"Math is Cool" Championships -- 2024-25

5th Grade

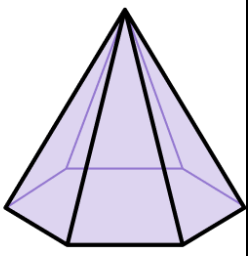
Mental Math Solutions

	Answer	Solution
1	40	What is three hundred and forty-five minus three hundred and five? 345 – 305 = 40
2	23	What is the largest positive integer factor of twenty-four minus the smallest positive integer factor of twenty-four? 24 – 1 = 23
3	4 [sq. meters]	What is the area in square meters of a triangle with a height of two meters and a base of four meters? (2*4)/2=4
4	225 [cents]	If Sasha has fifteen dimes and Olivia has three quarters, how many cents do they have in total? (15*10)+(3*25)= 225
5	24 [= x]	x minus fourteen equals ten. What is x? X-14=10, x = 24
6	2	The first six Fibonacci numbers are zero, one, one, two, three, and five. What is the average of the first six Fibonacci numbers? (0+1+1+2+3+5)/6=2
7	7	The product of two numbers is one hundred and twelve, and four times the first number is sixty-four. What is the second number? 4*16 = 64 16*7 = 112
8	5 [hours]	If one machine can make one hundred pencils every thirty minutes, how many hours will it take two machines to make two thousand pencils? 1 machine: 100 pencils: 30 min = 1 machine: 200 pencils: 1 hour Or, 1 machine-hour per 200 pencils. 2000 pencils needs 10 machine-hours. 10/2 = 5 hours

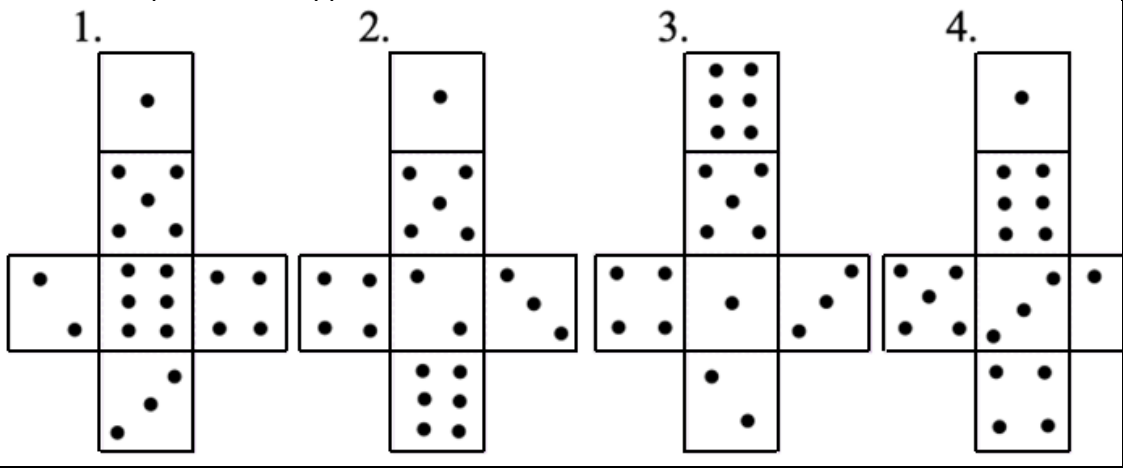
"Math is Cool" Championships -- 2024-25

5th Grade

Individual Test Solutions

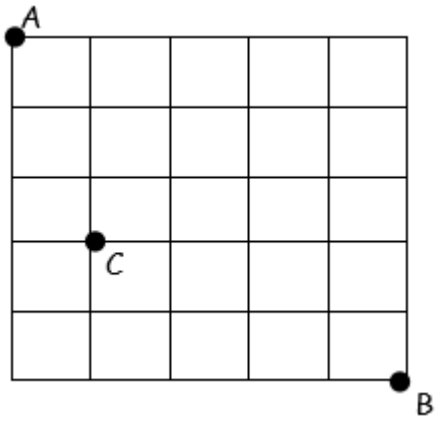
	Answer	Solution
1	6	What digit is in the hundreds place of 145,679? 145,679
2	12 [inches]	What is the perimeter in inches of a regular hexagon with side length 2 inches? 2(6) = 12
3	4103	What is 373 multiplied by 11? 373*11 = 4103
4	35 [apples]	Caleb has 3 oranges for every 7 apples that he has. How many apples does Caleb have if he has 15 oranges? (15/3)*7=15, or 3:7 = 15:5x7 = 15:35
5	11 [=x]	If 7x + 27 = 104, what is the value of x? 7x=77 → x=11
6	33 [pages]	Amiyaa's dog eats 3 pages of her homework per day. How many pages of homework does Amiyaa's dog eat in 11 days? 3(11) = 33
7	6 [candy bars]	Siri wants to buy candy bars that cost 89 cents each. How many whole candy bars can she buy with 6 dollars? 600/89=6.7… → 6 whole candy bars
8	5	How many lines of symmetry does a regular pentagon have? # of lines of symmetry= number of sides for a regular polygon
9	9	Evaluate: 8(3.875 – 2.750) 8(1.125) = 9
10	54 [inches]	Larry the snail can crawl 1 yard per hour. How many inches can he crawl in 1 hour and 30 minutes? (36)(1.5) = 54
11	26	What is the number of vertices plus the number of faces plus the number of edges on a hexagonal pyramid? 7+7+12=26 

