# Sleep & Teen Obesity: Is there a Correlation?

**I. UNIT OVERVIEW & PURPOSE:**

In this unit, students will spend three days exploring and interpreting data through the use of tables, charts, and equations, using personally collected data. The amounts of sleep teens get, as well as the staggering rate of obesity in our country, are both important issues that this unit touches on. In addition, students are asked to find flaws in data and not except information at face value. Technology is another important feature of the unit; Excel and/or graphing calculators are used in every lesson.

**II. UNIT AUTHOR:**

Adrienne Ballin

**III. COURSE:**

Mathematical Modeling: Capstone Course

**IV. CONTENT STRAND:**

Algebra and Functions

**V. OBJECTIVES:**

- Collect, analyze and interpret data using words, tables, and various types of graphs.
- Determine if a correlation exists between two variables.
- Determine the equation of the line of best fit.
- Determine the domain and range of a function in context of a real-world problem.

**VI. MATHEMATICS PERFORMANCE EXPECTATION(s):**

MPE.1 The student will solve practical problems involving rational numbers (including numbers in scientific notation), percent, ratios, and proportions.

MPE.2 The student will collect and analyze data, determine the equation of the curve of best fit, make predictions, and solve real-world problems, using mathematical models. Mathematical models will include polynomial, exponential, and logarithmic functions.

MPE.12 The student will transfer between and analyze multiple representations of functions, including algebraic formulas, graphs, tables, and words. Students will select and use appropriate representations for analysis, interpretation, and prediction.

MPE.16 The student will investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include

c) domain and range, including limited and discontinuous domains and ranges

**VII. CONTENT:**

a) Discover personal eating and sleeping habitats
b) Analyze multiple representations of functions
c) Create a line and bar graph in Excel
d) Create a scatter plot in Excel
e) Determine an appropriate domain and range of a function
f) Determine the equation of the curve of best fit using a graphing calculator
g) Make predictions
h) Determine extraneous variables that can affect data
i) Make mathematical conclusions and express them in formal writing

**VIII. REFERENCE/RESOURCE MATERIALS:**

- How-to-Guide for creating a line chart in Excel 2007 (attachment)
- Class set of lap tops or access to a computer lab that have Excel 2007 on them
- "Tired & Hungry?" Activities 1, 2 and 3 (provided in Appendix)
- Class set of TI-83 (or higher) calculators

**IX. PRIMARY ASSESSMENT STRATEGIES:**

- Activities 1, 2 and 3 will provide feedback on the students understanding of the mathematics and ability to interpret the mathematics
- Participation in many discussion throughout the lesson, as well as the final discussion will help determine whether students understand the mathematics, as well as the many factors that impact a research study
- Questioning by the teacher, and observations of student interaction when completing small group work.

**X. EVALUATION CRITERIA:**

Activity #1 = 20pts
Activity #2 = 30pts
Activity #3 = 40pts
Participation in Final Discussion = 10pts

*Rubrics are provided within each lesson

**XI. INSTRUCTIONAL TIME:**

Each of the three lessons is designed to take 90 minutes. However a full week is required so that students may collect their data. The data can be collected before beginning the unit, or after Lesson #1 (there would be a gap of time between the Lesson 1 and 2). It is suggested that the students collect data *after* Lesson #1.


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# Lesson 1 – Looking at the Research

**Strand**
Algebra and Functions

**Mathematical Objective(s)**

Transfer between and analyze multiple representations of mathematical situations.

In this lesson students will read an article and interpret the mathematics involved in order to compare the findings to their own lives. They will take a situation given in words and translate it to form a table and a line chart using excel. Then using the three models, students will analyze the data and form conclusions. Students will also be asked to determine which would be a more appropriate representation of the data: a line chart or scatter plot.

**Mathematics Performance Expectation(s)**

MPE.1 The student will solve practical problems involving rational numbers (including numbers in scientific notation), percent, ratios, and proportions.

MPE.12 The student will transfer between and analyze multiple representations of functions, including algebraic formulas, graphs, tables, and words. Students will select and use appropriate representations for analysis, interpretation, and prediction.

**Related SOL**

A.1 The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. (Focus on representing verbal quantitative situations algebraically)

A.7 The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including
b) domain and range;
f) making connections between and among multiple representations of functions including concrete, verbal, numeric, graphic, and algebraic.

**NCTM Standards**

- Understand relations and functions and select, convert flexibly among, and use various representations for them
- Draw reasonable conclusions about a situation being modeled.
- Use the language of mathematics to express mathematical ideas precisely.
- Communicate mathematical thinking coherently and clearly to peers, teachers, and others


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**Additional Objectives for Student Learning**

The student will use Excel to create a table and line chart.

