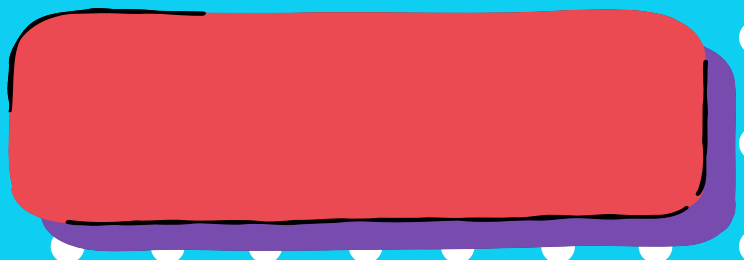
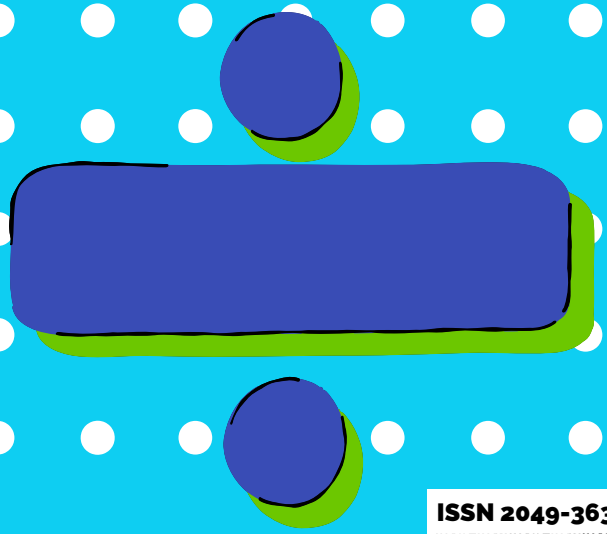
odd one out

the world where math and life collide

mary lawton jones





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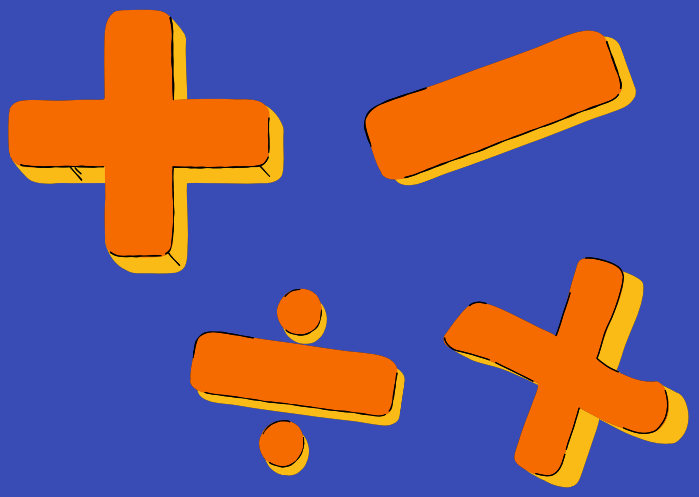

Editorial

FRACTION FINDS THE PERFECT FIT

Dear Mary Lawton,

My name is ⅔. About a month ago, my long-time boyfriend, 1/7, and I broke up. We had been dating for around a year, and at first, it came as a hard blow. I was really sad and felt lonely for a few weeks, but soon I realized that maybe I was better off without him. Today, I am writing to you for advice and tips on finding the number that's right for me.

I am 26 years old and just graduated from Equivalency University with a bachelor's degree in numerical analysis. I love living an active lifestyle--playing soccer, running, hiking, and swimming. My favorite time of year is summer when I can explore the world, especially at the beach. My favorite foods are tacos and pizza, and I love ice cream, cookies, and brownies. I am looking to share my life with someone that enjoys some of these activities.

My favorite subject is obviously math, and while I don't believe in fate, I do believe in using mathematic processes to find my future number. What do you think? Any formulas or ideas I should use to find a compatible companion? Thanks so much!

Sincerely,
⅔

Dear ⅔,

Congrats on your recent graduation! You should be so proud of your hard work! I'm sorry about your breakup, but I'm glad you've moved on and are ready to try something new. I, too, am a huge fan of math, and I think it can be a great way to find the right friend. One method that helps a lot of numbers is to find someone that is a multiple or a factor, or in your case, an equivalent fraction of yourself. Oftentimes, shared denominators can result in shared interests and personalities. In your case, ⅔, to find an equivalent fraction, multiply your denominator (3) by any value. Then, multiply your numerator (2) by the same value. This new fraction has the exact same value as you do! For example, multiplying your numerator and denominator by 4 would produce the fraction 8/12. If you simplify this fraction, you get ⅔, which is YOU! Good luck finding a compatible partner, and let me know if you are successful!

All the best,
Mary Lawton Jones

BRAIN BOOSTING BUBBLES!

FIZZY FUN FOR FAST BRAIN POWER!

$2 PER CAN WITH 3 FUN FLAVORS!

BUBBLES THAT IMPROVE YOUR ATTENTION AND ABILITY TO RETAIN INFORMATION!

How to:

SOLVING INEQUALITITES

Have you ever attempted to stay within a budget while shopping? What about driving at or below the speed limit? Ever tried to make more than a certain sum of money to buy something special? There are countless situations in which numbers are the constraints that guide our choices. These situations are known as systems of inequalities. Instead of representing exact amounts, inequalities represent a limit of what is allowed or what is possible.

One example of using inequalities in real life is that a party planner is renting an event room for a flat fee of $100 and an additional $50 for every hour used. The party planner has budgeted $550 for the event room rental and will not spend more than the set amount. She wants to rent the room as long as possible to allow for maximum set up and clean up, and is wondering exactly how many hours she can rent the room and stay within her budget. In this situation, an inequality can be written to solve for the number of hours the party planner can rent the room. Since she can spend up to $550 but not more, the cost for the room can be represented as less than or equal to $550 using the symbol ≤. Since the hourly rate of the room is $50, the variable x can be used to represent the number of hours rented and $50 is the amount per hour of rent, resulting in the term 50x. Additionally, because the rental company charges a flat fee of $100, 100 should be added to the inequality to represent the flat fee. To combine all values to create the inequality statement, the party planner can put the amount of money she is paying on the left side of the less than or equal to symbol (≤) and 550 on the right. The final inequality can be written as $100 + 50x \leq 550$.

Next, the party planner needs to solve the inequality to determine the number of hours she can rent the room. To do this, she can use inverse operations to solve the inequality. First, subtract 100 from both sides to get $50x \leq 450$. Then, isolate the variable x (the number of possible hours) by dividing both sides of the inequality by 50. This results in the simplified statement $x \leq 8$. This means that to stay within her $550 budget, the party planner should rent the room for 8 or fewer hours.

Inequalities can also represent a range of values. For example, Jack wants to determine how many hours he spent doing his homework last week. Jack knows that this week, he spent 2 more hours doing homework than he spent last week. Knowing that he spent between 6 and 9 hours this week, Jack wants to determine how many hours he spent doing homework last week. To start, he first identifies his variables and values. If he spent x hours doing his homework last week, and 2 more hours doing homework this week, Jack spent $x + 2$ hours on his homework this week. Since this week's homework hours are greater than 6 but less than 9, Jack can write a compound inequality using 2 inequality signs to represent the situation: $6 < x + 2 < 9$. Finally, Jack can use inverse operations to isolate x and get the range of hours he spent working on homework this week. To isolate x, Jack can subtract 2 from all 3 parts of the equation, resulting in $4 < x < 7$. Since x is the number of hours he spent doing homework last week, Jack spent more than 4 but less than 7 hours on last week's homework.

Vocabulary:

> greater than
< less than
= is equal to
≥ greater than or equal to
at least
≤ less than or equal to
no more than

Example

Ms. Roberts wants to take some of her students on a field trip to a museum. Her budget is $365. The museum charges a group rate of $80 and an additional $15 per person. What is the maximum number of students Ms. Roberts can take without exceeding her budget?

1. Determine which inequality symbol matches the situation: Since Ms. Roberts can spend up to but no more than $365, use the less than or equal to symbol ≤.

2. Set up inequality: $80 + 15x \leq 365$

3. Use inverse operations to solve: $80 + 15x \leq 365$

Subtract 80 from both sides: $80 + 15x - 80 \leq 365 - 80$

$15x \leq 285$

Divide both sides by 15 to isolate x: $15x/15 \leq 285/15$

$x \leq 19$

4. Identify answer: Since x represents the number of students Ms. Roberts can take, $x \leq 19$ means that Ms. Roberts can afford to take less than or equal to/a maximum of 19 students on the field trip.

Now you try!

Practice what you've learned and check your answers on page 18!

1. Natalie is deciding whether or not she should become a gym member to use their soccer training facility. The membership cost is $120. Members pay $3 to rent out the soccer facility. Non-members can also rent the facility, but they have to pay $11 each time. How many times would Natalie need to rent the soccer facility as a member in order for it to be cheaper than a non-member?

2. Ryan's shoe store makes a profit of $55 per pair of store-brand sneakers. If Ryan wants to make a profit of at least $440, how many pairs of shoes does she need to sell?

3. CJ is a wrestler trying to make weight. He currently weights 210 pounds. If he cuts 4 pounds per week, how many weeks will it take him to weigh less than 180 pounds?

How to:

DIMENSIONAL ANALYSIS

Vocabulary:

Conversion table - a table that arranges the equivalent values for changing units of measure or weight into other units

Rate - a quantity that is typically one measured another quantity or measure

As humans, we are constantly comparing things—ourselves and others, prices, products, and, more often than we realize, quantities and amounts. There are countless systems of measurement, and sometimes you have to go from one to another and back again. This process of comparing, calculating, and converting values is known as dimensional analysis. People often use dimensional analysis when cooking, measuring, and building, but the possibilities are endless! Dimensional analysis uses relationships and conversion factors to convert amounts between different sets of units. The easiest way to do this is to use proportions. By aligning values in the form of fractional proportions, the numerators and denominators can be multiplied to convert one unit to another.

For example, Emma is making a large quantity of lemonade for a bake sale. The recipe for one serving of lemonade calls for 2 cups of water. However, since Emma is scaling the recipe up to accommodate 21 people, the modified version requires 42 cups of water. Instead of measuring out 42 cups of water, Emma wants to figure out how many gallons is equivalent to 42 cups. To do this, Emma starts with the fraction 42 cups/1. Using the following conversion table:

1 pint = 2 cups
1 quart = 2 pints
4 quarts = 1 gallon

Emma identifies that there are 2 cups in 1 pint. She writes this proportion next to the first one with a multiplication sign in between, making sure to put 2 cups as the denominator of the ratio (so the units alternate numerator and denominator):

$$\frac{42cups}{1} \bullet \frac{1pint}{2cups}$$

She continues identifying the conversion rates and writing them as fractions until she gets the unit of gallons in one of the fractions. This makes sense because Emma has the starting value of 42 cups and the ending value of gallons:

$$\frac{42cups}{1} \bullet \frac{1pint}{2cups} \bullet \frac{1quart}{2pints} \bullet \frac{1gallon}{4quarts} \bullet \frac{1}{1gallon}$$

Finally, Emma can multiply all the numerators, multiply the denominators, and simplify the fraction.

$$\frac{42cups}{1} \bullet \frac{1pint}{2cups} \bullet \frac{1quart}{2pints} \bullet \frac{1gallon}{4quarts} \bullet \frac{1}{1gallon} = \frac{(42 \bullet 1 \bullet 1 \bullet 1)\,cups}{(1 \bullet 2 \bullet 2 \bullet 4 \bullet 1)\,gallons} = \frac{42cups}{16gallons} = 2\frac{5}{8}gallons$$

After simplifying, Emma got the answer of 2⅝ gallons. Therefore, instead of measuring 42 cups, Emma can measure 2⅝ gallons to make her lemonade.

Example

Jennifer has 5 meters of string to make a garland. How many inches of string does she have? Use the following conversion table and round your answer to the nearest hundredth.

1 foot = 12 inches	1 yard = 3 feet	1 inch = 2.54 centimeters	1 foot = 0.305 meters

1. Identify starting value and ending value: 5 meters → X inches

2. Set up starting proportion:

$$\frac{5meters}{1}$$

3. Identify corresponding conversion rates and write an equation of proportions. Multiply the numerators, multiply the denominators, and simplify the fraction:

$$\frac{5meters}{1} \bullet \frac{1foot}{0.305meters} \bullet \frac{12inches}{1foot} = \frac{(5 \bullet 1 \bullet 12)}{(1 \bullet 0.305 \bullet 1)} = \frac{60}{0.305} = \boxed{196.72inches}$$

4. Identify answer: 196.72 inches

Now you try!

Practice what you've learned and check your answers on page 19!

1. Corinne needs 1 meter of fabric for a project, but she only has access to a yard stick. How many yards of fabric does Corinne need? Use the following conversion table to solve and round your answer to the nearest hundredth.

1 foot = 12 inches	1 yard = 3 feet	1 mile = 5280 feet	1 foot = 0.305 meters	1 inch = 2.54 centimeters

2. Mack is riding his bicycle at a speed of 22 feet per minute. What is Mack's speed in yards per second? Use the following conversion table to solve and round your answer to the nearest hundredth.

Distance/length	Time
1 yard = 3 feet	60 seconds = 1 minute
5280 feet = 1 mile	60 minutes = 1 hour

3. Maya scales up a baking recipe for her catering company, and the result calls for 115 tablespoons of oil. How many pints of oil will she need? Use the following conversion table to solve and round your answer to the nearest hundredth.

16 tablespoons = 1 cup	2 cups = 1 pint

STUDY with the GOAT

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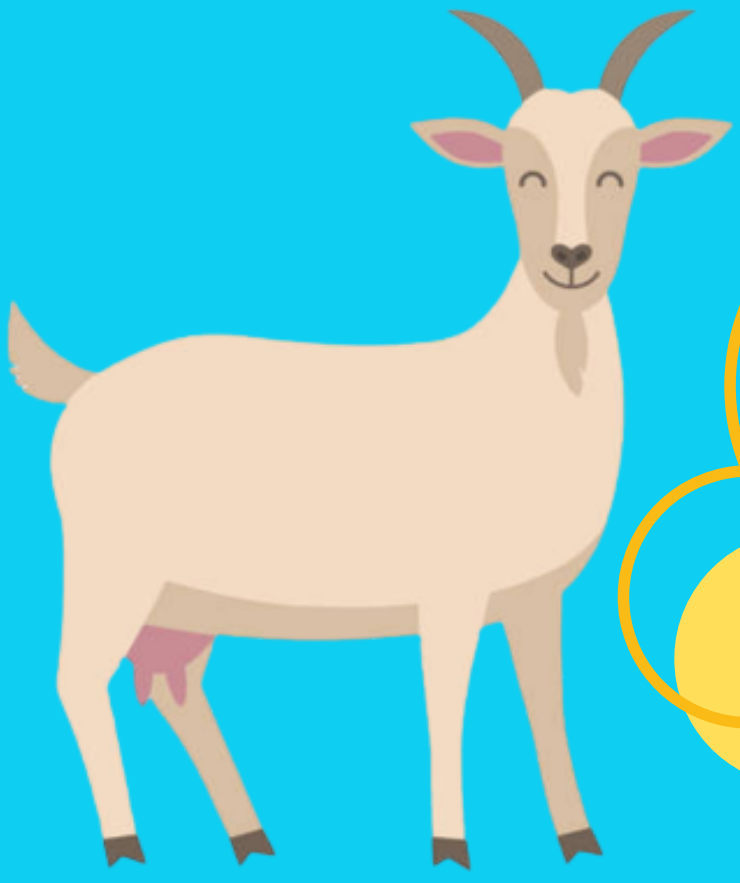

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THE MATH, THE MYTH, THE LEGEND: katherine johnson

Katherine Johnson was born as Katherine Coleman on August 26, 1918, in White Sulphur Springs, West Virginia. From a young age, Johnson excelled in school, especially in math, quickly climbing grades and earning honors. At the age of fourteen, she graduated from West Virginia State College's high school program. Five years later, at the age of eighteen, Johnson graduated from West Virginia State College with a bachelor's degree in mathematics and French. After college, she took a job teaching math at an elementary school in West Virginia. Soon after, Johnson was admitted to West Virginia University's graduate mathematics program as the first female Black student to attend the university. The same year, Johnson married a chemistry teacher named James Goble. Unfortunately, James Goble died in 1956. Johnson married James Johnson three years later.

In 1953, the National Advisory Committee for Aeronautics (NACA) Langley Research Laboratory was searching for female mathematicians. Johnson was hired and assigned to Langley's West Area Computing unit, a group of African American women who performed complicated calculations for the program's engineers by hand. The group, known as the West Computers, analyzed the U.S. space program's data and computed calculations essential to the success of the program.

During the 1950s, many organizations were segregated, including the NACA. The West Computers had to use separate facilities, like bathrooms, offices, and dining rooms. In 1958, NACA transitioned into the newly-formed National Aeronautics and Space Administration (NASA), which banned segregation.

At the desegregated NASA, Johnson was a member of the Space Task Group. In 1960, she coauthored a paper with one of the organization's engineers about calculations for placing a spacecraft into orbit. Her accomplishment marked the first time a woman in the Space Task Group was credited as an author of a research report. Johnson went on to achieve countless accomplishments, the most notable perhaps being her calculations for the trajectory of astronaut John Glenn's influential Freedom 7 flight around Earth in 1962. Even though NASA's new electronic computers had performed these calculations, Glenn requested that Johnson personally check and approve them before the launch, ensuring for the successful launch and landing. Furthermore, Katherine Johnson also worked on the exit and entry trajectories for the Apollo 11 mission, the spaceflight that landed the first two humans on the moon in 1969.

Katherine Johnson is well-known for her work in calculating the numbers that put humans into space. She did this, or course, using math. Johnson delved into the intricate world of geometry and analyzed how to use it for space travel. She expertly applied complex mathematical prinicpals, such as geometry and angles, to determine the precise entry and exit times for spacecraft entering and exiting the earth's atmosphere for NASA's early spaceflights.

Over the years, Katherine Johnson took giant leaps for both racial equality and mathematics. Through her actions, Johnson led the way in showing what women and African American people could achieve in the workplace and in society.

Works Cited:

González, Echo Elise. "Johnson, Katherine Goble." World Book, 2023, www.worldbookonline.com/advanced/article?id=ar757732&.

"Katherine Johnson." Encyclopedia Britannica, Encyclopedia Britannica, 31 Mar. 2023, www.britannica.com/biography/Katherine-Johnson-mathematician.

10 MATH JOKES SURE TO GET SUM GIGGLES

1. What did zero say to eight?

2. Why was the math book stressed?

3. What is a bird's favorite type of math?

4. What do you get when you take the sun and divide its circumference by its diameter?

5. What's a math teacher's favorite class pet?

6. What did the triangle say to the circle?

7. Why did the obtuse angle go to the beach?

8. What do you call the shape of an empty parrot cage?

9. What is a math teacher's favorite vacation destination?

10. What do you call a number that can't sit still?

Answers found on page 20!

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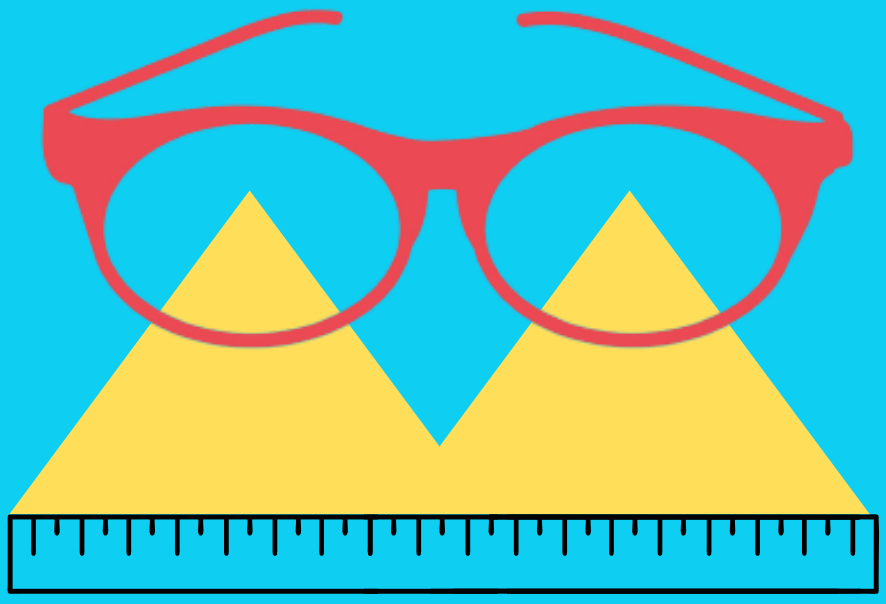

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ADD racadabra!

math and magic

Impress your friends and family with this easy math card trick! How to play:

1. Cut out the cards.
2. Place all 6 cards face-up in a pile and put the "Pick a Number Between 1 and 30" card on top. The order of the other 5 number cards does not matter.
3. Show your participant the "Pick a Number Between 1 and 30" card and ask him/her to pick a number between 1 and 30. Be sure that the participant does not tell you what it is.
4. Show the student the first number card in the pile and ask, "Is your number on this card?" Be sure that the participant looks carefully before responding.
    - If the student says "yes," make a mental note of the number in the top lefthand corner of that card (it's either 1, 2, 4, 8, or 16).
    - If the student says "no," just continue.
5. Show the participant the next number card in the pile and repeat the process.
6. Keep going until you have asked the participant about all 5 number cards.
7. You should have kept a mental note of the top lefthand corner numbers for all of the cards to which the student responded "yes." Now, add those numbers together.
    - TIP: Keep a running total in your head as you move through the cards instead of waiting until the end to add them. It's much easier to remember a running total than to remember a bunch of different numbers.
8. The sum that you just calculated is the participant's secret number! Now the fun part—blow the student away by sharing what his/her secret number is!

Why it works:

This card trick uses the arrangement of binary numbers. Instead of using 1's, 10's, and 100's, binary numbers use 1's, 2's, 4's, 8's, etc. Not coincidentally, the top left numbers on the cards follow the binary number pattern. This makes the card trick work!

8	9	10
11	12	13
14	15	24
25	26	27
28	29	30

2	3	6
7	10	11
14	15	18
19	22	23
26	27	30

MAGIC MATH

pick a number between 1 and 30

16	17	18
19	20	21
22	23	24
25	26	27
28	29	30

4	5	6
7	12	13
14	15	20
21	22	23
28	29	30

1	3	5
7	9	11
13	15	17
19	21	23
25	27	29

WHICH STUDY METHODS DO 8TH GRADERS PREFER?

ALONE, WITH A PARTNER, USING FLASHCARDS, READING NOTES, & WATCHING VIDEOS

In this study, a sample size of 25 8th-grade students of different genders, races, and academic abilities were surveyed. They were each asked 2 questions: "Do you prefer to study alone or with a partner?" and "When studying alone/with a partner, do you prefer to use flashcards, read over notes, or watch videos?" The results of the survey are shown below.

	Studying with flashcards	Studying by reading notes	Studying by watching videos	Total
Studying with a partner	6	7	1	14
Studying alone	2	6	3	11
Total	8	13	4	25

The results show that studying with a partner is more popular than studying alone. Additionally, given the choices of studying with flashcards, studying by reading notes, and studying by watching videos, most students prefer studying by reading notes. The results of the survey can also be represented by percentages and decimals.

	Studying with flashcards	Studying by reading notes	Studying by watching videos	Total
Studying with a partner	0.24	0.28	0.04	0.56
Studying alone	0.08	0.24	0.12	0.44
Total	0.32	0.52	0.16	1

	Studying with flashcards	Studying by reading notes	Studying by watching videos	Total
Studying with a partner	24%	28%	4%	56%
Studying alone	8%	24%	12%	44%
Total	32%	52%	16%	100%

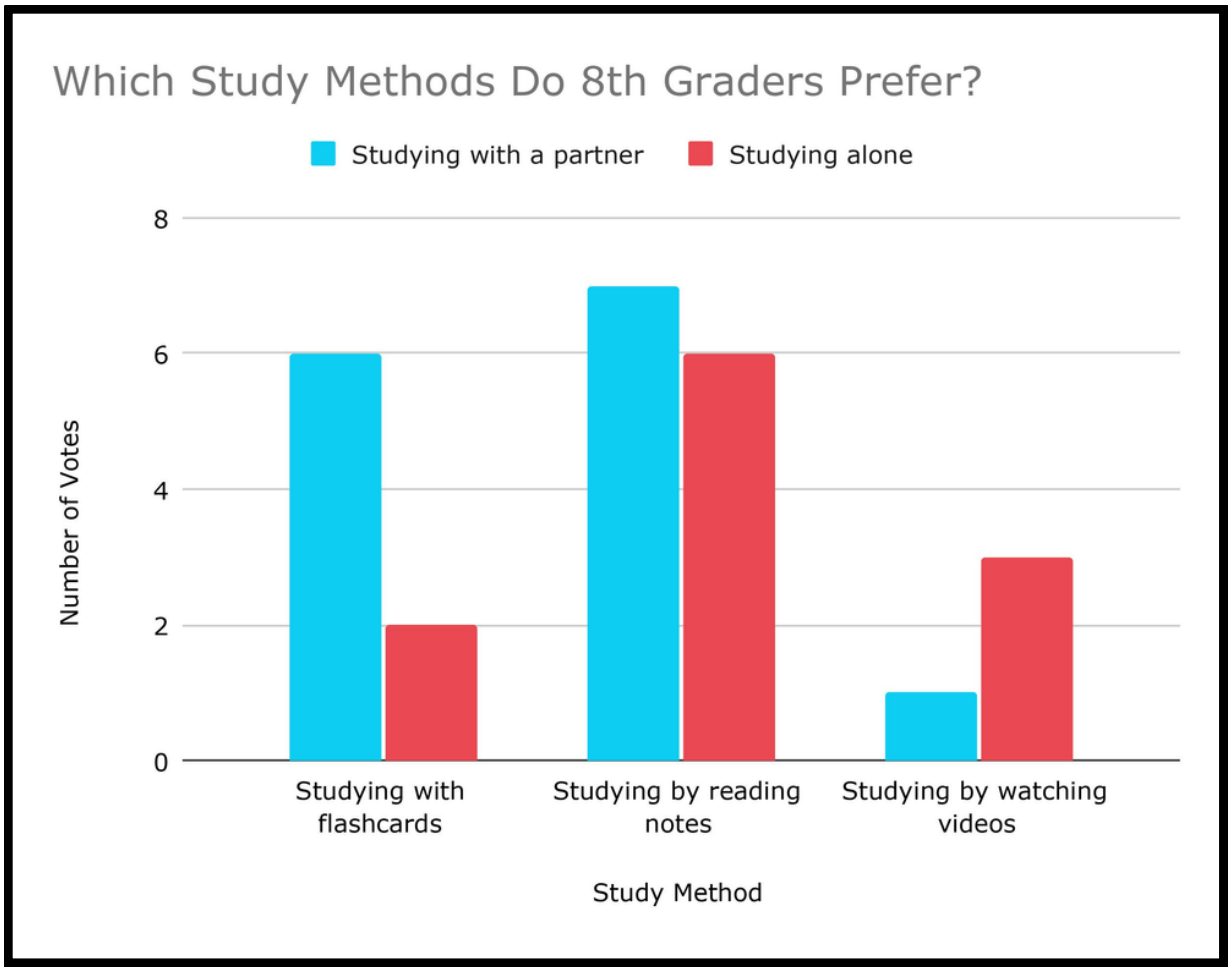
Conditional frequencies

1. Given that a student prefers to study alone, the probability of him or her preferring to study with flashcards is 2/11, 0.18, or 18%.

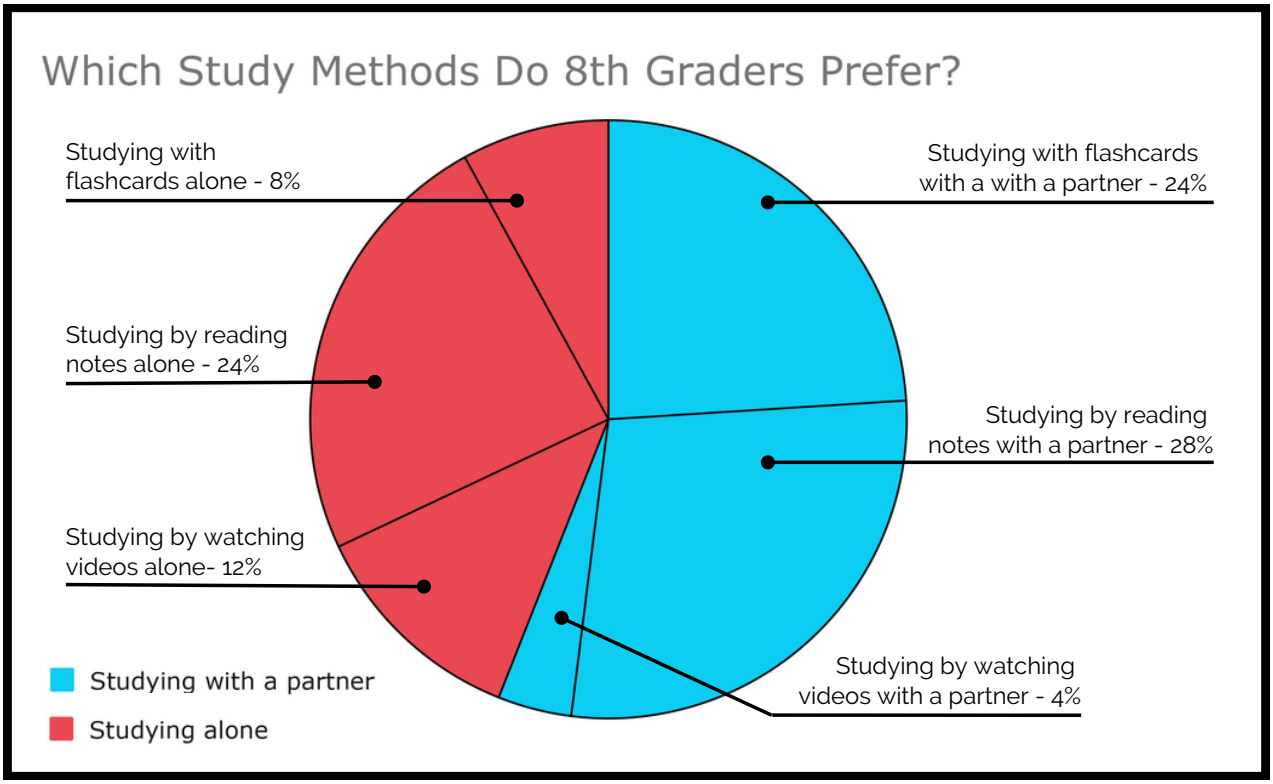
2. Given that a student prefers to study by reading notes, the probability of him or her preferring to study with a partner is 7/13, 0.54, or 54%.

3. Given that a student prefers to study alone, the probability of him or her preferring to study with flashcards OR study by watching videos is 5/11, 0.45, or 45%

BAR GRAPH



PIE CHART



MATH LIBS

Fill in the blanks with the word/number that matches the description to create a funny and educational story! Be sure to use a calculator when you need to!

This summer, _____ and I decided to hit the highway and take a road trip together to see
1. NAME

our friend _____ in _____. We knew we needed to find the shortest driving route
2. NAME **3. PLACE**

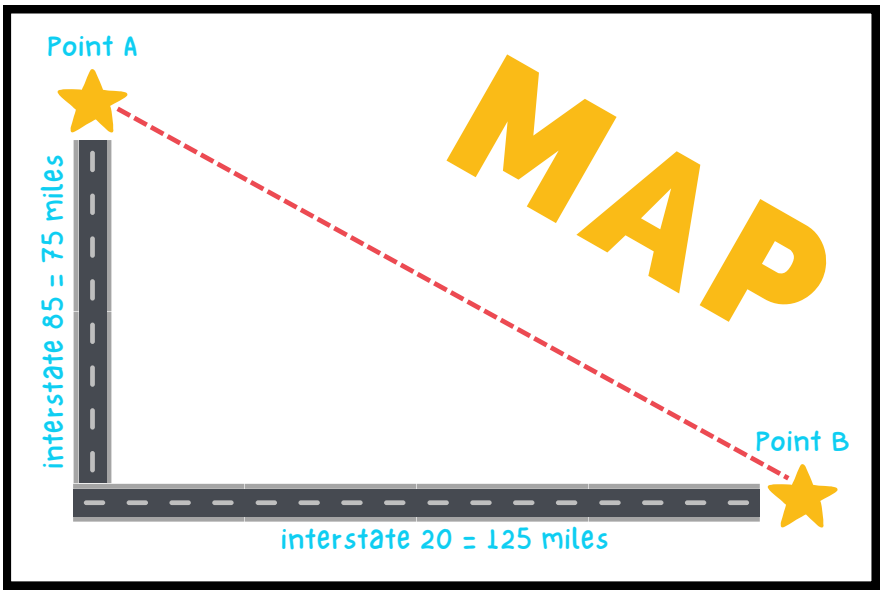
from point A to point B, so we used the Pythagorean theorem to find the distance. Since the length of Interstate 85 is _____ miles and the length of Interstate 20 is _____ miles, we used
4. (USE MAP BELOW) **5. (USE MAP BELOW)**

the Pythagorean theorem to solve for the distance between the two points: _____ miles.
6. DISTANCE BETWEEN POINT A AND POINT B ROUNDED TO THE NEAREST TENTH

After we had traveled _____ miles, we saw a giant _____ on the side of the road. We
7. THE SQUARE ROOT OF (10 x YOUR AGE) **8. NAME OF SHAPE**

stopped the car, and realized it was a _____ pie stand. A sign read "SUMMER DEAL: 12¢ per
9. COLOR

square inch of pie!" A little confused, we got out of the car and started talking to the old man running the pie stand. He had a long white beard and clothes that looked like he belonged in a different century. "Hello!" he said brightly, "my name is Pie Thagoras, and today only we have a deal of 12¢ per square inch of every pie you buy!"



My friend looked at me confused, but I knew what to do! I quickly looked at the pie size—8 inches.

Knowing that this size was the _____ , I divided it by 2 to get the _____. Then, I used
10. LENGTH FROM ONE SIDE OF A CIRCLE TO THE OPPOSITE SIDE
11. LENGTH FROM A CIRCLE'S MIDPOINT TO THE EDGE
the formula for the area of a circle _____. By plugging in the radius of _____, I got
12. CIRCLE AREA FORMULA
13. VALUE OF THE RADIUS
the equation _____. I quickly pulled out my phone to calculate the equation and got the
14. CIRCLE AREA FORMULA WITH VALUES PLUGGED IN
area of _____ inches. Glancing up at the sign again, I saw that each square inch of pie costs
15. AREA OF THE PIE ROUNDED TO THE NEAREST TENTH
12¢, so I multiplied _____ by 0.12. I finally got the answer of $_____!
16. AREA OF THE PIE ROUNDED TO THE NEAREST TENTH
17. COST OF PIE ROUNDED TO THE NEAREST HUNDREDTH OF A DOLLAR

I looked over at my friend, who watched me do all this with wide eyes and an open mouth. "How did you do that?" she asked. "Math!" I responded proudly. I turned to Pie Thagoras and said, "One _____ pie, please, Mr. Thagoras. Here's $_____!" I fished around in my pocket,
18. FLAVOR OF PIE
19. COST OF PIE
finding the exact change, but when I handed it to him, Pie Thagoras pushed my fist back towards me.

He looked at me, impressed, and responded, "Please just call me Pie, and this one's on the house. When most people see that sign, they just keep on driving because they have no clue what '12¢ per square inch of pie' means. But you, my friend, just used math in the real world, and I'm impressed." Then, Pie pushed a scrumptious looking _____ pie into my hands and proudly
20. FLAVOR OF PIE (SAME AS # 18)
exclaimed, "Enjoy your pie!"

I smiled. My friend and I hopped back in the car, pulled 2 forks out of the glove box, and dug into the best pie I've ever tasted.

Use the numbers underneath the blanks to check your answers on page 21.

MATH IN THE REAL WORLD

AN INTERVIEW WITH DR. JOYCE SIM

Dr. Joyce Sim remembers experiencing her first earthquake when she was 17; "I really was amazed... and [the experience] was really crazy. It was a little bit scary, honestly..." Dr. Sim is a research scientist at Georgia Institute of Technology, specializing in solid earth, space, and planetary sciences. She recalls growing up and being really interested in geology and earth sciences, leading her to pursue a career studying what she loves. Dr. Sim went to the University of California San Diego, majoring in earth science geophysics and earning both her Master's degree and her PhD. In 2020, Dr. Sim accepted a position as a research scientist at Georgia Tech, and has been working, researching, and communicating science and data ever since. Dr. Sim graciously agreed to answer a few questions and share about her job and its relation to math.

Dr. Joyce Sim, Georgia Tech reasearcher

HOW LONG HAVE YOU BEEN A RESEARCH SCIENTIST?

"I've been here [Georgia Tech] since 2020, so about three years, but I started doing research since my PhD, essentially."

HOW WOULD YOU DESCRIBE YOUR JOB AND WHAT DOES IT ENTAIL?

"My job is really to do research to try to understand the natural world, and there's all these little things that I have to do in order to understand the natural world. For example, right before I this meeting, I was reading scientific papers that other people have written. I write a lot of codes, so I'm on a computer a lot. I mentor students. I talk with my colleagues about science and different problems that come up. Doing science and writing a lot to communicate

science is also part of my everyday job."

WHAT IS YOUR FAVORITE PART ABOUT YOUR JOB?

"The thing I really enjoy most about what I do

8th grade math interview Trash

me May 3
to jssim

Hello, Dr. Sim,

My name is Mary Lawton Jones, and I am currently an 8th grader at Chamblee Middle School. This week my math class was assigned a project to make a math magazine. One of the features of the magazine is to include an interview with someone who has a profession related to math and how they use math at work. I am interested in interviewing a researcher that combines science and math in their job. After some research, I came across your profile on the Georgia Tech website. Would you be interested in answering a few questions for me about your work? I would really appreciate it.

Thanks so much for your consideration,
Mary Lawton Jones
8th grader
Chamblee Middle School

SIM, Shi May 3
to me

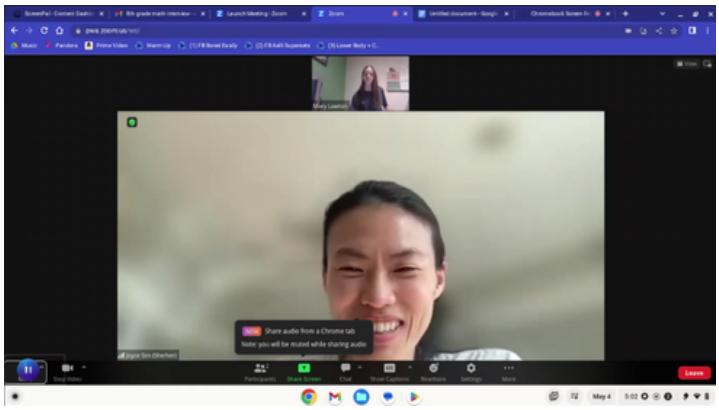
Hello Mary,

Happy to. Please let me know how you would like to do it.

Kind regards,
Joyce

Initial communication with Dr. Sim via email

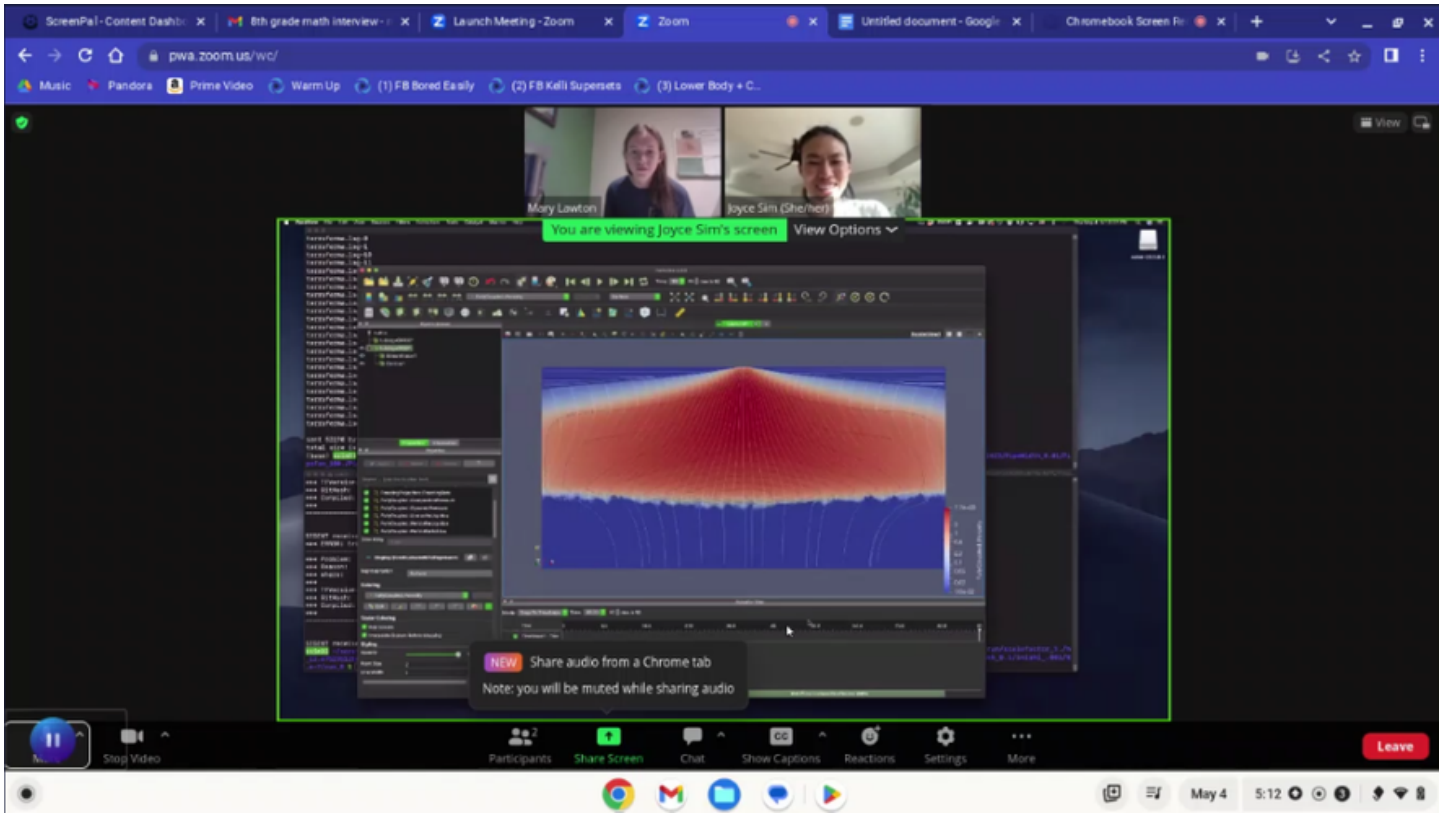
is when I am really on the verge of discovery. I'm solving this equation, looking at this code model output, and I'm realizing that no one else has seen this before and realizing what it means for the natural world. I find that really amazing and it just blows my mind every time. It's a sense of, 'Oh wow, no one else knows this, and I have to tell the world.' It's really the sense of discovery that I get from doing my work that I truly love."



Interview with Dr. Sim over Zoom

HOW IS YOUR JOB RELATED TO MATH AND WHERE DO YOU USE MATH IN YOUR WORK?

"I use math everywhere in my work. The main thing I do is try to picture the problem I'm trying to solve and put it in a mathematical form. Then, I try to solve it using different theorems and different proofs. Some days when I need to figure out, 'Okay, how do I solve this particular problem?' I have to conceptualize it and actually write it down in the form of an equation that I can solve on a computer. For example, I've looked at how magma moves underneath the ocean. Currently, I'm studying how an icy layer on the surface of Europa starts to melt, and how that melting moves materials along with it. I have to think about its size and geometry, and how different conditions affect the parameters of the situation. I think about things like what the boundaries should be, what the equation should entail, and what the simulation should do when certain conditions change. Then, I translate the information into equations. So a lot of times I'm using pen and paper writing out sets of equations that govern physics, and then slowly solving them using different math theorems and proofs."



Dr. Sim explaining ParaView, a software she uses to visualize geological movements on the surface of earth

ONCE YOU USE EQUATIONS TO GATHER DATA, WHAT DO YOU USE THE DATA FOR? HOW DO YOU VISUALIZE THE DATA TO SOLVE REAL-WORLD PROBLEMS?

"Visualization is really important because it's nice that you can solve equations, but then you want to try to understand what the output is. So one of the biggest tools I use is called ParaView. I use equations to make models to see how conditions will change over time. Sometimes the models work, and sometimes they don't. And of course, there's a lot of plotting depending on the problem, like how the variable that you're looking at is changing over time. A lot of the models I do actually run on supercomputers at Georgia Tech. Supercomputers are essentially a whole bunch of little computers put together, and they can do really big, really complicated problems. For example, a laptop is one computer, but a supercomputer is essentially putting hundreds and hundreds of laptops together into one to solve one big problem."

Thanks so much to Dr. Joyce Sim for sharing about her experiences and work, and empowering others to love science and math just as much as she does.

CHECK YOUR WORK!

Solving Inequalities practice (page 3):

1 **Determine which inequality symbol matches the situation:** Since Natalie is figuring out the number of times renting the facility will be cheaper as a member, use the less than symbol <.

Set up inequality: X = number of times renting the facility, member fee = 120 + 3x, non-member fee = 11x,

$120 + 3x < 11x$

Use inverse operations to solve: $120 + 3x < 11x$

Subtract 3x from both sides: $120 + 3x - 3x < 11x - 3x$

$120 < 8x$

Divide both sides by 8 to isolate x: $120/8 < 8x/8$

$\mathbf{15 < x}$

Identify answer: Since x represents the number of times Natalie would have to rent the soccer facility as a member for it to be cheaper than a non-member, x > 15 means that Natalie would have to rent the facility **more than 15 times** for the cost to be less than that of a non-member.

2 **Determine which inequality symbol matches the situation:** Since Ryan wants to make a profit of at least $440, use the greater than or equal to symbol ≥.

Set up inequality: X = number of pairs of sneakers, $55 = profit per pair, $440 = total profit,

$55x \geq 440$

Use inverse operations to solve: $55x \geq 440$

Divide both sides by 55: $55x/55 \geq 440/55$

$\mathbf{x \geq 8}$

Identify answer: Since x represents the number of pairs of shoes Ryan has to sell to make a profit of at least $440, x ≥ 8 means that Ryan would have to sell **8 or more pairs of shoes** to make a profit of at least $440.

3 **Determine which inequality symbol matches the situation:** Since CJ needs to make a weight of less than 180 pounds, use the less than symbol <.

Set up inequality: X = number of weeks, 200 = initial weight, 4 = number of pounds cut per week,

$200 - 4x < 180$

Use inverse operations to solve: $200 - 4x < 180$

Subtract 200 from both sides: $200 - 4x - 200 < 180 - 200$

$-4x < -20$

Divide both sides by -4: $-4x/-4 < -20/-4$

$x < 5$

Flip the sign since the equation was divided by a negative: $\mathbf{x > 5}$

Identify answer: Since x represents the number of weeks it will take CJ to get under 180 pounds, and x is greater than 5, it will take CJ **more than 5 weeks** to weigh less than 180 pounds.

CHECK YOUR WORK!

Dimensional analysis practice (page 5):

1

Identify starting value and ending value: 1 meter → X yards

Set up starting proportion:

$$\frac{1 meter}{1}$$

Identify corresponding conversion rates and write an equation of proportions. Multiply the numerators, multiply the denominators, and simplify the fraction:

$$\frac{1 meter}{1} \bullet \frac{1 foot}{0.305 meter} \bullet \frac{1 yard}{3 feet} = \frac{(1 \bullet 1 \bullet 1)}{(0.305 \bullet 3)} = \frac{1}{0.915} = \boxed{1.09 yards}$$

4. Identify answer: 1.09 yards

2

Identify starting value and ending value:

$$\frac{22 feet}{1 minute} \rightarrow \frac{X yards}{X seconds}$$

Identify corresponding conversion rates and write an equation of proportions. Multiply the numerators, multiply the denominators, and simplify the fraction:

$$\frac{22 feet}{1 minute} \bullet \frac{1 yard}{3 feet} \bullet \frac{1 minute}{60 seconds} = \frac{(22 \bullet 1 \bullet 1)\, yards}{(1 \bullet 3 \bullet 60)\, second} = \frac{22 yards}{180 seconds} = \boxed{0.12 yards/second}$$

Identify answer: 0.12 yards/second

3

Identify starting value and ending value: 115 tablespoons → X pints

Set up starting proportion:

$$\frac{115 tablespoons}{1}$$

Identify corresponding conversion rates and write an equation of proportions. Multiply the numerators, multiply the denominators, and simplify the fraction:

$$\frac{115 tablespoons}{1} \bullet \frac{1 cup}{16 tablespoons} \bullet \frac{1 pint}{2 cups} = \frac{(115 \bullet 1 \bullet 1)}{(1 \bullet 16 \bullet 2)} = \frac{115}{32} = \boxed{3.59 pints}$$

4. Identify answer: 3.59 pints

CHECK YOUR WORK!

Jokes (page 8)

1.What did zero say to eight?

Nice belt!

2. Why was the math book stressed?

It had too many problems!

3. What is a bird's favorite type of math?

Owl-gebra

4. What do you get when you take the sun and divide its circumference by its diameter?

Pi in the sky

5. What's a math teacher's favorite class pet?

A pi-thon

6. What did the triangle say to the circle?

You're pointless!

7. Why did the obtuse angle go to the beach?

Because it was over 90 degrees outside

8. What do you call the shape of an empty parrot cage?

A poly-gone

9. What is a math teacher's favorite vacation destination?

Times Square

10. What do you call a number that can't sit still?

A roamin' numeral

CHECK YOUR WORK!

Math libs (page 13-14)

1. **Any name** (ex. Alex, Ruby, Maddie)
2. **Any name** (ex. Steven, Miles, Aubrey)
3. **Any place** (New York City, the beach, Atlanta)
4. **75 miles**
5. **125 miles**
6. **145.8 miles**
7. **The square root of (10 x your age) -** (example: square root of (10 x 14) = 11.8)
8. **Any shape** (ex, triangle, circle, trapezoid)
9. **Any color** (ex. purple, blue, magenta))
10. **Diameter**
11. **Radius**
12. **πr^2**
13. **4 inches**
14. **$\pi (4)^2$**
15. **50.3**
16. **50.3**
17. **$6.04**
18. **Any flavor of pie** (ex. chocolate, blueberry, apple)
19. **$6.04**
20. **Flavor of pie** (same as #18)