"Math is Cool" Championships -- 2023-24

4th grade

Mental Math Solutions

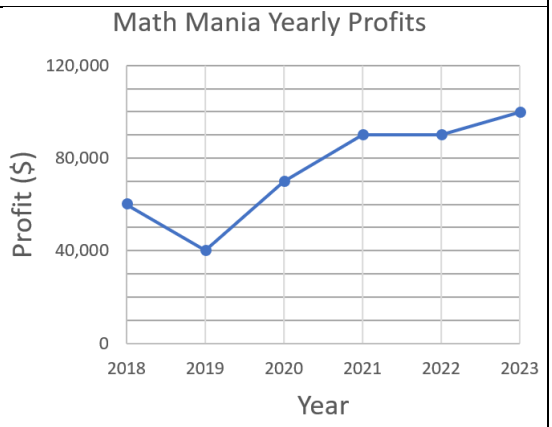
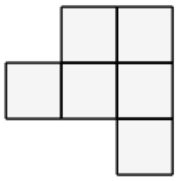
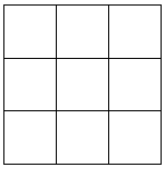
	Answer	Solution
1	17508	Write down the number seventeen thousand five hundred eight. **17508**
2	22	What is the next number in the following sequence? Two, seven, twelve, seventeen, and so on. **The sequence increases by 5 each term. 17 + 5 = 22**
3	80	Four thousand eighty-one equals four thousand one plus what number? **4001 + 80 = 4081**
4	4 [centimeters]	A rectangle has an area of twenty-four square centimeters, and a length of six centimeters. How many centimeters is the width of the rectangle? **4*6 = 24**
5	23	What is the value of x plus twelve when x equals eleven? **11 + 12 = 23**
6	50 [cm]	A piece of rope measuring four meters is cut into eight equal lengths. In centimeters, how long is each piece? **4/8 = ½ meter each** **½ meter = 50 cm**
7	105 [years]	Daniel asks his great-grandpa how old he is. He responds, "My age is the product of the first 3 odd prime numbers." How old is Daniel's great-grandpa, in years? **3 * 5 * 7 = 105**
8	11220 [cents]	At the mall, Vivien's mom bought her a pair of shoes that cost one hundred twenty dollars. They had a fifteen percent off coupon which was applied pre-tax. Adding the ten percent sales tax, what is the total amount that Vivien's mom paid, in cents? **120*0.85 = 102** **102*1.1 = $112.20 = 11220 cents**

"Math is Cool" Championships -- 2023-24

4th grade

Individual Test Solutions

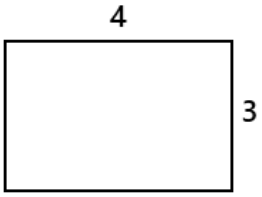
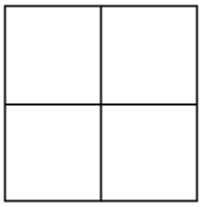
	Answer	Solution
1	2,023,000	Round 2,023,202 to the nearest thousand. **3202 rounds to 3000**
2	135 [pounds]	When Justin first started going to the gym, he could bench press 90 pounds. Now, he can bench press 225 pounds. How many more pounds can he bench press now than when he started? **225 – 90 = 135**
3	1 [line of symmetry]	How many lines of symmetry does this figure have?  
4	7 [oranges]	Carter needs to eat less than 500 calories a day for his diet. An orange has 70 calories. What is the maximum number of oranges he can eat without going over his calorie limit? **500 / 70 is greater than 7, but less than 8**
5	3	What is the mode of the following set of numbers: 2, 17, 3, 5, 11, 3, 7, 13 **3 appears the most times in the set of numbers.**
6	26	Evaluate: 20 + (2 × 3) **20 + 2 × 3 = 20 + 6 = 26**
7	31 [percent]	Peter has 31 fantasy books, 46 sci-fi books, and 23 realistic fiction books. If he selects a book at random, what is the probability, as a percentage, that Peter picks a fantasy book? **31 + 46 + 23 = 100** **31/100 = 31%**
8	18 [square meters]	What is the area in square meters of a rectangle with length 6 meters and width 3 meters? **6 × 3 = 18**
9	4	What number comes next in the following sequence? 1, 2, 2, 3, 3, 3, 4, 4, 4, … **Each number is shown a number of times equal to its value.**

10	5 [numbers]	How many of the following numbers are multiples of 5? 70, 75, 99, 110, 331, 490, 923, 955 **Multiples of 5 end in 5 or 0.** **70, 75, 99, 110, 331, 490, 923, 955**
11	50,000 [$]	The line graph shows the yearly profits for the Math Mania company over the last 6 years. In dollars, how much more did the company earn in 2021 compared to 2019? **2021: $90,000** **2019: $40,000** **90000 – 40000 = 50000** 
12	12	What is 10% of 120? **120/10 = 12**
13	61 [nickels]	Olina wants to buy a new bandana to start the school year. The bandana costs $6.95, and she pays with a 10-dollar bill. If she receives her change entirely in nickels, how many nickels does she receive? **10.00 – 6.95 = 3.05. 305 / 5 = 61**
14	12 [inches]	The figure shown here is made up of squares that measure 1 inch on each side. What is the outer perimeter of the shape, in inches? **The shape has 12 outer edges that measure 1 inch each.** 
15	2 [candies]	Namita and Darsha each have a candy box. Namita said, "If you give me one of your candies, we would both have the same number of candies". Darsha said, "If you hadn't eaten all of yours already, you would have some left!" How many candies does Darhsa have? **Namita has 0. The only possibility is that Darsha has 2, so when she gives one to Namita, they will both have the same number.**
16	14 [squares]	Sonit drew the grid shown here, which is made up of unit squares. How many total squares of any size are in the grid? **1 x 1 squares: 9** **2 x 2 squares: 4** **3 x 3 squares: 1** **9 + 4 + 1 = 14** 

17	120	What number comes next in the following number pattern? 15, 15, 10, 30, 30, 20, 60, 60, 40, … **The first three numbers, 15, 15, 10, are doubled to get the next three: 30, 30, 20. That pattern continues, so 60, 60, 40 are doubled to get 120, 120, 80.**
18	14 [centimeters]	Ivy is making pencils in woodshop class. The lengths of her first 4 pencils, in centimeters, are: 12.5, 13.5, 15, and 15. What is the mean length of her pencils, in centimeters? **12.5 + 13.5 + 15 + 15 = 56** **56/4 = 14**
19	16	Evaluate: $\frac{4}{5} \times 20$ **(4/5) × 20 = 16**
20	6 [positive whole numbers]	How many positive integers can be put in the blank to make the inequality below true? $3 \times \_ + 2 < 23$ **1, 2, 3, 4, 5, and 6 all satisfy the inequality, but 7 and above do not.**
21	3 [batches of biscuits]	Luke's biscuit recipe calls for 2 cups of self-rising flour, ½ cup of butter, and 6 tablespoons of milk to make 1 batch. If he has 8 cups of flour, 2 cups of butter, and 20 tablespoons of milk, how many full batches of biscuits can he make? **8 / 2 = 4 batches worth of flour** **2 / (1/2) = 4 batches worth of butter** **20 / 6 = 3 1/3 batches worth of milk** **The limiting amount is that of milk, and since the problem asked for full batches, the answer is 3.**
22	46	A sequence begins: 11, 11011, 11100111, 11110001111, and the pattern continues. What is the sum of the digits in the 23rd number in the sequence? **Each term increases the sum of its digits by two, and the sum of the digits of the first term is 1 + 1 = 2. 2 × 23 = 46**
23	90 [students]	The following table shows the number of students per grade at Garfield High School. If 10% of 9th graders, 20% of 10th graders, 10% of 11th graders, and 5% of 12th graders are on the math team, how many total students from Garfield High are on the math team? **(0.1) (150) + (0.2) (200) + (0.1) (250) + (0.05) (200) = 15 + 40 + 25 + 10 = 90**

Grade	Number of Students
9th	150
10th	200
11th	250
12th	200

24	12	Connor and George each choose a different integer from 1 to 10 without telling each other. Their conversation goes as follows: Connor: "My number is divisible by 4." George: "Well then, I now know your number." Connor: "Well, I know your number also." Assuming perfect logic from both of them, what is the sum of Connor's and George's numbers? **From 1 to 10, there are two numbers divisible by 4, 4 and 8. If George knows Connor's number after he tell him that his is divisible by 4, George must have the other multiple of 4. The sum of both multiples of 4 is 4 + 8 = 12.**
25	12 [orders]	Araceli's favorite 3 chords on his guitar are E, A, and D, but she likes A the most. In how many different orders can Araceli play a series of 4 of her favorite chords, if she plays E and D once each and plays A twice? **4! / 2! = 24 / 2 = 12**
26	6	If x = 1, what is the value of $2x^2 + 3x + 1$? **2(1)^2 + 3(1) + 1 = 2 + 3 + 1 = 6**
27	60 [possible schedules]	At camp, Levi can choose one of five possible classes for his first period: Archery, Swimming, Track and Field, Basketball, or Meditation. He then chooses a different one of the five classes for his second period. He can then choose one of three possible activities, Hiking, Volleyball, or Frisbee, to do after that. How many different schedules can Levi choose? **5 * 4 * 3 = 60**
28	40 [%]	If you pick a random whole number from 1 to 20 inclusive (including 1 and 20), what is the probability that it is prime, as a percentage? **There are 8 prime numbers from 1 to 20. 8 / 20 = 40%**
29	65 [degrees]	A quadrilateral has 4 interior angles, measuring 120°, 110°, x°, and x°. What is the measure of each angle x, in degrees? **360 = 230 + 2x.** **2x = 130** **x = 65**
30	11 [ways]	In how many different ways can you make 1 dollar using only nickels and dimes? **You can use any number of dimes from 0 to 10, and make the rest up with nickels. That's 11 possible ways.**
31	385	Evaluate the sum of the integers between 30 and 40 inclusive. **The average of all the numbers is 35, and there are 11 numbers total, so 35 × 11 = 385**

32	120 [pounds]	Alden, Miles, and Nathan, all weigh themselves. Alden and Miles weigh the same, and Nathan is 140 pounds less than the sum of Miles and Alden's weights. If all three of them stand on the scale together, their combined weight is 340 pounds. In pounds, how much does Miles weigh? **Use a for Alden, m for Miles, and n for Nathan.** **a = m** **n = a + m – 140 = 2m – 140** **n + a + m = 2m – 140 + m + m =** **4m – 140 = 340** **4m = 480** **m= 120**
33	5 [units]	The rectangle has side lengths 3 and 4 units. What is the length of the diagonal of the rectangle, in units? $3^2 + 4^2 = 25$ **The square root of 25 is 5.** 
34	14 [ways]	Max is trying to color a 2 by 2 grid of squares. He can color each individual square red or blue, and he colors every square. He has to have at least one square colored blue and one square colored red. How many possible ways can Max color the grid? The grid is in a fixed location, it cannot be rotated.  **Each square has two possibilities, so 2 to the power of 4 is 16. An all-red grid and an all-blue grid would both be invalid, so 16 – 2 = 14.**
35	76	When a certain 2-digit number is divided by 3 or 5, the remainder is 1. The sum of the digits of this number is 13. What is the number? **The number is 1 more than a multiple of 15. The possible choices are then: 16, 31, 46, 61, 76, and 91. Out of these, only 76 has a digit sum of 13.**
36	3 [inches]	An equilateral triangle with perimeter 6 inches is divided into 4 smaller congruent equilateral triangles. What is the perimeter in inches of one of the 4 smaller triangles? **The large triangle has a side length of 2, so each smaller triangle will have a side length of 1. 1(3) = 3 inches**
37	31	In a leap year (such as 2024), on which date of a month would exactly 2/3 of the year have elapsed? To be clear: your answer should consist only of the date, a positive integer. Do not include the month in your answer. **A leap year has 366 days. 366x(2/3) = 244. Adding the days in each month from January through August shows that August 31st is the 244th day of the year.**

