Lauren Berube
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Mini Unit: 5 day student centered mini unit on middle school (7th/8th grade) probability and math in the real world aimed to engage and motivate students to learn math

Material included

- ☐ [Math & interests pre-survey](#)
- ☐ [Teacher's lesson plan guide 5 days](#)
- ☐ [Mini unit teacher packet](#)
- ☐ [Mini unit student packet](#)
- ☐ [Day 1 google slideshow](#)
- ☐ [Day 1 exit ticket](#)
- ☐ [Day 2 exit ticket](#)
- ☐ [Day 3 exit ticket](#)
- ☐ [Day 4 google slideshow](#)
- ☐ [Day 4 exit ticket](#)
- ☐ [Day 5 exit ticket](#)

Day 1: Math in real world and human desires

Learning target: I can identify 2 to 3 places where math is in the real world.

- Introduction/ check in / ground in -meditation (5-7 minutes)
  - [Day 1 google slideshow](#)
  - About me
    - Name, school, where I am from, hobbies
  - Question of the day
    - Would you rather shovel snow (1) or rake leaves(2)?
    - Have students close their eyes and raise their hands for votes. Write the number of votes on board and ask for 1 student from each side to say why.
  - [Headspace breath (2 min)](#)
    - Why do we meditate? To help with stress, anxiety, self awareness, lengthen attention span, generate kindness, and improve sleep. [Info link](#)
- Tiktoks/ discussion (10 minutes)
  - 8 videos
  - Discussion between peers
  - Guided questions

- - ■ What are some of the ways math is all around us shown in the videos?
    - ■ As a group can you come up with 3 more ways math is used around us?
- Math puzzles for human desires (15 minute)
  - Sudoku is from [Logic puzzles](#)
  - Brownie problem is from Math for Human Flourishing Book

Sudoku

The goal when filling out a sudoku is to enter a number from 1 to 9 in each box of the puzzle. Each row, column, and outlined 3×3 region must contain each number only once.

Example I

Sudoku Puzzle - Easy

| 9	4	1	8					2
	6	8	4	5	2			3
		5		6	9		4	8
6			5		7	8		4
8	5	7		2	4	9	3	1
2		4		3	8	5	6	
4		6	7	9	1	2		
1		9	2		5		7	6
		2				4	1	9

www.sudoku-puzzles.net

Mathematical exploration begins with questions. So I'm scattering a few puzzles throughout this book. No pressure—you can skip them if you wish, or think about just the ones that seem enticing. Hints and solutions can be found in the back, but before you look there, I recommend playing around with each problem.

DIVIDING BROWNIES

A father bakes brownies in a rectangular pan as an afterschool snack for his two daughters. Before his daughters get home, his wife comes along and removes a rectangle from somewhere in the middle, with the sides of the rectangle not necessarily parallel to the sides of the pan.

How can he make one straight cut and divide the remainder of the brownies evenly between his two daughters so that they get the same area?

A version of this puzzle was featured on the NPR show *Car Talk*.[a]
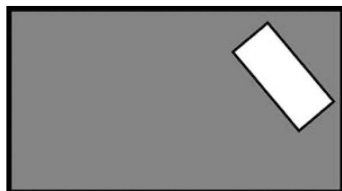
- Conversation - Usages (5 minutes)
  - [Nature resource](#)
    - Fibonacci sequence 0, 1, 1, 2, 3, 5, 8, 13… Found in a number of pedals on a flower, pinecones, and seeds in a sunflower.
    - Fibonacci spiral found in shells and in the shape of huracanes.
    - Fractals are repeating shapes where if you are looking really close or far you'll see the same pattern. Examples are leaves on ferns, tree branches, coastal lines
    - Hexagons in nature… Can anyone tell me what a hexagon looks like? Regular hexagon has six sides of equal length. Examples, beehives, snowflakes, bubbles all pushed together.
    - Concentric circles all have the same center but have different sizes. Examples, rings of tree as it grows, ripples in water
    - Math in space… fibonacci spiral, symmetries that create eclipse. How does the moon completely cover the sun when the moon is so much smaller? The moon is about 400 times smaller than the sun and the moon approximately 400 times further away than the sun is. This causes a total eclipse that doesn't happen on the other planets.
  - Usages
    - Cooking… Converting fractions and numbers based on how many servings you want to create, measuring, working out cooking times based on weight
    - Music…counting, rhythm, scales, intervals, patterns, time signatures, tone, & pitch
    - Money… budgeting, spending, saving, and investing (etc)
    - Architecture… geometry, algebra, and trigonometry are involved in building a blueprint and initial sketches of designs
    - Sports… players statistics (shooting percentages), catching a baseball, determining playoffs, ,march madness, golf scores
    - Technology… basic numbers with calling etc, Computers programs use algebra, statistics, calculus 1 and 2, math is used with sharing and processing information on the internet (example… personalized ads)
  - Desires
    - Flourishing… "I'm saying that the pursuit of math can, if grounded in human desires, build aspects of character and habits of mind that will allow you to live a more fully human life and experience the best of what life has to offer." (12)
    - Exploration… "At every opportunity we need to counter the idea that math is memorization, and replace it with the idea that math is exploration." (26)
    - Meaning… "Mathematics is the science of patterns and the art of engaging the meaning of those patterns." (44)
    - Play… "Math builds perseverance- just as weekly soccer practices build up muscles that make us stronger for the next game, weekly math

