. **What information have you been given?**

2. **What can you infer from the graph you were given?**

3. **Do you need to define missing information or labels before you can create your data set? Why is this important?**

4. **What are the benefits of having your students generate data in this manner?**

Transparency: Gallery Walk 2

- **What are some of the benefits of generating data from generic graphs for the student?**
- **What are some of the benefits of generating the verbal descriptors of different types of graphical representations?**
- **Which type of graphical representation did you choose to display your data? Why did you choose to display the data in this way?**
- **Would it be better to consider a different type of graphical representation? Why or why not?**
- **Compared to the other graphical representations, did you see a better choice for displaying the data? If so, which one and why?**
- **Can you determine the different measures of central tendencies with the type of graph you selected?**
- **What are some of the strengths of using a dynamic spreadsheet to generate graphs?**

Activity Master: Data Statement Cards

Data Statement Card Set 1:

Grams of Fat Consumed

50% of the people surveyed gave a response between 20 and 29 grams of fat per day.

Grams of Fat Consumed

Only 0.125 of the total responses were between 0 and 9 grams of fat per day.

Grams of Fat Consumed

About half as many people who answered between 20 and 29 grams of fat answered between 10 and 19 grams per day.

Grams of Fat Consumed

The same number of people responded between 30 and 39 grams of fat as did those people that responded between 0 and 9 grams.

Data Statement Card Set 2:

Grams of Fat Consumed

25% of the people surveyed gave a response between 10 and 19 grams of fat per day.

Grams of Fat Consumed

One third of the people responded with an answer of between 20 and 29 grams of fat each day.

Grams of Fat Consumed

The same number of people who responded between 10 and 19 grams of fat gave a response of 0 to 9 grams.

Grams of Fat Consumed

About $\frac{1}{2}$ as many people had a response of 30 to 39 grams as did those that gave a response of 20 to 29 grams each day.

Data Statement Card Set 3:

Grams of Fat Consumed

Thirty-three and a third percent of the people surveyed gave a response between 30 and 39 grams of fat.

Grams of Fat Consumed

About $\frac{1}{3}$ of the people responded with an answer between 10 and 19 grams of fat.

Grams of Fat Consumed

About half as many people who were surveyed responded with 0 to 9 grams of fat as responded with 10-19 grams of fat.

Grams of Fat Consumed

The rest of the people gave a response between 20 and 29 grams.

Data Statement Card Set 4:

Grams of Fat Consumed

One fourth of the people surveyed responded with an answer between 30 and 39 grams of fat per day.

Grams of Fat Consumed

$\frac{1}{3}$ of the people responded with an answer between 0 and 9 grams of fat.

Grams of Fat Consumed

The same number of people who responded with answers between 30 and 39 grams of fat per day responded with an answer between 20 to 29 grams of fat per day.

Grams of Fat Consumed

About 0.5 as many people who responded with answers between 0 and 9 grams of fat gave a response between 10 and 19 grams each day.