38	100	What is the sum of the mean and the median of the list of all the positive odd integers less than 100? **There are 50 odd numbers in this set, so the median will be the average of the 25th and 26th, or (49 + 51)/2 = 50.** **This is also an arithmetic sequence, so the mean is equal to the median. 50 + 50 = 100**
39	78 [seconds]	Haruta is singing 3 songs for a competition. He times each song, and the combined length that his finds is 9 minutes and 36 seconds, but his stopwatch is inaccurate. For every 8 seconds it records, 9 seconds pass in real life. For the competition, Haruta is only permitted to be on stage for 10 minutes. If he has to include a 30 second introduction along with his three songs, how many seconds will he be over the limit? **9 minute and 36 seconds = 576 seconds** **576(9/8) = 648** **648 + 30 = 678** **10 minutes = 600 seconds** **678 – 600 = 78 seconds**
40	840	What is the largest whole number less than 1000 that is divisible by each of the first 4 prime numbers? **2 * 3 * 5 * 7 = 210.** **The largest multiple of 210 less than 1000 is 840**

"Math is Cool" Championships -- 2023-24

4th grade

Multiple Choice Solutions

<table>
<tr><th></th><th>Answer</th><th>Solution</th></tr>
<tr><td colspan="3">USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #1 THROUGH #4.

Derek wants to make a meal plan for a keto diet. Shown here is a list of foods and their nutritional values per 100 grams (g):

<table>
<tr><th>Item</th><th>Total Fat</th><th>Sodium</th><th>Total Carbohydrate</th><th>Protein</th></tr>
<tr><td>Eggs (per 100 g)</td><td>10g</td><td>130mg</td><td>2g</td><td>12g</td></tr>
<tr><td>Milk (per 100 g)</td><td>3g</td><td>86mg</td><td>10g</td><td>6g</td></tr>
<tr><td>Avocados (per 100 g)</td><td>15g</td><td>7mg</td><td>9g</td><td>2g</td></tr>
<tr><td>Walnuts (per 100 g)</td><td>65g</td><td>2mg</td><td>14g</td><td>16g</td></tr>
<tr><td>Strawberries (per 100 g)</td><td>0.5g</td><td>1mg</td><td>8g</td><td>1g</td></tr>
</table>
</td></tr>
<tr><td>1</td><td>B</td><td>How much fat would be found in 200 grams of eggs?

A) 10 g B) 20 g C) 100 g D) 200 g
E) Answer not given.

There are 10 g of fat per 100 g of eggs. 200g of eggs has 10x2 = 20 g of fat.</td></tr>
<tr><td>2</td><td>C</td><td>What percentage of milk is carbohydrate?

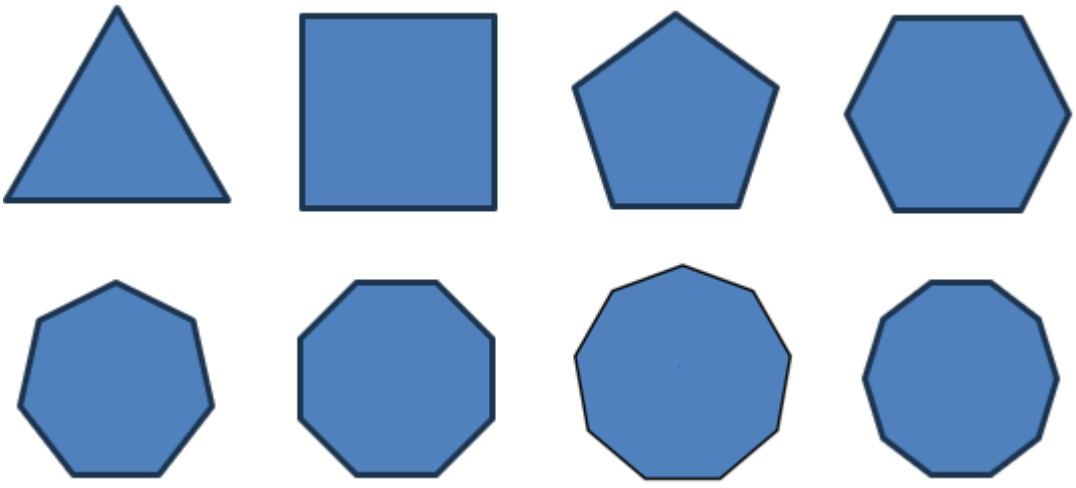
A) 0.1 % B) 1 % C) 10 % D) 100 % E) Answer not given.

