Title: Line of Best Fit

Brief Overview:

This Concept Development Lesson is based on the skills needed to determine the line best fit for a set of data. The focus is based on grade levels 7-12. Students will review basic graphing skills, and constructing scatter plots. They will identify the relationships that are presented by the data on the scatter plot. This knowledge will guide them in understanding how to identify a line of best fit for different data sets.

NCTM Content Standard/National Science Education Standard:

Data Analysis & Probability:
- Select and use appropriate statistical methods to analyze data.
    - Be able to display a scatter plot, describe its shape, and determine regression coefficients, regression equations, and correlation coefficients using technological tools.
    - Identify trend and bivariate data and find the functions that model the data or transform the data so that they can be model.

Grade/Level:

Grades 7 – 12, Algebra I

Duration/Length:

Three to four 86-minute lessons

Student Outcomes:

Students will:
- Learn to input different data in order to create a scatter plot.
- Learn to identify different correlations of scatter plot and relate them to slopes of lines.
- Learn to identify lines of best fit by using their calculator.

Materials and Resources:
- White boards, dry erase markers, erasers
- TI-83 calculators
- M&M Candy (Plain)
- Cups
- Graph paper
- Computer lab
- Scissors
- Overhead projector

- Worksheets
  - What's the Relationship?
  - What's the Relationship? Exit Ticket
  - From Behind the Line
  - Slope-Intercept Warm-Up Cards
  - Sizing It Up
  - Line Ups
  - Making Sense of Data
  - Line of Best Fit Quiz
  - Falling Face Up or Down
  - Calculator Steps

Development/Procedures:

Lesson 1

Preassessment – Present students with scatter plots which show positive, negative, and no associations. Students will identify the relationships. Distribute copies of the warm-up activity "What's the Relationship?" Review as a class the correct answers to the warm-up.

Launch – Connect the warm-up with the lesson's objective. Explain to students they will analyze the relationship of the variables within a data set. They will determine if the data represents a positive or negative association, or perhaps no association. Then, students will determine the line of best fit. Although some exploration will be done with technology, students will also be asked to find the line of best fit by hand. One technique involves asking the students to draw an oval around the data that displays a positive or negative relationship, as done in the warm-up. After they draw an oval around the data points, they will draw a line from end to end of the oval. This will represent their line of best fit.

Teacher Facilitation – Ask students to recall the definition for the line of best fit. Elicit volunteers to explain how they drew their lines of best fit in the warm-up. Lead students to the definition, "The line that passes most closely through several coordinates, minimizing the distances between the line and the actual points. It does not have to pass through the points." Have students record the definition on their warm-up worksheet. Ask students what is the purpose of finding the line of best fit. Expect answers such as, "Describe the trend of the line" or "Use it to predict values that are not actual data points."

All students will go the computer lab to complete the assignment "From Behind the Line". Instruct the students to go to the website:

http://illuminations.nctm.org. Select "Activities" from the top navigation bar or from the first button along the left side. On the search page, enter the line of best fit in the Advanced Search box, and click the Search button. The resulting list will include the Line of Best Fit activity. Click on the link for this. Read the Instructions as a class. The teacher should visit the website before the start of class in order to be able to demonstrate how to use the tools for this activity. Listed below are general steps on using this activity.

- Click on the scatter plot multiple times to create data points.
- Click on the Student Guess box to approximate the line of best fit for the data.
- Next, click the box that says "Computer fit". The computer will give you the correct line of best fit for the data.
- Compare. Continue playing with different sets of data.

Student Application – Once students are familiar with the computer program, distribute the packet for their class work titled, "From Behind the Line". Students will use the data tables provided describing two basketball teams. They should create scatter plots showing the relationship between players' minutes played and points scored. Instruct the students to input the data points in the box, using a comma between the data (Ex: minutes, points; 2234, 120). Click on "Update Plot" and the points will be plotted on the scatter plot. Students will complete a student guess of the line of best fit and record that guess. Next, click the "computer fit" button. The computer will now give you the correct line of best fit for the data. Repeat this procedure for both sets of data.

Embedded Assessment – As students are working, teacher should be monitoring their progress by walking around the room. Worksheets should be collected at the end of the class period to evaluate student understanding. Exit tickets will be handed out for students to complete before leaving the classroom. See "What's the Relationship? Exit Ticket". Students will plot a set of data points, draw a line of best fit, and explain, in one sentence why this is the line of best fit.

Reteaching/Extension –
- For those who have not completely understood the lesson, supply them with another set of data to input into the computer. Use the data set:

# Minutes to take test	Test Grade
31	64%
38	66%
46	82%
49	90%

Students will guess the line of best fit on the computer looking at the relationship of the data. Then have the computer give them the correct line.

- For those who have understood the lesson, have them delete the data for Kobe Bryant from the data box on their computer. Ask the following questions.
  o How does the line of best fit change?
  o Why does the line change? Consider how Kobe Bryant's data compares to the rest of his teammates' data.

Lesson 2

Preassessment – Using the "Slope-Intercept Warm-Up Cards", give students approximately five minutes to write down any of the definitions to the vocabulary words that they are familiar with. Prepare an overhead transparency of the words to review as a whole class, using the class's definitions and teacher guidance. All students should make any corrections to their own definitions, if necessary. Have students cut out their cards, separating the vocabulary word from its definition, to make a total of 14 cards. After mixing up the cards, students can either work independently to match the words and definitions. As an alternate activity, have the students work with a partner, using only one set of cards, and play memory. To play memory, students will turn all cards face down and attempt to match the vocabulary word with its definition, turning over two cards per turn. If it is a match, they can take another turn. If it is a mismatch, turn the cards back over and their partner gets the next turn.

Launch – Ask students for their shoe size and their height in inches. Collect data from each student and record it on the overhead as students record the data in the table on the worksheet, "Sizing it Up." Transfer the data into a scatter plot, using height as the independent variable (x – axis) and shoe size as the dependent variable (y – axis). Ask: "Is this data linear?" and "Could we find a slope?" Lead students through finding a slope for the data by hand. Have the students draw a line of best fit through the data. Identify the two points the line passes through. Find the change in the heights and the change in the shoe sizes, modeling the slope

formula $\dfrac{y_2 - y_1}{x_2 - x_1}$. Talk about whether this is a valid slope, and what the slope means in relationship to the problem. Talk about how the slope and the line of best fit connect to the data by asking if all data points follow this trend.

Teacher Facilitation – Hand out the worksheet, "Making Sense of Data". This worksheet provides the students with four sets of data. Allow students will work independently, in pairs, or with small groups to compute the slope by hand, for each set of data. For each set, students will analyze the slope and y – intercept, and interpret each within the context of the problem. With each data set, they will answer these questions:
- o   Is there a constant rate of change in this set of data?
- o   What does the slope mean in the context of this problem?
- o   What is the y – intercept? (The teacher may need to assist students in recalling that the y – intercept is where the line crosses the y – axis and when the x – coordinate is equal to 0.
- o   What does the y – intercept mean in the context of the problem?

