3

TEACHING MANUAL

MEET & MATH

WINTER 2019 MEETING 3

JANUARY 22 - 23

Contents

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2019 UCI MATH CEO COMMUNITY EDUCATIONAL OUTREACH.
UNIVERSITY OF CALIFORNIA AT IRVINE

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Meeting 3: Meet & Math!

- Tuesday 9:00 AM - 9:50 AM
  - Place: **UCI** NS 2 1201 (Marco Forester comes)
- Tuesday 2:45 PM - 3:45 PM
  - Place: **SANTA ANA**: Carr Intermediate School
- Wednesday: 2:00 PM - 3:45 PM
  - Place 1: **UCI,** NS2 1201 (Lathrop comes)
  - Place 2: **UCI,** PSCB 140 (Villa comes)

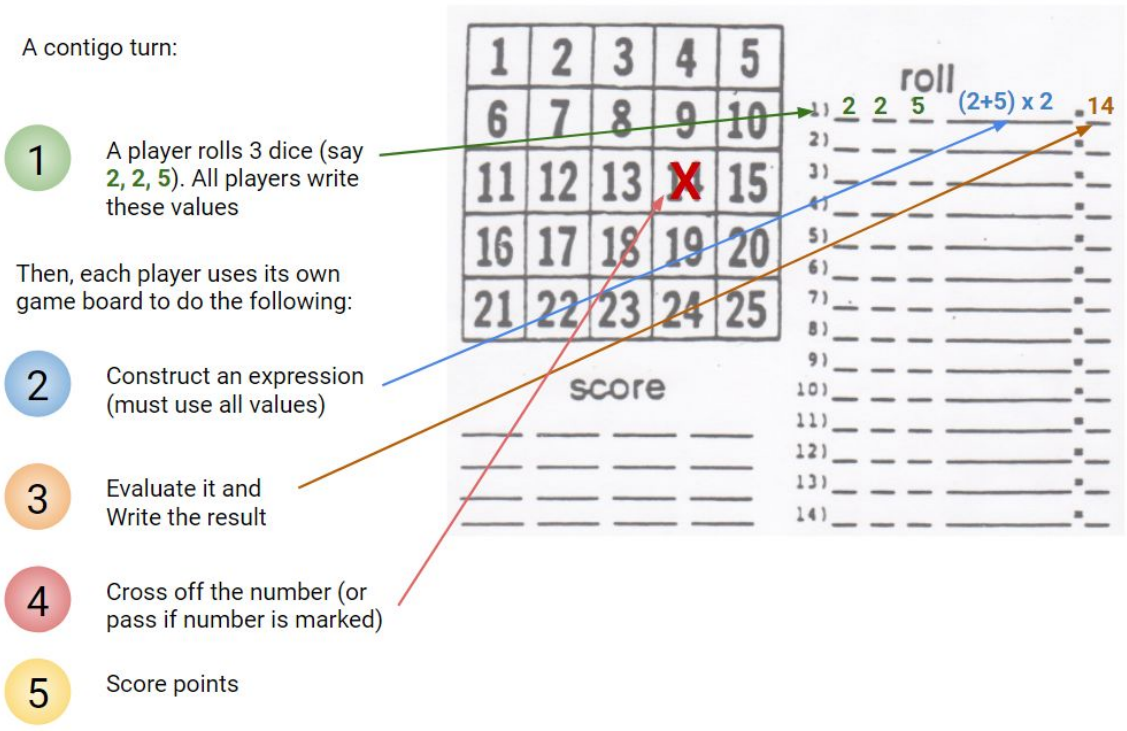
<table>
<tr>
<td>Tuesday Morning
(50 minutes)
January 22

• Activity 1: 45 minutes
• Weekly Youth Survey: 5 minutes</td>
<td rowspan="2">Wednesday Afternoon
January 23(80 minutes)

• Activity 1: 40 minutes
• Activity 2: 20 minutes
• Stock market Game: 20 minutes
• Weekly Youth Survey: 5 minutes
Start at 3:35</td>
</tr>
<tr>
<td>Tuesday Afternoon
(50 minutes)
January 22