10g / 100g = 10%</td></tr>
</table>

3	*A*	A keto diet is characterized by foods that have lots of fat, but low amounts of carbohydrates. Which one of the five given items would Derek pick if he wanted the highest fat to carbohydrate ratio? A) Eggs B) Milk C) Avocados D) Walnuts E) Strawberries **Just by looking at the table, the only ones that have a chance are walnuts and eggs. 10/2 > 65/14, so the answer is Eggs**.
4	*C*	Derek eats 180 grams of protein each day. On a certain day, he gets 4/9 of his daily protein from walnuts. If one walnut is 2g, how many walnuts did he eat? A) 5 B) 80 C) 250 D) 500 E) Answer not given. **(4/9)(180) = 80** **80/16 = 5** **Since there are 16g of protein for every 100g of walnuts, Derek needs 500 grams of walnuts.** **500/2 = 250**

USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #5 THROUGH #7.

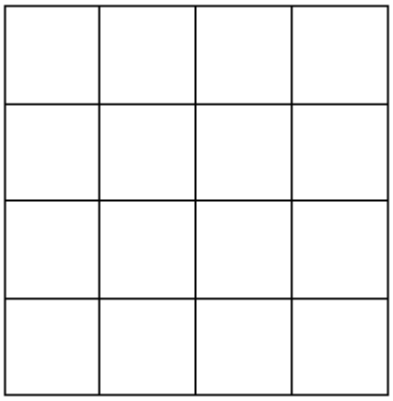
A mathematical set of cookie cutters contains one of each of the regular polygons with n sides, where n is between 3 and 10, inclusive.



5	*C*	In this set, what is the total number of sides of all the cookie cutters combined? A) 45 B) 49 C) 52 D) 54 E) Answer not given. **Sum of 1 to 10 = 55** **55 – 1 – 2 = 52**
6	*A*	Rohit decided to make 8 dozen octagon cookies and $5\frac{1}{3}$ dozen pentagon cookies. How many more octagon cookies does he have than pentagon cookies? A) 32 B) 64 C) 96 D) 160 E) Answer not given **8x12 = 96 octagons** **$5\frac{1}{3}$ x 12 = 64 pentagons** **96 – 64 = 32**
7	*B*	The heptagon (7 sides), octagon (8 sides) and nonagon (9 sides) all have the same side length of 3 centimeters. Rohit decided to glue together one edge of the heptagon to one edge of the octagon. He then glued the opposite edge of the octagon to one edge of the nonagon. What is the outer perimeter of the new shape, not counting the glued edges? A) 20 cm B) 60 cm C) 72 cm D) 84 cm E) Answer not given. **The heptagon now has 6 edges on the exterior, the octagon now has 6 edges on the exterior, and the nonagon now has 8 edges on the exterior. 6+6+8=20 edges. 20x3 = 60 cm**

USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #8 THROUGH #10.

Julie owns a group of 16 red pandas, and also has a grid of 16 pens to keep them in, as shown below. Each panda goes into a separate pen at night to sleep.



8	D	The average weight of the pandas is 12 pounds. How much do all of the pandas weigh together? A) 12 lbs B) 48 lbs C) 148 lbs D) 192 lbs E) Answer not given. **16x12 = 192**
9	D	Every night, Julie puts one panda into each pen at bedtime. What is the maximum amount of pandas Julie can put into pens without having a full row of 4 pandas or a full column of 4 pandas? Diagonals do not count as a row or a column. A) 9 B) 10 C) 11 D) 12 E) Answer not given. X X X X X X X X X X X X

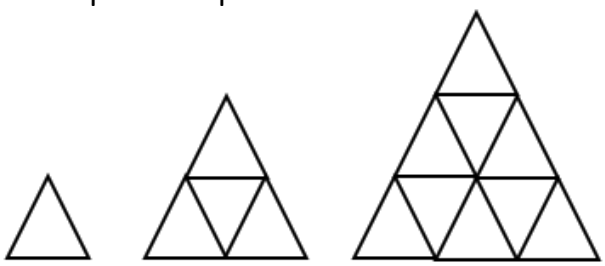
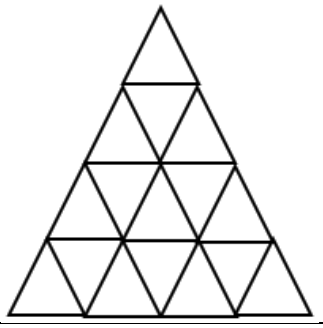
10	D	One night as she put the pandas to bed, Julie randomly selected each time which open pen to put the next panda in. What is the probability that the first 4 pandas ended up in the top row of the grid? A) 12/1024 B) 24/1024 C) 4/1820 D) 1/1820 E) Answer not given. **There are a total of 16C4 = 16!/(12!4!) = 1820 ways to choose 4 pens out of 16. There is 1 way to choose the 4 pens in the top row. P=1/1820**

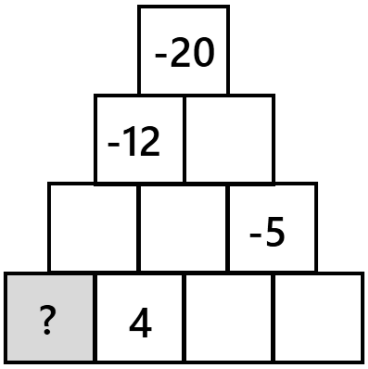
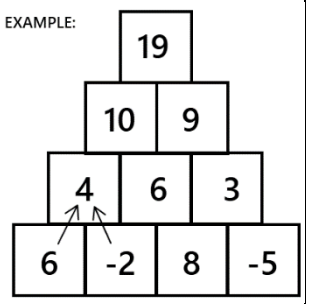
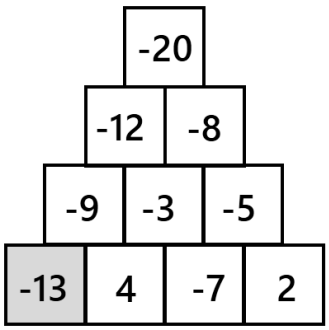
"Math is Cool" Championships -- 2023-24

4th grade

Team Test Solutions

	Answer	Solution
1	83 [inches]	Tiny the giant has grown $1\frac{1}{2}$ inches every year for the past 20 years. Twenty years ago, he was 53 inches tall. How tall is he now, in inches? **20 * 1.5 = 30** **53 + 30 = 83**
2	480 [cubic meters]	The side lengths of a rectangular prism are 6, 8, and 10 meters. What is its volume, in cubic meters? **6 x 8 x 10 = 480m^3**
3	3[rd place]	Andrei, Bridger, Colin, Dhruv, and Evan placed in some order, 1, 2, 3, 4, and 5 at a wrestling meet. If Evan was 3 places ahead of Colin, Andrei was 2 places ahead of Dhruv, and Evan did not win the meet, what place did Dhruv get? Give your answer as a place number: 1, 2, 3, 4, or 5. **Evan and Colin are three places apart, which makes them either 2nd and 5th or 1st and 4th.** **Evan, did not win, so he is 2nd, and Colin is 5th. Places 1, 3, and 4 are still open, but the only two that are 2 apart are 1 and 3, and since Andrei is 2 places ahead of Dhruv, Dhruv was 3rd.**

4	16 [triangles]	The following pattern is made from congruent triangles. The first shape has one triangle. The second shape has four congruent triangles, and so on. How many congruent triangles will be in the 4^{th} shape in the pattern?  **1** **2** **3** **You could just draw it, and see that it takes 25 congruent triangles. Or, note the pattern in the first three shapes, which is: 1, 4, 9, n^2… 4^2 = 16** 
5	15	What is the greatest odd factor of 30? **2x15 = 30**

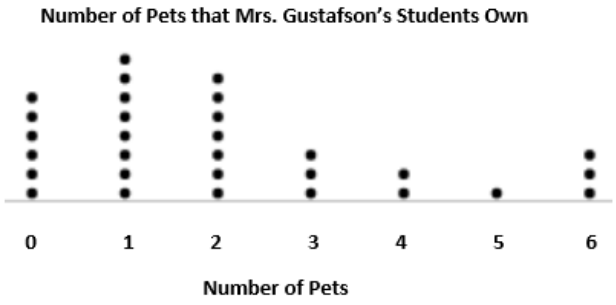
6	-13	In the example number tower shown bottom right, each square is made by adding the numbers in the two squares below it. For example, 6 + (-2) = 4. In the following number tower, which follows the same pattern, what number goes in the shaded square?   Work down from the top. -13 + 4 = -9 
7	696	A sequence that starts with 3 increases by 7 each following term, starting with 3, 10, 17, … What is the 100th number in this sequence? **3 + 99(7) = 696**
8	3 [different values]	The average of 3 whole numbers is a whole number. One of the numbers is 2, and the other two numbers are the same as each other, and not equal to 2. If the average of the three numbers is less than 10, how many different values could the other two numbers equal? **(2+5+5)/3 = 4** **(2+8+8)/3 = 6** **(2+11+11)/3 = 8**

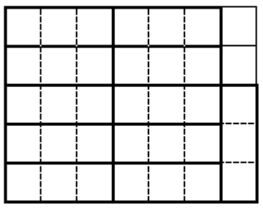
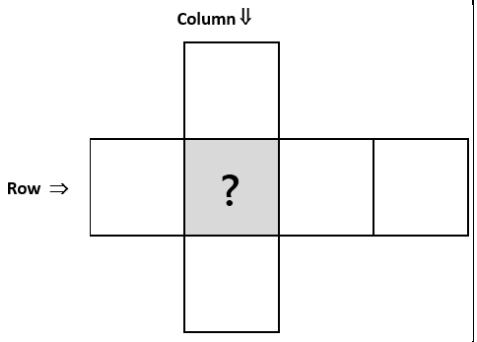
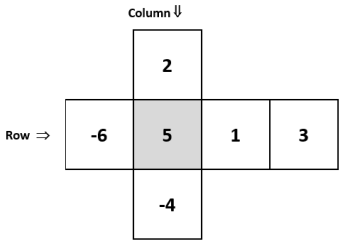
9	29 [ways]	In how many ways can you make 1 dollar using only quarters, dimes, and nickels? **Make cases based on the number of quarters:** **4 quarters: You already have a dollar, so this is 1 option** **3 quarters: You can have 0, 1, or 2 dimes, and the remainder can be made up with nickels. 3 options** **2 quarters: 0, 1, 2, 3, 4, or 5 dimes. 6 options** **1 quarter: 0, 1, 2, 3, 4, 5, 6, or 7 dimes, 8 options** **0 quarters: Anywhere from 0 to 10 dimes. 11 options** **1 + 3 + 6 + 8 + 11 = 29**
10	35 [students]	In Mr. Kostenko's history class, the number of blue-haired students is 8 more than half the number of green-haired students, and the number of green-haired students is 8 more than half the number of blue-haired students. How many students are in Mr. Kostenko's history class, if only 3 of them do not have blue or green hair? **Let b be the number of blue-haired students, and g be the number of green-haired students.** **b = g/2 + 8** **g = b/2 + 8** **b-8 = g/2** **g = 2b – 8** **2b – 8 = b/2 + 8** **1.5b = 24** **b = 16** **g = (16)/2 + 8 = 8 + 8 = 16** **b + g = 16 + 16 = 32** **32 + 3 = 35**

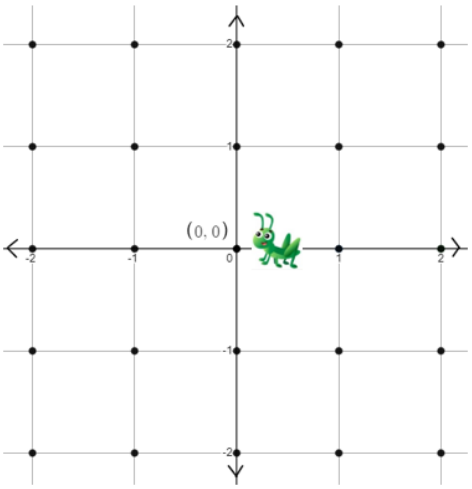
"Math is Cool" Championships -- 2023-24

4th grade

Linda Moore Triple Jump Solutions

	Answer	Solution
1	54321	Evaluate the following: $(5 \times 10000) + (4 \times 1000) + (3 \times 100) + (2 \times 10) + 1$ **50000 + 4000 + 300 + 20 + 1 = 54321**
2	2190	When the following numbers are put in order from smallest to largest, what is the third largest number? 18460 2082 2190 434 20623 19 2024 **19, 434, 2024, 2082, 2190, 18460, 20623**
3	29	A number pattern starts with 1, 3, and each following number is the sum of the previous 2. For example, the 3rd number is 1 + 3 = 4. What is the seventh number in the pattern? Pattern: 1, 3, 4, 7, … **1, 3, 4, 7, 11, 18, 29** **3 + 4 = 7** **4 + 7 = 11** **7 + 11 = 18** **11 + 18 = 29**
4	14 [laps]	Amina swims each lap of her 20-lap freestyle race in 30 seconds. After swimming for 3 minutes, how many more laps does she have to swim? **In 1 minute she can swim 2 laps, therefore in 3 minutes she swims 6 laps. She has 20 – 6 = 14 left to go.**
5	16 [students]	Mrs. Gustafson's class took a survey on how many pets each student owns. The results are shown in the graph, with each dot representing one student. How many students own two or more pets?  **Add up the dots for 2, 3, 4, 5 and 6 pets. The total is 16.**

6	11 [rectangles]	What is the largest number of 1 cm by 3 cm rectangles that can fit in a 5 cm by 7 cm rectangle, with none of the rectangles overlapping? 
7	59 [dollars]	Three friends eat at a restaurant and the bill comes to $150. If they give the waiter an 18% tip, then split the bill evenly, how much, in dollars, does each friend pay? **150 * 1.18 = 177** **177 / 3 = 59**
8	5	Put each of the following numbers into exactly one square, so that the numbers in the column and the numbers in the row each add up to 3. What number is in the shaded box? -6, -4, 1, 2, 3, 5  **The number 5 must be in the shaded box. The other numbers can be in different positions.** **2 + 5 + -4 = 3** **-6 + 5 + 1 + 3 = 3** 
9	40 [seconds]	Akaash can run one mile at a steady rate of 10 miles per hour, while Virun can run one mile at a steady rate of 9 miles per hour. If they both run one mile, starting at the same time, how many seconds after Akaash finishes will Virun finish? **60/9 = 6 2/3 min** **60/10 = 6 minutes** **6 2/3 – 6 = 2/3 min = 40 seconds.**

10	36 [paths]	A grasshopper is sitting on the point (0, 0) on the coordinate plane. He can hop exactly one unit at a time either up, down, left, or right. For example, from the starting point of (0, 0) he can hop to the points (1, 0), (0, -1), (-1, 0) or (0, 1). With the second hop, he could again go one unit in any direction. Starting at (0, 0), and taking exactly four hops, how many different paths can he take that will have him end up again at the point (0, 0)?  **U = up** **D = down** **L = left** **R = right** **Assume the first hop is to the point (0, 1):** **UUDD** **ULRD** **URLD** **ULDR** **URDL** **UDUD** **UDDU** **UDLR** **UDRL** **There are 9 ways. There are 4 different ways he could have started (U, D, L, R)** **9x4 = 36**

"Math is Cool" Championships -- 2023-24

4th grade

College Bowl Round #1 Solutions

	Answer	Solution
1	4600	What is four thousand six hundred twenty-three rounded to the nearest hundred? **4623 rounds to 4600**
2	5	What is the positive difference between the number of days in a week and the number of months in a year? **12 – 7 = 5**
3	12 [cm^2]	What is the area of a triangle with a base of four centimeters and a height of six centimeters, in square centimeters? **0.5(4)(6) = 12**
4	90 [2-digit counting numbers]	How many two digit counting numbers are there? **10 through 99** **99 – 9 = 90 2-digit counting numbers**
5	60 [pages]	Talia is reading a book. On the day she starts, she reads two pages. The next day, she reads four pages. She doubles the number of pages she reads every day until day five, when she reads the last thirty pages. How many total pages did she read? **2 + 4 + 8 + 16 + 30 = 60**
6	5 [= mean]	What is the mean of the following data set? Seven, four, five, five, five, two, ten, two **The sum of all the numbers in the data set is 40** **40/8 = 5**
7	126 [cents]	Hannah purchases a candy cane that costs one dollar and twenty cents before tax. If tax is five percent, what is the total price that she paid for the candy cane, in cents? **120*1.05 = 126**
8	39 [degrees]	The complement of angle x is fifty-one degrees. What is the measure of x, in degrees? **90 – 51 = 39**
9	30 [hours]	Terry practices the piano for five hours a day, except for Sundays, when he takes a break. How many hours a week does he practice? **5 * 6 = 30**
10	80	Four times four times twenty times twenty equals eighty times what number? **4x4x20x20 = (4x20)x(4x20) = 80x80**

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College Bowl Round #2 Solutions

	Answer	Solution
1	11	As a whole number, what is six and two-fifths plus four and three-fifths? **6 2/5 + 4 3/5 = 11**
2	125 [minutes]	If Blake wakes up at six fifteen AM, and leaves for school at eight twenty AM, how many minutes did it take him to get ready? **2 hours 5 minutes = 125 minutes**
3	17 [years]	The range of the ages of members of a local community service club is sixty-four years. If the oldest member is eighty-one years, what is the age of the youngest member, in years? **81 – 64 = 17**
4	17 [units]	What is the length of the hypotenuse of a right triangle in units with leg lengths of eight and fifteen units? **8^2 + 15^2 = 64 + 225 = 289 = 17^2**
5	210	What is the sum of all the whole numbers from one to twenty, including one and twenty? **(20/2)(21) = 210**
6	30 [ways]	In how many ways can the letters in the word ARRAY, spelled A-R-R-A-Y, be arranged? **5!/(2!*2!) = 120/(2*2) = 30**
7	18 [blonks]	There are four blinks in three blanks, and four blanks in three blonks. How many blonks are in thirty-two blinks? **(3/4)(3/4) = 9/16** **(9/16)(32) = 18**
8	5	How many square numbers from one to one hundred, including one and one hundred, are odd? **1, 9, 25, 49, 81**
9	210 [degrees]	If three angles in a quadrilateral are forty, fifty, and sixty degrees, what is the measure of the fourth angle, in degrees? **360 – 40 – 50 – 60 = 210**
10	7 [orange slices]	Sam has sixteen orange slices, while Tom has two. How many orange slices does Sam have to give Tom in order for Sam and Tom to have the same number of orange slices? **16 + 2 = 18 total** **If Sam gives Tom 7 slices, they will both have 9.**

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College Bowl Round #3 Solutions

	Answer	Solution
1	0	What is three times two times one times zero? **3x2x1x0 = 0**
2	23	What is the smallest prime number greater than 20? **21 and 22 are not prime, 23 is.**
3	23 [nickels]	How many nickels are equivalent to one dollar and fifteen cents? **115/5 = 23**
4	2 [place] [2nd]	Anthony was in fourth place in a race, but then passed the person in third place. The person in first place then sprained his ankle and had to exit the race. If the standings didn't change for the rest of the race, in what place number did Anthony finish in? **After passing person in 3rd, Anthony was in 3rd. First place dropped out so Anthony moved up to 2nd.**
5	4	Double a certain number is four more than that number. What is the number? **2x = x + 4** **x = 4**
6	50 [toy soldiers]	Will arranges his toy soldiers in rows of eight, but there were two left over. Then, he arranges them in rows of seven, but there was one left over. What is the fewest number of toy soldiers that Will could have? **49/7 = 7** **48/8 = 6** **This property is not shown for any smaller number**
7	9 [square feet]	How many square feet are in one square yard? **3 * 3 = 9**
8	2033	The sum of the digits in the year twenty twenty-four is two plus zero plus two plus four equals eight. What is the next year whose digits sum to eight? **180 – 88 = 92**
9	12 [ways]	On a five by five bingo board, in how many ways can you get a bingo, which is five numbers all in the same column, row, or diagonal? **5 columns + 5 rows + 2 diagonals = 12**

10	40 [meters]	What is the perimeter in meters of a square patio that has an area of one hundred square meters? **If area = 100, then side length = 10** **4x10 = 40**

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College Bowl Round #4 Solutions

	Answer	Solution
1	312	Evaluate twenty-four times thirteen. **24x13 = 312**
2	92 [degrees]	An isosceles triangle has two base angles that measure forty-four degrees each. What is the measure of the largest angle in the triangle, in degrees? **6 * 7 * 8 = 336**
3	125	What is the value of five cubed? **5 × 5 × 5 = 125**
4	108	A geometric sequence begins with one, three, nine. What is the sum of the next two numbers in the sequence? **27 + 81 = 108**
5	216 [tiles]	What is the maximum number of two inch by four inch tiles that can fit on a thirty-six inch by forty-eight inch board with no overlapping? **36/2 = 18, 48/4 = 12** **18 * 12 = 216**
6	150 [cents]	Eric buys four identical hot dogs and pays with a ten dollar bill. If he receives ten quarters, ten dimes, and ten nickels in change, how much did each hot dog cost, in cents? **10(25) + 10(10) + 10(5) = 10(40) = 400 cents in change** **1000 – 400 = 600 cents** **600 / 4 = 150 cents per hotdog**
7	4	The radius of a circle is half the length of the side of a square. The square's perimeter is equal to the diameter of the circle multiplied by what number? **If radius = ½ side length, then diameter = side length** **Perimeter = 4 x side length**
8	49 [%]	If a counting number from one to one hundred, including one and one hundred, is randomly selected, what is the probability in percent that it is less than fifty? **There are 49 counting numbers less than 50. 49/100 = 49%**

9	8 [miles]	Abdul walks at a constant rate of four miles per hour. If it takes him one hundred twenty minutes to walk to the supermarket from home, how many miles is it from Abdul's house to the supermarket? **120 min = 2h** **2 * 4 = 8 miles**
10	2	What is the remainder when two hundred twenty-three is divided by seventeen? **221 is divisible by 17. 2 more than that is 223**

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College Bowl Round #5 Solutions