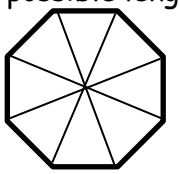
12	4 [donuts]	The Math Team is fundraising by selling boxes containing 5 donuts each. However, they can only buy the donuts in dozens. If the Math Team bought 7 dozen donuts, how many donuts will be left over after they have repacked the donuts into boxes of 5? 7(12 donuts) = 84 donuts 84/5 = 16 remainder 4 So 4 donuts left over
13	27	What is the next term in the following sequence? $\frac{1}{3}$, 1, 3, 9, … Pattern is x3, 9x3 = 27
14	11 [= x]	What is the largest integer x that satisfies the following inequality? $15 - x > 3$ X<15-3=12 so x<12 so largest integer x can be is 11
15	16	Express the following fraction as an integer: $\frac{16\times8\times10}{4\times4\times5}$ 16*80/80, or simplifies to 4x2x2 = 16
16	7	Nikko's favorite number is the largest prime factor of 35. What is Nikko's favorite number? 5*7=35
17	102	What is the range of the following set of numbers? {39, 56, 27, 13, 5, 98, 107, 79} 107-5=102
18	15	An isosceles triangle has 2 sides of length of 8 centimeters. What is the greatest possible integer length in centimeters of the 3rd side? 8+8-1=15
19	9 [day]	Cameron has a magic tree that doubles in height every day. On day 1 the tree is 1 meter, on day 2 the tree is 2 meters, on day 3 it is 4 meters, and so on. What is the first day that the tree will be over 200 meters tall? Day 1= 1, 2, 4, 8, 16, 32, 64, 128, Day 9 =256
20	4 [= A + B]	The probability of rolling an odd prime number when a standard 6-sided die is rolled exactly 1 time can be expressed as a reduced common fraction A/B. What is A + B? Probability rolling either 3 or 5 so 2/6 = 1/3 A + B = 1 + 3 = 4
21	29	What is the sum of the first 10 positive even integers minus the sum of the first 9 positive odd integers? (2+4+6+8+10+12+14+16+18+20) –(1+3+5+7+9+11+13+15+17) = 110 -81 =29

22	6	How many ways are there to rearrange the letters in the word TOTO? 4!/2!*2!=6 TTOO TOTO TOOT OTOT OOTT OTTO
23	60	What is one-half of two-thirds of 180? (2/3)(180) = 120 (1/2)(120) = 60
24	12 [factors]	How many positive integer factors does 350 have? 1,2,5,7,10,14,25,35,50,70,175,350
25	8 [Wackadoodles]	If 4 Wackadoodles are equal to 9 Flemmings and 3 Flemmings are equal to 5 Guacks, how many Wackadoodles are equal to 30 Guacks? 4 wackadodles = 9 flemmings, 3 flemmings = 5 guacks so with 30 guacks = 6*5 guacks there will be 6*3 flemmings = 18flemmings so there will be 8 wackadoodles
26	3	If A#B = AB - (A + B) then what is the value of 3#(5#2)? 5#2=(5*2)-(5+2)=3 3#3=(3*3)-(3+3)=3
27	22	MacGuire draws a card from a standard 52 card deck. He flips it over and sees that it is an Ace of Spades. Without replacing the card, he then draws another card. The probability that he draws another ace, or another spade can be expressed as the reduced common fraction A/B. What is A + B? After 1 drawn there are 51 cards. There are 12 spades remaining and 3 aces remaining so there are 15 cards that he can draw and be successful. So 15/51. This can be reduced to 5/17= A/B so A+B is 22.
28	3	Opposite sides of a standard die always sum to 7. Which of the following unfolded cubes (called nets), can be folded into a standard die? Answer with the corresponding integer (1, 2, 3 or 4) that labels the net. 3 is the only one with opposite sides that sum to 7. (6+1), (2+5), (3+4) 

29	150 [minutes]	Mason and Issac are on different trains that are headed towards each other on a straight line. Mason's train is traveling at 70 miles per hour, and Issac's train is traveling at 50 miles per hour. If the trains are currently 300 miles apart, in how many minutes will the trains be 0 miles apart? Because Mason and Issac are traveling towards each other, they are getting closer as a rate of 120 miles per hour. So to get 300 miles closer, they would need to travel 2.5 hours to be 0 miles apart. So 2.5hours (60minutes/hour)=150 minutes.
30	12 [points]	In the school kickball tournament, the Grant Elementary School Math Team averaged 4 points per game after the first 7 games. If the Math Team averaged 5 points per game after the 8^{th} game, how many points did the Math Team score in the 8^{th} game? 4(7)=28 5(8)=40 So to average 5 points per game after 8 games, the Math team had to have scored 12 more points to bring the total points to 40 to have averaged 5 points per game for 8 games.
31	4 [combinations]	Austin is buying 5 tacos. For each taco, he must choose exactly one filling: beef, chicken, or vegetable. How many different combinations of the 5 tacos are possible if Austin wants exactly 2 chicken tacos? He must have CC, so the possibilities for the other 3 fillings are: BBB, BBV, BVV, VVV
32	[A + B + C =] 10	In the addition problem shown, let A, B, and C each represent distinct single-digit positive integers. What is the value of A + B + C? There are four possibilities (A, B, C) = (1, 4, 5), (2, 3, 5), (3, 2, 5), or (4, 1, 5), and in each case A + B + C = 10. A A A + B B A C 5
33	36 [minutes]	On a backpacking trip, while Xiaoyong is moving, he hikes at an average rate of 2.5 miles per hour. During one 10-mile hike, he takes four 30-minute breaks. With the breaks added to his total time, how many minutes on average does it take him to hike one mile during the trip? 2.5 miles in 1 hour = 10 miles in 4 hours and 4 hours + 4 30-minute breaks = 6 hours, so overall he hikes 10 miles in 6 hours = 5/3 miles in 1 hour = 1 mile in 3/5 hour or 36 minutes.
34	41 [robots]	Brad, Chad, and Sophie start a robot-making business. Brad can make 2 robots per hour, Chad can make 7 robots in 3 hours and Sophie can make 10 robots in 4 hours. Working together, how many robots can they make in 6 hours? Brad can make 2 robots a hour, Chad can make 7/3 robots an hour, and Sophie can make 2.5 robots an hour so together they can make 2+2.5+7/3 which 4.5+7/3 = 27/6 + 14/6 =41/6 robots per one hour so therefore they can make (41/6)x6 = 41 robots in 6 hours.