After students calculate all slopes, as a class, record everyone's slope for data set #1. Ask: "Why are the slopes different?" (Slopes will be different because students will have used different data points.)

Student Application – Take students to the computer lab and access the same website:, http://illuminations.nctm.org. Click on the link to "Line of Best Fit". Have students work independently to complete the information needed for each set of data, using the same data from the worksheet, "Making Sense of Data". Students will input their data into the data box, making sure they input the x – value and y – value in that order. Plot the points on the scatter plot by clicking "Update plot". Use the slope they calculated in the classroom as their 'student guess'. On worksheet, compare their guess to the scatter plot. Ask, "Does your guess look appropriate?" Click on "Computer guess" to receive the most approximate answer. Have the students record this value next to their guess. Ask, "How close was your slope to the correct slope for the line of best fit?"

Embedded Assessment – Teachers will circulate around the classroom and through the computer lab to offer help as needed by the students. Teachers should collect the student worksheets to

5

check for completion and understanding by students. Assign an exit ticket using the same website; http://illuminations.nctm.org. Using the line of best fit program, students will input the following data into the data box:

Hours Worked	Amount of Paycheck
12	$54
13	$56
16	$65
17	$64
20	$100

Students will make a "Student Guess" for the line of best fit. Students will then use the "Computer fit" option to create the actual line of best fit. Have students print out their student guess and computer fit finished products. Be sure to tell students that the teacher expects 2 different lines. Very rarely is the student guess "perfect," so they should be graded on completion, not perfection!

As a homework assignment, instruct students to bring in a set of numerical data to use in class tomorrow. Tell them to look in the newspaper, internet, magazine, etc.

Reteaching/Extension –
- For those who have not completely understood the lesson, partner up with those who have understood the lesson, and perform a "Player/Coach" Activity. One student begins as the Player and the other student is the Coach, encouraging students with better understanding to be the coach first. The coach instructs the player how to complete the problem, and the player follows the directions. Switch roles, and complete a second problem.

Lesson 3

Preassessment – Prior to the start of class, complete a class set of graphs, as modeled on the worksheet "Line Ups". Cut each graph out and tape it on to an index card, one graph per card. Each student will get a graph taped on their back. Students will walk around the room asking other students Yes/No questions about their line. For example, "Does my line have a positive slope?", "Is the y-intercept above the x-axis?" etc. Students will be responsible for identifying the slope-intercept form of the equation of the line of the graph on their back.

Launch – Have each student collect the following materials: a copy of "Falling Face Up or Down" experiment packet, a cup of color-

coated candy, and a TI-83 or TI-84 calculator. Establish the rule "Do not eat the candy or you will take a zero on the assignment!" to prevent students from eating the materials they will need for the lesson's activity.

Teacher Facilitation – Lead students step by step through the assignment, "Falling Face Up or Down." Have each student count out how many candies they have in their cup and record that number as the starting point in the chart (0, # candies). The teacher can have a cup as well to model the activity as students work. Begin by having the students place their candies in their cup and gently toss them out onto their desk. Remove all candies that landed face up, and set them aside. Remind the students not to eat the candies yet. Count the number that landed face down. Record this number as the first total in the chart (1, #candies). Place those face down candies back in the cups.

Student Application – Have student repeat this procedure, recording the number of candies landing face down for 6 trials or until there are no candies remaining. Using this data, instruct the students to make a scatter plot. Tell the students to use the trial number as the x – coordinate and the number of candies as the y – coordinate.

Repeat the experiment, recording the candy data in column C of the data table. Draw a line of best fit in the scatter plots. Allow students to the calculator to determine the "best" line of best fit for the data. Each student has already received a TI-83 or 84 calculators. They need to input their data in the lists on the calculator by following the directions on the worksheet, "Steps for Creating a Scatter Plot." Challenge students to make observations about the relationship of their data. Ask questions such as, "Is it positive or negative correlation? Why does the correlation make sense, in the context of the problem?" Leave the data in the calculator and use the calculator to generate the line of best fit for the data, again following the directions for "Steps for Finding Line of Best Fit".
See attached "Data Sets and Scatter Plots on the TI-83 Plus"   (The screen shots are just an example, they are not the actual data for this experiment)
Students are more familiar with slope-intercept form following the equation $y = mx + b$. Explain to them that in this case $m = a$, where a is the slope. Substitute the value of a in for a in the equation and the value of b in for b in the equation. Instruct students to find the line of best fit for both experiments. Allow students to continue to use the calculator when answering the

questions regarding the experimental outcomes. Note these questions frequently appear on the High School Assessments, and are critically important. Students may eat their candy now!!!

Embedded Assessment – Collect the questions that students completed regarding their M&M experiment. Pass out one white board, a white board marker, and a white board eraser to each student. Make an overhead of "Finding the Line of Best Fit". Display one set of data at a time, giving students approximately five minutes for each. Students should input the data into the lists in their calculators and compute the line of best fit. On the white board, students should write the equation of the line of best fit in slope-intercept form. Extend this activity by asking students to interpret the slope and y – intercept in context of the candy activity.

Reteaching/Extension –
- Group students into threes or fours. Have them use their homework assignment from the previous night. All students should have brought in a set of numerical data. Instruct them to input the data into their calculators and produce the line of best fit for everyone's data. For each set of data, try and challenge students to explain what the slope and y – intercept mean in the context of each situation.

Summative Assessment:

Teachers can use each activity in the previous three lessons to assess student understanding of the concept, "Line of Best Fit". Questions have been asked of them to explain their reasoning and deduction in finding their answers. With practice, as much as necessary, teachers can choose to assess their students with a small, HSA-like quiz. Included with the materials of this unit is a quiz, "Line of Best Fit Quiz," consisting of two grid-ins and one ECR.

Authors:

Elizabeth Farrell
Chesapeake High School
Anne Arundel County Public Schools

Erika Hancock
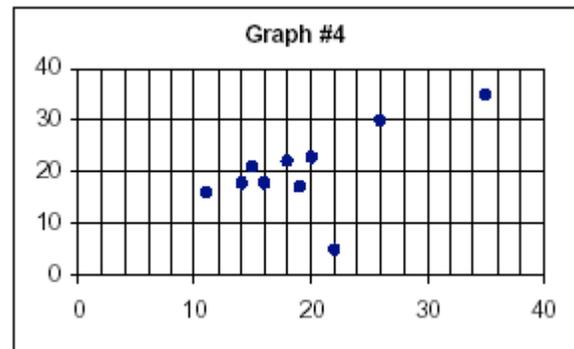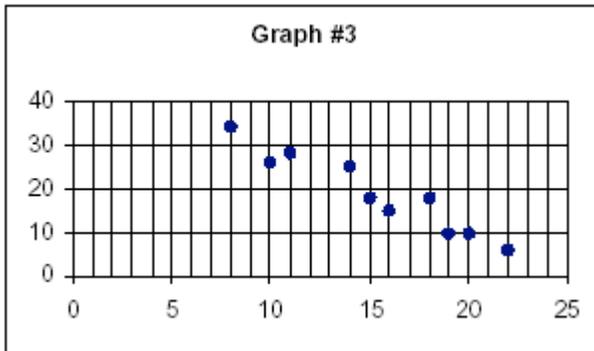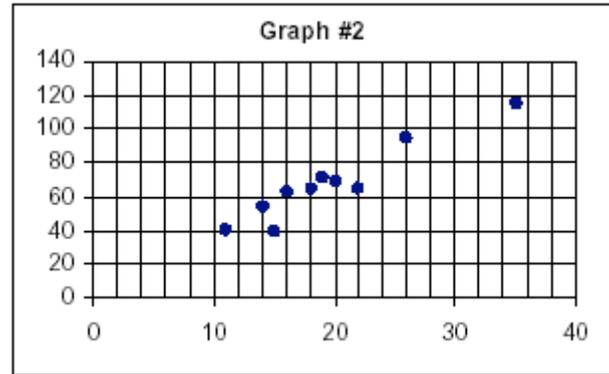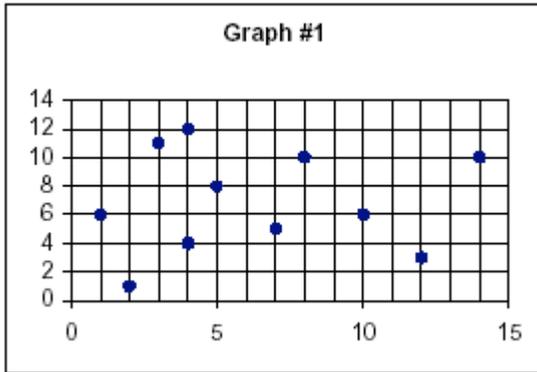Western Heights Middle School
Washington County Public Schools

Melissa Page
Chesapeake High School
Anne Arundel County Public Schools

What's the Relationship?

Name: _____

Date: _____

1. Identify the correlation in each graph below. Label each graph as "positive", "negative", or "no correlation".

Graph #1

Graph #2

Graph #3

Graph #4

2. On the graphs that have a positive or negative correlation, draw an oval surrounding all points.
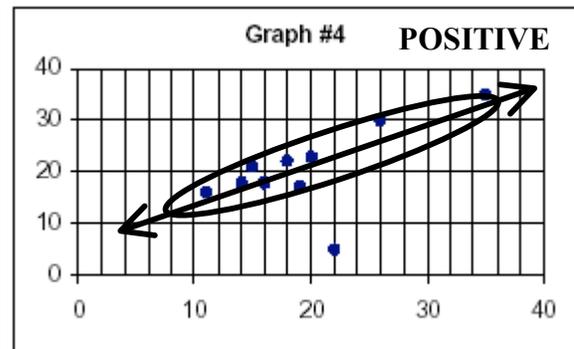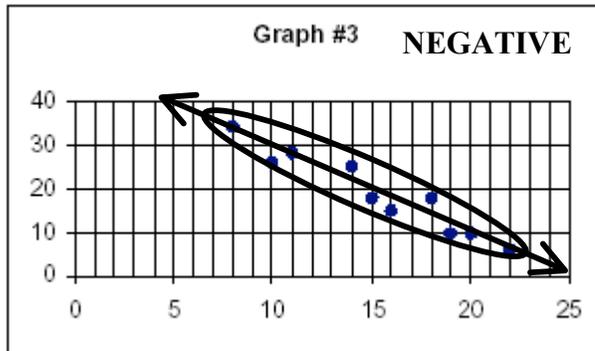
3. Draw the a line through the oval (end to end).

Definition: **Line of Best Fit**

_____

_____

_____

_____

What's the Relationship?   Name: ___ANSWER KEY____
                                                  Date: _____

1. Identify the correlation in each graph below. Label each graph as "positive", "negative", or "no correlation".

Graph #1 **NONE**

Graph #2 **POSITIVE**

Graph #3 **NEGATIVE**

Graph #4 **POSITIVE**

2. On the graphs that have a positive or negative correlation, draw an oval surrounding all points.

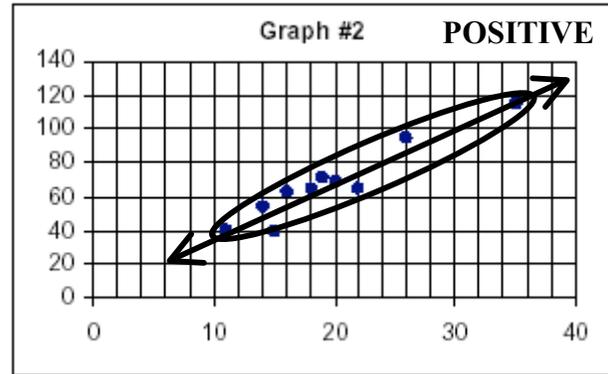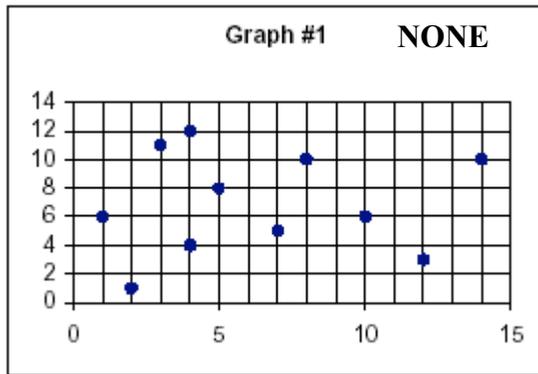3. Draw the a line through the oval (end to end).

Definition: **Line of Best Fit**

 The line of best fit describes the trend of the data. The equation of this line can be used to predict data values.
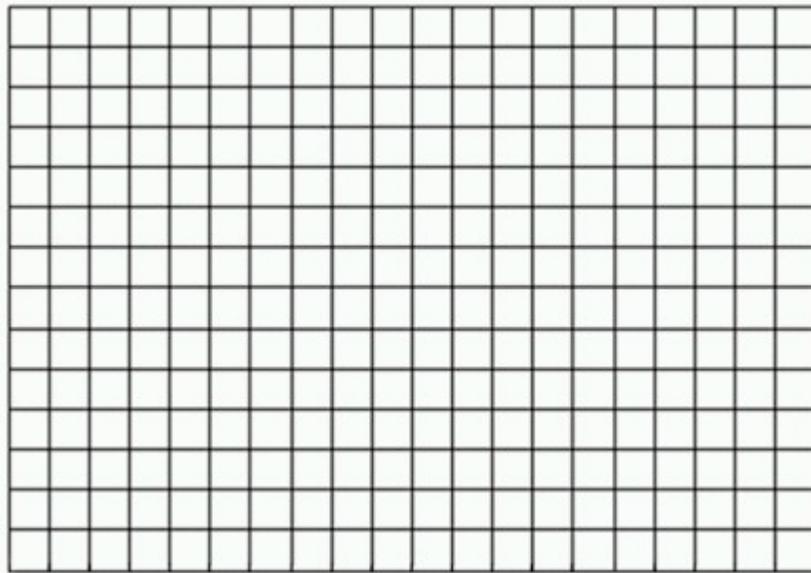
_____

What's the Relationship?
Exit Ticket

Name: _____

Date: _____

Biking Home

Hours (x)	1	2	3	4	5	6	7	8
Miles (y)	35	29	26	20	16	9	6	0

1. Graph a scatter plot of the data relating time and distance on the grid below. Be sure to label the grid appropriately.