• Activity 1: 45 minutes
• Weekly Youth Survey: 5 minutes</td>
</tr>
</table>

ACTIVITY 1: CONTIGO	
Description	The game of Contigo (or Contig) is a simple but powerful mathematics game of numerical calculations. This game develops mental math skills and numerical sense in your students. The goal is to form mathematical expressions using numbers given by dice rolls, and collect points. The scoring rules of the game force players to try several options.
Materials	● 3 dice per player (in case you want students to do their own rolls) ● 1 Game board per player
Set up	Each student receives its own game board. This includes the following elements: ● A rectangular array of values 1-25 to cross out. ● A list of 25 dice rolls to write: dice values, expression and value. ● A scoring space, where students add up their scores.
Game Instructions	1. Roll the dice yourself the first time and create an algebraic expression. Make sure that all students write that same expression on their whiteboards and evaluate it. Checks the answers. Then ask students to write it on their game sheet. ○ Record 0 points for this turn. 2. Do the first 5 rolls together (same expressions and thus same numbers), so students understand how to score. ○ Everybody will have the same score for the first 5 rolls. ○ Students take turns rolling the dice. 3. If the roll for Roll Number 1 is 1, 3, 4 and the roll for, say, Roll Number 5 is 1, 3, 4 again, the roll is valid even though the numbers are the same. As we know, there are many numerical expressions that can be made with the same 3 numbers. Students must create a different expression for this roll, of course, because they want to cross a different number than the one marked in roll Number 1. 4. The students must write down the points and add after each roll. If their answer box touches the side of 2 or more boxes, have the students write down the points for each touching box and then add. 5. On the 6th roll, one student rolls the dice. Everybody records the numbers and makes their own numerical expression. Have students write the expression and answer on the whiteboard so you can check. Then the students write it on their

	game board and record their points. 6. Students can work individually or in pairs. Students must do their work on their whiteboards and record it on their own game board. 7. Raffle Tickets: When a student reaches 100 points, he raises his hand and will receive 1 raffle ticket. He will also receive 1 raffle ticket for 200 points, 300 points, 400 points, etc. ● **Game end:** The game ends after 25 rolls. Towards the end it might be impossible for some students to make a numerical expression for the boxes that are still open. ○ For example, let us suppose that a student rolls 1, 2, 3. Say one student only has box 24 open. He will not be able to make 24, and so he must pass in this turn, and not mark any box. However, another student might have a 9 open. He will be able to make 3 x (1+2).
Example of Play	
Notes	● The rules imply that in Roll #1 players always score 0 points, simply because

and tips	there are no previous marked boxes. ● When a student rolls the dice, he is not the only one creating an expression. Everyone will use these 3 values to create an expression. ● It is perfectly ok that repeated numbers are rolled. For example, a student might roll 1, 2, 2 or even 5, 5, 5, and students can still construct different expressions. For example, with 1, 2, 2, a student can construct (1 x 2) x 2 = 4, or (2−2) + 1 = 1. ● Students must do their work on their whiteboards (so that you can check their work) and then record it on their own game board. ● Remember that to make the game fun for the kids, the mentor does not roll the dice. A student rolls the dice and calls out the 3 numbers. Each student creates its own expression. Then the dice is passed clockwise or counterclockwise to the next student.

MEETING 3: ACTIVITY 2

CANDY BARS

A group of friends are planning to sell candy bars at the school shop.

They conduct a small survey among 30 people, asking the question:

How many candy bars do you eat in a typical week ?

Here are their results:

Male 1 bar	Female 4 bars	Male 5 bars	Female 1 bar	Male 2 bars	Male 25 bars
Male 13 bars	Female 0 bars	Male 2 bars	Male 9 bars	Male 6 bars	Female 16 bars
Female 14 bars	Male 10 bars	Male 19 bars	Male 11 bars	Female 1 bar	Male 0 bars
Male 1 bar	Male 3 bars	Female 10 bars	Male 25 bars	Female 16 bars	Male 13 bars
Female 30 bars	Male 8 bars	Male 2 bars	Male 0 bars	Male 28 bars	Female 0 bars

1. Draw graphs or charts to compare the results for males and females.

2. Chris says:

" We have found that the total number of bars eaten by all the males is 183, and the total number eaten by all the females is 92. In general, this means that men eat more candy than women."

(a) Give two reasons why Chris is wrong in his reasoning.

(b) Write down **one** conclusion (comparing males and females) that is supported by the data. Show any work you do.

ACTIVITY 2: CANDY BARS	
Description	In this task, students are given some data about candy bars and need to make sense of it through a series of questions. They algo need to represent the information given using a chart or a graph, which will help them make sense of the problem.
Learning Goals	• I can draw graphs or charts to help me understand information and data. • I can analyze a mathematical idea or statement from someone else and check whether it is valid or not, giving reasons why.
Materials	• Student's Workbook
Set up	• Have students start working in pairs from the start. You can keep the same pairs, or make new ones.
My solution	In this space, write your solution to the problem (working out details, not just the final answers). Use as many different approaches as possible! Also, write **discussion questions**: these are questions that help students, at the end, consolidate the math learning. **My solution** 

 **My discussion questions (some examples are included)**

-

Write your own discussion questions here:

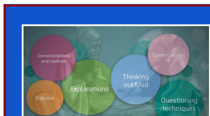
- ____
____
____

- ____
____
____

Productive discussion

This section gives you examples of prompts, cues and questions that you may ask students during or at the end of the problem solving process.

Before you continue, please watch:



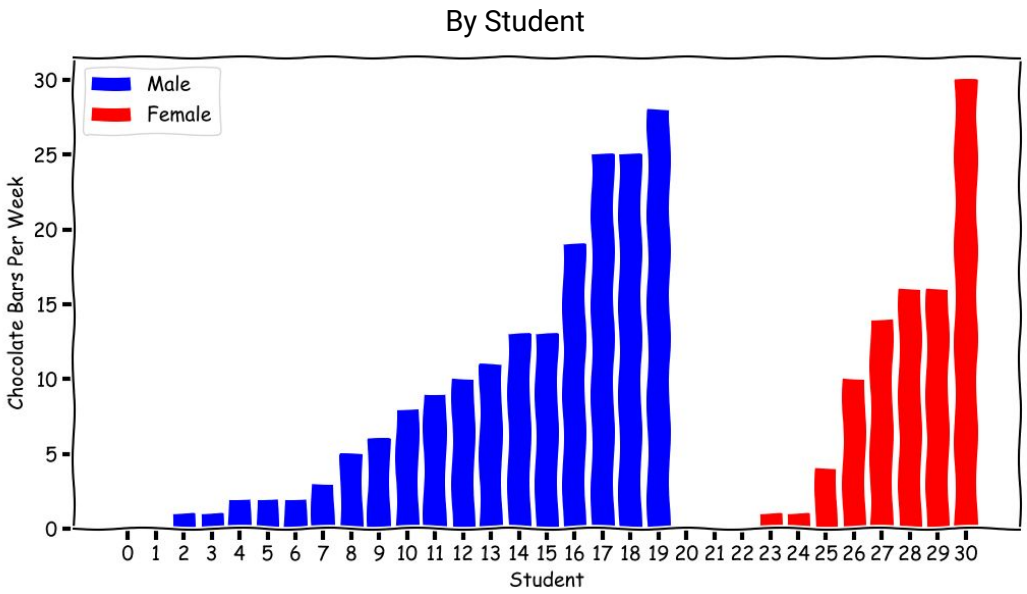
Communication in the Teaching and Learning of Math
More Math 192 Series Videos:
(www.math.uci.edu/mathceo/teachingvideos.php)

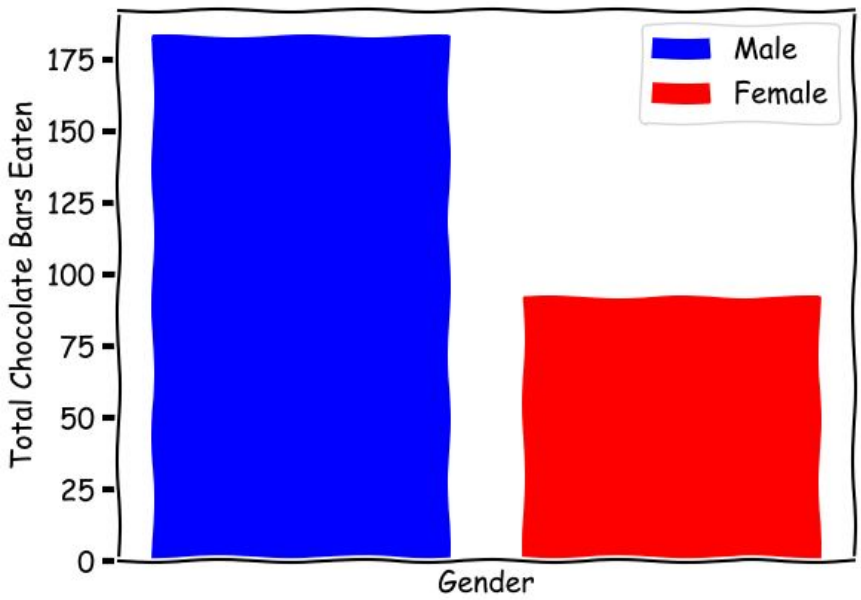
- **If some students are stuck and cannot begin to make progress**
  - *"How could you use colors to make sense of the information that you are given?"*
  - *"Is there a different way to represent all the data (information) that we have? One that is easier to grasp?"*