35	10	The following fifteen integers are distributed to three friends, each getting five: 1, 1, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 4, 4, 5 After selecting their numbers, the friends make the following statements: Alice: The product of my five numbers is not divisible by 9 or 10. Benny: The product of my five numbers is not divisible by 5 or 6. Carli: The product of my five numbers is not divisible by 3 or 4. What is the sum of Carli's five numbers? **Alice can have at most one 3 and cannot have the 5 if she has a two or four which would mean her other values would be 1's. All even.** **Benny can't have the 5, if he has a 3, he can't have 2 or 4. All odd.** **Carli has the 5 as it places no condition on the others. She cannot have a 3 or 4 and at most one 2.** **Alice: 4, 4, 2, 2, 2** **Benny: 3, 3, 3, 1, 1** **Carli: 5, 2, 1, 1, 1** **Total of Carli's is 10.**
36	42 [dollars]	Jack has 3 coupons that he wants to use to buy his new graphing calculator, which costs $100. He has a $10 off coupon, a 35% off coupon and 20% off coupon. If he uses each coupon exactly once, what is the lowest price in dollars that Jack can pay for the calculator? Using the percentage-based coupons first will allow for a higher percentage discount for the $10 off coupon. So 100*(1-.35)(1-.8)=52 and then after the $10 off coupon is applied then 52-10=42.

37	5	March 14th is known as "Pi Day" to mathematicians as the date 3/14 represents the first 3 digits of the irrational number π. Pi day in 2025 falls on a Friday. On what day of the week will Pi day fall in 2030? Your answer must be an integer from 1 through 7, according to the following key: 1 = Sunday 2 = Monday 3 = Tuesday 4 = Wednesday 5 = Thursday 6 = Friday 7 = Saturday There are 365 days in a year which when divided by 7 has a remainder of 1. So each year, the day of the week is shifted by 1 for any date. However, 2028 will be a leap year so the day of the week will shift by 2 days as 266/7 will have a remainder of 2. So Pi day in 2026 →Saturday 2027→Sunday 2028→Tuesday 2029→Wednesday 2030→Thursday And because Thursday will be the 5th day of the week, The correct answer is 5.
38	60 [routes]	Luke is riding his bike from his house, located at point A, to his friend Mark's house, located at point B. On his way, he stops at the convenience store located at point C. Luke rides his bike along the grid lines, moving only to the right or down. How many different routes can Luke take on his trip to Mark's house?  **R = right, D = down** **To get from A to C, he needs to move RDDD in any order = 4!/(3!) = 4** **To get from C to B he needs to move RRRRDD in any order = 6!/(4!2!) = 15** **Total ways = 4x15 = 60**

39	9	What is the units digit of 7^{10}? 7^1=7 7^2=49 7^3=343 7^4=2301 There is a pattern that the last digit in any power of 7 will end in 7,9,3, or 1. This repeats with cyclicity 4 so because 10/4 has remainder 2, 7^10 will end in 9.
40	20 [%]	A regular octagon has multiple diagonals of varying lengths. What percent of the total diagonals have the longest possible length? An octagon has 8(5)/2 = 20 total diagonals and 4 of those 20 have the longest possible length (see below), and 4/20 = 1/5 = 20%. 

"Math is Cool" Championships -- 2024-25

5th Grade

Multiple Choice Solutions

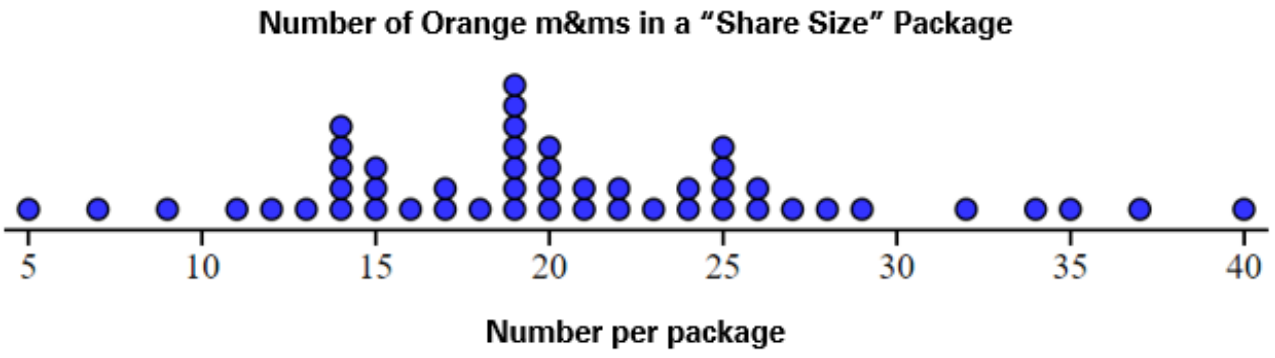
	Answer	Solution
USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #1 THROUGH #4. The following table shows the results of soccer games that were played between four teams, the Ants, the Bison, the Cougars, and the Ducks. Each team played every other team exactly one time. "Goals For" means how many total goals that team scored in their games. "Goals Against" means how many total goals were scored against that team in their games.		
1	D	How many total goals were scored against the Ducks? A) 1 B) 2 C) 3 D) 5 E) Answer not given. The table indicates that 5 goals were scored against the Ducks.
2	A	How many total games were played? A) 6 B) 8 C) 10 D) 12 E) Answer not given. It says each team played every other team once. AvB, AvC, AvD, BvC, BvD, CvD.
3	B	How many of the games ended in a tie? A) 1 B) 2 C) 3 D) 4 E) Answer not given. Four teams had ties, therefore two games were tied.

	Games Won	Games Lost	Games Tied	Goals For	Goals Against
Ants	3	0	0	7	0
Bison	1	1	1	1	1
Cougars	0	1	2	3	8
Ducks	0	2	1	3	5

4	D	What was the final score of the Cougars versus the Ducks game? A) Cougars 0, Ducks 0 B) Cougars 2, Ducks 5 C) Cougars 8, Ducks 5 D) Cougars 3, Ducks 3 E) Answer not given. Final scores were: A v B: 1 – 0 A v C: 5 – 0 A v D: 1 – 0 B v C: 0 – 0 B v D: 1 – 0 C v D: 3 – 3 A won all games, so the opponents each have 0. B only had one goal against, so it must have been that game against A. The other two games that C was in were ties, therefore B v. C must have been 0 – 0. Therefore, B's one win was against D: 1 – 0. C vs. D was the other tie, and C must have scored 3 goals, since their other two games they had none. Therefore the score was 3-3.

USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #5 THROUGH #8.

The dot plot shown here shows the number of orange m&ms that were in a "Share Size" package of plain m&ms. Fifty packages were counted, so there are 50 dots, one for each package.

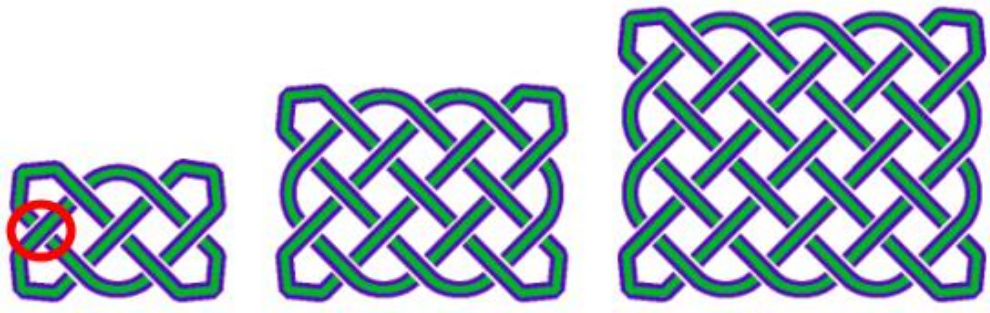


5	D	None of the packages contained which of the following number of orange m&ms? A) 11 B) 12 C) 29 D) 30 E) Answer not given. There is no dot on 30, all of the other given values have a data dot.

6	B	What is the median of the data, in number of orange m&ms? A) 19 B) 19.5 C) 20 D) 20.5 E) Answer not given. The median is at the middle, which is between data values # 25 and 26. Number 25 = 19 orange, and number 26 = 20 orange. Halfway between = 19.5.
7	B	A typical "Share Size" package of m&ms contains about a total of 105 m&ms of various colors. According to the data in the dot plot, which of the following is the closest estimate to the percentage of orange m&ms in a "Share Size" package? A) 10 % B) 20 % C) 25 % D) 30 % E) 35 % The median is 19.5, so the middle of the data is right around 19 to 20. Rounding down to 100 total, that would be about 20%. Or, 19/105 is about 18%, 20/105 is about 19%. 20% is the closest answer to either of these.
8	D	Out of the 50 packages of m&ms that are shown in the graph, if one package is randomly selected, what is the probability that it contains at least 25 orange m&ms? A) 8 % B) 4/25 C) 25 % D) 28 % E) Answer not given. 14 of the packages contain 25 or more orange m&ms. 14/50 = 28/100 = 28%

USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #9 THROUGH #10.

The following figure shows the first three iterations of a Celtic knot pattern. Iteration #1 contains 7 crossings, where a 'crossing' is indicated by the circle, when one segment of the pattern crosses another.



1 2 3

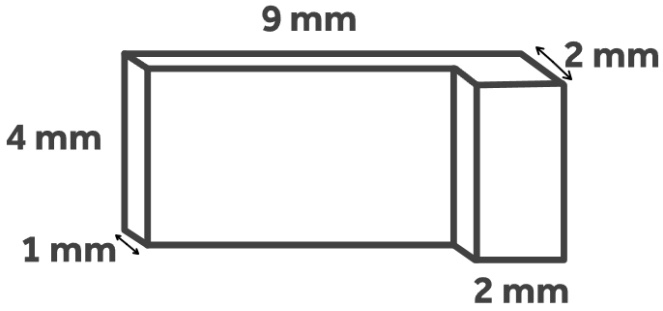
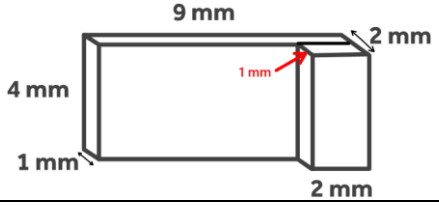
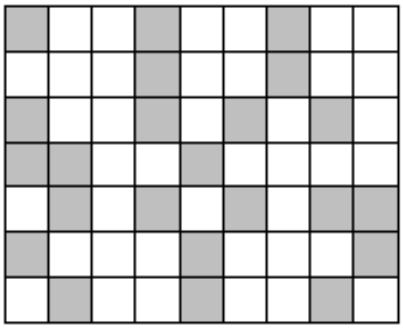
9	E (31)	How many crossings does Iteration 3 contain? A) 23 B) 24 C) 25 D) 27 E) Answer not given. There are 31 crossings, which can be counted from the figure.

10	E	If the pattern illustrated here continues, how many crossings will Iteration #10 contain? A) 153 B) 156 C) 194 D) 221 E) 241 **There are multiple ways to solve. For the first three iterations, notice the number of crossings:** **N = 1: (2 + 3) + 2** **N = 2: (3 + 4) + (3 + 4) + 3** **N = 3: (4 + 5) + (4 + 5) + (4 + 5) + 4** **This can be written as:** **# crossings =** **n[(n + 1) + (n + 2)] + (n + 1)** **For n = 10:** **10[11 + 12] + 11 = 241**

"Math is Cool" Championships -- 2024-25

5th Grade

Team Test Solutions

	Answer	Solution
1	242 [¢]	Omar bought three pens that each cost the same amount. The total cost was $7.26. What was the price of each pen, in cents? 7.26/3 = $2.42 = 242 cents
2	44 [mm^3]	In cubic millimeters, what is the volume of the solid shown here? All lines are straight, and all corners are right angles.  Split the solid into two parts, where one is 9x4x1 = 36 mm^3, and the other is 2x4x1 = 8 mm^3. The total is 36 + 8 = 44 mm^3. 
3	225	What is the product of all of the positive integer factors of 15? The factors of 15 are: 1, 3, 5, 15. 1x3x5x15 = 225
4	4 [squares]	The grid shown here is made up of congruent squares. How many more of the squares need to be shaded in order for 3/7 of the entire figure to be shaded?  There are 7x9 = 63 squares total. (3/7)x63 = 27 squares need to be shaded. 23 are currently shaded. 27 – 23 = 4

5 — 1780 ($)

According to Maya's pay stub, how much money in dollars did she receive for the pay period after all taxes were deducted?

