Gallery Walk

Sequences

Directions:

You have been given a group number and other guests will also be assigned to your group.
Go to the problem set posted on the wall assigned to your group.

1) Identify the pattern and write the next three terms of the sequence on the poster.
2) Determine whether the sequence is arithmetic, geometric or neither. Then write this on the poster.
3) Justify your response by providing one of the following:
   - An equation, or
   - A description of the pattern

From D. Cortez, Math 75
Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Gallery Walk

Posters

Group 1	Group 2
a) $-21,-15,-9,-3,\ldots$ b) $-21,-,-1,-\frac{1}{2},\ldots$ c) $-1,.2,1.4,2.6,\ldots$	a) $2,8,32,128,\ldots$ b) $320,160,80,40,\ldots$ c) $405,-135,45,-15,\ldots$
Group 3	**Group 4**
a) $1,4,9,16,25,\ldots$ b) $1,1,2,3,5,8,\ldots$ c) $1,8,27,64,125,\ldots$	a) $\frac{1}{2},\frac{1}{4},\frac{1}{8},\frac{1}{16},\ldots$ b) $1,\frac{1}{8},\frac{1}{27},\frac{1}{64},\frac{1}{125},\ldots$ c) $\frac{1}{2},\frac{2}{3},\frac{3}{4},\frac{4}{5},\frac{5}{6}\ldots$

Group 5	Group 6
a) Joe's Diner serves omelets all day long. Joe gets his shipment of eggs each morning. After Joe makes one omelet he has 177 eggs remaining, after two omelets he has 174 eggs remaining, and after making three omelets he has 171 eggs remaining.	a) Angel has a secret. The first day he tells two people. The second day, each of those two tell two other people who, on the third day, each tell two more. Assume this pattern continues.
b) A brick staircase has a total of 30 steps. The bottom step requires 100 bricks. Each successive step requires two fewer bricks than the prior step.	b) A ball is dropped from a height of 100 meters. Each time it hits the floor, it rebounds to $\frac{3}{4}$ of its previous height.

From D. Cortez, Math 75
Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Gallery Walk

Teacher Directions

Objective: Students will be able to identify the pattern and determine if it represents that of an arithmetic sequence, a geometric sequence or neither.

Materials:

- Post-it Poster Paper
- Markers
- Calculator
- Textbook

Activity Notes:

A. **Discovering the Pattern:** Students will work collaboratively to identify the pattern assigned for the respective groups. Once they have the work completed in their notebooks, they must check with the instructor for correctness and accuracy of their work. Then, students may transfer their work to the poster.

   Each group must choose a presenter/teacher to explain the work to the students who are rotating through the posters.

B. **Gallery walk:** The students are provided the worksheet to take notes on as they rotate to the different posters and receive information from the group presenter. The time for each rotation is decided by the instructor. A timer or tool of choice may be used to monitor the time for each rotation.

Collecting Data to Analyze a Trend

Organize Your Group

Work in groups of three to four persons. Each person in the group should be given a role: Writer, Split Timer, and Recorders.

Role of Writer: This person writes her or his full name twenty times. I suggest choosing the person with the longest name.

Role of Split Timer: This person runs the technology. Use a timer such as SplitTime, an app available on the i-phone, or use an online split timer available at https://www.timeme.com/split-lap-timer.htm or https://www.timeanddate.com/stopwatch/. The Split Timer will hit "Split" or "Lap" when the Recorders say the word. Make sure that it is the cumulative time that is being recorded, not just the time it takes for a single signature.

Role of Recorders: The remaining group members observe the Writer and say "Split!" or "Lap" as soon as the writer has finished each signature. After the writer has written the signature twenty times, record the information in the table.

This is based on Almy, Kathleen, and Heather Foes. "3.2 Homework, Exercise 6." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, pp. 310–311.

Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Collecting Data to Analyze a Trend

Produce the Evidence

While the Split Timer and Recorders are measuring your times, write your full name or signature here twenty times. Before you start this, practice writing your name on scratch, and using the split timer device.