2. Draw the line of best fit for the data above. Use mathematics to explain how you determined your line of best fit. Use words, symbols, or both in your explanation.

Biking Home

Hours (x)	1	2	3	4	5	6	7	8
Miles (y)	35	29	26	20	16	9	6	0

1. Graph a scatter plot of the data relating time and distance on the grid below. Be sure to label the grid appropriately.
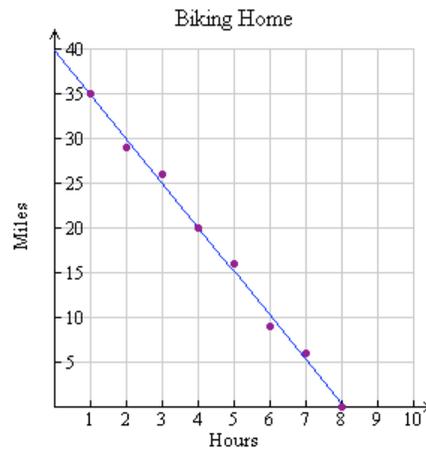
Biking Home

2. Draw the line of best fit for the data above. Use mathematics to explain how you determined your line of best fit. Use words, symbols, or both in your explanation.

The line of best fit should be drawn through the middle of the data, capturing as many points as possible. The data points follow a negative correlation, so the slope of the line of best fit should be negative.

Name: _____

The 2004-2005 Detroit Pistons are often credited as the epitome of team concept, with no player trying to outperform his teammates. "We are a team that truly embodies what team is about. We're unselfish" said Piston Chauncy Billups.[1] Many credit the Piston's unselfish style as the reason they won the NBA Championship in 2005.

On the other hand, hecklers have branded Kobe Bryant as a selfish, egotistic player who pads his own statistics at the expense of his team.[2]

In this activity, you will compare these two teams to see what impact a superstar player has on his team's statistics. The following tables show only those players who, on average, played more than 20 minutes per game. Roughly speaking, these players would be considered the "starters" on each team.
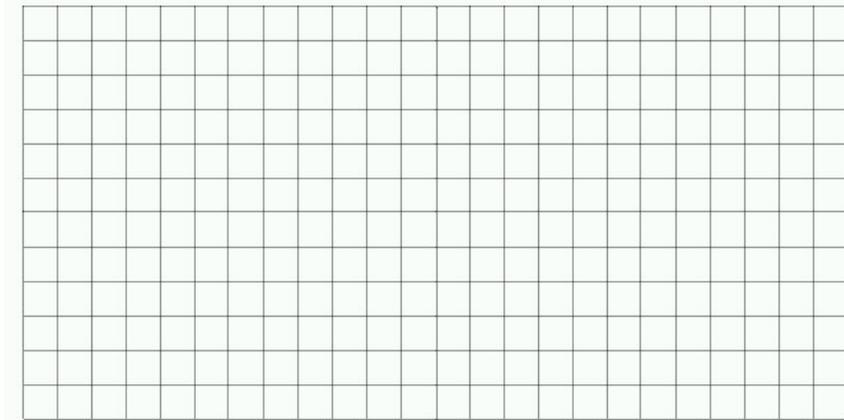
Los Angeles Lakers, 2004-2005

Player	Minutes	Points
Kobe Bryant	1819	2689
Caron Butler	1195	2746
Chucky Atkins	1115	2903
Lamar Odom	975	2320
Chris Mihm	735	1870
Jumaine Jones	577	1830

1. Using the data for Kobe Bryant, enter points along the horizontal axis and minutes along the vertical axis. To plot this data, you can enter **1819, 2689** in the text box and click the Update Plot button. Plot the same data for the other players on the Lakers. After all of the data is plotted, describe any patterns that you notice.

   _____

   _____

2. Click the **Student Guess** button, and move the green dots until the line approximates the data. Sketch your graph and your guess of the line of best fit.
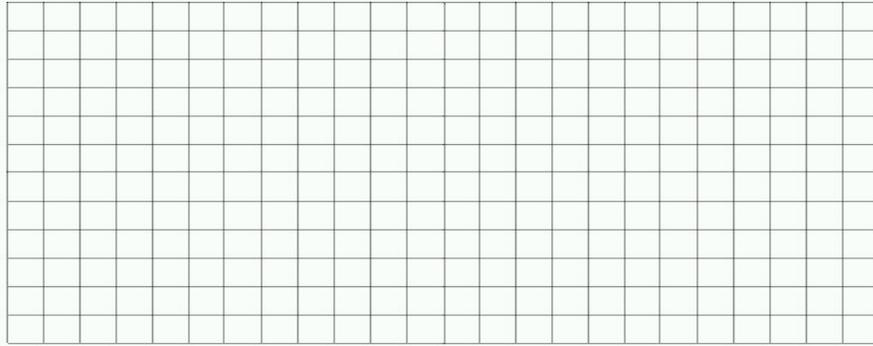
3. Click the **Computer Fit** button. The computer will calculate the equation for a line of best fit, and a red line will appear on the graph. How does the equation of your green line compare to the equation for the red line of best fit? Sketch your guess of the line of best fit (use a dotted line, or a different color) and then sketch the computer's line of best fit (use a solid line, or different color).

Now, you will be repeating this procedure for the Detroit Pistons!

Detroit Pistons, 2004-2005

Player	Minutes	Points
Tayshaun Prince	3039	1206
Richard Hamilton	2926	1424
Chauncey Billups	2866	1316
Rasheed Wallace	2687	1145
Ben Wallace	2671	721
Antonio McDyess	1797	740
Carlos Arroyo	1448	461

4. Using the data for Tayshaun Prince, enter points along the horizontal axis and minutes along the vertical axis. To plot this data, you can enter **1206, 3039** in the text box and click the Update Plot button. Plot the same data for the other players on the Lakers. After all of the data is plotted, describe any patterns that you notice.

_____

_____

5. Click the **Student Guess** button, and move the green dots until the line approximates the data. Sketch your graph and your guess of the line of best fit.
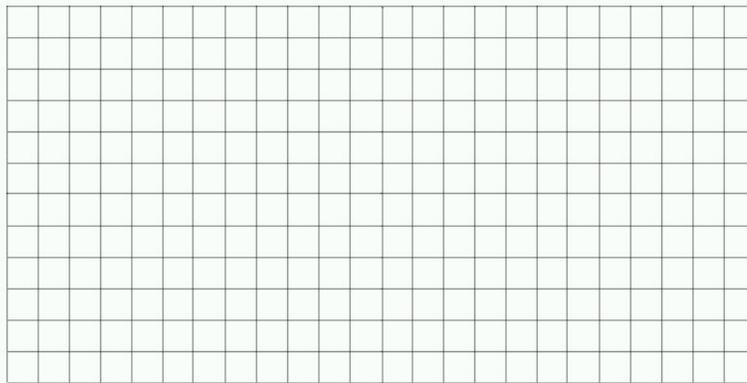
6. Click the **Computer Fit** button. The computer will calculate the equation for a line of best fit, and a red line will appear on the graph. How does the equation of your green line compare to the equation for the red line of best fit? Sketch your guess of the line of best fit (use a dotted line, or a different color) and then sketch the computer's line of best fit (use a solid line, or different color).
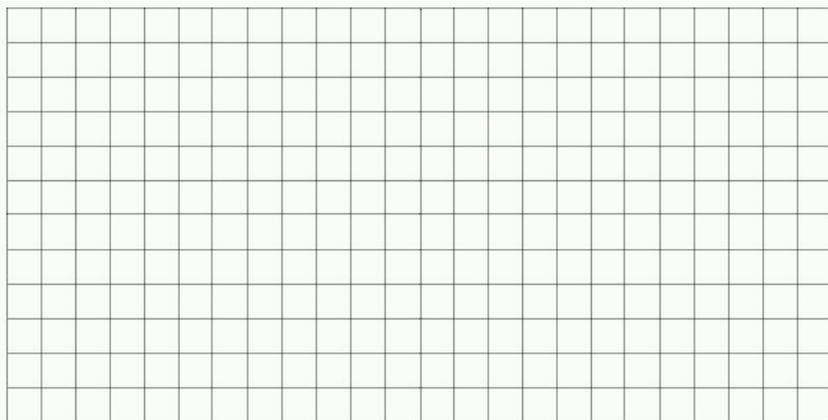
Slope	
Rise	
Run	
Slope-Intercept Form	
Ordered Pair	
Independent Variable	
Dependent Variable	

Slope	$m = \dfrac{\text{rise}}{\text{run}} = \dfrac{y_2 - y_1}{x_2 - x_1}$
Rise	The change in y
Run	The change in x
Slope-Intercept Form	$y = mx + b$ $y = ax + b$
Ordered Pair	$\left(a, b\right)$
Independent Variable	Variable that changes independently
Dependent Variable	Variable that changes according to the Independent variable

Sizing it Up

1. Enter the shoe size and height in inches for every member of the class.

Height (in)	Shoe Size

2. Make a scatter plot of the data for height and shoe size on the grid below. Be sure to label the grid appropriately.
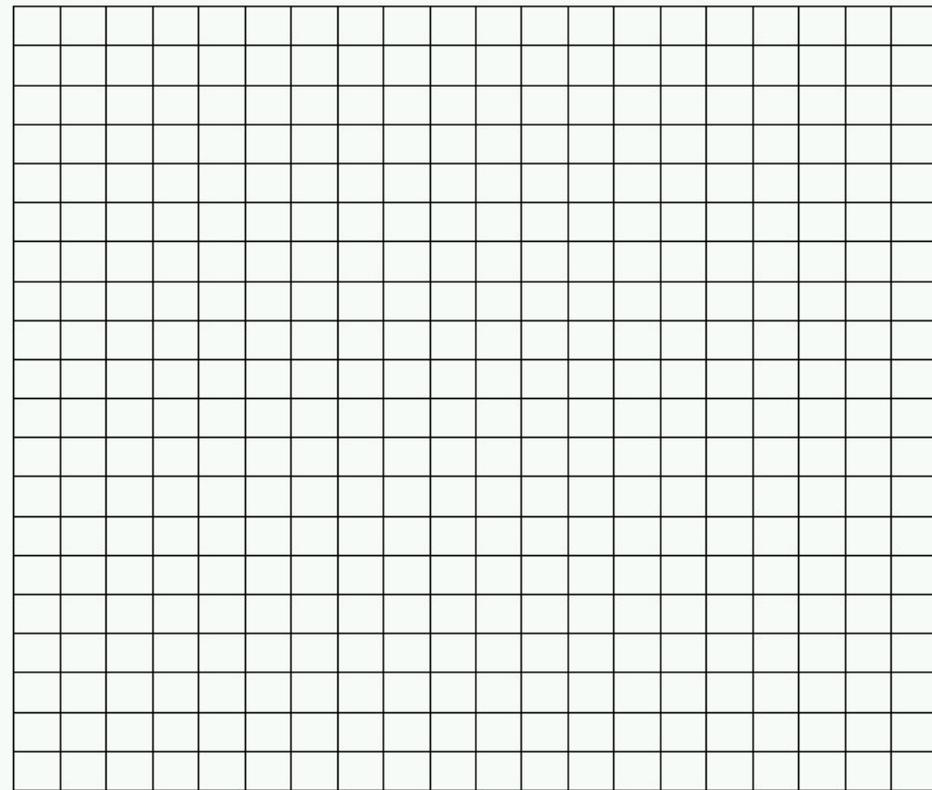
3. Draw the line of best fit.

4. Calculate the slope of the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

5. Is this a valid slope? Explain.

6. Explain what this slope means in the context of the problem.

7. Do all data points follow this trend? Use mathematics to explain your answer. Use words, symbols, or both in your explanation.

Making Sense of Data   Name: _____

Slope Formula: $\dfrac{y_2 - y_1}{x_2 - x_1}$

1. *Exercise Program*

Minutes (x)	0	10	20	30	40	50	60
Calories Burned (y)	0	74	120	175	200	242	280

- Is there any constant rate of change with this data?

- Pick any two points and calculate the slope.

- What does the slope mean in the context of this situation?

- Calculate the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

- Identify the y – intercept.

- What does the y – intercept mean in the context of this situation?

2. *Active Dentists in the U.S.*

Year (x)	0	5	10	15	20	25	30
Number of Dentists (y)	154	152	149	147	144	136	121

- Is there any constant rate of change with this data?

- Pick any two points and calculate the slope.

- What does the slope mean in the context of this situation?

- Calculate the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

- Identify the y – intercept.

- What does the y – intercept mean in the context of this situation?

3. Calories in Fast Food

Total Fat (x)	0	9	13	21	30	36	42
Total Calories (y)	0	260	320	425	452	463	550

- Is there any constant rate of change with this data?

- Pick any two points and calculate the slope.

- What does the slope mean in the context of this situation?

- Calculate the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

- Identify the y – intercept.

- What does the y – intercept mean in the context of this situation?

4. *Wind Speed and Wind Chill Temperature*

Wind Speed (x)	0	6	9	12	17	20	22
Temperature (y)	32	28	22	18	16	10	3

- Is there any constant rate of change with this data?

- Pick any two points and calculate the slope.

- What does the slope mean in the context of this situation?

- Calculate the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

- Identify the y – intercept.

- What does the y – intercept mean in the context of this situation?

Name: __ANSWER KEY____

$$\text{Slope Formula: } \frac{y_2 - y_1}{x_2 - x_1}$$

1. *Exercise Program*

Minutes (x)	0	10	20	30	40	50	60
Calories Burned (y)	0	74	120	175	200	242	280

- Is there any constant rate of change with this data? YES

- Pick any two points and calculate the slope. ANSWERS MAY VARY

- What does the slope mean in the context of this situation?
        The number of calories burned per 10 minutes

- Calculate the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation. $y = 4.49x + 21.29$

- Identify the y – intercept. 21.29

- What does the y – intercept mean in the context of this situation?
        There are 0 calories when 0 minutes are exercised

2. *Active Dentists in the U.S.*

| Year (x)	0	5	10	15	20	25	30
Number of Dentists (y)	154	152	149	147	144	136	121

- Is there any constant rate of change with this data? YES

- Pick any two points and calculate the slope. ANSWERS MAY VARY

- What does the slope mean in the context of this situation?
        The number of dentists every five years

- Calculate the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation. $y = 0.97x + 157.85$

- Identify the y – intercept. 154

- What does the y – intercept mean in the context of this situation?
        In the first year the data was collected there were 154 dentists

3. Calories in Fast Food

| Total Fat (x)	0	9	13	21	30	36	42
Total Calories (y)	0	260	320	425	452	463	550

- Is there any constant rate of change with this data? YES

- Pick any two points and calculate the slope. ANSWERS MAY VARY

- What does the slope mean in the context of this situation?
        Change in number of calories as fat increased

- Calculate the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation. $y = 11.1x + 113.4$

- Identify the y – intercept. 0

- What does the y – intercept mean in the context of this situation?
   There is 0 fat when there is 0 calories

4. *Wind Speed and Wind Chill Temperature*

Wind Speed (x)	0	6	9	12	17	20	22
Temperature (y)	32	28	22	18	16	10	3

- Is there any constant rate of change with this data? YES

- Pick any two points and calculate the slope. ANSWERS MAY VARY

- What does the slope mean in the context of this situation?
        As wind speed increases, the temperature decreases

- Calculate the line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation. $y = -1.23x + 33.56$

- Identify the y – intercept. 32

- What does the y – intercept mean in the context of this situation?
        It is 32° when there is no wind

Line Ups
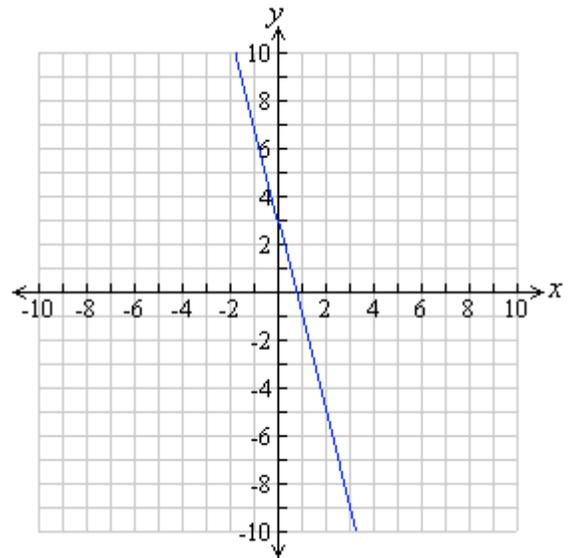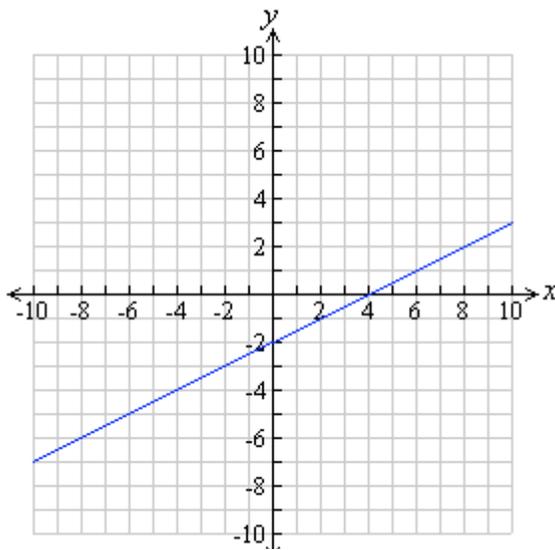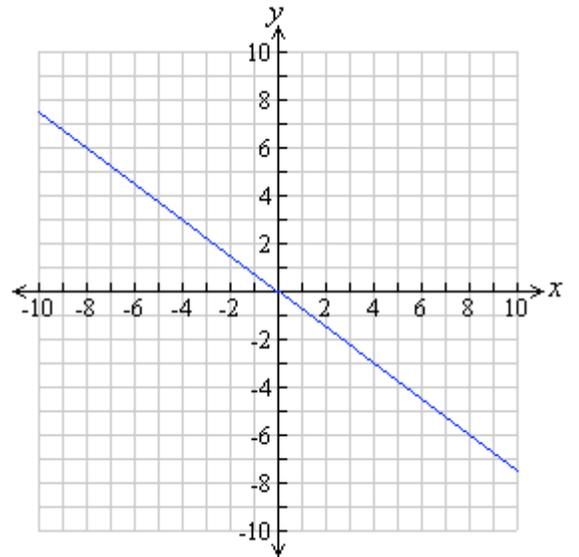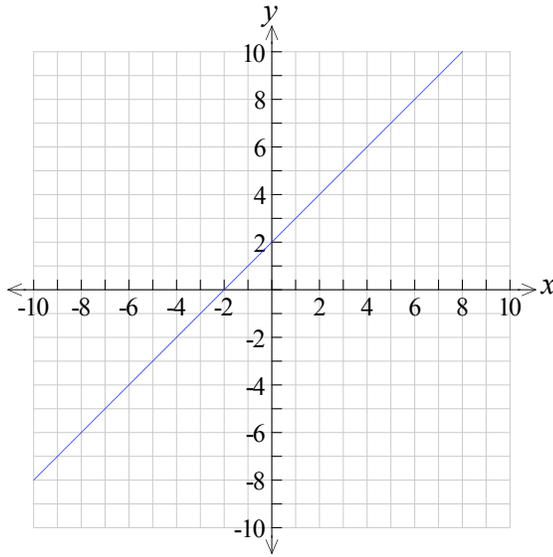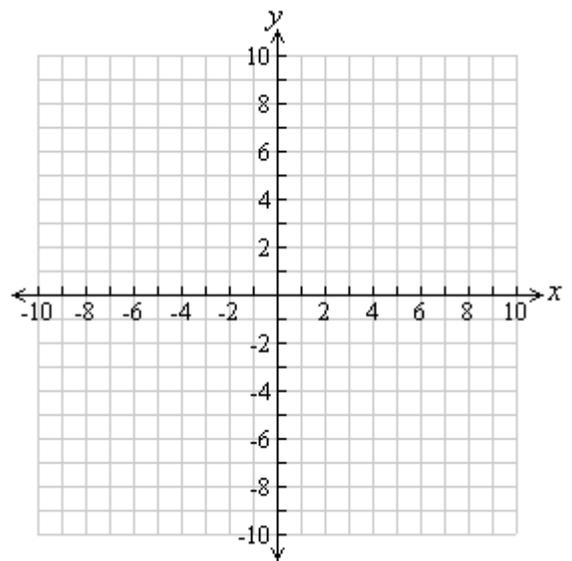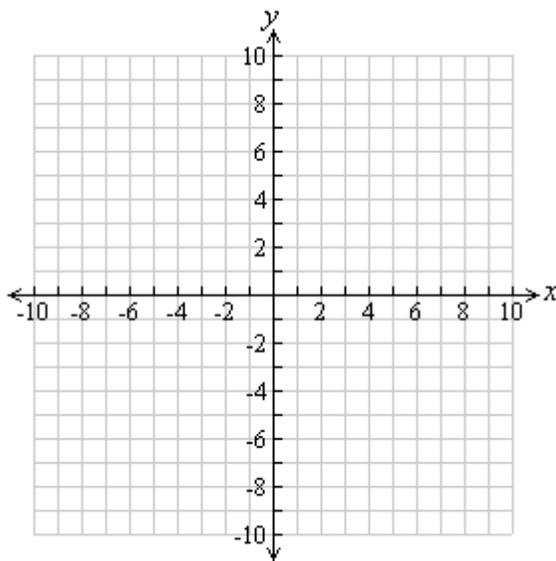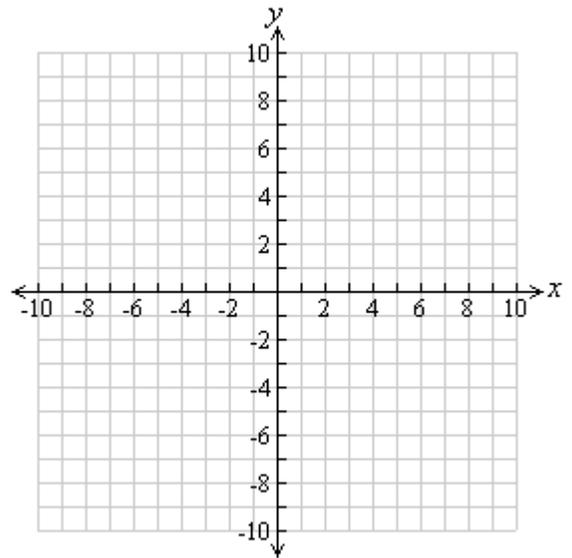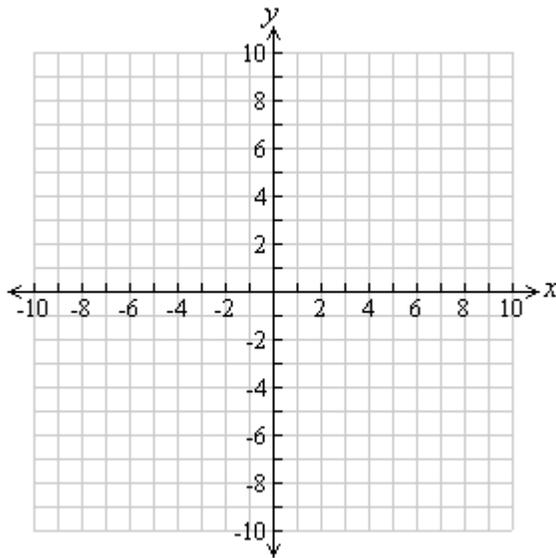
These are empty graphs to be copied. Make as many as you need. Make sure to draw lines that have a y-intercept and a slope to the scale of one.