Employee Name: Maya Rodriguez	Pre-Tax Income:		$2000
	Federal Income Tax: State Income Tax: Other Taxes:	$100 $80 $40	
Pay Period: March 1 – March 15, 2025	Total Income After Taxes		?

2000 – (100 + 80 + 40) = 1780

6 — 2 [km]

Sol is running a 10 kilometer race. The distance that he has currently covered is $\frac{1}{4}$ of the distance that he has remaining. How many kilometers has Sol run so far?
If x = the distance run so far, then 4x = the distance remaining.
5x = 10, x = 2 km

7 — 161 [black stones]

A game is played with black and white stones. At the start of the game, the number of black stones is 5 more than 3 times the number of white stones. Each round, 7 white stones and 15 black stones are removed. After several rounds are played, there are 3 white and 56 black stones remaining. How many black stones were there are the beginning of the game?
Can work backwards by adding 7 to the white column and 15 to the black column each time.

white	black		3*w+5
3	56		14
10	71		35
17	86		56
24	101		77
31	116		98
38	131		119
45	146		140
52	161		161

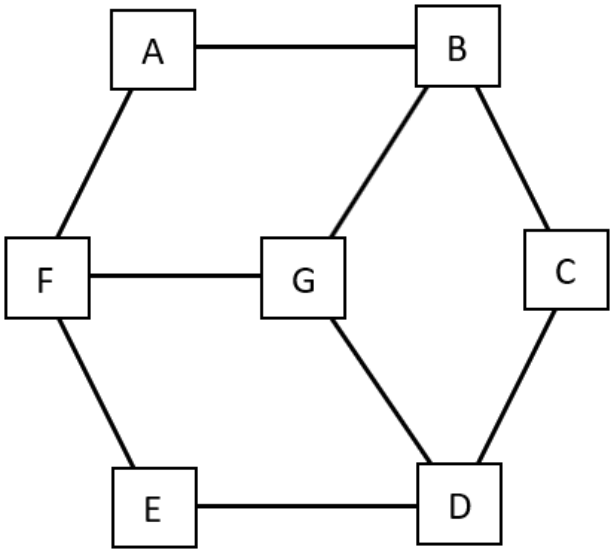
8 — 60

What is the largest possible number in a data set with 5 distinct positive integers and a mean of 14?
5 · 14 = 70, so the data set could be 1, 2, 3, 4, and 60

9	30 [%]	A 10-sided die has sides numbered 0 through 9. Assume that two of the fair 10-sided dice are thrown. What is the probability in percent that the sum of the numbers showing on the two dice is less than 10, given that the first die is showing a 7?  **If the first die is showing a 7, then there are 10 possible outcomes (sums of 7 through 16). Three of those outcomes are less than 10.** **P(sum < 10 | 1st die = 7) = 3/10 = 0.300.**

10 | 10

Each of the letters A, B, C, D, E, F and G in the figure shown will be replaced with a different value from the set {2, 3, 4, 5, 6, 7, 8}. If the sums of the four numbers at the vertices of quadrilaterals ABGF, BCDG, and DEFG are each 18, what is the sum of all numbers that can replace G?



If each quadrilateral has a sum of 18, the total of the three quadrilaterals will be 54, and in than sum A, C, and E will each be used once, B, D, and F will each be used twice, and G will be used three times. So you can write the equation a + c + e + 2(b + d + f) + 3g = 54. The table shows the possibilities:

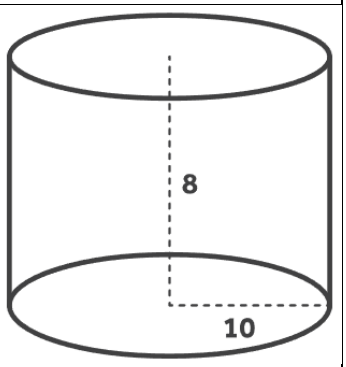
	Possible sums: a + c + e	Possible values: 2(b + d + f)	
If g = 2, then a + c + e + 2(b + d + f) = 48	12 13 14 15 16 17 18 19 20 21	2 · 21 = 42 2 · 20 = 40 2 · 19 = 38 2 · 18 = 36 2 · 17 = 34 2 · 16 = 32 2 · 15 = 30 2 · 14 = 28 2 · 13 = 26 2 · 12 = 24	3 ways to make 48: 3 + 7 + 8 + 2(4 + 5 + 6) -doesn't work **4 + 6 + 8 + 2(3 + 5 + 7) - works** 5 + 6 + 7 + 2(3 + 4 + 8) – doesn't work
If g = 3, then a + c + e + 2(b + d + f) = 45	11 12 13 14 15 16 17 18 19 20 21	2 · 21 = 42 2 · 20 = 40 2 · 19 = 38 2 · 18 = 36 2 · 17 = 34 2 · 16 = 32 2 · 15 = 30 2 · 14 = 28 2 · 13 = 26 2 · 12 = 24 2 · 11 = 22	2 ways to make 45: **4 + 7 + 8 + 2(2 + 5 + 6) – works** 5 + 6 + 8 + 2(2 + 4 + 7) – doesn't work
If g = 4, then a + c + e +	10 11 12	2 · 21 = 42 2 · 20 = 40 2 · 19 = 38	1 way to make 42:

		2(b + d + f) = 42	13 14 15 16 17 18 19 20 21	2 · 18 = 36 2 · 17 = 34 2 · 16 = 32 2 · 15 = 30 2 · 14 = 28 2 · 13 = 26 2 · 12 = 24 2 · 11 = 22 2 · 10 = 20	5 + 7 + 8 + 2(2 + 3 + 6) – doesn't work
		If g = 5, then a + c + e + 2(b + d + f) = 39	9 10 11 12 13 14 15 16 17 18 19 20 21	2 · 21 = 42 2 · 20 = 40 2 · 19 = 38 2 · 18 = 36 2 · 17 = 34 2 · 16 = 32 2 · 15 = 30 2 · 14 = 28 2 · 13 = 26 2 · 11 = 24 2 · 12 = 22 2 · 10 = 20 2 · 9 = 18	1 way to make 39: **6 + 7 = 8 + 2(2 + 3 + 4) – works**
		If g = 6, then a + c + e + 2(b + d + f) = 36	9 10 11 12 13 14 15 16 17 18 19 20	2 · 20 = 40 2 · 19 = 38 2 · 18 = 36 2 · 17 = 34 2 · 16 = 32 2 · 15 = 30 2 · 14 = 28 2 · 13 = 26 2 · 12 = 24 2 · 11 = 22 2 · 10 = 20 2 · 9 = 18	All of the possible sums here of a + c + e + 2(b + d + f) are greater than 36, so 6 cannot be g. For the same reason, 7 and 8 cannot be g either.
		The values of g that have a solution are 2, 3, and 5, so the answer is 2 + 3 + 5 = 10			

"Math is Cool" Championships -- 2024-25

5th Grade

Linda Moore Triple Jump Solutions

	Answer	Solution
1	10	Round 9.627 to the nearest whole number. 9.627 rounds up to 10
2	63 [cupcakes]	Hunter can make 7 cupcakes with one cup of flour. How many cupcakes can he make with 9 cups of flour? 7:1 = 63:9, 7x9 = 63
3	2512 [cubic units]	The cylinder has a radius of 10 units and a height of 8 units. What is the volume of the cylinder in cubic units? Assume a value of 3.14 for π. $V = \pi r^2 h = (3.14)(10^2)(8) = 2512$ 
4	16 [= mean]	What is the mean of the following data set? 11, 0, 24, 33, 0, 28 11+0+24+33+0+28 = 96 96/6 = 16
5	43	What is the next number in this sequence? 1, 1, 3, 7, 13, 21, 31, … Pattern is: +0, +2, +4, +6, +8, +10, … 31 + 12 = 43

6	1410	What number replaces the question mark in the third equation? ♣ + ♣ + ♣ + ♥ + ♥ + ♥ + ♥ + ♥ = ♥ +2918 ♣ + ♣ + ♣ = 294 ♣ + ♥ + ♥ = ? 3♣ = 294, ♣ = 98 294 + 4♥ = 2918 ♥ = 656 ♣ + 2♥ = 98 + 2(656) = 1410
7	14 [= gcf]	What is the greatest common factor of 210, 350 and 546? 210 = 2x3x5x7 350 = $2x5^2x7$ 546 = 2x3x7x13 GCF = 2x7 = 14
8	18 [mice]	Kayal had 60 pet mice divided between 3 cages. Six mice escaped from the first cage, 8 mice escaped from the second cage, and 4 mice escaped from the third cage. Now there are the same number of mice in each cage. How many mice were in the third cage to start with? A total of 6+8+4 = 18 mice escaped, leaving 60-18 = 42. An equal number in each cage means 42/3 = 14 mice per cage. Four had escaped from the third cage, therefore there were originally 14+4 = 18 mice.
9	16 [m]	Levi and his classmates painted a colorful stripe down the 5th grade hallway at Cottonwood Elementary School. 1/10 of the length of the stripe is red, 1/20 is orange, 1/30 is yellow, 1/40 is green, 1/50 is blue, 1/60 is indigo, and the rest is violet. The length of the violet portion of the stripe is 12.08 meters. In meters, what is the length of the entire stripe? 1/10 + 1/20 + 1/30 + 1/40 + 1/50 + 1/60 = 147/600 = 49/200. Therefore the violet portion is 151/200 of the total. 12.08*200/151 = 16
10	1	Let N = 1234567891011…998999 be the natural number formed by writing the integers 1, 2, 3, 4, …, 999 in order. The left-most digit is '1', the second digit from the left is '2', and so on. What is the 2025th digit from the left? **There are 9 single digits, followed by 90 2-digit numbers, for 189 digits. Every subsequent group of 100 numbers (100-199, 200-299, …) contains 300 digits. Therefore, the last digit in 699 is the 1989th digit. Count up from there to see that the 2025th digit is the '1' at the end of 711.**

"Math is Cool" Championships -- 2024-25

5th Grade

College Bowl Round #1 Solutions

	Answer	Solution
1	900 [seconds]	How many seconds are in fifteen minutes? 15 * 60 = 900
2	190 [m]	A rectangular sidewalk covers four hundred fifty square meters. It is ninety meters long. In meters, what is the perimeter? 450/90 = 5 is the width. Perimeter = 90 + 90 + 5 + 5 = 190
3	17	What is the sum of all of the one-digit prime numbers? 2+3+5+7 = 17
4	44 [%]	In Ricardo's math class, twelve students play the guitar, seven students play the bass, four students play the drums, and two students play keyboards. If one student is randomly selected, what is the probability in percent that they play bass or drums? 12 + 7 + 4 + 2 = 25 total 7 + 4 = 11 play bass or drums 11/25 = 44/100
5	39 [years]	Keira is fifty-four years old and her father is eighty years old. How old was Keira's father in years when he was three times older than Keira? If x = the number of years ago: 80 – x = 3(54 – x), x = 41 years ago, 80 – 41 = 39 years. Or, can use some guess and check to solve.
6	21 [= range]	What is the range of the following set of numbers? Five, eight, thirteen, eight, twenty-five, twelve, four 5, 8, 13, 8, 25, 12, 4 25 – 4 = 21
7	1333 [m]	A car is traveling at eighty kilometers per hour. Rounded to the nearest whole number, how many meters will the car travel in one minute? 80 km/hr x 1000 m/km x 1 hr/60 min = 8000/6 = 4000/3 = 1333
8	20	What is the next number in the following sequence? Five, nine, ten, fourteen, fifteen, nineteen, and so on. Pattern is +4, +1, …
9	400 [chocolates]	How many chocolates are in one large box containing sixteen small boxes with twenty-five chocolates each? 16x25 = 400