Solutions (Candy bars)

See also: http://map.mathshell.org/tasks.php?unit=ME12&collection=9

1) **Graphs**





2)

a) Chris is **not** wrong in his reasoning about the total number of candy bars each gender

consumed. However, he is wrong in his reasoning that, in general, men eat more candy bars than women. He is wrong to conclude this from the evidence simply because there were more total candy bars eaten by men -- because there are **twice as many men as women** (20 males, 10 females)**.** In fact, the second reason he is wrong in his reasoning is that if we look at the number of bars of candy eaten *for every 10 students of each gender,* we see that they eat **exactly the same number** -- there were 184 total candy bars eaten by the males, and 92 by the females, but since there are 20 men, the number eaten *for every 10 males* is 92 (184/2). On average, they eat **exactly the same number of candy bars.**

b) One thing we can conclude about the data is that **females are almost twice as likely to eat an even number of candy bars per week.** 9 male students eat an even number of candy bars per week, whereas 8 females eat an even number of candy bars per week, so with twice as many males, but roughly the same number of even numbered candy bar weeks for each gender, females are about twice as likely to eat an even number of candy bars in the week.

MEETING 3: ACTIVITY 1

CONTIGO

Math Standard: Evaluate numerical expressions.
Materials: 3 dice, game sheet

Rules:
1. Roll 3 dice.
2. Make an numerical expression using +, −, ×, ÷, ( ). You may use the numbers in any order.
3. Evaluate your expression and × out the number on your game sheet.
4. If your × touches the side of a box with an ×, you receive the points inside the box it touches.
5. If your × touches the corner of a box with an ×, you do not receive any points.
6. Once a box has an ×, you cannot use the number again.

Let's play a practice game.

Roll 1 ➤ 6 2 3 ➤ 3+6×2=15 ➤ Put × in box 15 ➤ Score: 0

Roll 2 ➤ 5 1 5 ➤ (5+5)÷1 = 10 ➤ Put × in box 10 ➤ Score: 15 Why? 10 touches side of 15.

Roll 3 ➤ 4 3 2 ➤ 2(4+3) = 14 ➤ Put × in box 14 ➤ Score: 15 Why? 14 touches side of 15. Total: 30

Roll 4 ➤ 3 1 3 ➤ 1×3×3 = 9 ➤ Put × in box 9 ➤ Score: 10 &14 Why? 9 touches the sides of 10 and 14.
Total: 30 + 10 + 14 = 54

Roll 5 ➤ 3 3 4 ➤ 4x3-4 = 8 ➤ Put × in box 8 ➤ Score: 9 Why? 8 touches the side of 9. Total: 63

Below is the game board for Rolls 1-5.

CONTIGO

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

Mark the #'s you obtain with an X. You cannot mark a number twice.

Scoring

____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____

	Dice rolls	Expression		#
Roll # 1:	[ ][ ][ ]	_____	=	____
Roll # 2:	[ ][ ][ ]	_____	=	____
Roll # 3:	[ ][ ][ ]	_____	=	____
Roll # 4:	[ ][ ][ ]	_____	=	____
Roll # 5:	[ ][ ][ ]	_____	=	____
Roll # 6:	[ ][ ][ ]	_____	=	____
Roll # 7:	[ ][ ][ ]	_____	=	____
Roll # 8:	[ ][ ][ ]	_____	=	____
Roll # 9:	[ ][ ][ ]	_____	=	____
Roll #10:	[ ][ ][ ]	_____	=	____
Roll #11:	[ ][ ][ ]	_____	=	____
Roll #12:	[ ][ ][ ]	_____	=	____
Roll #13:	[ ][ ][ ]	_____	=	____
Roll #14:	[ ][ ][ ]	_____	=	____
Roll #15:	[ ][ ][ ]	_____	=	____
Roll #16:	[ ][ ][ ]	_____	=	____
Roll #17:	[ ][ ][ ]	_____	=	____
Roll #18:	[ ][ ][ ]	_____	=	____
Roll #19:	[ ][ ][ ]	_____	=	____
Roll #20:	[ ][ ][ ]	_____	=	____
Roll #21:	[ ][ ][ ]	_____	=	____
Roll #22:	[ ][ ][ ]	_____	=	____
Roll #23:	[ ][ ][ ]	_____	=	____
Roll #24:	[ ][ ][ ]	_____	=	____
Roll #25:	[ ][ ][ ]	_____	=	____

ACTIVITY 2

CANDY BARS

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(a) Give two reasons why Chris is wrong in his reasoning.

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a)

b)

You can use next page for your graph or charts