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

This is based on Almy, Kathleen, and Heather Foes. "3.2 Homework, Exercise 6." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, pp. 310–311.

Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Collecting Data to Analyze a Trend

Make a Table to Record Data

One of the recorders should record the data here.

Number	Cumulative Time In Seconds
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

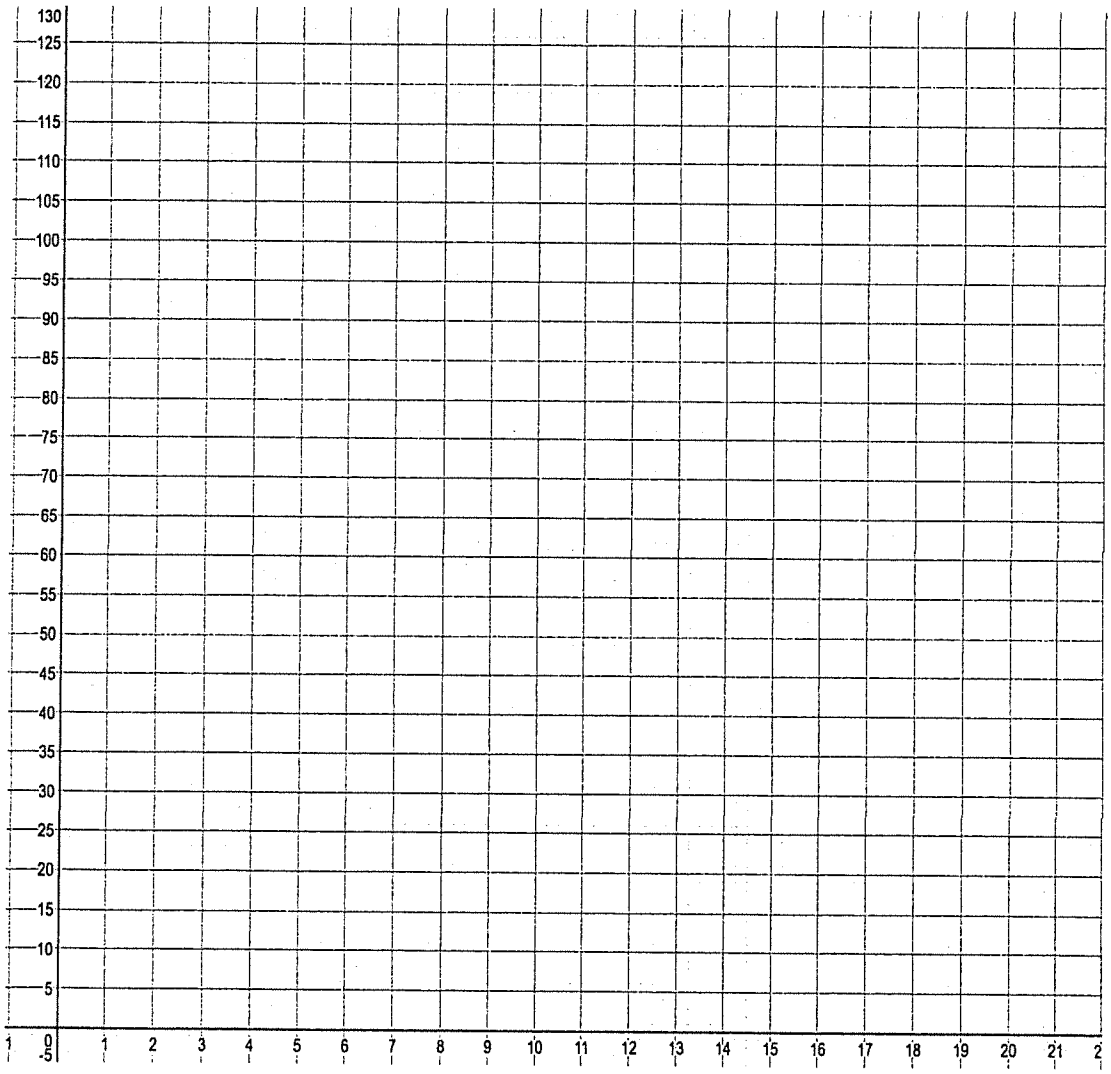
This is based on Almy, Kathleen, and Heather Foes. "3.2 Homework, Exercise 6." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, pp. 310–311.

Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Collecting Data to Analyze a Trend

Make a Graph to Visualize Data

On the grid below, or on a separate sheet of graph paper, create a scatter plot using the data from your table. Provide a title for your graph and label the axes. Don't forget to include the units.



This is based on Almy, Kathleen, and Heather Foes. "3.2 Homework, Exercise 6." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, pp. 310–311.

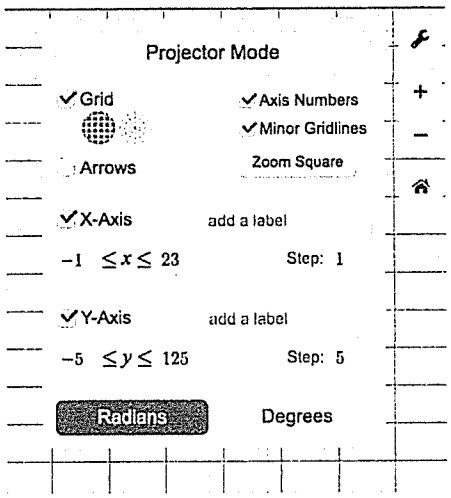
Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Collecting Data to Analyze a Trend
Create the Trend Line
Using Desmos

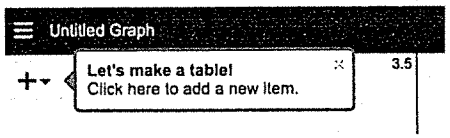
Use a graphing utility to create the trend line. Use either Desmos at https://www.desmos.com/ or use a TI-83 or TI-84 to find the equation of the trend line.

Here are instructions for using Desmos to find the trendline.

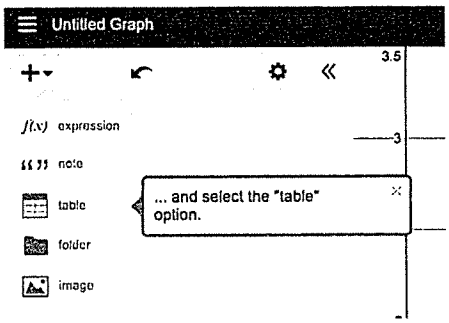
Go to the tool box and adjust the settings for the x-axis and the y-axis.



Click the plus sign to add a table.



Select table.



This is based on Almy, Kathleen, and Heather Foes. "3.2 Homework, Exercise 6." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, pp. 310–311.

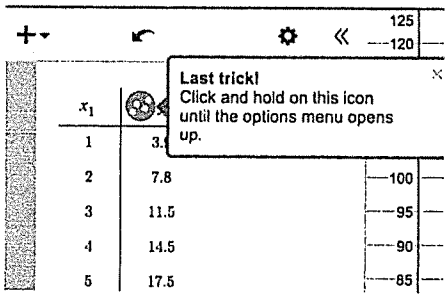
Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Collecting Data to Analyze a Trend

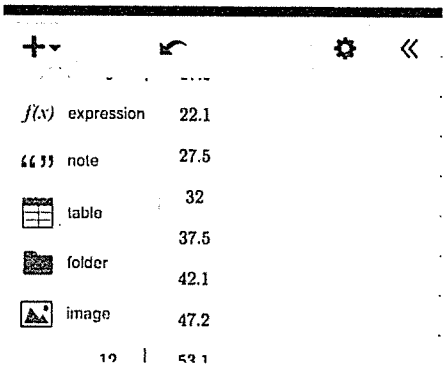
Create the Trend Line

Using Desmos

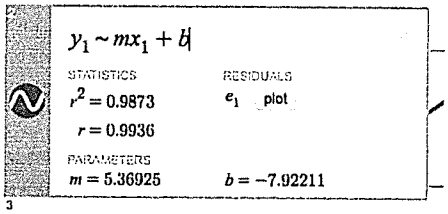
Fill in the table with your data.



Next, get the equation of the trendline. Hit the plus sign again and select expression.



Now, type in the equation $y_1 \sim mx_1 + b$.



This is based on Almy, Kathleen, and Heather Foes. "3.2 Homework, Exercise 6." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, pp. 310–311.

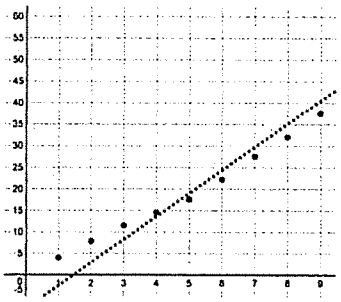
Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Collecting Data to Analyze a Trend

Create the Trend Line

Using Desmos

Write the equation for your trend line below your graph, and graph the trend line. For example, the equation of this trend line is approximately $y = 5.4x - 7.9$.



$$y = 5.4x - 7.9$$

On an attached piece of paper, answer these questions:

1. What does the slope of the line describe about this data?

2. Take the average of the independent values to get the x-coordinate of a point, and the average of the dependent values to get the y-coordinate of a point. Does this point lie on your trend line?

3. Does your data appear to be linear or is there a graph that would better approximate your data? Try typing in some other types of equations to see if you can get a better description of your data. For example, try $y_1 \sim a{x_1}^2 + bx_1 + c$, or an equation containing an exponential expression.

This is based on Almy, Kathleen, and Heather Foes. "3.2 Homework, Exercise 6." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, pp. 310–311.

Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Collecting Data to Analyze a Trend

Create the Trend Line
Using a TI-Calculator

Regression is a concept you will study further if you take Statistics.
Finding a regression equation involves three steps in the statistical menu of the calculator:

1) entering the data as lists (EDIT),
2) choosing the type of regression equation (in this case a linear equation) (CALC),
3) telling the calculator which data list is the independent variable (input) and which data list is the dependent variable (output).

Follow the instructions below to find the linear regression equation.

STAT
Choose **EDIT** **#1** or press **ENTER**
Enter all x-values in L1 and all y-values in L2.*

STAT
Choose **CALC** (Use Right arrow), press **ENTER**
Choose **LinReg(ax+b)** **#4**
Type the name of the *x-list*, comma, name of the *y-list*. **L1** is 2nd **1**, **L2** is 2nd **2**.

(*To clear data in a list pit the cursor on the list name by using the up arrow. Hit CLEAR. Put cursor on the first entry in the list by using the down arrow.)

Note: Under **STAT** CALC

Linear Regression Equation → **LinReg(ax+b)** **#4**

Exponential Regression Equation → **ExpReg** **#0**

Quadratic Regression Equation → **QuadReg** **#5**

Adapted from Los Medanos College Intermediate Algebra Class Activities

This is based on Almy, Kathleen, and Heather Foes. "3.2 Homework, Exercise 6." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, pp. 310–311.

Prepared by M. Clarke, A. Conley, D. Cortez, P. George, and I. Mariani from Cerritos College for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Math Literacy Building Equations 11/10/17

Directions: You are going to perform a series of operations to build an equation. As the direction is given, write the equation and simplify (if possible). For example: If I start with x = 2 and was asked to add 100 to both sides, the equation would read x+100=2+100. I can simplify that to be x+100=102. In order to build **equivalent equations**, the **same operation** must be performed **on each side** of the equation.

1) x = 4	Build steps (on both sides of the equation)
	Add 3
	Multiply by 5
	Subtract 7
	Divide by 2

Compare your equation with your partner's equation. Substitute 4 for x to make sure that the equation is correct:

2) $x = -2$	Build steps
	1. Multiply by 5
	2. Add 7
	3. Divide by 3
	4. Subtract 2
	5. Multiply by 10
	6. Add 1

Substitute -2 for x to make sure that your equation is correct:

TASK B: Now work the problem you just did in #2 backwards to verify your equation. Start with the equation and "un-build" the equation to get x=-2.

$10\left(\frac{5x+7}{3}-2\right)+1=-29$	"Un-build" Steps
x = - 2	

How do the un-build steps relate to the build steps from number 2?

Building Equations

Build and Un-Build the equations.

x=3	Build Steps	Un-build Steps	
	Subtract 5		
	Divide by 2		
	Add 2		
	Multiply by 3		
	Subtract 1		X=3

When we "Un-Build" an equation it is called SOLVING or FINDING THE SOLUTION. When you are asked to "**Solve**" an equation, you can "Un – Build" it in order to find the value of the variable that makes the equation true, the **solution** to the equation.

TASK C: Build and Solve the Equations to verify they are correct.

$x = -1$	Build Steps	Solution Steps	
	Multiply by 4		
	Add 1		
	Subtract x		
	Multiply by 6		$x = -1$

$x = 3$	Build Steps	Solution Steps	
	Multiply by 3		
	Subtract 3		
	Add x		
	Multiply by 2		
	Subtract 8		$x = 3$

Teacher Directions: Building Equations

Objective: Students will be able to perform equivalent operations to equations to build equivalent equations which can be solved using the inverse of the steps. By building equivalent equations student will develop an algorithm to solve linear equations and isolate variables.

Materials:

- One of each of set of steps for each pair of students

Activity Notes:

Day One:

TASK A: Students will work collaboratively to build equivalent equations by applying simple operations to both sides of the equality. To begin, work the first step of the first build it with students. They should add 3 to both sides of the equality giving the equation: x+3=4+3 and simplify to x+3=7. The rest of the equation can be built in pairs with students checking each other's work.

$$\frac{5(x+3)-7}{2} = 14$$

After most students have built the equation, demonstrate that by substituting in the value of 4 for x we can verify that the equation that was built correctly. Work with students that do not have correct equations to identify their mistakes.

After the first equation is built and discussed as a whole class, students can complete the second problem in a similar manner.

$$10\left(\frac{5x+7}{3} - 2\right) + 1 = -29$$

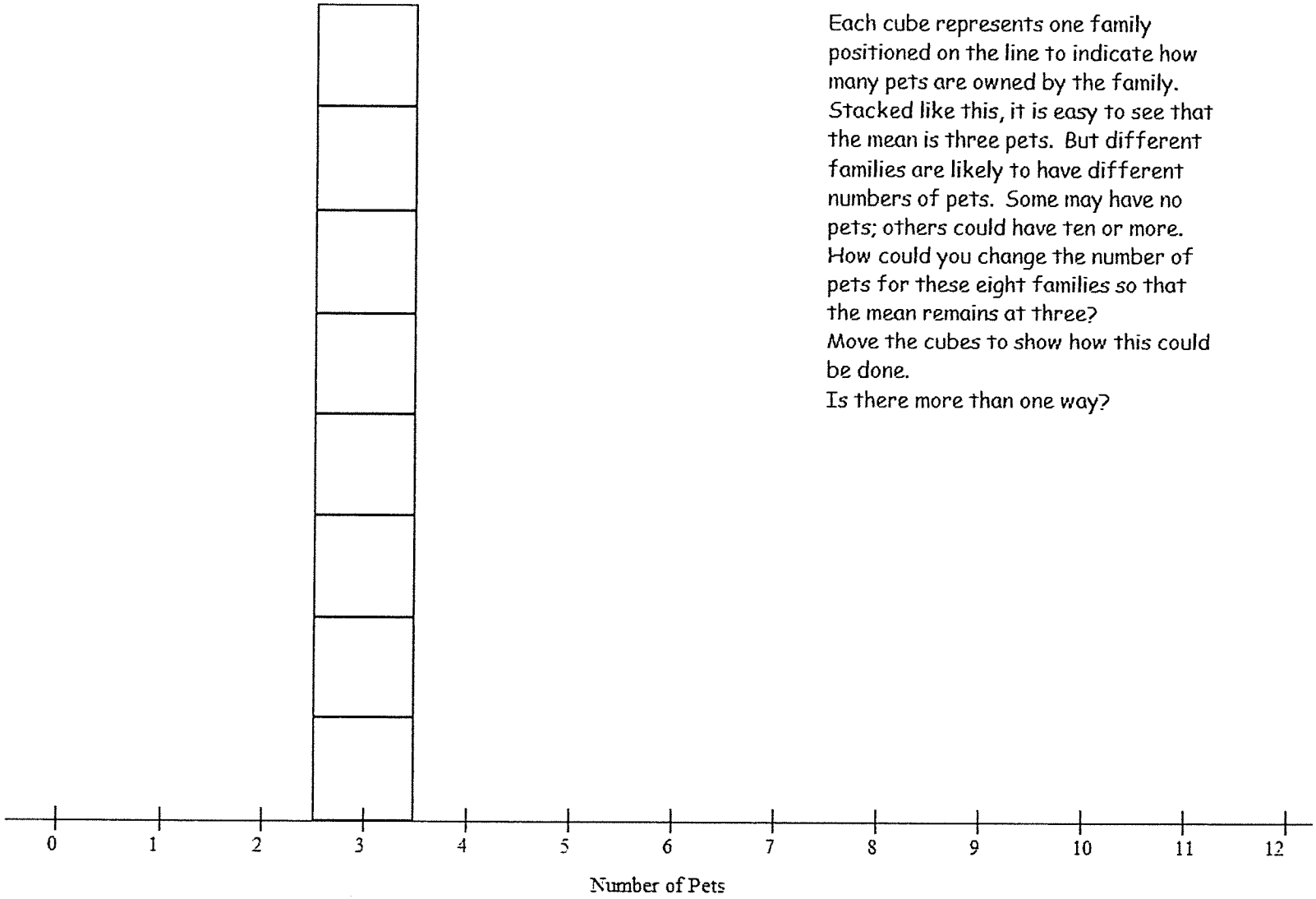
TASK B: Students are asked to solve the equation that they have just built by using the inverse of the steps in reverse order. Students may not immediately identify that they need to perform the inverse operation between steps but a short time of struggle should allow for this realization.

The fourth question asks them to build and solve the equation right next to each other. This should allow students to see the connection between the steps and inverse operations. Number 3 and 4 should be done in partner groups with some guidance from the teacher as needed.

TASK C: The last two problems on day one follow the same (build and solve) procedure but work with multiple variable terms. There are a variety of solutions for the equations depending on the level of simplification the student performs between steps.

$6(3x+1) = -18 - 6x$ $\qquad$ $2(4x-3) - 8 = 4 + 2x$

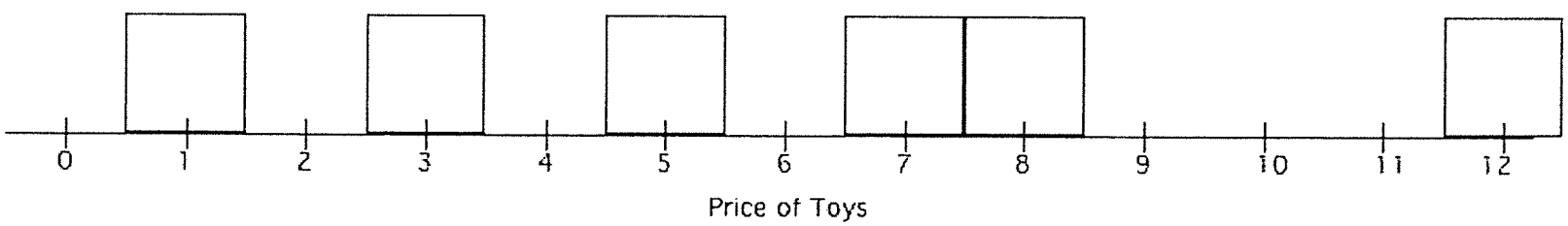
The Mean as Balance Point
Exercise I



Each cube represents one family positioned on the line to indicate how many pets are owned by the family. Stacked like this, it is easy to see that the mean is three pets. But different families are likely to have different numbers of pets. Some may have no pets; others could have ten or more. How could you change the number of pets for these eight families so that the mean remains at three?
Move the cubes to show how this could be done.
Is there more than one way?

adapted from *Elementary and Middle School Mathematics, Teaching Developmentally*, John A. Van de Walle, Fifth edition, 2004

Each cube represents the price of a toy.
Mark on the number line where you think the mean of the prices is.
Determine the actual mean by moving the cubes toward the "center" until they all have the same value.



Student Presentations

You may choose your own groups. You may not have more than 4 students in your group. The presentation should be organized in the following format.

1) You must prepare a PowerPoint or Video presentation.

2) The first and last names of all participants must be listed with the title of the presentation.

3) Have an introduction.

4) Each group member must participate in the presentation. The group member responsible for a particular slide should put her or his name in the lower right hand corner of the slide.

5) All work must be original.

6) Cite your sources on the final page.

7) The presentation should not be more than 8 minutes.

These are possible presentation topics. If you are interested in proposing your own topic, make sure to describe how it is related to course material.

What are Statistics?

How are Arithmetic and Algebra Different?

How are Ratios and Proportions Used in Cooking?

What are Functions?

What are the Mean, the Median and the Mode?

Using Scientific Notation to Describe Very Large and Very Small Things

Irrational Numbers

The Pythagorean Theorem

Fibonacci Numbers

The Golden Ratio

The Nature of Infinity

Percentage Increase and Percentage Decrease

Compound Interest

Using Linear Equations to Compare Food Prices

Using Linear Equations to Compare Water Usage

Using Linear Equations to Compare Gasoline Consumption

Using Linear Equations to Compare Cell Phone Costs

What are Polynomials?

What are Complex Numbers?

How are Longitude and Latitude related to Graphing in the Rectangular Coordinate System?

What is Calculus?

Attached are some examples of how you might organize a specific topic.

Presentation Topic
The Pythagorean Theorem

Prepare a PowerPoint presentation including video clips created with an i-Pad, videophone or with a web cam to create the presentation. Organize your presentation so that each of the following points is appropriately addressed.

- Prepare slides and video clips that answer the following questions:
    - What is some interesting historical information about the Pythagorean Theorem?
    - What is a proof of the Pythagorean theorem?
    - What types of application problems can be solved using the Pythagorean Theorem? Provide at least three application problems to illustrate a variety of applications.

- The name of the author of each slide should be included at the bottom of the slide. Cite the sources for your presentation.

- Provide a handout for the class to support the main ideas and problems presented in the presentation include an interactive illustration of this concept.

- Consult with the professor prior to the day of the presentation.

- Email the presentation and the handouts to the professor at pgeorge@cerritos.edu.

Presentation date: _____

Presentation Topic
Fibonacci Numbers

Prepare a PowerPoint presentation including video clips created with the i-Pad, videophone or with a web cam to create the presentation. Organize your presentation so that each of the following points is appropriately addressed.

- Prepare slides and video clips that address these issues:
    - Provide some historical information about the Fibonacci Numbers
    - Describe what they are and their significance.
    - Show the numerical patterns of the Fibonacci Sequence.
    - Provide examples of how the Fibonacci sequence might be encountered in nature.
- The name of the author of each slide should be included at the bottom of the slide. Cite the sources for your presentation.
- Provide a handout for the class to support the main ideas and problems presented in the presentation include an interactive illustration of this concept.
- Consult with the professor prior to the day of the presentation.
- Email the presentation and the handouts to the professor at pgeorge@cerritos.edu.

Presentation date: _____

Presentation Topic
The Golden Ratio

Prepare a PowerPoint presentation including video clips created with the i-Pad, videophone or with a web cam to create the presentation. Organize your presentation so that each of the following points is appropriately addressed.

- Prepare slides and video clips that address these issues:
    - Provide some historical information about the Golden Ratio.
    - Describe what it is and why it is significant.
    - Provide examples of how the Golden Ratio appears in art, architecture, or nature.