10	314 [sq meters]	A circular swimming pool has a diameter of twenty meters. Assuming that pi equals three point one four, what is the area of the pool in square meters, to the nearest whole number? Area = $(3.14)(10^2) = 314$

"Math is Cool" Championships -- 2024-25

5th grade

College Bowl Round #2 Solutions

	Answer	Solution
1	12 [fireflies]	Finley caught seven fireflies, Rhythm caught nine, and Yuching caught six. They put some of the fireflies in a jar. The jar had ten fireflies. How many fireflies were not put in the jar? 7+9+6 = 22 22-10 = 12
2	15 [right angles]	How many right angles added together make one thousand three hundred fifty degrees? 1350/90 = 15
3	14	If 'a' plus 'a' equals twelve, what is the value of three 'a' minus four? a + a = 12, a = 6 3(6) – 4 = 14
4	50 [%]	Beckett has four pennies, one nickel, three quarters and two dimes. If he selects one coin randomly, what is the probability in percent that it is worth more than five cents? 4p, 1n, 2d, 3q, = 10 coins 5 of them are worth more than 5 cents. 5/10 = 50%
5	3	Three distinct whole numbers less than ten will produce the same result whether they are all added or all multiplied. What is the largest of the three numbers? The three numbers are 1, 2, 3.
6	11 [=x]	If the median of the following set of whole numbers equals eleven, what is the smallest possible value of x? Ten, seventeen, x, ten, eleven The median is the middle value. Two numbers are below 11, therefore x must be at least 11: 10 10 11 x 17
7	42 [marbles]	The ratio of red marbles to blue marbles in a box is three to four. How many total marbles are there, if there are eighteen red marbles $\frac{3}{4}$ = 18/x X = 24 blue marbles 18 + 24 = 42

8	454	What number comes next in the following sequence? One hundred twenty-one, two hundred thirty-two, three hundred forty-three, and so on. Pattern is +111, or just look at the pattern of the digits.
9	1000 [%]	Thirty is what percent of three? 30 = (x)(3) x = 30/3 = 10, x 100% = 1000%
10	48 [cm]	A rectangle measuring twelve centimeters by eighty-four centimeters is divided into seven equal squares. What is the perimeter of one square, in centimeters? Each square will have a side length of 12 cm. 12x4 = 48

"Math is Cool" Championships -- 2024-25

5th grade

College Bowl Round #3 Solutions

	Answer	Solution
1	70,300 [Seventy thousand three hundred]	What is a five-digit whole number with a seven in the ten-thousands place, a three in the hundreds place, and zeros in all other places? 70,300
2	23 [cm]	In centimeters, what is the perimeter of a parallelogram with one side length of five centimeters and one side length of six point five centimeters. 2(5 + 6.5) = 23
3	138	What number goes in the blank of the following sequence? Two hundred seven, one hundred eight-four, one hundred sixty-one, blank, one hundred fifteen, and so on. Pattern is -23
4	9 [days]	Erin and her family went to Hawaii over winter break. They traveled there on December twenty-sixth and traveled home on January fifth. How many full days were they in Hawaii, not counting their travel days? Full days were: Dec. 27, 28, 29, 30, 31, Jan. 1, 2, 3, 4
5	137	A number, when divided by twelve, has a quotient of eleven and a remainder of five. What is the number? 137/12 = 11 r 5
6	60 [%]	A game spinner is divided into five equal sections, numbered four through eight. On one spin, what is the probability in percent of landing on a number less than seven? 3 of them are numbered less than 7. 3/5 = 60/100 = 60% 

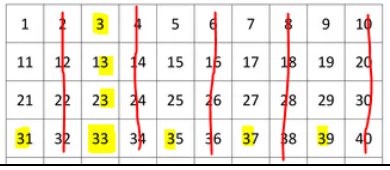
7	3 [= x]	The numbers three, four, six and x have a mean of four. What is the value of x? The sum of the four numbers = 16. 16 – 3 – 4 – 6 = 3
8	2 [books]	Anders reads twenty pages per day. In April, how many three hundred page books can he read in full? April has 30 days. 20 pages/day * 30 days = 600 pages / 300 pages/book = 2 books
9	42 [sides]	How many combined sides do two quadrilaterals, three octagons and one decagon have? 2*4 + 3*8 + 1*10 = 42
10	75 [miles]	A car can travel three hundred miles on six gallons of gas. How many miles can it travel on one point five gallons of gas? 300/6 = 50 miles per gallon 50 * 1.5 = 75

"Math is Cool" Championships -- 2024-25

5th grade

College Bowl Round #4 Solutions

	Answer	Solution
1	20 [%]	Twenty-five students took a math test, and twenty of them passed the test. What percentage of students failed the test? 5 students failed out of 25. 5/25 = 20/100 = 20%
2	1000 [cubic yards]	The surface area of a cube is six hundred square yards. What is the volume of the cube, in cubic yards? If the surface area = 600, then the area of one side = 100, therefore one side length = 10. Volume = 10x10x10 = 1000 cubic yards
3	9	The rule of a sequence is to divide by two every time. The first two numbers are one hundred forty-four and seventy-two. What is the smallest number in the sequence that is a whole number? 144, 72, … 72/2 = 36 36/2 = 18 18/2 = 9 9/2 = 4.5
4	462	What three-digit whole number is described by the following clues? The hundreds place digit is twice the ones place digit. The ones place digit is the smallest prime number. The tens place digit is four more than the ones place digit. Ones place = 2 Therefore hundreds place = 4 Therefore tens place = 6
5	90 [= LCM]	What is the least common multiple of five, nine, and ten? $5 = 5^1$ $9 = 3^2$ 10 = 2x5 LCM = 2x5x9 = 90
6	40 [pints]	How many pints are in twenty quarts? 1 quart = 2 pints 2x20 = 40