**Materials/Resources**

- Classroom set of graphing calculators (optional)
- Article (available at: For teens, too little sleep may equal too many snacks).
  *Note*: *There have been a lot of studies done on the relationship between weight and sleep. If the article is unavailable or does not suit your class, health.com and cnn.com have several articles available.*
- Variety of packaged snacks with nutrition facts clearly displayed (enough for one per pair/group)
- Class set of lap tops or access to a computer lab (with Excel 2007)
- *Making a Simple Line Chart in Excel* Instructions (available in separate document)
- *Tired and Hungry? Activity #1* (in Appendix)

**Assumption of Prior Knowledge**

- It is assumed these students have already taken Algebra I
- Students should already be familiar with percentages and adding and subtracting rational numbers.
- Know how to read and create tables and line charts, as well as know what an ordered pair is and how to plot one on the coordinate plane.
- Be familiar with domain and range.
- The most difficult aspect of this lesson is getting the students to give thorough responses in complete sentences when answering the discussion questions. Students should be reminded that if it is something that they can see and observe in the problem, then their answer will never be wrong.
- The relevant real-life problem in this lesson is sleep-deprived teenagers and the rising rate of obesity in teens.
- It is assumed that the students have little or no experience with creating charts in Excel. Therefore a brief set of instructions has been provided that may be handed out to the students (available in separate document).

## Introduction: Setting Up the Mathematical Task

There has been research that shows a relationship between teens that lack the proper amount of sleep and teens that are overweight. By looking at research and their own personal habits, students will discover how mathematics can help them to investigate their own life. The following activities will introduce students to the task ahead of them.

1) The teacher will have students examine the nutrition facts on a food product and lead a discussion: (10 mins)

It would be best to have the packaged snacks already sitting on students' desk when they enter the room. Be sure to tell them not to open the snacks and to observe the nutrition facts as the rest of the class comes in.

Questions to Consider:
-What is the difference between the "Calories" and the "Calories from Fat"?
-If the serving size is 12 crackers and you only eat 4, how will you determine how many calories from fat you consumed?

2) Read and discuss CNN Health article For teens, too little sleep may equal too many snacks (15 mins). The article can be projected for all students to see and/or each student can have their own copy/computer. The teacher will open the floor for students to make comments/conclusions, and pose questions to continue the discussion:

Suggested Paragraphs for Discussion:
*The study didn't show that sleep patterns caused teens to become overweight, but Redline and her colleagues did find that the 18 percent of teens in the study who were obese were less likely to get eight hours of sleep than the teens of average weight (Health.com 2010).*

*Compared with their better-rested peers, sleep-deprived teens got about 2 percent more of their daily calories from fat and 3 percent fewer calories from carbohydrates, the study found. And the teens who slept less than eight hours were more likely to get their calories from snacks -- especially the girls (Health.com 2010)*

## Student Exploration 1:

**Small Group Work**

1) In groups of two, students will complete parts A through D of *Tired and Hungry? Activity #1* using Excel (20 mins). The activity is in the appendix at the end of this unit. Students are expected to work together and the teacher will be available solely to help with technical problems. The students should be checked off by the teacher before moving on to part E.

*An example of what the Excel activity should look like is provided in a separate document.

2) Students will answer discussion questions (part E). Students may work with their partner but each person must turn in their answers on their own paper (10 mins).

3) Students will complete part F of *Tired and Hungry? Activity #1*. Students may work with their partner but each person must turn in their answers on their own paper (15 mins)

**Whole Class Sharing/Discussion**

4) Allow 5 – 10 minutes to bring closure to the lesson. Have students share their answers to some of the discussion questions – particularly the ones that students may have had difficulty with.

## Assessment

- Each student will turn in *Tired and Hungry? Activity #1*. The following scoring rubric will be used.
- This activity is one of 5 components making up a final grade (see unit overview)

Activity #1

| | |
|---|---|
| **Excel Table & Graph**<br>✓ Entered data into tables correctly<br>✓ Created line chart correctly<br>✓ Correct title/color<br>✓ Neat and easy to read | /5pts |
| **Discussion Questions**<br>✓ Complete sentences<br>✓ Referred to table and chart to explain answers | /10pts |
| **Table/Scatter Plot and discussion of Sleep v. Calories**<br>✓ Table is correct<br>✓ Scatter plot is correct<br>✓ Made conclusions and was able to support them | /5pts |

## Extensions and Connections (for all students)

At the end of the lesson explain to students that they will be collecting their own data.