- The name of the author of each slide should be included at the bottom of the slide. Cite the sources for your presentation.

- Provide a handout for the class to support the main ideas and problems presented in the presentation include an interactive illustration of this concept.

- Consult with the professor prior to the day of the presentation.

- Email the presentation and the handouts to the professor at pgeorge@cerritos.edu.

Presentation date: _____

Presentation Topic
Mean, Median and Mode

Prepare a PowerPoint presentation including video clips created with an i-Pad, videophone or with a web cam to create the presentation. Organize your presentation so that each of the following points is appropriately addressed.

- Prepare slides and video clips that answer the following questions:
    - Describe generally how the mean, the median and the mode are used.
    - Define the mean, the median and the mode.
    - Provide at least two examples of how each is used.

- The name of the author of each slide should be included at the bottom of the slide. Cite the sources for your presentation.

- Provide a handout for the class to support the main ideas and problems presented in the presentation include an interactive illustration of this concept.

- Consult with the professor prior to the day of the presentation.

- Email the presentation and the handouts to the professor at pgeorge@cerritos.edu.

Presentation date: _____

Problem Solving
Unit Fractions

The ancient Egyptians had symbols for unit fractions. Unit fractions are fractions that have a one in the numerator. For example, $\frac{1}{2}, \frac{1}{3}$, and $\frac{1}{10}$ are unit fractions. However, all other fractions were expressed as the sum of unique unit fractions. For example, $\frac{5}{6}$ would be written in the form $\frac{1}{2}+\frac{1}{3}$. The fraction $\frac{7}{10}$ would be written as $\frac{1}{3}+\frac{1}{5}+\frac{1}{6}$.

See if you can write each of the fractions below as a sum of unique unit fractions:

$\frac{7}{12}$

$\frac{13}{15}$

$\frac{53}{60}$

$\frac{109}{120}$

Based on work by M. Clark, A. Conley, D. Cortez, P. George, I. Mariani for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Problem Solving
Putting It All Together

Find all of the real numbers that have all of these qualities:

- The number has seven digits.
- The number is between 1,000 and 10,000.
- The digit in the tenths place is 150% of the digit in the thousandths place.
- The digit in the hundredths place is of the sum of the digit in the tenths place and the digit in the thousandths place.
- The sum of all the digits in the number is 17.
- None of the digits is zero.

Add one additional quality that narrows the group down to exactly one number.

This is based on Almy, Kathleen, and Heather Foes. "1.2 Explore." *Math Lit: a Pathway to College Mathematics*, 2nd ed., Pearson, 2017, p. 5.

Based on work by M. Clark, A. Conley, D. Cortez, P. George, I. Mariani for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Problem Solving
The Party Problem

Jose has planned to have a typical southern California party this weekend. He has invited all of his classmates. He just has one rule. The guests may greet the host and each of the other guests with a kiss ... but only one. If each guest greets the host and each of the other guests with a kiss, how many kisses will take place at Jose's party?

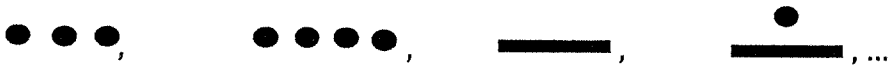
Based on work by M. Clark, A. Conley, D. Cortez, P. George, I. Mariani for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".

Problem Solving
Can You See a Pattern?

Find the next term in each sequence.

O,T,T,F,F,S,S,E, ...

111, 1000, 1001, 1010, 1011, ...



A				E	F		H	I		K	L	M	N						T		V	W	X	Y	
	B	C	D			G			J					O	P	Q	R	S		U					

1, 11, 21, 1112, 3112, 211213, 312213, ...

18, 46, 94, 63, 52, ...

1, 2, 3, 4, ...

Based on work by M. Clark, A. Conley, D. Cortez, P. George, I. Mariani for "Activities and Projects to Promote Mathematical Literacy -- AMATYC 2017".