investigations make us more fit for the next problems, whatever it might be- even if we don't solve the current problem." (61)
  - Struggle.. "Struggling is a good thing, that is where the learning happens.." (122)

- Future plans (1 minute)
- Day 1: exit ticket (3 min)

Day 2: Movement and Probability

Learning target: I can find probabilities from events and find how many times an event occurs when given the probability.

- Standards
  - 7.SP.C.5
  - 7.SP.C.6
  - 7. SP.C.7
  - 7.SP.C.7.a

Lesson plan

- Question of the day
  - Put guided note sheet at front of the classroom
  - What is your favorite day of the week? (vote on board as coming in)
- Meditation (1 min)
  - Body scan headspace (1 min)
- Post answers to yesterday's puzzles online
- Introduction to topics using guided note sheet 7.SP.C.5 (5 min)
  - Probability: Chance event will occur between 0 and 1. 0 means not possible and 1 means guaranteed. ½ means not unlikely or likely (50/50)
  - Example: Let's say you have a bag with 4 moons and 1 star. What is the probability that you pick a moon out of the bag? 4 moons out of 5 total pieces. ⅘ The percentage of ⅘ is 80%. We can find that by doing long division, setting this fraction equal to X/100 and then cross multiplying, or using a calculator.
  - Example 2: Let's say that there now are 300 total pieces in the bag. Using the same probability as above (⅘) Find how many moon pieces that are in the bag. Cross multiply and divide.

Where:
Block 3 and 4 cafeteria
Block 5 auditorium (Split into 30 and 30)

Split into groups designated sections
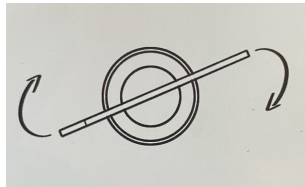
Directions are at the sections

Write groups on excel spreadsheet
Have them write group on sheet
Write #s 1-5 and hang up before class

Movement activity (35 minutes)

1. *Wheel of fortune:* Place a cup face down on the table. Balance a chopstick on top. Spin the chopstick 360 degrees without it falling off the cup. Each person gets 3 attempts.

2. *Dice shoulders:* Place a dice on each shoulder. Walk the length of the tape and back and then take both dice off your shoulders without the dice falling. Each person has 2 attempts

3. *Keepie uppie:* Everyone has 5 attempts to bounce the ball as many times as possible on a card.

4. *Flip off:* Start with the cup facing up and hanging a little off the table. Flip the cup so it lands face down on the table. Each person gets 4 attempts to flip the cup.

5. *Wall head ball:* Place your head against a wall. You have 3 attempts to bounce a ball over your head onto the wall and catch it in one hand before it hits the ground. Your head must stay against the wall at all times.

Mathematics integration

1. As a group keep track of makes and misses (each person gets X attempts)
   a. Ex: 2 makes 10 misses total 12 attempts
   b. Only acception is *keepie uppie* : Keep track of total number of bounces in a row without dropping the ball
2. Worksheet questions
   a. What is the probability that your group completed the task? Write answer as fraction and a percentage
      i. Keepie uppie : What is the probability that your group did X bounces or higher?
      ii. What is the probability that your group got X bounces or below?
      iii. Let's say you and your team took a total of 400 attempts at this challenge using the probability from #1 find how many times your group would get X bounces or higher?
   b. What is the probability that your group failed the task? Write answer as a fraction and a percentage 7.SP.C.6
   c. Let's say you and your team took a total of X attempts at this challenge using the probability from #1 find how many times your group completes the challenge? 7.SP.C.6 , 7.SP.C.7.a

Bring students back to classroom

Depending on time…
   [Day 2 exit ticket](#)

Day 3: Video game and probability

Learning target: I can find probabilities from events and find how many times an event occurs when given the probability.