7	9 [times]	Kat writes the first twenty odd counting numbers. How many times does she write the digit three? 
8	16 [lamps]	A house has four rooms. Each room has four lamps, two chairs and eight cats in it. What is the total number of lamps in the house? 4x4=16
9	32 [inches]	As a whole number of inches, what is the perimeter of a rectangle with a length of twelve point three inches and a width of three point seven inches? 2(12.3 + 3.7) = 32
10	50 [%]	When a six-sided die is rolled one time, what is the probability as a percent that an even number is rolled? 3 ways to get an even number / 6 total outcomes = $\frac{1}{2}$ = 50%

"Math is Cool" Championships -- 2024-25

5th grade

College Bowl Round #5 Solutions

	Answer	Solution
1	1745 [cm]	Rishi stacks one Lego tower, which is two hundred eighty nine centimeters tall, on top of another Lego tower, which is one thousand four hundred fifty six centimeters tall. What is the total height in centimeters of the new tower? 289 + 1456 = 1745
2	12	What is three times two-sevenths times fourteen? (3)(2/7)(14) = 12
3	1205 [mm]	How many millimeters are in one hundred twenty point five centimeters? 120.5 x 10 = 1205
4	58 [students]	Sasha is standing in a row of students. She is the twenty-ninth person from the left, and the thirtieth person from the right. How many students are in the row? There are 28 people to the left of her, and 29 people to the right of her. 28 + 29 + 1 = 58
5	7 [= GCF]	What is the greatest common factor of seven, thirty-five, and forty-nine? 7, 35, 49 are all divisible by 7
6	23 [years old]	Emil is four years older than Varun, and their combined age is forty-two years. How many years old is Emil? E = V + 4 (V + 4) + V = 42 V = 19, E = 23
7	24 [sq in]	Rafael takes a twelve by eight inch rectangle and folds it in half vertically, then horizontally. In square inches, what is the area of the new smaller rectangle? Each dimension will be cut in half. 6x4 = 24
8	600 [ml]	A jug can hold five times the amount of water than a glass can hold. If the jug holds three liters of water, how many milliliters of water will the glass hold? 3L = 3000ml / 5 = 600 ml

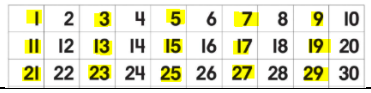
9	225 [$]	Georgia sells clay pots at an arts festival. On Friday she made three hundred fifty dollars, on Saturday she made two hundred dollars, and on Sunday she made one hundred twenty-five dollars. In dollars, what was her mean earnings per day? 350 + 200 + 125 = 675 675/3 = 225
10	1	What is five raised to the power of zero? $5^0 = 1$

"Math is Cool" Championships -- 2024-25

5th grade

College Bowl Round #6 Solutions

	Answer	Solution
1	26,000 [$]	Oliver earns five hundred dollars a week delivering produce boxes. Assuming he works every week, how many dollars does he earn in one year? 500*52 = 26,000
2	6 [questions]	A test consists of twenty questions. If Peyton got seventy percent of them correct, what number of questions did he get wrong? 30% were wrong. 0.3*20 = 6
3	-1	What is the next number in the following sequence? Two, three, one, four, zero, five, and so on Pattern is +1, -2, +3, -4, +5, … 5 – 6 = -1
4	58 [sq in]	A cube with side length three inches has another cube of side length one inch glued to the middle of its top face. What is the surface area of the new figure, in square inches? The surface area of the 3x3x3 cube alone is 6(3x3) = 54. Subtract 1 for gluing the 1x1x1 cube on top. Add 5 for the remaining surfaces of the small cube. 54 – 1 + 5 = 58.
5	60 [%]	The letters used in the word quadrangle, spelled Q-U-A-D-R-A-N-G-L-E are placed in a bag. If one letter is randomly selected, what is the probability in percent that it is **not** a vowel? 10 letters total. 4 are vowels, 6 are not vowels 6/10 = 60%
6	40 [%]	What percentage of the integers from eleven through twenty, including eleven and twenty, are prime? 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 There are 10 integers total, 4 of them are prime, 11, 13, 17 and 19. 4/10 = 40%
7	216 [unit cubes]	How many unit cubes are needed to create a larger cube that has an edge length of six units? The dimensions of the larger cube will be 6x6x6 = 216 unit cubes.
8	8 [zeros]	How many times does the digit zero appear in the whole number one billion two hundred million? 1,200,000,000 8 zeros

9	29	What is the value of the fifteenth positive odd integer? 
10	130 [not red m&ms]	Solomon has sixty-four red m&ms, ninety-five blue m&ms, and thirty-five green m&ms. How many m&ms does he have that are not red? 95 + 35 = 130

"Math is Cool" Championships -- 2024-25

5th grade

College Bowl EXTRA

	Answer	Solution
1	42	What number is twenty-one twenty-fourths of forty-eight? (21/24)*48 = 21*2 = 42
2	2078	What is the positive difference between four thousand one hundred two and two thousand twenty-four? 4102 – 2024 = 2078
3	18	What is the sum of the number of faces on a cube and the number of edges on a cube? Faces = 6 Edges = 12 Sum = 18
4	35 [sq yards]	A rectangular storage unit is twenty-one feet long and fifteen feet wide. What is its area in square yards? 21 feet / 3 = 7 yards 15 feet / 3 = 5 yards 7x5 = 35 sq yards
5	2 [factors]	How many positive integer factors does the number twenty-four have that are greater than ten? 12, 24
6	210	What is the product of all of the digits in the number thirty-seven thousand two hundred fifteen? 37,215 : 3x7x2x1x5 = 210
7	50 [%]	Two fair coins are flipped. What is the probability in percent that one is heads and one is tails? The outcomes are HH, HT, TH, TT, 2/4 = ½ = 50%
8	5	What is the units digit of five raised to the sixth power? 5 raised to any power ends in 5. 5, 25, 1256, etc.
9	84 [hours]	How many hours are in one-half of a week? ½ of a week equals 3.5 days 3.5 days x 24 hours/day = 84 hours
10	23,720	What is five thousand nine hundred and thirty times four? 5930x4 = 23720