Falling Face Up or Down

Name:_____
Date: _____

Don't eat the candy yet, or you will score a zero on this assignment!

Material:
- Calculator   - Graph paper
- Cup   - Data Table
- M&M's   - Writing utensil

Procedure:
1. Working in pairs of two, pour out the candies found in you cup. Count how many candies are in the cup. Record this information as toss #0 in the table. Put the candies back in the cup.

2. Gently toss the M&M's in the cup on to the table. Count the number of M&M's that landed face up, with the M on the candy is facing up towards you. Record this first toss in the table. Remove those M&M's and place the 'upside down' Candies back in the cup.

3. Repeat step 2 six times or until there are no M&M's remaining.

4. Once you are done, repeat steps 1-3 for columns B and C.

5. Using your calculator, create two scatter plots, one for the results in B and one for C. (For steps on how to use your calculator to create a scatter plot look at attached worksheet)

6. Re-create the scatter plots you have made on your graph paper.

7. Use your calculator to find the equation of best fit for each scatter plot. (For steps on how to use your calculator to find the equation of best fit look at attached worksheet)

8. Answer questions on the attached answer sheet.

Falling Face Up or Down   Name: _____
Data Analyzation   Date: _____

M&M Data Table

Toss	Candies Remaining in Cup	Toss	Candies Remaining in Cup
A	B	A	C
0		0	
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	

Plot the points to create a scatter plot.

Trial One

Trial Two
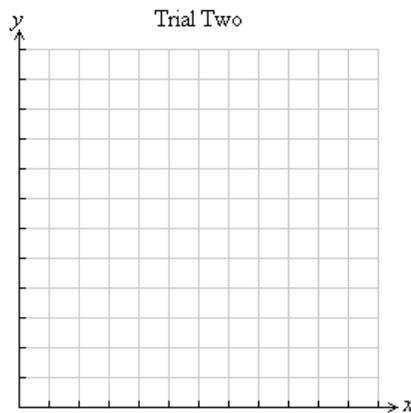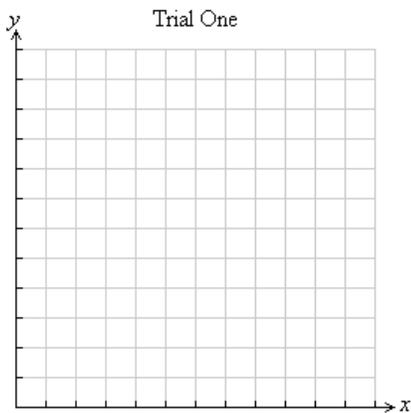
Use your calculator to find the line of best fit for each trial.

First Line of Best-Fit = _____   Second Line of Best Fit _____

Falling Face Up or Down　　　　　　　　　　　Name: _____
Questions　　　　　　　　　　　　　　　　　　Date: _____

1. Do either of the scatter plots have an x – intercept? Explain how you know your answer to be true.

　_____

　_____

　_____

2. Do either of the scatter plots have a y – intercept? Explain how you know your answer to be true.

　_____

　_____

　_____

3. Explain how each of the scatter plots are similar.

　_____

　_____

　_____

4. State the independent and dependent variables for this activity.

　Independent: _____　　　Dependent: _____

5. Identify the slope in the line of best fit for the first trial. What does the slope mean in the context of the experiment?_____

Finding the Line of Best Fit

Data Set 1:

POINTS	*x*	*y*
A	9	26
B	13	32
C	21	42
D	30	53
E	31	56
F	31	59
G	34	61

Data Set 2:

POINTS	*x*	*y*
A	95	17
B	92	19
C	87	12
D	83	17
E	75	9

Data Set 3:

POINTS	*x*	*y*
A	2	1
B	3	4
C	6	8
D	10	12
E	15	14
F	17	17
G	19	21

Name: _____

Date: _____

1. Use your calculator to find the slope of the line of best fit for the data.

x	y
72	39
56	21.5
81	102
55.8	17.3
458	36
121	12.84
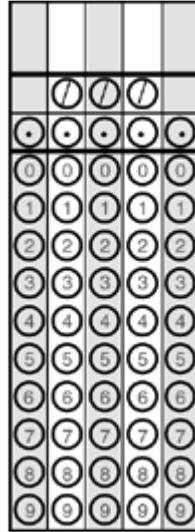
2. **Without** using your calculator find the line of best fit for the following data.
   - Circle the two coordinates you are using to find slope.
   - Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

x	y
5	3
0	14
8	5
10	17
9	21
3	6

Extended Constructed Response (4 points)

At Mountaineer Cyclists, the number of products sold is related to the price they charge for the product. The table below shows this relationship for one month.

Price Charged (x)	350	450	600	800	1000
Number Sold (y)	2500	1450	800	1100	100

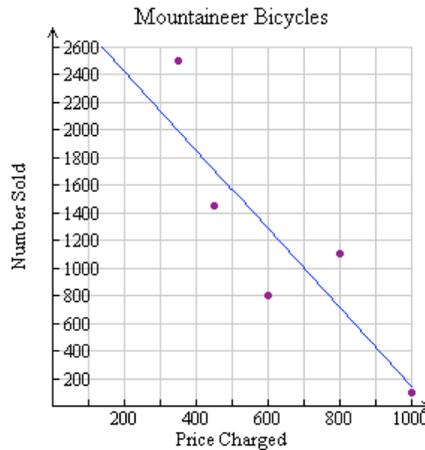- Plot the points on the on the grid provided. Be sure to label your graph completely.
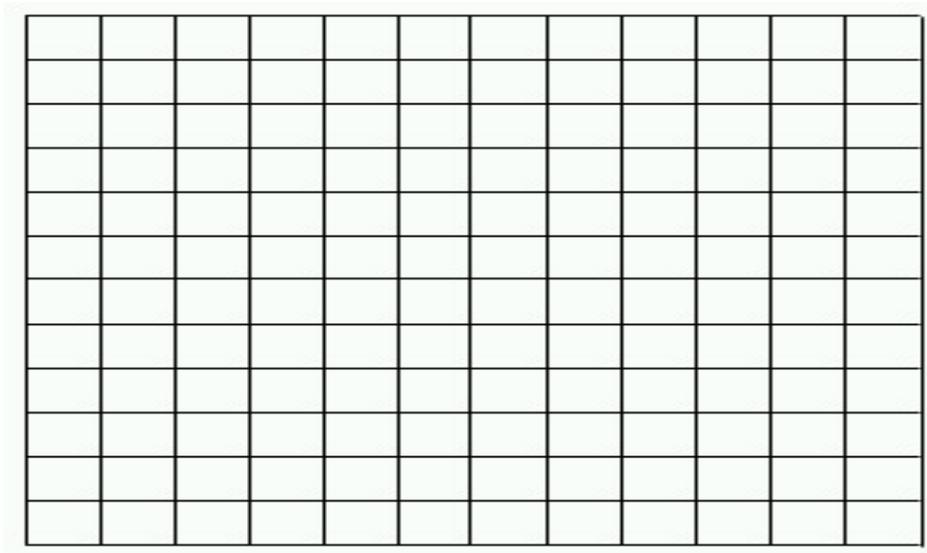
- Draw the line of best fit on the grid above.

- Write the equation for your line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

- Identify the slope in your equation for the line of best fit. Explain what the slope means in the context of the problem.

- Identify the y – intercept in your equation for the line of best fit. Explain what the y – intercept means in the context of the problem.

- Use your equation to estimate how many bikes would be sold if the company charged $500 per bike. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

1. Use your calculator to find the slope of the line of best fit for the data.

x	y
72	39
56	21.5
81	102
55.8	17.3
458	36
121	12.84

2. **Without** using your calculator find the line of best fit for the following data.
   - Circle the two coordinates you are using to find slope.
   - Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

x	y
5	3
0	14
8	5
10	17
9	21
3	6

Answer:

$y = mx + 14$

Note that slopes will vary depending on the points the student selected. See student

Extended Constructed Response (4 points)

At Mountaineer Cyclists, the number of products sold is related to the price they charge for the product. The table below shows this relationship for one month.

Price Charged (x)	350	450	600	800	1000
Number Sold (y)	2500	1450	800	1100	100

- Plot the points on the on the grid provided. Be sure to label your graph completely.

Mountaineer Bicycles

- Draw the line of best fit on the grid above.

- Write the equation for your line of best fit. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.
  $y = -2.857x + 2998.74$

- Identify the slope in your equation for the line of best fit. Explain what the slope means in the context of the problem.
  Slope $= -2.857$, which means for every $2.85 they lower the price, they will sell one more bike.

- Identify the y – intercept in your equation for the line of best fit. Explain what the y – intercept means in the context of the problem.
  y – intercept $= 2998.74$, which represents the initial number of bikes

- Use your equation to estimate how many bikes would be sold if the company charged $500 per bike. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.
  $y = -2.85(500) + 2998.74$
  $= 1570$ bikes

Finding the Line of Best Fit

Data Set 1:

POINTS	*x*	*y*
A	9	26
B	13	32
C	21	42
D	30	53
E	31	56
F	31	59
G	34	61

Answer:
$y = 1.38x + 13.46$

Data Set 2:

POINTS	*x*	*y*
A	95	17
B	92	19
C	87	12
D	83	17
E	75	9

Answer:
$y = 0.40x - 19.9$

Data Set 3:

POINTS	*x*	*y*
A	2	1
B	3	4
C	6	8
D	10	12
E	15	14
F	17	17
G	19	21

Answer:
$y = 1.01x + 0.54$
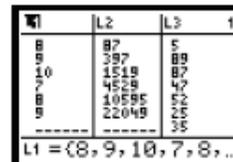
Data Sets and Scatter Plots on the TI-83+

Entering Data

Access the data lists. PRESS [STAT] [ENTER].

If a data set is present in L_1, move the cursor over L_1,
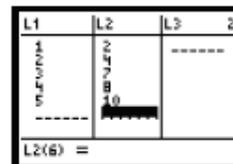PRESS [CLEAR] [ENTER]
Repeat for other lists as necessary.

Enter the following data points in Lists 1 and 2:
{(1,2), (2,4), (3,7), (4,8), (5,10)}
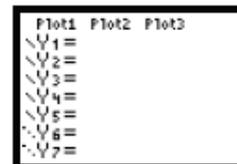
Place the x-values in List 1 and the y-values in List 2.
PRESS [ENTER] after each value,
PRESS [▶] to move to List 2.

Drawing Scatter Plots

PRESS [Y=] and clear any expressions in the display.

PRESS [2nd][STATPLOT] to set up Plot 1.
If any plots are on, PRESS 4[ENTER], PRESS
[2nd][STATPLOT] to get back to the plot setup.

PRESS [WINDOW]
Set the Window for graphing by pressing [ENTER] and
moving the cursor to each setting and entering the
desired value.
PRESS [GRAPH].