● Introduction/check in/ meditation

- - Question of the day: If you were given 5,000 dollars what would you buy with it?
    - Take 1 minute to write it down on a piece of paper.
    - Ask for 3 people to share.
    - Teacher will share as well
    - If more students are eager to share… let 2 more share
  - Meditation
    - [Focus headspace (2 min)](Focus%20headspace%20(2%20min))
- Activity SNAKE video game (75 max for 2 min)
  - Make sure all students have guided note sheet
  - Randomize a list of the students names in the class
  - Have 5 students get 1 attempt at game (max 2 min each)
    - Ask students, what is the probability that the class scored 15 or below? Find the fraction and the percent
    - What is the probability that the class scored 15 or above? Find the fraction and the percent
  - Have 5 different students get 1 attempt at game (max 2 min each)
    - Ask students, what is the probability that the class scored 15 or below? Find the fraction and the percent
    - What is the probability that the class scored 15 or above? Find the fraction and the percent

Depending on the time…

- Questions for a 4 or students who finish early
  - Each class is doing this activity with 10 students. There are 3 math class sections. Using the probability from above in question 3. How many students scored 15 or below?
  - Each class is doing this activity with 10 students. There are 3 math class sections. Using the probability from above in question 4. How many students scored 15 or above?
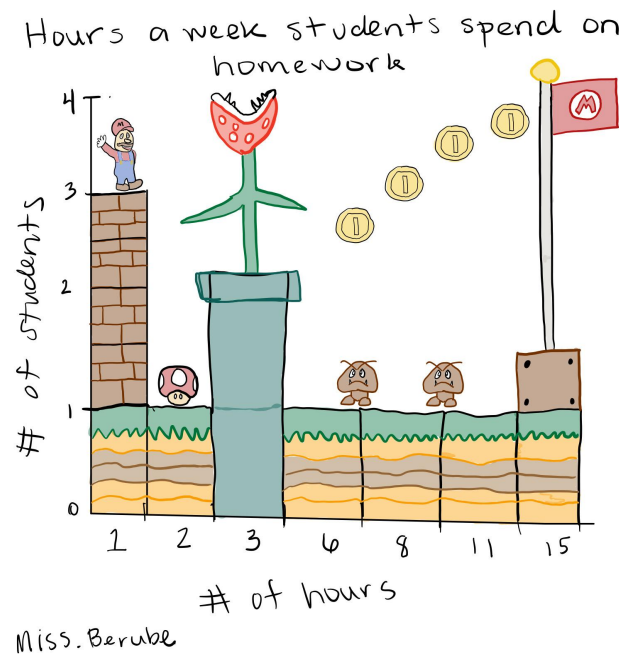- [Day 3 exit ticket](Day%203%20exit%20ticket)

Learning target: I can create a bar graph with data from an event.

Day 4: Art and graphing Standards

- Introduction/ question of the day/ meditation
  - Question of the day…pick one from yesterday's exit ticket
    - Have students vote (1 or 2)
    - Ask for a reason from a 1 and a 2
  - Meditation
    - [Headspace refresh (2 min)](Headspace%20refresh%20(2%20min))
- Types of graphs/ project (5 min)
  - [Types of graphs](Types%20of%20graphs)
    - Histogram
    - Frequency distribution

- - - ■ Line graph
    - ■ Scatter plot
    - ■ Pie graph
    - ■ Bar graph - Bar graphs might go up or to the right. This graph shows size relationships, frequencies, and measurements.
  - ○ Create bar graph
    - ■ Name on front or back (these might be hung in the halway)
    - ■ Label axis
    - ■ Title
    - ■ Plot data from all classes from Snake (30)
    - ■ USE ART, BE CREATIVE
    - ■ Paper or online (Jam Board)
    - ■ ELL students may put english and their native language on the poster
  - ○ Show an example of a CREATIVE bar graph

Data: 1, 1, 1, 2, 3, 3, 6, 8, 11, 15

Hours a week students spend on homework

Miss. Berube

- Day 4 exit ticket

Day 5: Art gallery celebration

Learning target: I can have meaningful conversations about my math with my peers.

Introduction/ question of the day/meditation
- Question of the day: If you had to become a vegetable, what would you become? (3 minutes)
  - ○ Ask 3 students to share their answers

- - ○ Share your answer as well
  - ● [Headspace restore (2 min)](#)
  - ● Art gallery activity (25 minutes)
    - ○ Explain how the art gallery will work (1 min)
    - ○ Have students take a quick walk around the room to look at the students work (3 min)
      - ■ Have the students write a question or comment that they have on a sticky notes and give them to the teacher afterward
      - ■ Teacher will put the questions on the TV by using the ipad camera
    - ○ Give each student the guided question and sentence starter sheet (1 min)
    - ○ Split the students in half. Half will be presenting and half will be observing. These conversations will be 1 on 1.
      - ■ Each student will observe 3 pieces of art and each student will present their art to 3 other students
      - ■ Give students 2 minutes to talk about the work. And then rotate. (15 minutes)
  - ● FOOD/DRINKS (:
  - ● [Math & interests end survey](#) (10 min)

If students finish before the time… allow them to celebrate their learning and chat among themselves. And/or let them ask you questions about your life.

Congratulations Lauren! You created your first math unit (: