

Sabbatical Report

Nancy Vendeville

Winter 2019



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Sabbatical Report for Nancy Vendeville

My Sabbatical during the Winter 2019 semester was very fulfilling and worthwhile. Not only did I achieve success in completion of all three stated objectives, I had fun! Below is my statement of purpose and a summary of the three objectives. The pages that follow are results of my work.

Original Statement of Purpose: The purpose of my sabbatical is to delve deeper into the world of Liberal Arts Mathematics. I seek to put a collection of “real-life” examples together that correlate with the four major units in the liberal arts math class at KVCC. In addition, how people use math in their jobs, and what kind of math skills employers are expecting out of employees are things I am interested in exploring as well. Additionally, I will investigate the design of other Michigan community college liberal arts math classes, including course learning objectives and pre-requisite classes.

I have taught the liberal arts math class at KVCC for the past four years. I’m always amazed at the number of students who claim that they “hate math” or that they’ve never had a good math experience. When I inquire more about these feelings, many say it’s because they never had a teacher who could clearly communicate the material. Even more students indicate that they don’t see the usefulness or application of mathematics to their lives. I want to change that mindset. I feel that if students are presented with “real-life” problems or situations that can be solved using mathematics, they will slowly buy in to the idea that math does have important ties to everyday life.

I have been a full-time mathematics instructor at KVCC since 2003, and this is my first sabbatical proposal. I would be thankful to have the time to create activities and network with colleagues.

Objective #1: The four main units in our liberal arts math class are problem solving and probability, geometry, finance, and statistics. The first task I’d like to accomplish during my sabbatical is to put together a series of “daily math” activities, preferably related to current events, which correlate with each of the four units.

Objective #2: Some common majors of students who enroll in this course are art (Art and New Media Pathway), criminal justice/law enforcement, and communication/English. I will interview people working in these fields to learn how they specifically use math. I will also find out what math skills they are looking for in future employees/colleagues.

Objective #3: I would like to meet with colleagues in other Michigan community colleges to learn more about their liberal arts math classes. Information gathered would include specific topics covered, structure of the class (lecture/activity-based, flipped vs. online vs. traditional face to face), and pre-requisite classes.

Objective #1: The four main units in our liberal arts math class are problem solving and probability, geometry, finance, and statistics. The first task I'd like to accomplish during my sabbatical is to put together a series of "daily math" activities, preferably related to current events, which correlate with each of the four units.

Arby's 2 for \$5 Special



For \$5, you can choose any two of the following:

- Roast Beef Classic
- Crispy Fish
- Beef 'N Cheddar Classic
- Loaded Curly Fries

a) How many combinations of pairs of food items can be purchased? Assume that you are allowed to pick two of the same item.

b) If you bought each of those pairs of items, what would the total bill be, including 6% sales tax?

January 5 2019 (50 degrees!) Bike Ride



a) Calculate my average speed in miles per hour.

b) If I walk a 13:45 mile (13 min 45 sec per mile), how long would it take me to walk the same route I biked?

Trump's Border Wall



Border wall prototypes stand in San Diego near the Mexico U.S. border, seen from Tijuana, Saturday, Dec. 22, 2018. The U.S. federal government remains partially closed in a protracted standoff over President Donald Trump's demand for money to build a border wall with Mexico. (AP Photo/Daniel Ochoa de Olza) AP (*Daniel Ochoa de Olza*)

January 2019

President Trump is asking for \$5.7 billion for his border wall/security. Part of the border already contains a wall or other barrier. He is proposing a concrete or steel wall be constructed that will span an additional 235 miles. (Based on speech delivered on Tues. Jan. 8, 2019)

Each panel of wall is projected to be about 30 feet long and 30 feet tall.

a) How many panels will be needed to cover the entire 235 miles?

b) What is the cost per panel?

c) Visit <https://www.omnicalculator.com/construction/trump> . Input requested information. Be sure to predict guards and maintenance. What is the tally, including materials, construction, and maintenance?

d) The above calculator is based on concrete construction. What if the wall is made of steel? How could the cost be estimated then? How much more/less would a steel wall be versus concrete?

Brrrrrr....It's Cold Outside!

January 20, 2019 the air temperature was 12 ° F and the wind speed was 9 mph. The wind chill (or “feels like temp”) according to the Weather Channel was -1 ° F.

The National Weather Service uses the following formula to calculate wind chill:

(Source: <https://sciencing.com/calculate-wind-chill-factor-5981683.html>)

Multiply the temperature by 0.6215 and then add 35.74. Subtract 35.75 multiplied by the wind speed calculated to the 0.16 power. Finally, add 0.4275 multiplied by temperature, multiplied by wind speed calculated to the 0.16 power. Your result is defined as $T(wc)$, which equals the current local wind chill factor.

- Write the formula so it looks like a proper mathematical formula. Use A for the air temperature and W for the wind speed.
- Put the numbers from the January 20 stats into your formula. Was the result $-1^{\circ}F$?
- In the wee hours of January 21, it's predicted the air temp will be $-12^{\circ}F$ with an 8 mph wind. Calculate the wind chill.

Check your Dosage!

Below is a clip from an article on MLive on October 27, 2018 explaining how a caregiver caused the death of a patient due to administering an incorrect amount of a drug:



Kubicek showed the caregiver a large syringe that measured in milliliters. Kubicek said she was giving her mother 10 milliliters every 15 minutes to an hour, instead of 10 milligrams every 15 minutes to an hour, as prescribed, to make her comfortable.

"She told Sue that she was using the wrong sized syringe and the fact that what she was giving her mother was 20 times the amount required," the detective testified. "Sue stated at that time, 'It's her



a) Convert 10 milliliters to milligrams.

b) Convert 10 milligrams to milliliters.

c) A person in the story is quoted as saying Kubicek administered 20 times the required dosage. How closely do the results of your conversions agree with that statement?

Oh, Baby That's Expensive!



1. What costs are associated with raising a child for the first year of life? (i.e. what items do parents/caregivers need to purchase or supply?)

2. Research the total cost of raising a child for the first year of life. What about the total cost of raising a child through age 18? Be sure to quote the source(s) of your information.

3. Compare the totals you obtained in question 2 with costs of raising a child 10 years ago. What is the percent increase? Is that percent more or less than the inflation rate over that 10 year period?

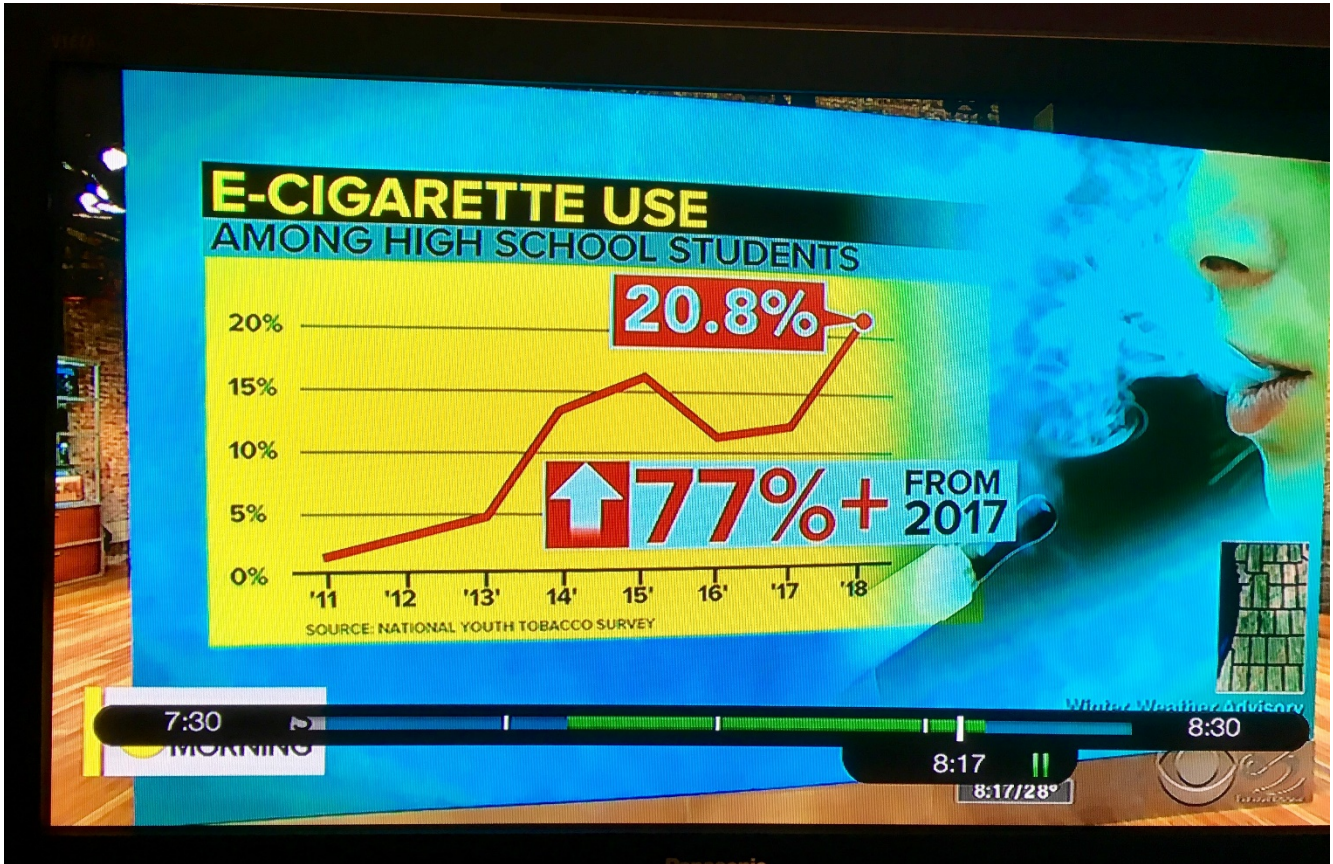
Driving in the Mountains



Explain what a grade of 3% means. Compare this road to one with a 6% grade.

E-cigarette usage on the rise

Source: CBS Morning News, January 18, 2019



1. Verify that the percent increase in e-cigarette use among high school students was 77% between 2017 and 2018 as stated in the graph.
2. Between what two years was there the sharpest increase in e-cig use, and what do you suppose accounts for that trend?

3. Between what two years was there the sharpest decrease in e-cig use, and what do you suppose accounts for that trend?

4. When e-cigarettes first came on the market, long-term health effects were uncertain. Since then, plenty of research and case studies have been done examining the health implications of e-cigarette usage, particularly among teens. Explain what current research indicates about how e-cig usage impacts one's health and report your results below.

Follow us on



MEMBER POLL

What's your favorite Kirkland Signature product?

Members weigh in on their most-loved items in our monthly poll, posted to Costco's Facebook page.



ILLUSTRATIONS: KEN BROMAN

The dark-chocolate-covered dried mangoes. OMG, I keep them in the fridge, and they are amazing.—*Catie Larsen*

When I had dogs, the Kirkland [Signature™] dog food was great. Higher quality than most off-the-shelf brands. I also get the organic lemonade, organic tomato sauce in cans, etc. Pretty impressed with most Kirkland [Signature]-branded stuff.—*Greg Henry*

Every single Kirkland [Signature]-brand everything I've bought has been exceptional, from the sheets on my bed to the tortilla chips I had for lunch. If it's Kirkland [Signature] brand, I don't think twice about trying it. Love Kirkland [Signature]. Love Costco.—*Linda Barclay*

Toss-up between Jelly Bellies and Colombian Supremo Whole Bean Coffee.—*Tim Moon*

Diapers! They are just like Huggies!—*Sam Mac*

Kirkland [Signature]-brand alcohol! The wine is really good. The ready-made margarita is by far the best.—*Deirdre Zabawa*

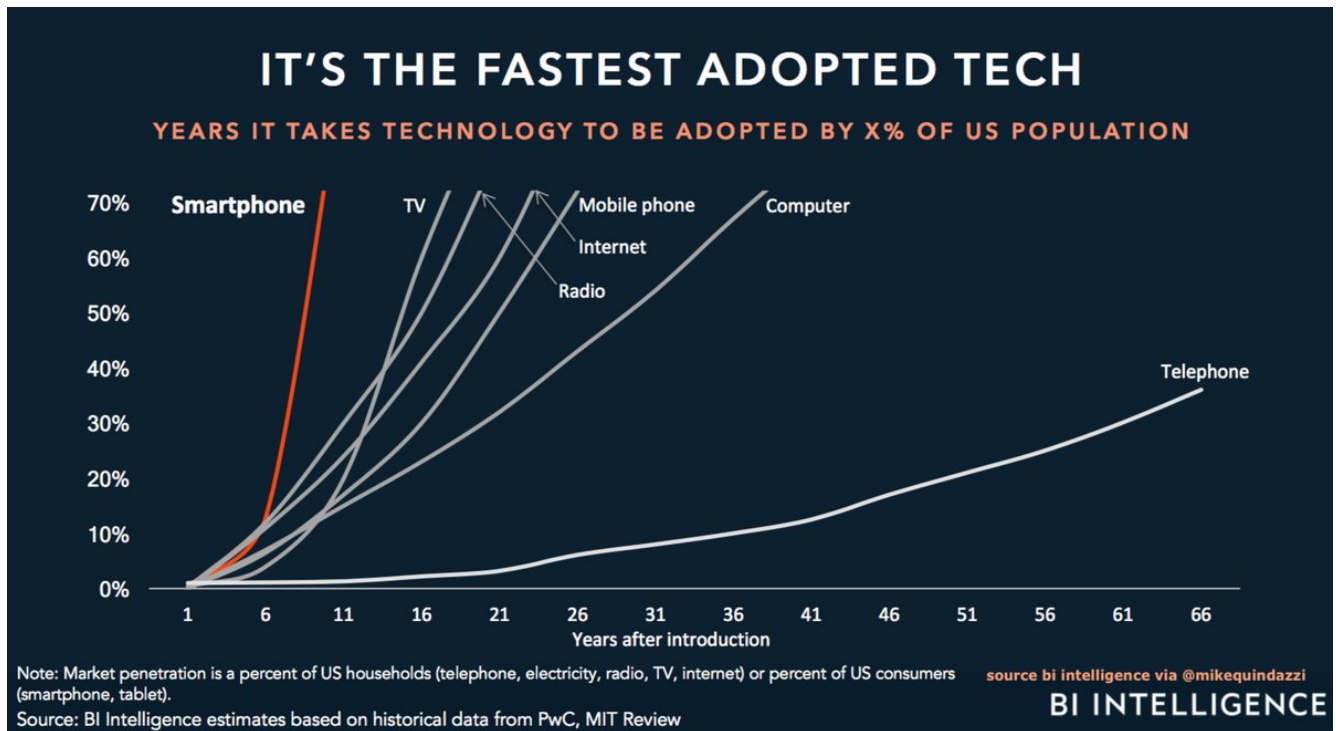
Kirkland Signature fun facts

- Kirkland Signature branded products were established in 1992.
- Kirkland Signature Bath Tissue is a top-10 item in sales.
- It takes more than 700 premium cocoa beans to make the exclusive chocolate found in one 40-ounce jar of Kirkland Signature Peanut Butter Cups.
- Last fiscal year, Costco sold enough Kirkland Signature activewear garments to total 6.8 million square feet of fabric. If you connected it all, you could create a fabric bridge from Kirkland, Washington, to Honolulu, Hawaii—2,700 miles!

★
Next up: Which dish completes your Thanksgiving meal?
Watch for the next poll question at [Facebook.com/Costco](https://www.facebook.com/Costco). Or send responses to the upcoming question at connection@costco.com, subject line "Poll."

QUESTION: Explain what is misleading about this graph.

Getting on the Technology Bandwagon



- How many years did it take for about 20% of the population to adopt the telephone?
- How many years did it take for about 20% of the population to adopt the smartphone?
- Thirty years after introduction, what percent of the population had adopted the computer?
- Thirty years after introduction, what percent of the population had adopted the internet?

Government Shutdown – Potential Impact on the FDA

Source: CBS Morning News, January 10, 2019



Due to the government shutdown, it is likely that the FDA will not be able to continue inspections at food and drug-prep facilities.

About 48 million people get sick each year from foodborne diseases, and of those, 3000 die. Based on these statistics, if 50,000 people eat at a contaminated restaurant and contract a foodborne disease (such as e-coli), how many will die?

Government Shutdown ... lost wages

January 2019

Image from Parade.com



Due to the government shutdown, approximately 800,000 Federal workers will not get paid (even though they may be required to still report to work!). It's estimated that these workers earn a combined \$2 billion each pay period. (Source: americanprogress.org)

Find the average salary per pay period for each of these Federal workers.

How Much is That Sucker in the Window??

I once saw a Tootsie Pop sucker at a convenience store with a price label of

.25 ¢

1. Explain in words how much the sucker costs.
2. If I gave the clerk \$1.00, how much change should I have received?
3. This [website](#) explains Michigan's Scanner Law, which allows consumers to collect a "bounty" if they are overcharged for an item. Summarize what this laws says.

A whole bunch of items erroneously priced:





VZW Wi-Fi 8:31 AM 49%
hardings.com

Standard Pride 73 % Lean Ground Beef
\$5.97
 3 lb tube
 Only \$1.99 per lb
 Friday Dec 7th, 2018 ONLY !
[Add to List](#)

Sugardale Butt Portion Ham
.99 cents lb
 Pound
 Friday Dec 7th, 2018 ONLY !
[Add to List](#)

Sugardale Shank Portion Ham
60 % Off Only \$.79 cents lb
 Only \$.79 cents lb
[Add to List](#)



Hungry Howie's

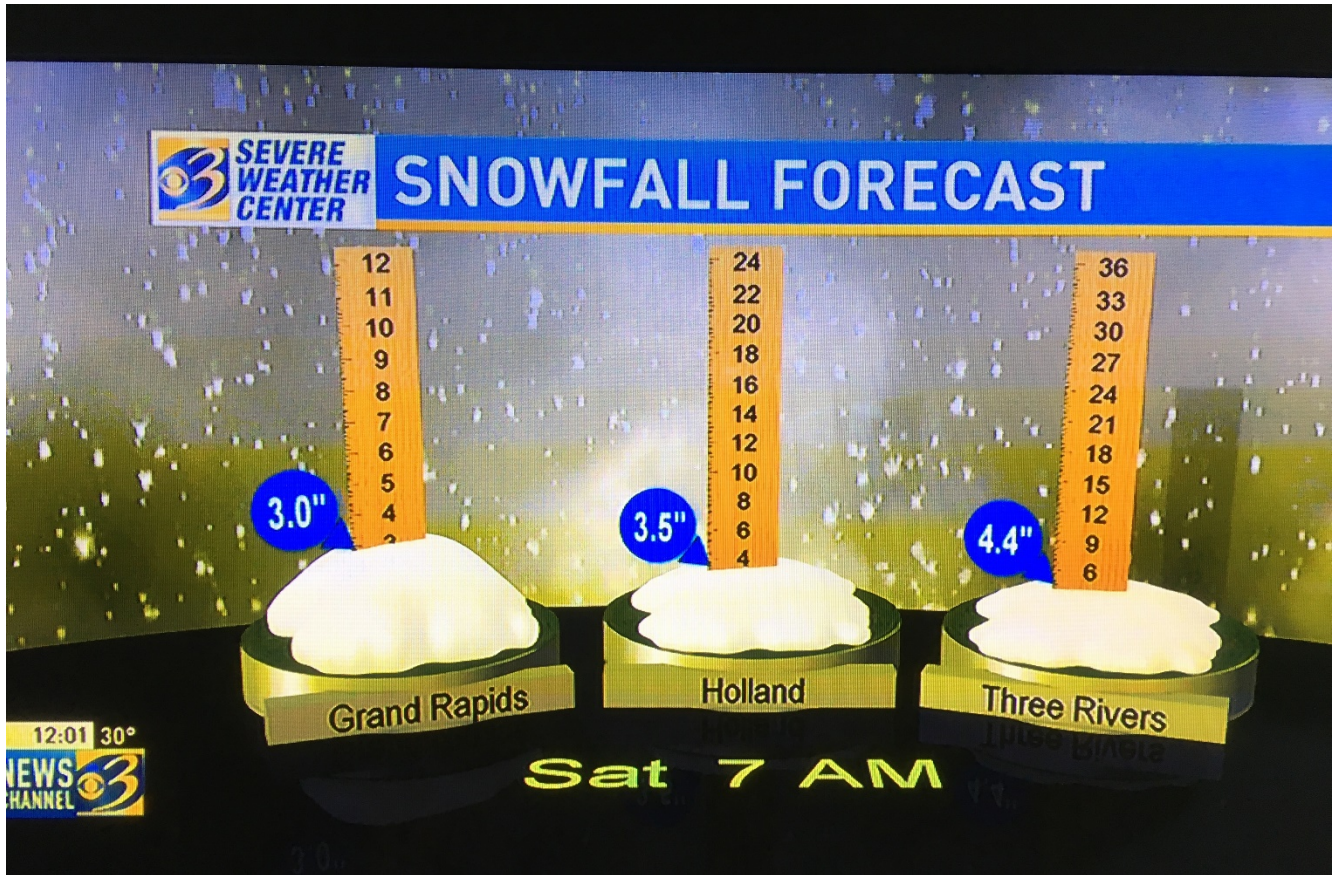
TV commercial, January 2019



A commercial on TV advertised that Hungry Howie's offers over 40,000 pizza combinations. Explain where this figure comes from.

Misleading Graphs, Snowfall Forecast

Source: News Channel 3, January 18, 2019



1. What is misleading about these graphs?

2. In the space below or on the back of this paper, draw a more accurate graph. Be sure to include labels.

My Quilt

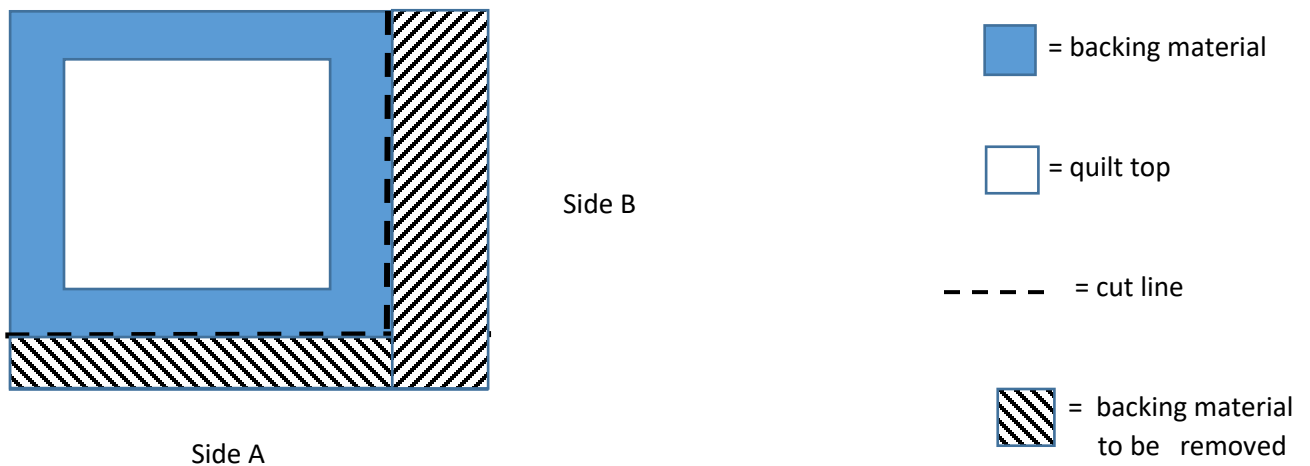


The quilt top at this stage is 63" x 63". I need to purchase backing material that is the size of the quilt plus an additional 4 inches on each side.

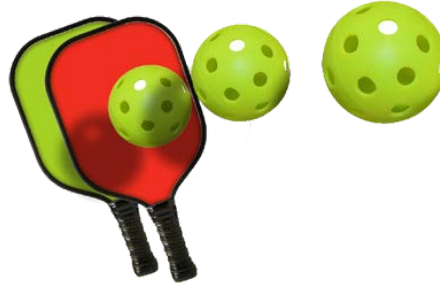
1. Sketch a picture of the quilt back and include dimensions.

2. Fabric purchased at a fabric store comes in widths of 44 inches. Two pieces of fabric will have to be sewn together (with a 5/8" seam allowance) to create the back. Determine how many yards (to the nearest 1/4 of a yard) must be purchased.

3. A sandwich is created with the back, the batting, and the top. When the quilt top is laid on top of the batting and backing, there will be extra material to trim off two sides. Use the diagram below (not drawn to scale) to determine how much fabric, to the nearest inch, should be trimmed from side A and side B.



Rates at The Alley Pickleball Club



On December 17, 2018, the charge for a 2.5 hour Pickleball 101 class was \$10. On January 10, the same class was advertised for \$15 for a 1.5 hour session.

- a) Find the cost per hour of the December class.

- b) Find the cost per hour of the January class.

- c) Find the percent increase.

- d) If the Alley Pickleball Club continues to raise its rates at the same pace, how much will a 2 hour Pickleball 101 class be in February?

Sears Closures



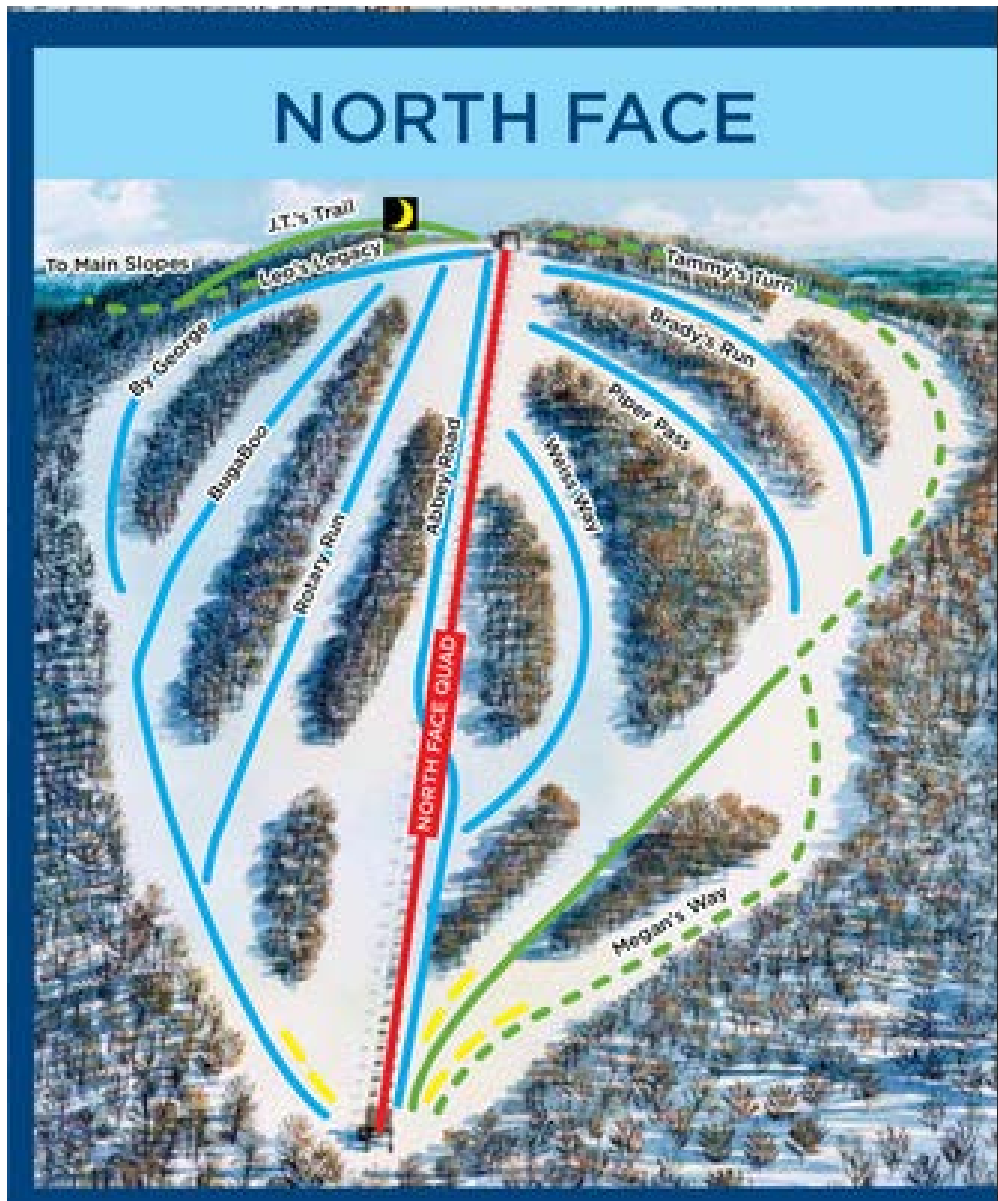
(Sears merged with Kmart in 2005.)

According to cnbc.com, Sears/Kmart had a combined 355,000 employees in 2006. In 2018, that number had dwindled to 89,000.

- a) Find the percent decrease in the number of employees over this time period.

- b) Find the percent decrease per year in the number of employees.

Skiing Fun!



One complete cycle of a ski run would be down the hill then back up again. If it took 5 times as long to ride up the North Face Quad lift as it did to ski down Bugaboo, and one complete cycle took 4 minutes and 45 seconds, how long was I on the chairlift and how long did it take to go down the hill?

Snowmageddon!

February 13, 2019



The next page includes a rough sketch, not drawn to scale, of my entire driveway/sidewalk. Each labeled section is roughly equal in area. The driveway has 6 sections, and the sidewalk, labeled “7”, is roughly equal in area to each of the six sections that comprise the driveway. The shoveled sections represented in the photo above are 1, 2, and 3. It took me 34 minutes to shovel those three sections. If I maintained the same shoveling rate, how long would it take me to shovel the entire driveway and the sidewalk?

A 3x2 grid with the following numbers:

4	1
5	2
6	3

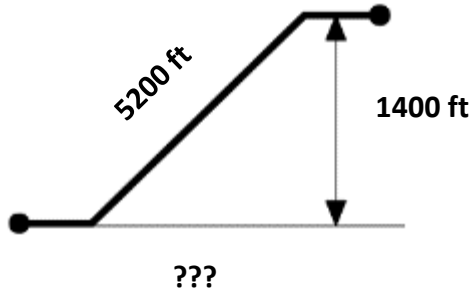
A bracket on the left side of the grid spans the first two rows and is labeled with the number 7.

(Took a few breaks to stretch my back and chat with a neighbor ... total time was one hour and 33 minutes!)

Solitude Mountain Resort, Utah



The Eagle Express Chair lift is 5200 ft long and has a vertical lift of 1400 feet. Find the horizontal change.



Texas Township residents seek answers and action to end flooding

Updated Feb 12; Posted Feb 11

105

By [Malachi Barrett | mbarret1@mlive.com](#)

TEXAS TOWNSHIP, MI -- A feeling of crisis in Texas Township is growing as residents wonder whether a solution to reduce flooding around inland lakes will bring problems to the doorstep of their downstream neighbors.

The Michigan Department of Environmental Quality is considering a permit requested by Texas Township to pump water from Crooked Lake and Eagle Lake to Bass Lake and surrounding wetlands. Floodwaters encroaching on more than 100 properties have caused some to abandon their homes while residents worry the situation will worsen during the spring snowmelt.



Texas Township seeks DEQ permit to pump flooded lakes

- ➔ Water would need to be pumped from Eagle Lake into Crooked Lake at a rate of 1,500 gallons per minute. Pumps will remove water from Crooked Lake to wetlands adjacent to Bass Lake at a rate of 3,000 gpm.
- ➔ Eagle Lake would need to be pumped for about 6 months to return to normal levels and Crooked Lake would need to pump about 8 months.

To approve the permit, the DEQ must find pumping the lakes will not adversely affect the public trust or riparian rights and take public comments from property owners. During a Monday, Feb. 11 public hearing, Thomas Schripsema said he's not too proud to beg his downstream neighbors to support the permit.

Refer to these statements:

Water would need to be pumped from Eagle Lake into Crooked Lake at a rate of 1,500 gallons per minute. Pumps will remove water from Crooked Lake to wetlands adjacent to Bass Lake at a rate of 3,000 gpm.

Eagle Lake would need to be pumped for about 6 months to return to normal levels and Crooked Lake would need to pump about 8 months.

1. Assume pumping proceeds for the prescribed amount of time.

a) How much water will be pumped out of Eagle Lake?

b) How much water will be pumped out of Crooked Lake?

2. What are the implications of pumping the water?

3. What are the implications of not pumping the water?

UPDATE: according to a May 16, 2019 [Mlive](#) article, pumping is slated to begin by the end of May. Hopefully lake residents will get flood relief soon after!