	Answer	Solution
1	28 [pos. difference]	What is the positive difference between seventy-seven and forty-nine? **77 – 49 = 28**
2	9 [sheep]	A farmer had twenty-one sheep. During a storm, all but nine of them got scared and ran away. How many sheep does the farmer have left? **All but 9 of them ran away, so there are still 9 there.**
3	6 [times]	A pen costs one dollar and twenty cents, while an eraser is twenty cents. How many times more does the pen cost than the eraser? **120/20 = 6**
4	18 [days]	It takes twelve days for twelve chickens to lay thirty-two eggs. How many days would it take six chickens to lay twenty-four eggs? **12(2)(24/32) = 18**
5	150 [degrees]	In degrees, what is the sum of the measure of the angle complementary to a sixty degree angle and the angle supplementary to a sixty degree angle? **Complementary = 30** **Supplementary = 120** **30 + 120 = 150**
6	4 [numbers]	How many different whole numbers have a square root between two and three, but not equal to two or three? **2^2 = 4, 3^2 = 9** **The numbers between 4 and 9 are 5, 6, 7 and 8, or 4 numbers**
7	100	What is the sum of the first 10 positive odd integers? **The sum of the sequence of positive odd numbers is equal to the number of terms squared.** **10^2 = 100**
8	80 [%]	The probability that it rains on any given day is twenty percent. As a percent, what is the probability that it does not rain on Saturday? **Probability of rain = 20%** **Probability of no rain = 80%**

9	21 [digits]	Asher writes down all of the digits in the whole numbers from one to fifteen, including one and fifteen. How many total digits did Asher write? **1 – 9 = 9 digits** **10, 11, 12, 13, 14, 15 = 12 digits** **9 + 12 = 21 digits**
10	11 [units]	An equilateral triangle has a perimeter of thirty-three units. In units, what is the length of one of its sides? **33/3 = 11**

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College Bowl Round #6 Solutions

	Answer	Solution
1	99	Evaluate twenty-nine plus thirty-three plus thirty-seven. **The average of all three numbers is 33, as both 29 and 37 are 4 away from 33. 33 * 3 = 99**
2	8 [pints]	How many pints are in one gallon? **There are 4 quarts in a gallon, and 2 pints in a quart. 4 * 2 = 8**
3	54 [unit squares]	A Rubik's cube is a cube with nine individual unit squares on each face. How many total unit squares appear on the faces of a Rubik's cube? **A cube has 6 faces.** **6x9 = 54**
4	150 [minutes]	Vishal tutors three students, Aiden, Brayden, and Caydn starting at one-thirty pm, three-fifteen pm, and five-forty-five pm, respectively. Each tutoring session lasts one hour. Between one-thirty pm and seven pm, how long is Vishal not tutoring, in minutes? **The time period is 5.5 hours, 3 hours of which are tutoring.** **5.5-3 = 2.5 hours = 150 minutes**
5	90 [mean]	What is the mean of the following data set: Ninety, eighty-seven, ninety, ninety-three **90 is right in the middle, so you don't even need to add them.** **Or, 90 + 87 + 90 + 87 = 360** **360/4 = 90**
6	90	What is the largest number less than one hundred that is divisible by five and two? **To be divisible by both 5 and 2, it must be divisible by 10.**
7	6 [orders]	In how many orders can four students line up at the classroom door, if Rosario insists on being first in line? **Since Rosario's position is fixed, there are 3! = 6 ways for the other students to line up.**
8	32	What is the next number is the sequence that begins: sixty-four, fifty-six, forty-eight, forty, and so on? **Pattern is subtract 8 each time.**

9	4 [socks]	In Sadie's drawer, she has four red socks, four black socks, and four blue socks. What is the fewest number of socks that she has to take out of the drawer at random to ensure that she has a pair of the same color of socks? **The greatest number of socks you could take out without having a pair would be 3, one of each color. The next one would be a guaranteed match.**
10	32	What is the positive difference between eighty-four point three and fifty-two point three? **84.3 – 52.3 = 32**

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College Bowl EXTRA

	Answer	Solution
1	10 [mode]	What is the mode of the following data set? Seven, ten, one, eleven, ten, seven, one, ten **7, 10, 1, 11, 10, 7, 1, 10** **10 is repeated three times.**
2	42 [cloves of garlic]	Brooklyn eats three cloves of garlic every day in order to keep the vampires away. How many cloves of garlic does she eat in two weeks? **2 weeks = 14 days** **14 * 3 = 42**
3	90 [inches]	How many inches are in two and a half yards? **2.5 yds * 3 ft/yd = 7.5 ft** **7.5 ft * 12 in/ft = 90**
4	5	What is the mean of all one-digit positive integers? **1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45** **45 / 9 = 5**
5	20	What is ten percent of fifty percent of four hundred? **50% of 400 = 200** **10% of 200 = 20**
6	4 [sq cm]	A rectangle has a perimeter of ten centimeters and one side length equal to four centimeters. What is the area of the rectangle in square centimeters? **The dimensions are 4x1 to give a perimeter of 10.** **Area = 4x1 = 4**
7	92 [degrees]	An isosceles triangle has two base angles that measure forty-four degrees each. What is the measure of the largest angle in the triangle, in degrees? **2 + 0 + 3 + 3 = 8**
8	0 [multiples]	How many multiples of twenty-three are between forty-eight and fifty-five? **23, 46, 69, …**
9	23 [day number] [23rd day]	A bacterial strain doubles in size every day. On day number twenty-four, the strain has completely filled its test tube. On day number what does the bacterial strain fills one-half of its test tube? **In one day, the strain doubles, so on day 23 it filled half, on day 24 it fills the whole tube.**

10	121 [cm]	A circle is inscribed in a square. If the side length of the square is 242 cm, what is the length of the radius of the circle, in centimeters? **242/2 = 121**