- For five days (Sunday Night/Monday Day – Thursday Night/Friday Day) students will record the number of hours of sleep they receive and the number of calories from fat they consume that day.
- Students will no doubt have questions about how to keep track of the calories. Encourage students to keep a little notebook or record the calories in their phone. There will be times where they will have to estimate due to the fact that the information is not listed, or they did not eat a full serving etc.

- One tool to use with food that does not have nutrition facts listed is http://www.myfoodapedia.gov/

## Strategies for Differentiation

- Addressing needs of diverse students
    - Read the article out loud and/or provide highlighters
    - Allow students to answer questions to you out loud before writing them down
    - Provide dictionaries
    - Reduce the number of questions
    - For students that may have writing or reading disabilities, it may be acceptable for one partner to turn in the completed discussion questions, or for the student to be graded by answering the questions out loud.
    - If appropriate, students may work independently instead of in small groups
    - Ask a student to "lead" discussions
- Organization Ideas
    - Provide grid paper for making graphs and tables
    - Provide highlighters
    - Provide a copy of the rubric for each student
    - Have snacks already placed on students desks, or hand them out as they enter the room, giving each student specific instructions

# Lesson 2 – Exploring your Own Research

**Strand**
Algebra and Functions

**Mathematical Objective(s)**

Transfer between and analyze multiple representations of mathematical situations.

In this lesson students will use data they have collected about their own eating and sleeping habitats to investigate if there may be a relationship. Students will create a table, bar graph and scatter plot, analyze these mathematical models, and determine an appropriate domain and range.

**Mathematics Performance Expectation(s)**

MPE.12 The student will transfer between and analyze multiple representations of functions, including algebraic formulas, graphs, tables, and words. Students will select and use appropriate representations for analysis, interpretation, and prediction.

MPE.16 The student will investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include

c) domain and range, including limited and discontinuous domains and ranges

**Related SOL's**

A.1 The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. (Focus on representing verbal quantitative situations algebraically)

A.7 The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including
b) domain and range;
f) making connections between and among multiple representations of functions including concrete, verbal, numeric, graphic, and algebraic.

**NCTM Standards**

- Understand relations and functions and select, convert flexibly among, and use various representations for them
- Draw reasonable conclusions about a situation being modeled.
- Use the language of mathematics to express mathematical ideas precisely.
- Communicate mathematical thinking coherently and clearly to peers, teachers, and others

**Additional Objectives for Student Learning**

The student will use Excel to create a table and bar graph.

**Materials/Resources**

- Classroom set of graphing calculators (optional)
- Class set of lap tops or access to a computer lab (with Excel 2007 and Word)
- *Tired and Hungry? Activity #2* (in Appendix)

**Assumption of Prior Knowledge**

- It is assumed these students have already taken Algebra I
- Students should know how to read and create tables and line charts, as well as know what an ordered pair is and how to plot one on the coordinate plane.
- Students should know how to determine an appropriate domain and range.
- Students should know how to create a chart in Excel (using knowledge from Lesson 1)
- The most difficult aspect of this lesson is getting the students to give thorough responses in complete sentences when answering the discussion questions. Students should be reminded that if it is something that they can see and observe in the problem, then their answer will never be wrong.
- The relevant real-life problem in this lesson is sleep-deprived teenagers and the rising rate of obesity in teens.

## Introduction: Setting Up the Mathematical Task

Students may be unaware of the lack of sleep they are getting and their less than adequate eating habits. After collecting data on their own personal habits students will become more aware of they are treating their bodies and may find a correlation between their eating habits and sleep habits.

1) Students should have already collected 5 days worth of data. If a student has incomplete data they may use what they have or use someone else's data (points should be deducted). Have all students get out their data. This would be a good time to distribute lap tops if necessary (5 minutes).

2) Have students share some of the difficulties they faced while gathering their data, and discuss some possible solutions. (10 minutes)

3) Students will transfer their data to a table in Excel and create a bar chart (similar to the steps used for creating a line chart) by complete A – C on *Tired and Hungry? Activity #2* (15 minutes). This is to be completed <u>independently</u>; if a student has a question, they may refer to their notes but may not receive assistance from another student or the


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teacher. The teacher's role will be to assist with any technical problems and monitor the time.

## Student Exploration 1:

**Independent Work**

1) Students will complete part D of *Tired and Hungry? Activity #2* (20 minutes) by choosing (or being assigned) to exchange data with another person. Each student will analyze the other student's table and bar chart and complete the activity independently. Answers should be typed in a word document.

As students complete the discussion questions, the teacher should move about the room reading responses and asking follow up questions, or for clarification.

2) Students will complete part E of *Tired and Hungry? Activity #2* (20 minutes). This should be completed with minimal assistance, although students less familiar with Excel may need additional help.

Students who finish early should share their findings with their partner, and ask them the following questions about their data such as:

1) Do you think your data was accurate or did you have to do a lot of guessing?
2) Was there something abnormal that happened this week, like an ice cream eating competition or a late TV show you couldn't miss?
3) What was the most difficult part of collecting your data?
4) Do you feel this represents a typical week for you?

**Whole Class Sharing/Discussion**

3) As students submit their work the teacher should choose at least 3 scatter plots to project (one with a positive, negative, and no correlation if possible).

## Assessment

- Each student will turn in *Tired and Hungry? Activity #2*. The following scoring rubric will be used.
- This activity is one of 5 components making up a final grade (see unit overview)

Activity #2

| | |
|---|---|
| **Excel Table & Bar Chart**<br>✓ Entered data into tables correctly<br>✓ Created bar chart correctly<br>✓ Correct title/color<br>✓ Neat and easy to read | /5pts |
| **Discussion Questions**<br>✓ Complete sentences<br>✓ Referred to table and chart to explain answers | /10pts |
| **Table/Scatter Plot and discussion of Sleep v. Calories**<br>✓ Table is correct<br>✓ Scatter plot is correct<br>✓ Chose appropriate scale<br>✓ Made conclusions and was able to support them | /15pts |

## Extensions and Connections (for all students)

- Science connection: http://kidshealth.org/teen/food_fitness/nutrition/fat_calories.html# Here, students can learn more about calories and fat
- Have partners put their calorie data together to find measures of central tendency and measures of spread.

## Strategies for Differentiation

- Addressing needs of diverse students
  - Simplify and clarify directions for students
  - Allow students to answer questions to you out loud before writing them down
  - For students that may have writing or reading disabilities, it may be acceptable for one partner to turn in the completed discussion questions, or for the student to be graded by answering the questions out loud.
  - Provide dictionaries
  - Reduce the number of questions
  - Ask a student to "lead" discussions
- Organization Ideas
  - Provide grid paper for making graphs and tables
  - Provide highlighters
  - Provide a copy of the rubric for each student

# Lesson 3 – Exploring the Class' Research

**Strand**
Algebra

**Mathematical Objective(s)**

- ✓ Analyze multiple representations of mathematical situations
- ✓ Determine whether a correlation may exist and
- ✓ Determine the line of best fit given a set of data.

Students will use the data they have collected as a class to look for relationships and determine the validity of those relationships. After averaging their sleep and calories for the week the class will create a table and a scatter plot using the calculator, as well as find the equation of the line of best fit using the calculator.

**Mathematics Performance Expectation(s)**

MPE.2 The student will collect and analyze data, determine the equation of the curve of best fit, make predictions, and solve real-world problems, using mathematical models. Mathematical models will include polynomial, exponential, and logarithmic functions.

MPE.12 The student will transfer between and analyze multiple representations of functions, including algebraic formulas, graphs, tables, and words. Students will select and use appropriate representations for analysis, interpretation, and prediction.

MPE.16 The student will investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically.

**Related SOL's**

A.1 The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. (Focus on representing verbal quantitative situations algebraically)

A.7 The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including
b) domain and range;
f) making connections between and among multiple representations of functions including concrete, verbal, numeric, graphic, and algebraic.


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A.11 The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve real-world problems, using mathematical models. Mathematical models will include linear and quadratic functions.

**NCTM Standards**

- Understand relations and functions and select, convert flexibly among, and use various representations for them
- Approximate and interpret rates of change from graphical and numerical data. Draw reasonable conclusions about a situation being modeled.
- Use the language of mathematics to express mathematical ideas precisely.
- Communicate mathematical thinking coherently and clearly to peers, teachers, and others
- Recognize and apply mathematics in contexts outside of mathematics

**Additional Objectives for Student Learning**

The student will participate in a large group discussion.

**Materials/Resources**

- Classroom set of graphing calculators
- *Tired and Hungry? Activity #3* (in Appendix)

**Assumption of Prior Knowledge**

- It is assumed these students have already taken Algebra I
- Students should know how to read and create tables, as well as know what an ordered pair is and how to plot one on the coordinate plane.
- Students should know how to determine an appropriate domain and range.
- Students should be able to explain themselves clearly through formal writing and use math to support their answer.
- Students should have had experience using the a TI 83 or higher to make a scatter plot and find the equation of the line of best fit
- Students should know the difference between a positive and negative correlation.
- Students should know how to find and interpret the slope of a line and y-intercept.
- It may be difficult for students to realize all of the variables to take into account when doing a "study" like this. Students who have limited knowledge of statistics may not think of problems such as sample size and bias results.
- The relevant real-life problem in this lesson is sleep-deprived teenagers and the rising rate of obesity in teens, as well as the importance of recognizing possible flaws and bias' in studies.

## Introduction: Setting Up the Mathematical Task

Using a single sample (yourself) is extremely unreliable (ask students why this is). In order for the class to look for any possible relationships, a larger group (the entire class) must be examined. Using technology facilitates the process of discovering possible correlations/associations. However, because the data was collected by the student personally and the sample size is still small, there are several possible errors that should be taken into account. It is important discuss with students the difference between a "causal relationship" and an "association", as well as other variables that may affect the outcome of the data.

1) Allow time for students to average their number of hours of sleep and their calorie intake. Students should round to the nearest tenth *(this may be something you have students do for homework to save time).* (5 min) It is probably best to have students turn in their averages anonymously. This could prevent some students feeling pressured to change their answer if their averages are much higher or lower than others. To do this you may have students write their two averages down (clearly labeled) on a sheet of paper and pass them to the front without a name.

2) Students will complete part A of *Tired and Hungry? Activity #3* (see appendix) while you fill in the table by projecting an excel spreadsheet or using some other form of presentation. Before filling in the table, the students must determine the independent and dependent variable, perhaps asking the students:

> "What is our hypothesis – that your eating habits depend on your sleeping habits or that your sleeping habits depend on your eating habits?"

Once the table has been filled in, students will complete part A by re-writing the table in numerical order. (10 mins)

## Student Exploration 1:

**Small Group Work**

1) With students in pairs, have them complete discussion question #1 in part A. Here, they will examine the table and observe any trends, patterns, or relationships. (10 mins)

**Independent Work**

2) Have students enter the data into $L_1$ and $L_2$ in their graphing calculators. They will turn the scatter plot on, pressing Zoom 9 in order to graph. Although it is expected that students already know how to make a scatter plot in the calculator, there may be some students who need assistance from the teacher or their peers. Students will complete part B. (15 mins)


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3) Students will answer discussion questions in part C (independently). The teacher should circulate the room reading responses and encouraging students to clarify and elaborate on their answers (5 minutes)

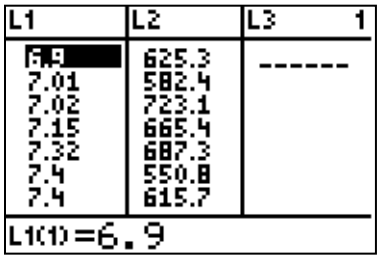
4) Students will complete part D and E. Again, it is expected that students already know how to find the line of best fit using LinReg, but students may need assistance from the teacher or their peers. (20 mins)

**Whole Class Sharing/Discussion**

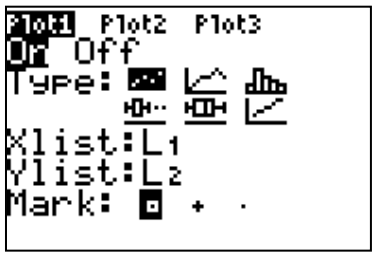
5) The class will come back together for a whole class discussion about each of the questions. After opening the floor for the discussion of a question, students will be allowed 1 - 2 minutes to add to or change their answer. (25 mins)

Below are some screen shots of how the activity will look on the calculator. This example is completely made up and not based on actual data:

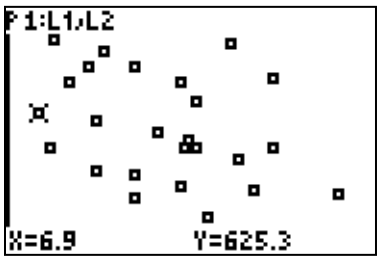
1. Enter averages into
   $L_1$(hours of sleep) $L_2$ (calories from fat)



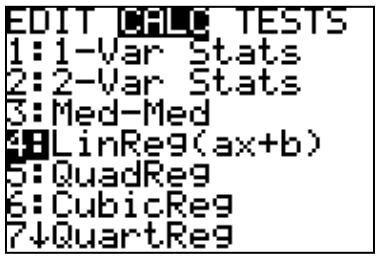

2. Turn Stat Plot On



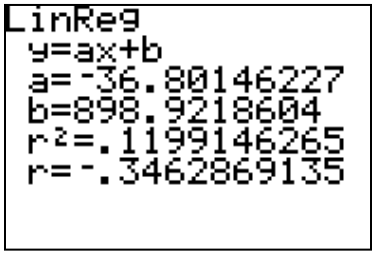

3. Choose Zoom 9 to graph

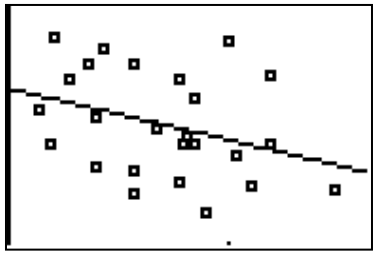



4. Stat, Calc, LinReg




5. The line of best fit is y = -36.8x + 898.9





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## Assessment

- Each student will turn in *Tired and Hungry? Activity #3*. The following scoring rubric will be used.
- Each student is expected to contribute to the final discussion
- These activities are the last of 5 components making up a final grade (see unit overview)

Activity #3

| | |
|---|---|
| **Tables & Scatter Plot**<br>✓ Both tables are complete/correct<br>✓ Data points are plotted correctly<br>✓ Scatter plot is easy to read and axes are clearly labeled | /10pts |
| **Discussion Questions**<br>✓ Complete sentences<br>✓ Supported answers by referring to mathematical model | /15 pts |
| **Line of Best Fit**<br>✓ Equation is correct<br>✓ Line is graphed correctly<br>✓ Slope and intercept are correctly identified | /15 pts |

Final Discussion

| | |
|---|---|
| **Student contributed at least one comment in final discussion** | /10pts |

## Extensions and Connections (for all students)

- The data collected by the students can be used to do further statistical analysis (measures of central tendency, measures of spread, box and whisker, histograms etc.) The TI calculator, Excel, or statistical software such as SAS or SPSS can be used.
- Discuss the meaning of the correlation coefficient "r".
- Consider partnering with the science department and create a project where students can apply the skills from this unit to an experiment in their science class.

## Strategies for Differentiation

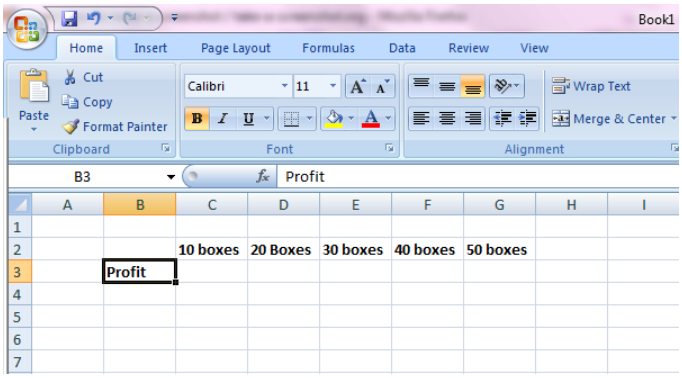
- Addressing needs of diverse students
  - Simplify and clarify directions for students
  - Allow students to answer questions to you out loud before writing them down
  - For students that may have writing or reading disabilities, it may be acceptable for one partner to turn in the completed discussion questions, or for the student to be graded by answering the questions out loud.
  - Provide dictionaries
  - Reduce the number of questions

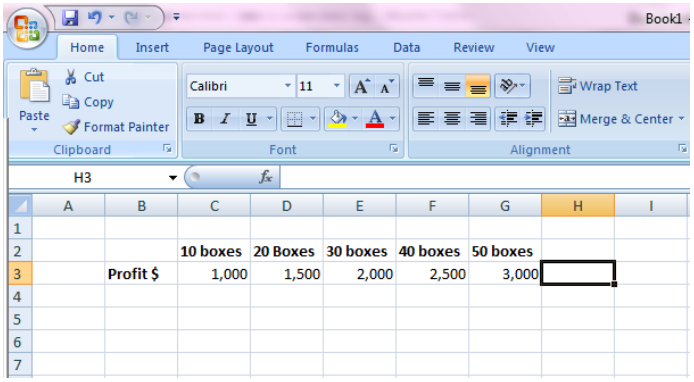
    - Ask a student to "lead" discussions
    - During the group instruction, ask a specific question to as student, or have a student speak on their behalf.
- Organization Ideas
    - Provide grid paper for making graphs and tables
    - Provide highlighters
    - Allow student to use Excel, Word or other computer software to answer questions
    - Provide a copy of the rubric for each student

# Simple Lines Charts in Excel 2007

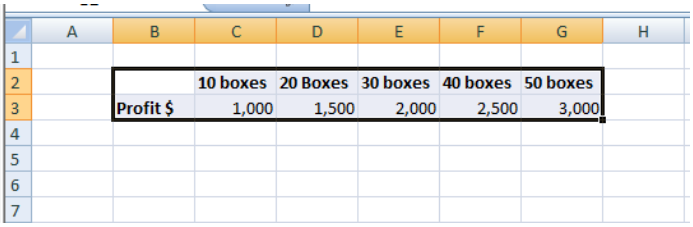
1) Enter your data into a table so that the independent variable (x values) run horizontally. You're dependent variable should be on the left side of the table. Enter each item into a separate cell.

* It always looks better to **BOLD** these headings

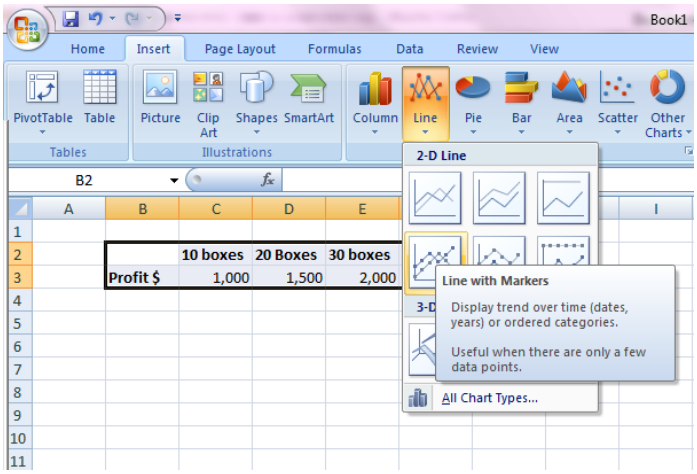


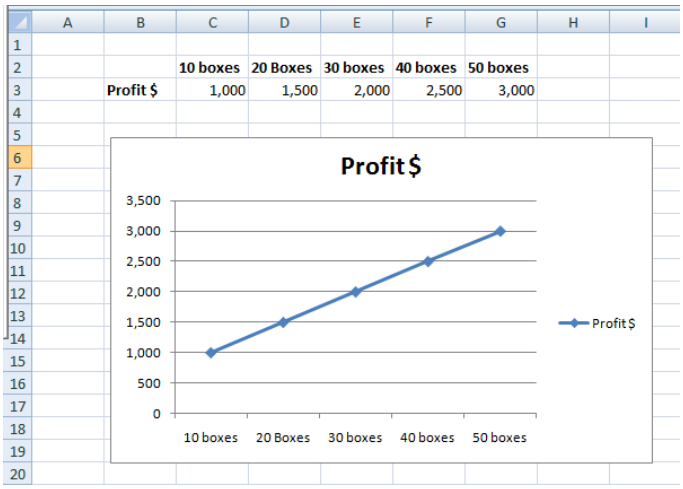




2) Select the entire table. In this example you would click on cell B2 and drag to cell G3




3) Click on "Insert" in the toolbar at the top of the page. Click on the "Line" option and a drop-down menu will appear. Choose the "Line with Markers" chart.




4) At this point you can change the title by clicking on it, as well as change the color of the line by right-clicking on it.

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# *Tired & Hungry?*

## Activity **#1**

A. Read the paragraph below

> *Joshua has been monitoring his sleep and his eating habitats for the past week. So far this is the data he has collected: Sunday night he went to bed at 11:00pm and woke up at 7:00am. That day he ate a total of 713 calories from fat. Monday night he went to bed at 10:15pm and woke up at 7:00am. Tuesday he ate 625 calories from fat. That night he had a soda and had trouble falling asleep. He believes he fell asleep at 12:00am and woke up at 7:30am. Wednesday he consumed a total of 675 fat calories…*

B. **Create two separate tables in excel**. Record the amount of sleep Joshua got each day in the first table and the number of calories from fat he consumed each day in the second table.

C. **Make a line chart for each table**. Change the title of the first line chart to say "Amount of Sleep" and the title of the second line chart to "Calories (from fat) Consumed".

D. Change the color of the line for "sleep" to blue (if it isn't already) and the color of the line for "calories" to red.

E. Use the table and graphs you created to answer the following discussion questions on your own paper. Be sure to use complete sentences:

1) Does the data appear to support the hypothesis presented in the article? Why or Why not?

2) Describe any relationships you notice between the two line graphs.

3) Why do you think we did not place both lines on the same chart? (Hint: Domain/Range)

4) Why do think we used a line graph instead making a scatter plot?

5) Is this information sufficient enough to make any conclusions? Why or why not?

F. Make a third table comparing his sleep and calorie intake. Plot the points on a scatter plot. You may use graph paper or create the scatter plot in Excel. Does it make sense to connect these points? Do you notice a trend or pattern? If so, explain.

**E-MAIL (or Print) YOUR EXCEL WORKSHEET(s) AND TURN IN YOUR DISCUSSION QUESTIONS**



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*Tired & Hungry?*

Activity **#2**

A. **Create two separate tables in excel**. Record the amount of sleep you received each day in the first table and the number of calories from fat you consumed each day in the second table.

B. **Make a bar chart for each table** (the bar chart is the first type of chart). Change the title of the first line chart to say "Amount of Sleep" and the title of the second line chart to "Calories (from fat) Consumed".

C. Change the color of the bars for "sleep" to blue (if not already) and the color of the bars for "calories" to red.

D. **Exchange data results with another student.** Analyze their data by answering the following questions IN A WORD DOCUMENT:

1) Described the student's sleep habits by looking at the bar chart:
   Did the student sleep about the same amount each night? Was there a day that stands out? Are there any patterns? **How can you tell**?

2) Described the student's eating habits by looking at the bar chart:
   Did the student eat about the same number of fat calories each day? Was there a day that stands out? Are there any patterns? **How can you tell**?

3) Compare the two charts: Does there appear to be a correlation? **How can you tell?**

4) If you were to compare sleep to calories, which would you indicate as the independent variable and which would you indicate as the dependent variable? **Why**?

E. In Excel, click on the bottom tab to move to a new "sheet" create a table like the one below using the student's data:

| Hours of Sleep | | | | | |
|---|---|---|---|---|---|
| Calorie (from fat) intake | | | | | |

F. Highlight the table and create a scatter plot.

G. Adjust x-axis to an appropriate scale by right-clicking on it and choosing "Format Axis". Change the min/max to "Fixed". You can now type in your own min/max. (REPEAT w/ Y-AXIS)

5) Based on the scatter plot do you believe there is a correlation? Explain your answer.

**E-MAIL YOUR WORK TO ME**



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*Tired & Hungry?*

Activity **#3**

A. Determine what your independent and dependent variables are and complete the first table. Re-arrange the data in numerical order in the second table.

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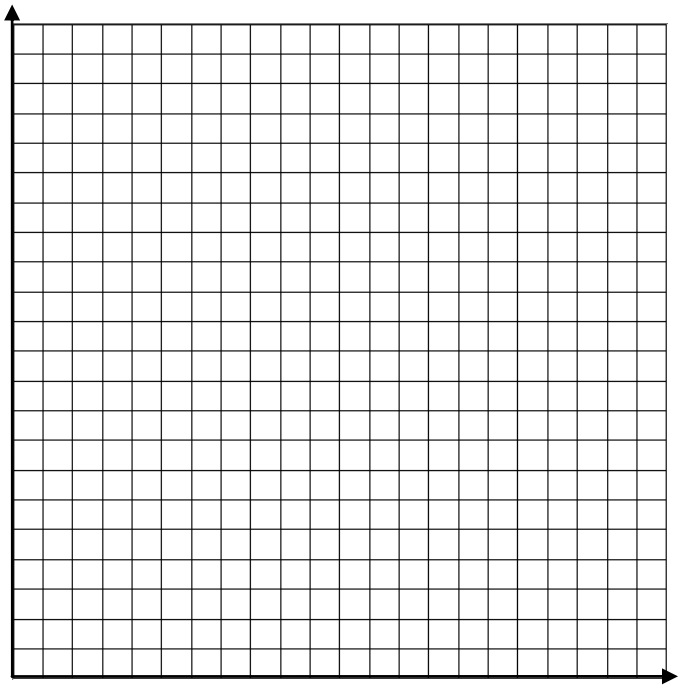
1) Below, describe any patterns or relationships, as well as particular data points that stand out to you. Determine whether, according to our data, there appears to be a correlation.

B. Using your graphing calculator, create a scatter plot.
Sketch the scatter plot below, being sure to label each axis correctly:



C. Answer the following discussion questions:

2) Looking at your scatter plot, does there appear to be a positive correlation, negative correlation, or no correlation?

3) Does the data appear linear, quadratic, or exponential (or none of these)?

4) Discuss the following:

-Are there any "clusters" of data points? If so, where?

-Are there any data points that seem unusual to you? If so, why?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D. Let's assume that this data may be linear. Find the line of best fit using LinReg.

Equation:

Slope:

Y-intercept:

E. Sketch the line of best fit on your graph in part C. Answer the following discussion questions:

5) How well does the line appear to fit the data?

6) Does the line appear to support our hypothesis? Why or why not?

7) Interpret the meaning of the slope and y-intercept in the context of the problem:

8) Determine an appropriate domain and range for the function.

9) Do you think this data is reliable enough to make a strong conclusion? Why or why not?



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