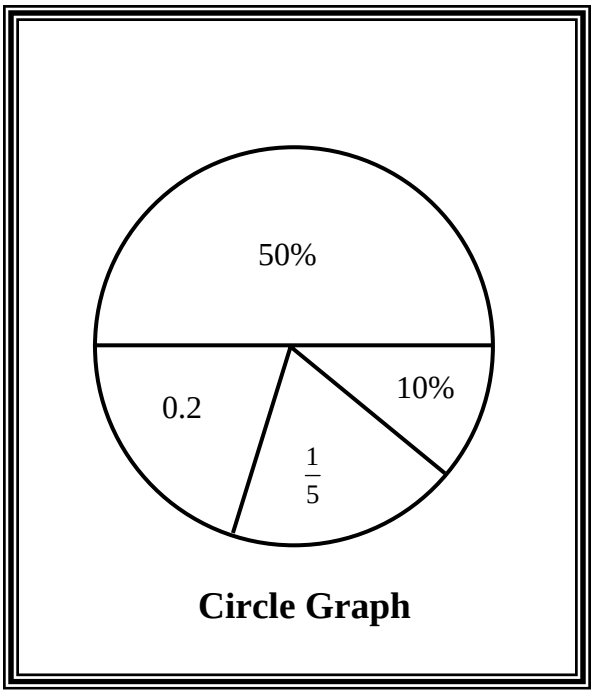
Activity Master: Data Cards

0	6	12	18
1	7	13	19
2	8	14	20
3	9	15	21
4	10	16	22
5	11	17	23

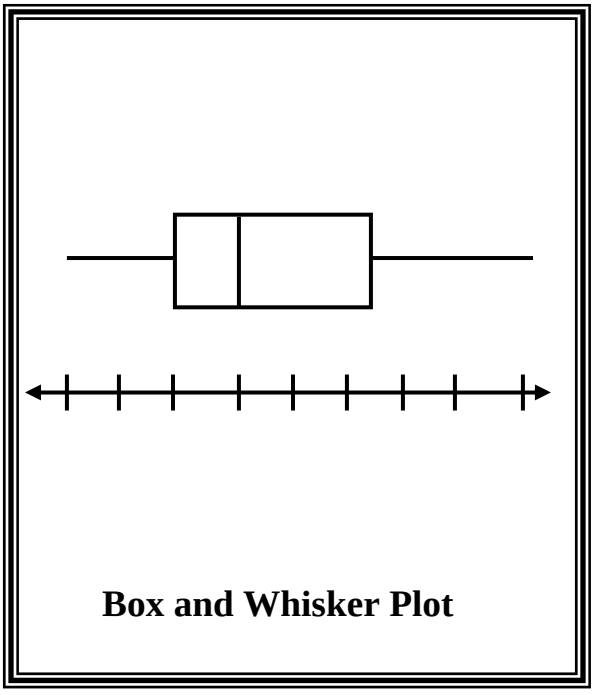
Activity Master: Data Cards

24	30	36	
25	31	37	
26	32	38	
27	33	39	
28	34		
29	35		

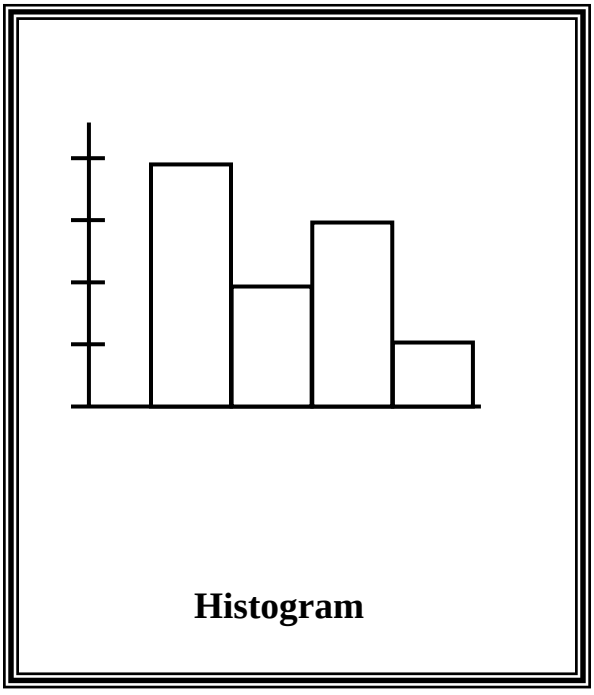
Activity Master: Graph Cards



Circle Graph



Box and Whisker Plot



Histogram

Participant Page: Generating Data

Part 1:

- Input formulas for all cells containing a red hint flag:
  Total Number of People Surveyed,
  Total Percent of People Surveyed,
  and Percent of People Surveyed for each interval.

Part 2:

- Complete Grams of Fat table by entering data into the Number of People Surveyed using the Data Statement Cards. Manipulate data until all cards have been satisfied.
- Save as: JDoe_Grams_of_Fat_Spreadsheet

1. What approach did your group take to complete the table?

2. What type of manipulation did it take to make your data set fit the Data Statement Cards you were given?

3. How would you manipulate the data when you have half or a third of a person represented in your data set? Is it okay to have half a person? Why, or why not?

4. What is the smallest meaningful value you can have for the total number of people surveyed for your data?

5. How does using a dynamic spreadsheet encourage student learning and thinking?

6. How could you combine what you just did on the spreadsheet with what you do in the classroom?

Participant Page: Time to Play

Part I. Collecting Data!

1. Sort and place data cards into the brown-paper bags by the defined intervals. Label each bag.

2. Based on the information in your table, draw data cards out one at a time with replacement.
   Example: You have 5 people that stated they ate between 0 and 9 grams of fat each day. Then you would make 5 pulls from the bag labeled 0-9 grams of fat.

3. Record results as you draw data from the bags into the Data Pieces table found on sheet 2 of the Middle School-Explore Explain 2 Spreadsheet spreadsheet.

4. Continue until all data has been generated.

5. Format the Measures of central tendency using the red flag hints.

6. Record the mean, median and mode. Which of the measures of central tendencies best describes your original data set, and why?

   Mean: _____

   Median: _____

   Mode: _____

7. Save your work as **JDoe_Grams_of_Fat_Spreadsheet** on your desktop.

Part II. What If?

In the following What If's: Manipulate the data elements in a way that keeps the Data Statements Cards **TRUE**. Open your spreadsheet and begin.

1. **What if**, you create a data set in which the mean is the same as the mode:

   What type of changes did you make to your data set? Were you able to make the changes to satisfy these parameters?

   _____

   _____

(Part 2 continued)

2. **What if**, you create a data set in which the mode would be the best measure of central tendency to use to describe the data set:

   What type of changes did you make to your data set? Were you able to make the changes to satisfy these parameters?

   _____

   _____

3. **What if**, you create a data set in which the median would be the best measure of central tendency to use to describe the data set:

   What type of changes did you make to your data set? Were you able to make the changes to satisfy these parameters?

   _____

   _____

Participant Page: Comparison

How does using the spreadsheet software compare to manipulating data and graphing data by hand?

Software Justification:

By Hand Method Justification:

Student Value:

Student Value:

Explore/Explain 2: Intentional Use of Data

TEKS	Math	
	Tech Apps	
Question(s) to Pose to Students	Math	
	Tech Apps	
Cognitive Rigor	Knowledge	
	Understanding	
	Application	
	Analysis	
	Evaluation	
	Creation	
Data Source(s)	Real-Time	
	Archival	
	Categorical	
	Numerical	
Setting	Computer Lab	
	Mini-Lab	
	One Computer	
	Graphing Calculator	
	Measurement Based Data	
Bridge to the Classroom		