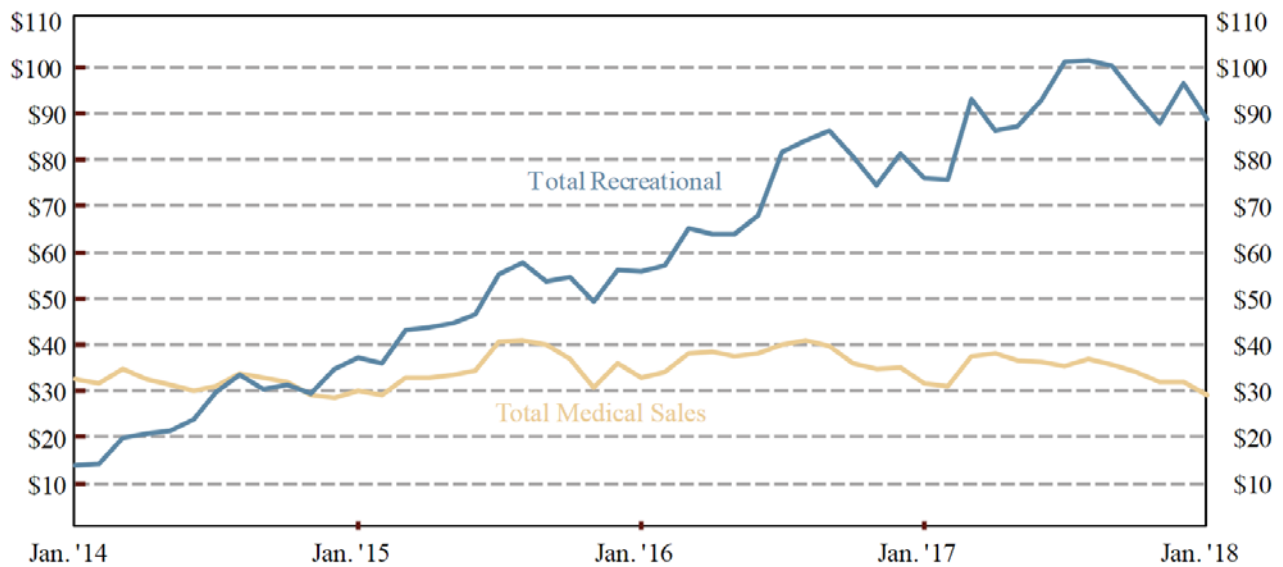
The Cannabis Economic Effect in Colorado

Source: <https://www.kansascityfed.org/publications/research/rme/articles/2018/rme-1q-2018>

After Amendment 64 passed in November 2012, recreational marijuana stores in Colorado opened Jan. 1, 2014. Although marijuana is legal in all of Colorado, each local jurisdiction can decide whether to allow medical or recreational marijuana retail stores. As of June 2017, 65 percent of Colorado jurisdictions (out of 320) had banned both medical and recreational stores, 4.7 percent had allowed only medical stores, 3.4 percent had allowed recreational stores only and 26.6 percent had allowed both recreational and medical marijuana stores.

Chart 1: Monthly Marijuana Sales

Millions



Source: Colorado Department of Revenue

- a) Estimate when total medical sales and total recreational sales were equal, and what is that amount?

- b) Predict total medical sales in January 2019.

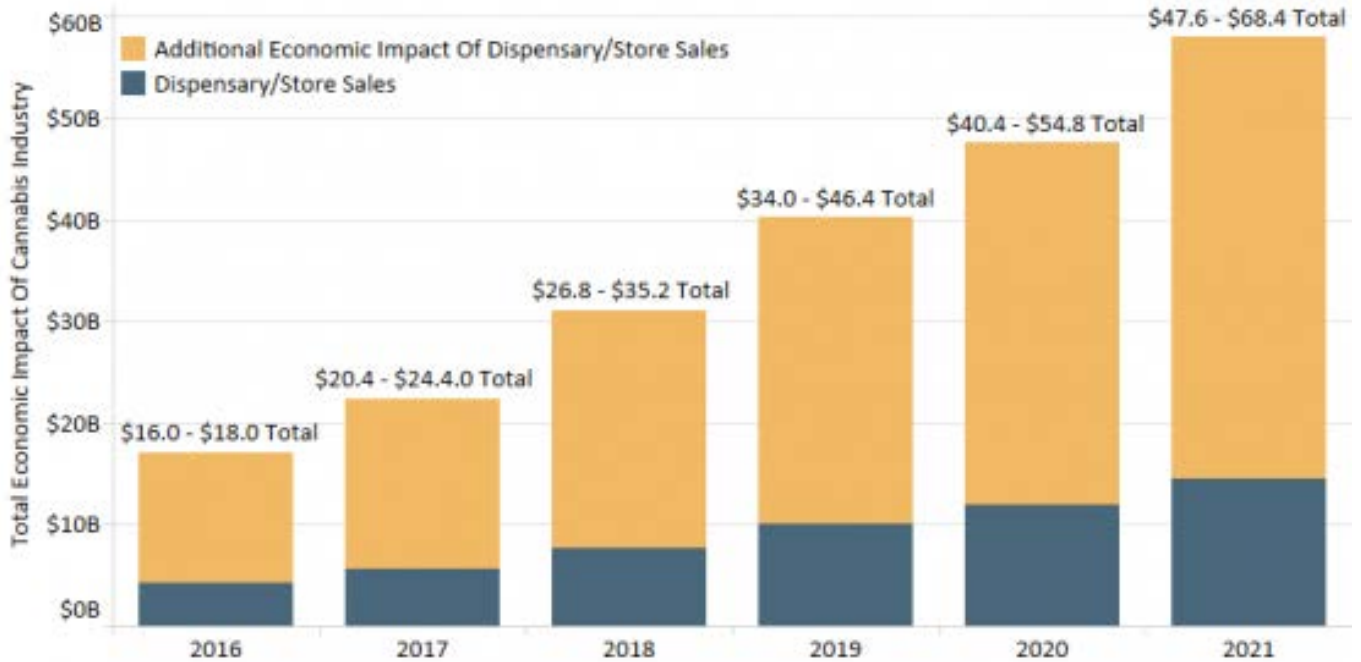
- c) Predict total recreational sales in January 2019.

U.S. marijuana industry's economic impact

Source: <https://mjbizdaily.com/chart-u-s-marijuana-industrys-economic-impact-approach-70b-2021/>



U.S. Cannabis Industry Total Economic Impact: 2016 - 2021
(In Billions Of U.S. Dollars)



Copyright 2017 Marijuana Business Daily, a division of Anne Holland Ventures Inc. All rights reserved.

- a) How can the figures be provided for 2019-2021 if those years are in the future?

- b) Consider the “additional economic impact of dispensary/store sales” for 2020 and 2021. Find the percent increase.

- c) Project the “additional economic impact of dispensary/store sales” in 2022.

The true cost of an iPhone over your lifetime: \$300,000

Published: Jan 13, 2019, <https://www.marketwatch.com>



“That’s how much you would make if you invested the money you spent on your smartphone from the age of 18 to 78. The figure is based on the average amount spent per year in the U.S. on cellphones, and the average returns you’d make on that money if you invested it instead from age 18 to age 78 and upgraded every 32 months. That number is also in constant dollars — in other words, it’s after accounting for inflation. Based on current average pricing, that puts your total expense at \$12,474.

Americans also spend approximately \$88 [a year on apps](#) and unlimited data plans typically [cost around \\$80 a month](#).

Put that money into an investment account, and factor in long-term returns of around 4% a year after inflation, and you reach that \$300,000.

As with all calculations, there are plenty of assumptions about average users. But they help show the value of reducing these bills. Based on these calculations, someone who buys a cheap \$150 Android phone every two years, and switches to a \$20 a month plan, would add more than \$200,000 to their retirement account.”

- Assume a person spends \$88 per year on apps and \$80 per month on their cell phone plan every year between the ages of 18 and 78. Find the total amount spent over this time span on both apps and cell phone plan.
- How much do you spend per month on your cell phone? Include money spent on your monthly bill and also any apps you purchase.

c) For many people, their cell phone is their life line, and it's not reasonable to go without one. Assuming you are in that category and are not willing to give up your cell phone, how could you keep your phone but save some money each month?

Unconventional Mortgages On the Rise

January 24, 2019

Source: Wall Street Journal



Unconventional loans are on the rise, according to an [article](#) in The Wall Street Journal, and this could be a problem.

Also known as non-qualified mortgages, or non-QM, these loans accommodate borrowers whose unusual circumstances mean they don't have a standard proof of income.

While unconventional loans comprised just 3% of the overall mortgage market in the first three quarters of 2018, according to the WJSJ, this is notable because at the same time, traditional home loans declined.

Discuss the implications in the increase of unconventional loans

Venezuela Inflation

January 24, 2019

Source: CBS Morning News



Inflation is the rise in the price of goods and services over a period of time.

There is an economic crisis in Venezuela, where inflation is currently 1,000,000%. Compare that to the U.S., where inflation in January 2019 was 1.9%.

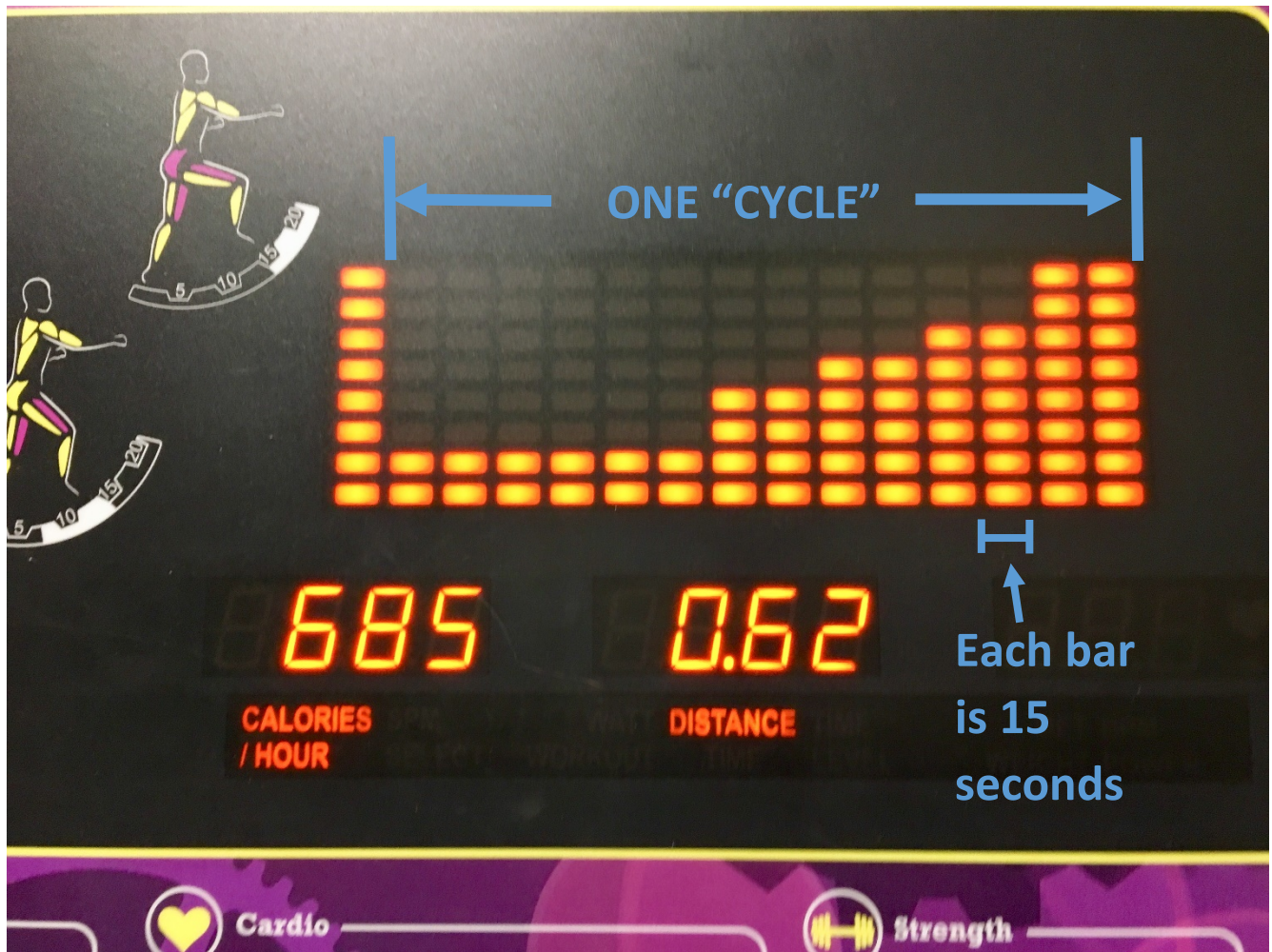
The currency in Venezuela is the Bolivar (VEF). Currently 1 VEF is about 0.1 USD (U.S. Dollar)

a) How many USD is 10 VEF?

b) How many VEF is 10 USD?

- c) A pair of jeans in 2019 in Kalamazoo, MI is \$40.
- i) Assuming the price of the jeans increases at the same rate as the stated US inflation rate given above, how much would those jeans cost if purchased in the US in 2020?
- ii) Convert the cost of the jeans to VEF.
- iii) If those jeans were purchased in Venezuela in 2019, how many VEF would they be in 2020 if they increase in price at the same rate as the stated Venezuela inflation rate?

Workout on the Arc Trainer



- How much time (in minutes and seconds) is needed to complete one cycle?
- How much time (in minutes and seconds) would it take to complete 18 cycles?
- How many cycles can be completed in a one-hour workout?

Lining a Cake Pan

I was getting ready to bake a cake in my springform pan for my sister's birthday. To ensure the cake comes out cleanly, the bottom and sides are to be lined with parchment paper.

The problem is that I was running low on parchment paper and needed to do some measuring to make sure I had enough.

For the bottom, I was able to trace the circle on the paper and cut it out. Explain how to calculate the length of the strip of parchment paper I needed to put around the sides.



P.S. I did have enough paper, but had to cut two shorter strips and overlap them slightly to make it all the way around the pan. And the dessert, Chocolate Guinness Stout Cake, was delicious!

Math Moves (Kalamazoo Valley Museum)

I visited the KVM in March to tour Math Moves! Experiencing Ratio and Proportion. There were more than 20 exhibits that were interactive in nature where participants could experience the concepts of ratio and proportion.

While as a math educator, I could understand the math each station was attempting to demonstrate, I found there to be a lack of educational questions. If an attendee didn't have a strong background in math, they would have a difficult time applying math concepts at some stations. It would have been nice if the exhibit provided participants with a series of questions that could be answered at each exhibit, with further explanation of how to apply various math skills. I did appreciate how interactive the displays were, though, and witnessed many young kids having fun exploring. The employee working the welcome desk did have one copy of an educator's guide but did not have additional copies to share. It would have been nice to have had a copy of that, particularly if I were a parent/teacher who brought kids to the exhibit so I had a list of age-appropriate follow-up questions to ask them.

Additional information on the exhibit from the museum's website is as follows:

"In Math Moves! Experiencing Ratio and Proportion, visitors will explore key math concepts with activities that use their brains, senses, and entire bodies. Through the more than 20 interactive stations, Math Moves! invites visitors to work together to experience ratio, proportion, fractions, geometry, and much more in a physical, cooperative, exciting, and memorable way. Visitors will explore, play, and investigate math concepts as they move through the exhibit!

Movie Ratios: Create a stop-motion movie and experiment with changing its speed and length.

Comparing Forms: Visitors use their body and other measuring tools to explore how three proportional chairs differ in size.

Scaling Shapes: Practice doubling the size of objects in three dimensions—height, length, and width—with varying levels of difficulty.

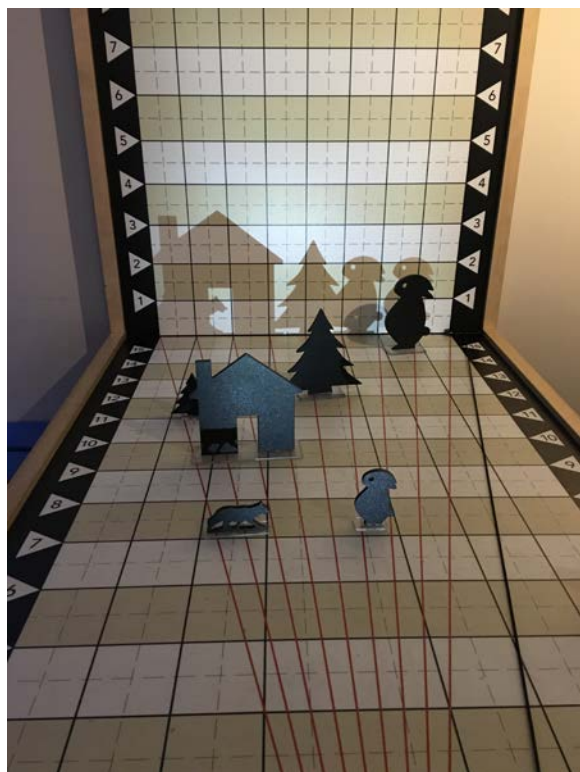
Partner Motion: Compare your rate of motion to a friend's and create patterns as your movements are tracked on the screen.

Math Moves! was created by the Science Museum of Minnesota.

Math Moves! was developed by a partnership between the [Science Museum of Minnesota](#); [Explora](#), Albuquerque; the [Museum of Life & Science](#), Durham; the [Museum of Science](#), Boston; the [Center for Research in Mathematics and Science Education \(CRMSE\)](#) at San Diego State University; and [TERC](#), Cambridge, with support from the [National Science Foundation](#)."

Source: https://www.kalamazoomuseum.org/exhibits/special_exhibits/math_moves/index.html

Below are a few snapshots of a few exhibits.



Note how the placement of objects affects the size of the shadows.



During the course of my sabbatical activities, I came across many interesting online resources, two of which are explained below.

One is created by Maria Andersen, consultant at Edge of Learning and the CEO and Cofounder of [Coursetune](#), an edtech company that builds curriculum design, management, and collaboration software. She recently has been on a quest to find graphs displaying real-life current trends that serve as starting activities and discussion boards in the classroom. Here's an excerpt from her website, [Busynessgirl](#) :

“So, I decided to start an [Instagram graphsintheworld account](#) (for the young'uns) and a [Facebook Graphs In the World page](#) (for us older readers). Since I collect about 1-3 graphs a day, it should provide a way to rack up graphs for your classes, assignments, and discussions as well. This is not just for math folks. There are plenty of graphs in here with social and business implications. I am surprised by at least one graph every week that teaches me something I did not know.”

I am excited to utilize this resource in the classroom, and I hope it sparks good conversation and gets students more involved in the math they experience in the world around them.

The second online resource I found interesting I learned of on the news shortly after I had conversations with game designers. It is called [Code.org](#)[®], which is a “nonprofit dedicated to expanding access to computer science in schools and increasing participation by women and underrepresented minorities.” Their hope is that all students in all schools have the chance to learn computer science. Needless to say, I was intrigued, and visited their website to learn more.

I tried their Hour of Code tutorial and learned how to use code to create characters having a dance party. I was able to choose characters, music, and dance moves. While creating my “dance”, I was able to toggle to a page that showed the actual code. It brought back fond (?) memories of the few computer science classes I took in college.

Coding definitely requires logic and proper understanding of algorithms. Some students in Math 115, particularly those planning on game design, may find the site useful and fun. There are plenty of courses students (and educators) can choose from to meet their needs and skill level.

Objective #2: Some common majors of students who enroll in this course are art (Art and New Media Pathway), criminal justice/law enforcement, and communication/English. I will interview people working in these fields to learn how they specifically use math. I will also find out what math skills they are looking for in future employees/colleagues.

I was able to talk to several people in the fields Math 115 students typically pursue. The conversations were worthwhile and I was able to gain a greater understanding of several careers I previously didn't know a lot about.

Each person I spoke to was able to share good, concrete examples of how math is applied in the workplace. Regardless of profession, some common threads for successful employment in the particular industry were: strong math skills, good problem solving skills, good verbal communication skills, reliability (showing up on time, meeting deadlines, etc), and not being on one's cell phone during work time. These are all skills I "preach" in my classes, so it was good to hear the importance of these traits from others in the workforce.

Discussions with these individuals have given me ideas of how I can incorporate various math problems into the curriculum that correlate well with future careers of Math 115 students.

The pages that follow are summaries of my conversations I had with multiple people.

Angie Farrell, Interior Designer, SKP Design

Angie shared a lot of information with me regarding her job and the fact that good math skills are mandatory. She's working on a large commercial project now designing offices, conference rooms, bathrooms, and break rooms. While the floor plan is created on a computer, she emphasized the importance of knowing how to use a tape measure to accurately determine room dimensions.

Various scale drawings were shared with me with notes like $\frac{1}{4}'' = 1'0''$. When she meets with clients to review layouts, she brings printouts of the floor plan along with a ruler. When the client asks questions such as "How much room is there between the table and the wall?", Angie needs to use her ruler to measure dimensions on the paper and convert that into the actual distance.

Angie also uses a spreadsheet to track expenses, and uses simple formulas to add tax and calculate totals. Additionally, when measuring for flooring, paint, and other finishes, it is customary to order about 5% more to allow for cuts and falloff. Those calculations are also included on spreadsheets and invoices.

It's also important to understand how to read product sheets from suppliers and to verify that enough product is being ordered. Below is a sample:

Some good math problems here Note that the dimensions of the product are given in inches, but the area is in square feet. Students could be asked to verify the area of each panel.

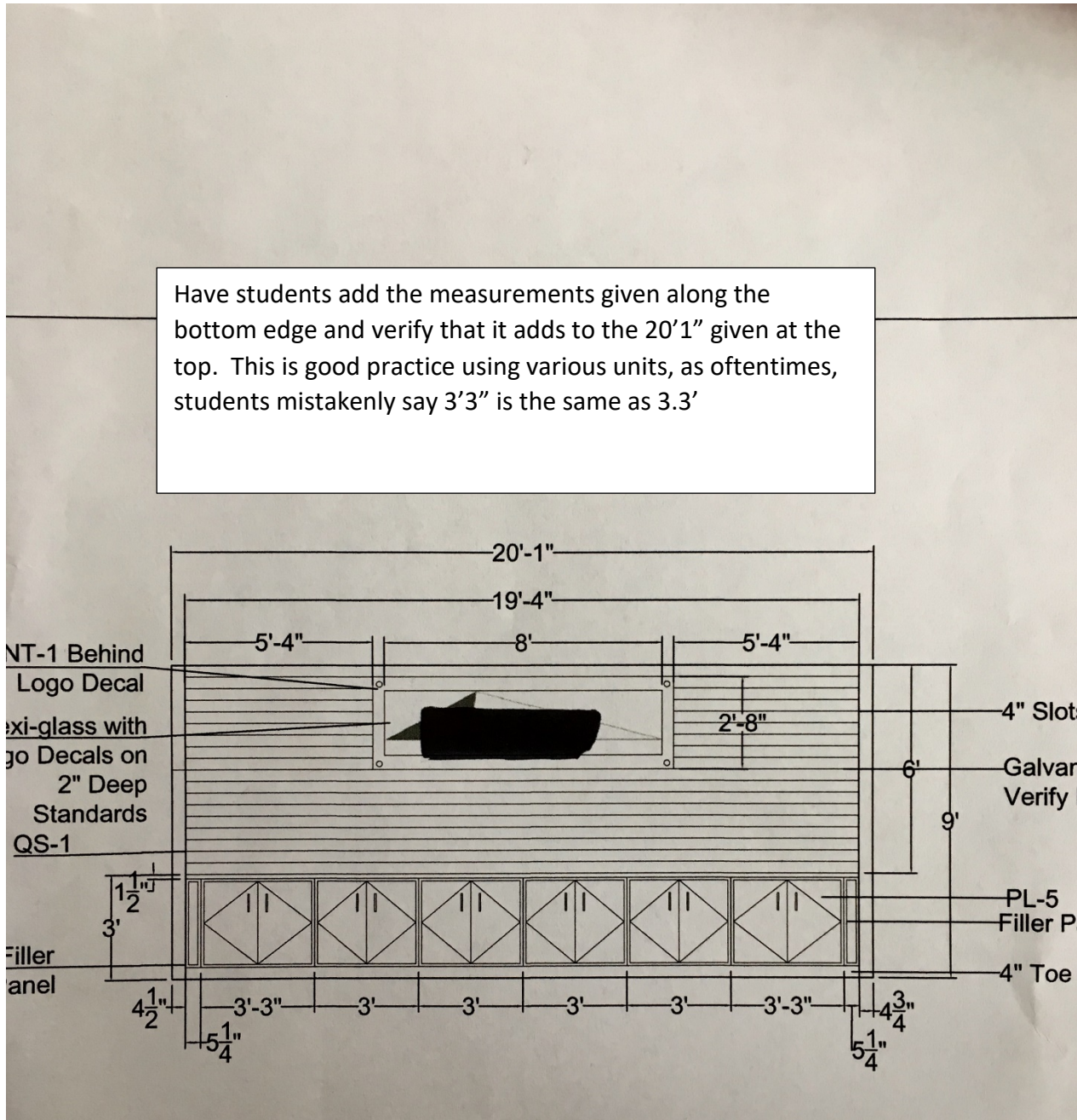
Another good problem The quantity is 154 panels. Students could be asked to calculate the entire area being covered, assuming the quantity represents 5% more than the measured dimensions.

S.No.	Product Details	Qty	List Price	Total
1.	FAD4005 Maisie Collection English	154	\$11.95	\$1,840.30
Each panel is 14" H x 57" W (5.5 sq ft), packaged 4 panels per box. Sold by the box of 22 sq ft. Price per square foot / 7 boxes				
				Sub Total \$1,840.30
				Tax \$0.00
				Freight \$178.10
				Grand Total \$2,018.40

Terms and Conditions
Tax not included. UPS Ground shipping quoted. A 2.5% convenience fee is added to all credit card orders.

Another good problem A 2.5% convenience fee is added for credit card orders. Given the Grand Total, ask students to calculate what the total would be if the client paid by credit card. AND also ask students to share if they know why such a policy is used.

Here is another great example that can be used with students



This meeting was very beneficial and I appreciate Angie's insight into how math is used every day in her line of work. It validates the importance I put on the measurement unit we cover in Math 115.

Ferris State University, School of Digital Media

Varun Singireddy, Assistant Professor

FSU offers Bachelor degree opportunities in Digital Animation and Game Design, Digital Media Software Engineering, and Television and Digital Media Production. When I spoke with Varun on February 20 regarding math requirements/expectations/applications in the gaming industry, I learned that students in these FSU programs need to have a more rigorous math background than what KVCC requires for the AAS in Animation and Game Art. While many required classes at FSU and KVCC are similar, it's clear that more advanced math is required to earn a Bachelor's degree in this field.

Nonetheless, it was made clear to me that a strong understanding of algebra, formulas, problem solving, and logic is a must, no matter what degree is being sought. For instance, when creating a game where one character shoots another, it is required to know how to find the area of a circle to determine the target area. The Pythagorean Theorem is used to find magnitude vectors, which will help determine if a shot hits its target. Varun was adamant about emphasizing the need to problem solve. Each game and corresponding code has its own idiosyncrasies, so to be able to apply reasoning skills to troubleshoot problems is vital.

Even though students in Varun's classes often have higher level math skills than students in Math 115 at KVCC, he reported some very basic concepts that students struggle with, such as proper use of order of operations. Understanding this concept is very important in being able to write code for programs. Defining and using variables correctly is another important concept. Both of these ideas are learning objectives in Math 115, and now I can express to students some real-life instances where following order of operations correctly, and using parentheses correctly, is important.

One observation that Varun and I both share in regards to our students is that some tend to lack persistence and give up too easily when a solution is not quick and easy. So many people are quick to turn to Google to answer questions for them. This is not a viable solution in the gaming industry. Students need a strong foundation in math so that they can write code for games and have the game work properly.

I was under the impression that students in the digital media program all wanted to create video games. I was surprised to learn there are many other career paths students pursue. The skills learned in the gaming curriculum allow students to do things such as create 3-D models for architecture companies, create medical simulators so medical students can practice doing surgeries before practicing on a live patient, be an artist for a video game company, and become web developers.

Marty Lier, Assistant Professor and Internship Coordinator

My conversation with Marty February 21 reinforced ideas Varun shared with me the day before. Marty was equally passionate about the gaming industry and the fact that math is a vital piece in being a good programmer and designer.

Just as Varun had mentioned, Marty indicated the requirement for students to be able to think logically and be good problem solvers. While the game engines used to create video games have physics built in, it's still important that students have a good understanding of basic math and algebra in order to write the code that makes programs work.

Like Varun, Marty indicated several fields besides game production that students pursue after graduation. One example is creating 3-D animations of accident scenes as part of accident reconstruction efforts. Another example is writing various apps, one of which is used by autistic people to help them recognize different faces and emotions. He indicated that Wolverine World Wide is using virtual reality to sell shoes. Steelcase is using a game engine to help customers select furniture and place furniture in a 3-D animated room. There is a partnership ongoing with the United Nations to create an escape room to help educate people on the history of the U.S.

Being the internship coordinator, Marty has a good relationship with many gaming companies. When I had indicated that I tried contacting two different local companies and hadn't heard anything back yet, he jumped in to help. As it turns out, one company no longer exists. The people running the other game company are FSU grads, and Marty offered to provide me contact information. He told me another local gaming company is now operating under a different name, and he offered to put me in touch with the folks in charge.

Even though I don't play video games, I was fascinated learning some of the facets of the gaming industry. I feel like Varun and Marty both were able to provide me with insight that will be applicable to my students.

Cory Heald and James O'Brien, Game Developers

Cory is the co-owner of Underbite Games, where he helps drive design, marketing, budgets, and production schedules. James had worked as a game developer at Frostburn Studios, but after that company folded, he started doing freelance work for various gaming companies, most of which are in California.

Both Cory and James reiterated the usefulness of good math skills not only for the programming process, but also for helping to run a business. When I asked about what they might be looking for when hiring a new employee, Cory responded that a passion for the industry, perseverance, and good problem solving skills are a must. When writing code for games, one can't always just Google a problem and find a solution.

One of Cory's game developers shared the following information regarding how math is used in the gaming industry:

How I Use Math As A Developer

High Level

Programming, at its core, is a tool that we use to solve problems. Whether it is a complex problem posed to us by a client or creating artificial intelligence for a creature in a game, both are approached in a similar matter. Analyze the problem, break it down into smaller parts, and translate those parts into things we can solve by writing code. For this reason, it is easy to see that programming and mathematics are fundamentally similar. Both require an understanding of how to approach a problem and how to use the tools at our disposal to manipulate and solve that problem.

More Specifically

As developers, we are always looking to add more useful tools to our toolbox for solving problems and some of the tools we use most often are mathematical. When displaying a user interface or hud on screen, we often lay out these elements using pixel dimensions. This requires us to do a lot of simple math like addition and subtraction or multiplication and division. For instance, we might need to layout an inventory menu using code. Each item might be 48x48 pixels, with a spacing of 10 pixels in between them, and a padding value of 12 pixels from the edge of the inventory window edges. With our use of basic math we can break down this problem pretty easily.

For animating anything like characters or explosions or even a highlight state for a button, we often use more in-depth math like linear interpolations or inverse linear interpolations. We often use 0 to 1 values to represent 0% to 100% and can easily feed this into a linear interpolation. For instance, if we are animating a bouncing ball, we can feed the start position, end position, and % completion value into a linear interpolation to figure out where the ball would be at the given % completion. When linear interpolations and inverse linear interpolations are used in conjunction, this lets us map one range of numbers onto another which is pretty handy. For example, getting input from a player's controller might give us a 0 to 1 value, we could then map this range of values onto let's say damage values of 12 to 24.

Finally, our game worlds exist in a 2D or 3D space and often require us to let a player move a character around in this space. This often requires the use of geometry or trigonometry as we are often dealing with vectors, angles, direction, heading, magnitudes, cross products, or dot products. Vectors let us know where in space we are, direction lets us know where we are going, magnitudes let us know how fast we are moving, and cross and

dot products let us know if we are moving towards or away from other points in space. These are especially helpful when programming artificial intelligence as our creatures need lots of information to be able to make smart decisions!

Conclusion

Mathematics give us many tools as developers to help us solve various problems. More importantly, the way that we approach and breakdown problems to solve with code is something we are trained to do early on when learning the use and application of mathematics!

Jim Eddinger, Director of Public Safety, Big Rapids

I met with Jim on February 20 to discuss math applications used in police work. He expressed several ideas to me.

He shared with me a manual from an accident investigation course he took recently that contained many examples of mathematical formulas used. Here are two examples:

1. Time-distance-speed analysis is used during accident investigation. This is done using velocity (feet and seconds) rather than speed (miles and hours), as the latter uses measurements too large to conveniently work with. Here are the formulas:

a) $\text{Velocity} = \text{Speed} \times 1.47$

b) $\text{Speed} = \text{Velocity} / 1.47$

These formulas would both be appropriate for students to apply in Math 115. Given one formula, I would expect students to create the other formula, and use both given necessary information. Correct labeling of answers is a must.

2. The drag factor, also known as the coefficient of friction, can be calculated given a speed and braking (skid) distance. It is the amount of friction (force) acting on the tires, and is influenced by the weight of the vehicle, the roadway surface (asphalt, gravel, etc.) and weather conditions (rain or ice). Using a variation of the formula, the speed a vehicle was traveling can be calculated given the braking distance and drag factor. Here are the formulas:

a) $f = \frac{S^2}{30d}$

F= drag factor (coefficient of friction)

S = speed

b) $S = \sqrt{30df}$

d = braking distance (as measured by length of skid marks)

Again these formulas would both be appropriate for students to apply in Math 115. Given one formula, I would expect students to create the other formula, and use both given necessary information. Correct labeling of answers is a must.

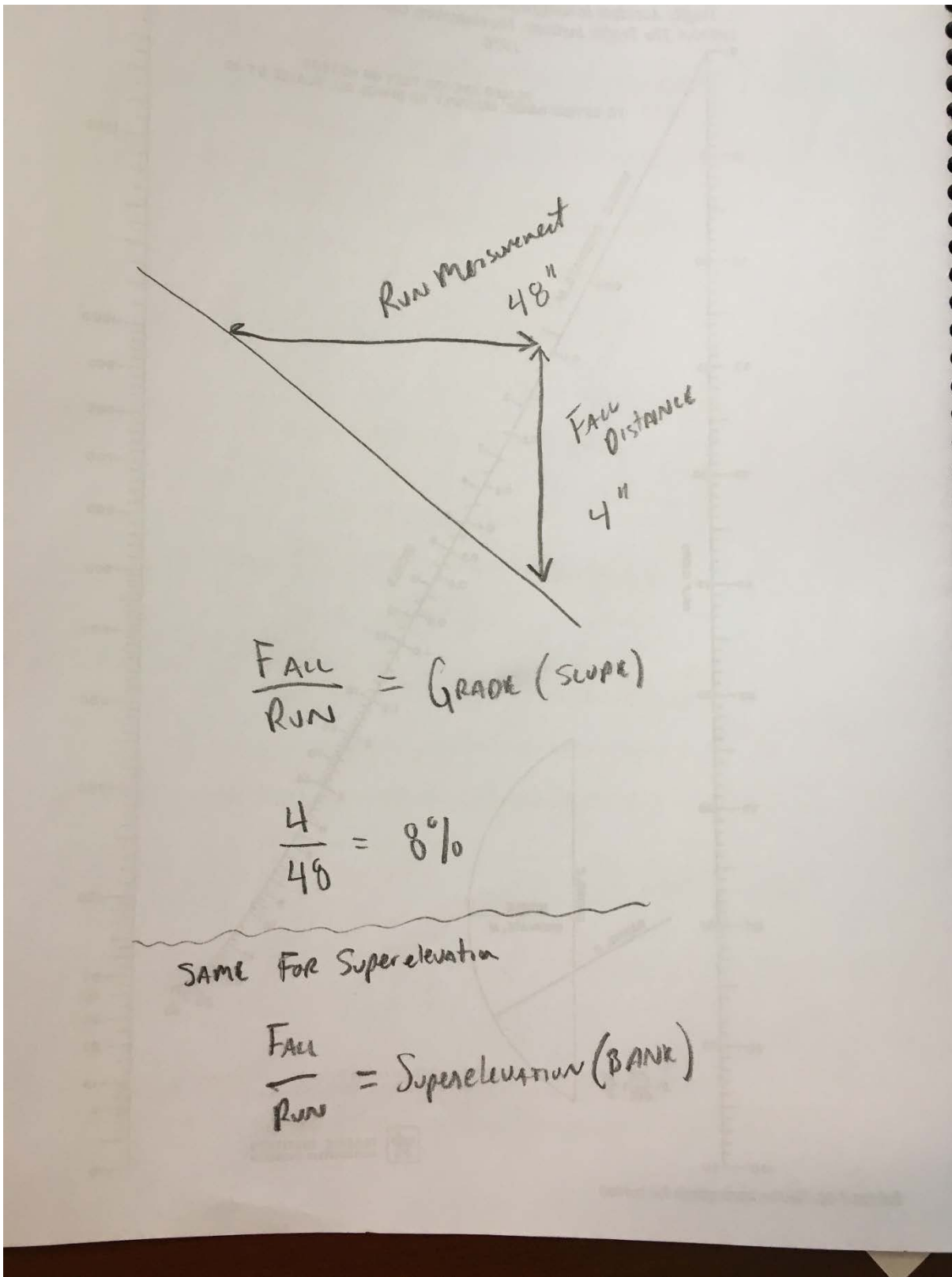
Jim has also been involved in several community-wide initiatives to improve safety on the streets of Big Rapids. Many of his ideas and suggestions are data driven. One such example involved determining whether to change the speed limit on a particular road. He applied the 85th percentile rule (if 85% of the cars are driving x mph or above, that is justification of raising the speed limit to x mph). Speed data was collected over a period of many days, at different times of the day, under

various weather conditions. Another example involved safety near several school buildings. Based on data collected regarding number of cars, average length of time needed for pick-up/drop-off, and walkers, he was able to design new traffic flow patterns and safety signals (or placement of officers) to make school zones safer and more efficient.

Finally, Jim had strong opinions on soft skills people in the police force need to possess. Here are some “rules” he tells his employees: Number one, when you get to work, put your cell phone away. When speaking to other officers or citizens of the community, being on your phone indicates you are not interested/engaged in the conversation and is a sign of disrespect. Number two, show up on time. Number three, look someone in the eye when you are speaking to them, and greet people with a handshake. Number four, if you want to earn respect, you need to show respect.

All in all, this was a very worthwhile conversation. I appreciate Jim’s insights and his sharing a few hours of his very busy day with me.

Here are a few snapshots of pages from the book from the course he took:



X. HOW DO I DETERMINE GRADE (m) AND SUPERELEVATION (e)?

- A. Grade (m) (AKA: "Slope")
1. Rise or fall of roadway as **measured along** it.
 2. Needs to be measured in percent (parts per 100) for AI use.
 3. The symbol for grade is "m"
 - a. Grade can be positive (+) upgrade/uphill or negative (-) downgrade/downhill.
 4. Methods of measuring grade (m)
 - a. Surveyor
 - b. Carpenters level and ruler
 - c. Angle finder
 - d. Traffic template and clipboard
 - e. Traffic template and helper
- B. Superelevation (e) (AKA: "bank")
1. Rise and fall of roadway as **measured across** it.
 2. Measured at right angle to centerline always on curves.
 3. Superelevation symbol is "e"
 4. Superelevation can be positive (+) or negative (-)
 5. Measured by same methods as used to measure grade.

**AI-2
UNIT 3.8
SUMMARY OF EQUATIONS**

TRAFFIC ACCIDENT INVESTIGATION 2

SUMMARY OF EQUATIONS

<u>TITLE</u>	<u>EQUATION</u>	<u>NEEDED DATA</u>
<u>SPEED TO VELOCITY</u>	$V = S \times 1.47$	*SPEED (MPH) *CONSTANT OF 1.47

<u>VELOCITY TO SPEED</u>	$S = V / 1.47$	*VELOCITY (FPS) *CONSTANT OF 1.47

<u>RADIUS</u>	$R = \frac{C^2}{8M} + \frac{M}{2}$	*CHORD *MIDDLE ORDINATE

<u>DRAG FACTOR</u>	$f = \frac{S^2}{30d}$	*TEST SKID SPEED *SKIDDING DISTANCE

<u>SLIDE TO STOP</u>	$S = \sqrt{30df}$	*SKIDDING DISTANCE *DRAG FACTOR

<u>SIDESLIP</u>	$S = 3.87 \sqrt{R f}$	*RADIUS OF PATH OF THE COM OF THE VEHICLE *DRAG FACTOR

<u>CRITICAL CURVE SPEED</u>	$S = 3.87 \sqrt{R f}$	*RADIUS OF CENTER OF TRAVEL LANE *DRAG FACTOR

<u>COMBINE SPEEDS</u>	$S_c = \sqrt{S_1^2 + S_2^2}$	*SPEED 1 *SPEED 2

<u>REACTION DISTANCE</u>	$RD = S \times 1.47 \times t$	*SPEED *TIME

AI-2
UNIT 3.8
SUMMARY OF EQUATIONS

BREAKING DISTANCE

$$d = \frac{S^2}{30f}$$

***SPEED**

***DRAG FACTOR**

FALL SPEED

$$S = \frac{2.74d}{\sqrt{md - H}}$$

***HORIZONTAL
DISTANCE**

***VERTICLE DISTANCE
COM MOVED**

***GRADE AT TAKE OFF.**

- lower level and you would like to know the vehicle's speed at the takeoff point.
- B. This approach is to be used when there is no tripping mechanism of any type (as in flip-over situations), but rather when a free fall occurs, i.e., the vehicle's tires simply don't have anything to support them.
- C. It is possible for a vehicle to "fall" up (and higher than the takeoff point) if there is enough positive grade present. This scenario is not common.
- III. WHAT INFORMATION IS NEEDED TO CALCULATE A FALL SPEED?**
- A. The distance the vehicle's Center of Mass (C.O.M.) moved forward (horizontal distance) from where it left the ground to where it landed ("falling").

Gary Maystead, Photographer, owner of GM Photography

Gary's photography hobby spring-boarded him into starting his own business. While it's not his primary career, he has managed to create a business successful enough to earn sufficient income. The best part, though, is that he loves what he does. I spoke with Gary in March to learn how math plays a role in a successful business.

While Gary did not feel math was specifically necessary to be a good photographer, he was adamant in saying good math skills are vital for running a profitable business. He shared with me all the ways he uses math. Below is a summary of those ideas:

Spreadsheets with formulas are used to track cost, markup, and profit. Gary mentioned the importance of always factoring in the cost for his time (travel, photography session, time required to do photo editing, meeting with customers to select and order prints...)

The spreadsheet is useful for determining how many tax dollars (sales tax, estimated tax, withholding) he needs to send the government.

Gary's business is cash-only. He figured if he allowed credit cards, that would eat into his profit, as credit card companies charge a processing fee, which is a percentage of the sale.

Income versus expenditures are closely monitored. Income is fairly straightforward to track, but he always needs to keep in mind expenses he incurs that are not directly paid by clients.

Examples of these things are equipment (cameras), computer, printer, software, props, lighting, personnel, mailing supplies, internet, and online classes to learn various photo editing programs.

Many former students have indicated to me that they plan on having their own business because they don't want to work for anyone else. Unfortunately, not all of these students take any business classes to learn the ins and outs of running a successful company. The ideas that Gary shared with me will be passed on to students where appropriate.

Objective #3: I would like to meet with colleagues in other Michigan community colleges to learn more about their liberal arts math classes. Information gathered would include specific topics covered, structure of the class (lecture/activity-based, flipped vs. online vs. traditional face to face), and pre-requisite classes.

The prerequisite for our liberal arts math class (Math 115) is Fundamentals of Algebra (Math 096). Math 096 is also the prerequisite for Intermediate Algebra, which then leads to College Algebra, Finite Math, and other higher-level classes. So there are students on both STEM and non-STEM pathways in the same class. Some of those students in Fundamentals of Algebra need to fully comprehend certain topics (graphing functions, factoring, simplifying expressions with exponents) in order to be successful in future math classes. Students on a non-STEM path, such as those going on to Mathematics for the Liberal Arts, do not need as deep of an understanding of those particular topics. According to Nicole McClure, one of the lead instructors for Fundamentals of Algebra, there is some content in the second half of Beginning Algebra that future liberal arts math students don't really need to know in order to be successful in Math 115. The question that has been on the mind of some math instructors at KVCC is whether we should design a non-STEM prerequisite course. This course would be suitable not only for Math 115, but also possibly for Math 105 and Math 106.

I was curious to find out if other community colleges in Michigan who offered a liberal arts math class similar to ours have a prerequisite *other than* beginning algebra.

Of the eleven community colleges I researched, most did require beginning algebra or suitable placement test score as a prerequisite for their liberal arts math class. There were five schools, Delta College, Kellogg Community College (KCC), Southwestern Michigan College (SMC), Lake Michigan College (LMC), and Grand Rapids Community College (GRCC), that had a non-STEM prerequisite, so I decided to focus my energy on obtaining more information from them.

Despite repeated attempts at making contact via phone and email, I did not hear back from LMC or GRCC. At risk of being considered a pest, I did not pursue further communication with those schools. I was successful in talking to lead math instructors at Delta, KCC, and SMC. The pages that follow include descriptions of each school's liberal arts math class along with the prerequisite class, and also relay the conversations I had with the lead instructors.

Delta College, Peter Carlson

Math 118W MATHEMATICAL EXPLORATIONS

Provides a course for students majoring in fields that do not have a specific mathematics requirement. Emphasizes practical applications of mathematics, problem solving, and the communication of mathematics. Includes core topics in Finance, Probability, Statistics, and Geometry. Integrates measurement in the geometry topic, and infuses algebra throughout all topics. A minimum of 4 additional topics will be selected from Economics, Calculus, Graph Theory, Set Theory, Game Theory, Number Theory, Logic, Voting, Apportionment, Combinatorics, Linear Programming, or other approved topics. Credit may be earned in MTH 118W or MTH 118AW, but not both. A GRAPHING CALCULATOR IS REQUIRED.

Prerequisite(s): MATH LEVEL 5

Math 118AW is the same class with extended hours and **Prerequisite(s):** MATH LEVEL 3 or MATH LEVEL 4 or MTH 099 with "C" or better

Math 099 MATHEMATICAL REASONING

Develops conceptual understanding and acquires multiple strategies for solving problems using mathematical and statistical concepts. Makes connections between concepts and applies previously learned material to new contexts. Practices using mathematical, statistical, and quantitative information to make decisions. A GRAPHING CALCULATOR IS REQUIRED.

At Delta College, the prerequisite for the liberal arts math class (Math 118, Mathematical Explorations) is Math 099 (Mathematical Reasoning). Peter Carlson, a math instructor at Delta, was kind enough to fill me in on these classes.

Initially, Delta had 3 developmental math classes, but were pushed by the college to reduce the number of such offerings. Historically, students placing into the lowest level class would take anywhere from 2 to 4+ years to complete all three developmental courses. For instance, they would take a class, fail it, take a semester or two off, take the class again, and assuming a passing grade, move on to the next class and repeat the cycle all over again. Delta College administration was wanting to not only reduce the number of developmental classes being offered, but also reduce the amount of time students took to get through the sequence. Thus, the development of Math 099, which was offered for the first time in Fall 2018, and is a 5 credit hour class.

Math 099 is a combination of pre-algebra and algebra topics though factoring. This class prepares students not only for Mathematical Explorations, but also for Intermediate Algebra and also Statistics, assuming students have a college-level reading score.

There are two versions of Math 118..... one is a traditional 4 credit hour course and the other is one with extended hours. In the first instance, students spend 4 hours per week in the classroom. In the extended hours version, students are in the classroom for 6 hours per week, even though they only pay for 4 credit hours. The extra time in the classroom is spent with the instructor (not an aide or a tutor), so instruction can be slowed down and extra time can be spent reinforcing concepts students

are struggling on. All students who successfully complete Math 099 must take the Math 118 class with extended hours (unless they take a placement test and score high enough to dictate enrollment in the traditional Math 118 course). The extended hours concept is also available in Intermediate Algebra. Students enrolled in Math 099 who earn a C or C+ must take the Intermediate Algebra class with extended hours.

Because Math 099 is a fairly recent addition, Peter could not share any concrete success/retention data with me. His initial observations, though, are promising.

Kellogg Community College, Sue Stetler

MATH 115 - Math for Liberal Arts

4 CR

This is a liberal arts mathematics course designed primarily for students whose programs of study have no further mathematics requirements. Its purpose is to develop an awareness of the use of mathematics in the world around us. Emphasis will be on the communication of mathematical ideas, problem solving, applications, and the historical nature of mathematics. Specific topics for this course include: logic and reasoning, mathematics of finance and investment, probability, statistics, graph theory, and geometry.

Requisites: (1) Next Gen ACCUPLACER® reading score of 244, or at least a grade of C in [TSRE 55](#) (AND) (2) Next Gen ACCUPLACER® quantitative reason score of at least 250, or Next Gen ACCUPLACER® adv alg & functions score of at least 237, or 1 course from [MATH 102](#), [MATH 105](#), [MATH 111](#), [MATH 112](#), MATH 115, [MATH 118](#), [MATH 119](#), [MATH 125](#), [MATH 130](#), [MATH 132](#), [MATH 140](#), [MATH 141](#), [MATH 142](#), [MATH 241](#), or [MATH 242](#) with at least a grade of C.

MATH 102 - Practical Algebra

4 CR

This course is designed for students pursuing a field of study outside of mathematics, science, and engineering. Mathematical application will be an emphasis and real-life applications will be presented in disciplinary and career context when appropriate. Topics include: a review of operations with integers and rational numbers, ratios and proportions, percent, solutions of linear and quadratic equations, graphs of linear and exponential functions, linear and exponential models, introduction to data and measures of central tendency. Lab Fee

MATH 105 - Beginning Algebra

4 CR

Course content includes operations on integers and rational numbers, geometric formulas, algebraic expressions, solutions of linear equations and inequalities, graphs of linear equations and linear systems, systems of linear equations in two variables, polynomials and factoring, rational expressions and equations, and radical expressions and equations. Lab Fee

I was particularly interested in learning more about the MATH 102 Practical Algebra class and had a very informative conversation with Sue on February 25. Below are some highlights

While the traditional Beginning Algebra (Math 105) class can be used as a prerequisite for the Math for the Liberal Arts (Math 115) class, I was intrigued with the Math 102 class, which also serves as a prerequisite for Math 115. Sue explained the course was developed about 4 years ago in conjunction with the Allied Health/Nursing faculty. Prior to Math 102 being available, many students who needed the Liberal Arts Math class struggled with the Beginning Algebra class, particularly the latter half,

where polynomials, factoring, and rational equations are covered. A similar thing happens at KVCC. Since the inception of Math 102, success rates in Math 115 have increased.

Students who take Math 102 can only then go on to Math 115. If students change programs to a more STEM-focused pathway, they must either take Math 105 or score sufficiently on a placement test before going on to College Algebra. The content in Math 102 covers primarily pre-algebra and beginning algebra learning objectives.

Math 102 uses a textbook written by two instructors at KCC, Pat Koph and Graham Smith. Students are required to complete a capstone project related to their field of study during the last few weeks of the semester.

Sue sent me an informational booklet that gives additional information on the new math pathway that includes the Practical Algebra course. She also included success/retention data along with a course syllabus. If KVCC decides to pursue a non-STEM algebra course, Sue enthusiastically agreed to provide further details.

Southwestern Michigan College, Ria Thomas

Math 102 MATHEMATICAL LITERACY

Prerequisite: Minimum grade of C in MATH 098 or satisfactory test score. Mathematical Literacy is a one semester course for non-math and non- science majors integrating numeracy, proportional reasoning, algebraic reasoning, and functions. Students will develop conceptual and procedural tools that support the use of key mathematical concepts in a variety of contexts. Recommended for the Arts/Humanities, Business, Communications, Criminal Justice, and Social Science Pathways.

Math 098 COLLEGE ARITHMETIC

Prerequisite: Compass pre-algebra and/or algebra assessment required. Provides a review of operations with whole numbers, fractions, decimals, ratios, proportions, percentages, area and perimeter, as well as an introduction to pre-algebra concepts. This course will not count toward graduation requirements.

Ria commented that many students in the Math 102 class are business or art majors. Typically, the business majors proceed directly to the Statistics course after successful completion of Math 102.

Math 098 is a fairly basic math class, covering elementary concepts. Ria commented that students who pass Math 098 with a B or higher are very likely to succeed in Math 102. Students who passed Math 098 with a C were eligible to take Math 102, but success rates were much diminished.

SMC also has an Introduction to Algebra class (Math 101) that STEM and nursing students take. The cut score on the Accuplacer test is higher for Math 101 than it is for Math 102.

Hawkes Learning Systems, an online learning program, is used for Math 098 and Math 101. Conveniently, the same code can be used for both courses, saving students money.

A two week boot camp is offered in the summer for students who need to brush up on their rusty math skills before taking (or retaking) the Accuplacer placement test. I really like this idea and wonder if KVCC should consider offering such a course.

Ria seemed very willing to provide additional information if KVCC decides to offer a non-STEM algebra class and/or summer boot camp.

Summary of the manner in which *Criteria for Sabbatical Leave Proposals* were addressed:

For reference, the criteria are stated below

- A. Likelihood that the proposed activities will enhance the faculty member's effectiveness in the areas of teaching/learning, scholarship including the scholarship of teaching/learning, professional development, assessment of student learning outcomes, and/or usefulness to the college.
- B. Likelihood that the proposed sabbatical leave will enhance the institution's ability to fulfill its mission and/or improve service to students or other publics we serve.
- C. Degree to which the proposed sabbatical leave objectives exceed expectations for routine, ongoing professional development (e.g., not only attendance at a conference/workshop; application of the learning experience; synthesis of how the information learned will be shared; impact on student success/retention; completing a course through another institution, field experiences – direct and indirect; etc.).
- D. Provides an opportunity for reflection and renewal.

Summary: As evidenced in the previous pages, I believe all of the criteria were addressed during my sabbatical leave. The numerous activities I created to use in the classroom will help students understand how math is used in the world around them. Hopefully the activities will be meaningful to the students, help them apply math concepts, assist in a deeper understanding of the material, and as a by-product, help them successfully pass the class and pursue graduation. Furthermore, I feel I have developed good collegial relationships with instructors in other institution who will be willing to share further insight if we decide to pursue a non-STEM prerequisite course for Math 115. My sabbatical leave allowed me time to really think about my approach to teaching Math 115 and provided opportunity for me to recharge my batteries. I will have a new sense of excitement as I reenter the classroom in the fall semester.

Conclusion:

During my sabbatical, I listened to the news and read magazine articles and advertisements with a new purpose. I tried to find where the math was in all the stories. In some cases, it was obvious, and other cases, I applied my critical thinking skills to come up with related math activities. In more than one case, I heard an interesting news story, then investigated the idea being discussed more thoroughly online. I had fun creating activities related to the stories I heard and read and just by observing the world around me.

Having an opportunity to talk to people in various professions was beneficial as well. My conversations with those in the gaming industry, police force, interior design, and photography gave me new insight into professions my students typically pursue. I appreciated learning some of the expectations employers have, not only in terms of math skills, but "soft skills" as well.

I've long been a believer that all students can be successful given the proper preparation, resources, and mindset. Sometimes, a prerequisite class can be a barrier to completion of a program. I hope that KVCC will consider creating a non-STEM math class to address the needs and skills for a rather significant portion of our student body, particularly those in the Art & New Media Pathway, Criminal Justice, and Culinary Arts & Sustainable Food Systems.

I am so grateful for the opportunity to be on sabbatical leave for the Winter 2019 semester. I feel like I have a renewed sense of energy and excitement to be back in the classroom. Hopefully my students find the activities I created as interesting and engaging as I do! Math is Fun!