"Math is Cool" Championships -- 2018-19

5th Grade

Mental Math Solutions

5th	Answer	Solution
1	56	
2	16	
3	21 [dogs]	
4	7 [vans]	
5	4 [ways]	
6	39 [balloons]	
7	[$] 10	
8	20 [feet]	

"Math is Cool" Championships -- 2018-19
5th Grade
Individual Test Solutions

5th	Answer	Solution
1	90	pick out the biggest
2	[$] 19.30 ("19.3" is incorrect)	12.22 + 7.08 = 19.30
3	165 [miles]	33×5 = 330/2 = 165
4	6	18/3 = 6
5	1	x < 18 – 16 = 2 → 1
6	5 [cups]	$1\frac{1}{4} \times 4 = 5$
7	12 [ounces]	$\frac{3}{4} \times 16 = 12$
8	19.868	do the subtraction
9	144 [inches]	12×3×4
10	C or 0.4001	A is ~0.9, B > 0.5, and C < D < 0.5
11	14	√196 = 14
12	68 [cm]	17 × 4 = 68
13	546 [pounds]	6 × 13 × 7 = 546
14	112	$8 = 2^4$ $28 = 2^2 \times 7$ 4 × 4 × 7 = 112

15	7 [times]	37 / 5 = 7 R2
16	24 [weeks]	16 = T × 2/3 T = 24
17	18 [Furbees]	$\frac{3\ F}{5\ S} \cdot \frac{10\ S}{7\ W} \cdot \frac{21\ W}{1} = 3 \cdot 2 \cdot 3 = 18$
18	18 [blocks]	2 + 4 + 5 + 3 + 4 = 18
19	7.5 [miles]	60/8 = 7.5
20	270 [words]	90 words = 30 s 2 min = 30 s + 10 s + 30 s + 10 s + 30 s + 10 s 90×3 = 270 words
21	105 [eggs]	Week 1 - 35 eggs 5 chickens Week 2 - 28 eggs 4 chickens Week 3 - 21 eggs 3 chickens Week 4 - 14 eggs 2 chickens Week 5 - 7 eggs 1 chicken
22	79	72 + 64 + 87 + 93 = 316 316/4 = 79
23	98 [units]	30 + 30 + 15 + 15 + 4 + 4 = 98
24	7 [pieces]	Lazy Caterer's sequence
25	60 [nests]	1 hour = 60 minutes 1 nest / 30 min × 60 min = 2 nests 2 nests × 30 porgs = 60 nests
26	36.4 [oz]	(don't forget to convert pounds to ounces!) 3.5 lbs = 56 ounces 56 oz × 0.65 = 36.4 oz
27	135 [degrees]	(8 – 2)·180 ÷ 8 = 6·180/8 = 3·45 = 135
28	3024 [m]	1.2 h × 60 min/h × 60 s/min × 0.7 m/s = (3600 + 0.2×3600) × 0.7 = (3600 + 720) × 0.7 = 432 × 7 = 3024
29	$7\frac{7}{12}$	$2\frac{3}{4}+4\frac{5}{6}=\frac{11}{4}+\frac{29}{6}=\frac{33}{12}+\frac{58}{12}=\frac{91}{12}=7\frac{7}{12}$
30	75 [degrees]	The ratio of 3:4:5 means there are 3+4+5=12 parts. The total measure of the angles is 180 so each part is 180/12=15 degrees. The largest angle is then 15*5=75 degrees.

31	9 [calculators]	96+96+30 = 222 → 12+12+3 =27 ~~96+63+63 = 222 → 12+7+7 = 26~~ 96+60 = 156 → 12+6 = 18 27 – 18 = 9
32	1100	The next two palindromes larger than 123456 are: 124421 and 125521 with a difference of 1100.
33	486 [sq. in.]	$729 = 9^3$, so each side is 9. Each of the 6 faces then has area 9x9=81. Total surface area = 6x81 = 486 $in.^2$
34	[$] 37	Work backwards. $C + 10 = 2D = 2(13) = 26$ → $C = 16$ $B = 2C = 2(16) = 32 = A - 5$ → $A = 32 + 5 = 37$
35	27:8	The larger cube will have side length 6 (216=6^2 x 6) and the smaller one a length of 4 ($96 = 4^2 \times 6$). The ratio of the side lengths is 6:4 = 3:2. The ratio of the volumes will be 3^3:2^3 = 27:8.
36	68 [%]	80% of 20 is 16 wins and 60% of 30 is 18 more wins for a total of 34 wins out of 50 games. That is 34/50 = 68%.
37	720 [ways]	choose empty chair, then have permutations of people $6 \times 5! = 6! = 720$
38	10 [red marbles]	The original probability was 6/10 = 60%. The new probability is then 30%=6/20, so 10 red marbles were added. Or, to cut the probability in half, double the number of marbles.
39	16	One can just count them but there is an easier way. 60 has prime factors of 2, 3 and 5. One half of the numbers less than or equal to 60 are even and thus share a factor of 2. Of the 30 odd numbers, 1/3 are divisible by 3 meaning 2/3 are not. Two-thirds of 30 is 20 remaining number and 4/5 of those are not divisible by 5. Final answer is: 60 (1/2)(2/3)(4/5)=16
40	60 [cu. cm]	One could try and guess the side lengths but… If the sides are x, y, and z then xy=10, xz=15 and yz=24. The volume $V = xyz = \sqrt{x^2y^2z^2} = \sqrt{xy \cdot xz \cdot yz} = \sqrt{10(15)(24)} = 60.$

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5th Grade

Multiple Choice Solutions

5th	Answer	Solution
1	C	60/6 = 10
2	B	50/300 = 1/6
3	D	3A, 1C+1M, 2A+2M, 1A+4M, 10E, 5E+1A+1M, 6M
4	B	
5	E($100)	
6	D	
7	B	
8	A	A = -15 B = 16 C = 15 D = 14
9	B	
10	C	Top of circle starts at (0, 5). Translation by (+2, +3) gives (2, 8)

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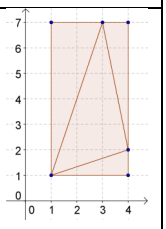
5th Grade

Team Test Solutions

5th	Answer	Solution
1	2 [cakes]	5 cups of flour / 2 = 2 R 1 2 cups of sugar / 0.5 = 4
2	102	101 + 1 = 102
3	8 [units^2]	Draw a rectangle to the corners of the grid and subtract each right triangle from it. $(4-1)(7-1) - \frac{1}{2}\cdot 1\cdot 3 - \frac{1}{2}\cdot 1\cdot 5 - \frac{1}{2}\cdot 2\cdot 6$ $18 - \frac{3}{2} - \frac{5}{2} - 6$ 
4	57 [apples]	20.15 ×100 = 2015 2015 ÷ 35= 57
5	48	1/40 + 1/60 = 3/120 + 2/120 = 5/120=1/24 so the average is 1/48. The reciprocal is 48. 2·(40·60)/(40+60) = 4800/100 = 48
6	9 [days]	3 carpenters for 3 days is 9 carpenter days for 2 tables meaning each table takes 9/2 carpenter days to build. If we want 4 tables, we need 18 carpenter days and with only 2 carpenters, it will take 9 days to complete.
7	641	10000 = 10^4 = (2^4)(5^4)=(16)(625). 16+625=641.
8	8 [sq feet]	Since the border is on all sides, the finished picture including border is 4 feet (3+1/2+1/2) by 5 feet for an area of 20 square feet. Just the picture is 3x4=12 square feet so the border is 20-12=8 square feet.
9	199	Two digits can add to at most 18=9+9; so the number must be in the hundreds. 199 works.

10	3/7	Primes: 2, 3, 5, 7, 11, 13, 17, 19. Let's enumerate. 2: 7, 13, 19 5: 7, 13, 19 7: 11, 17 11: 13, 19 13: 17 17: 19 There are 8(7)/2=28 ways to choose 2 numbers and 12 of them are multiples of 3. 12/26=3/7

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5th Grade

Relay Solutions

5th	Answer	Solution
P-1	12	
P-2	24	
P-3	8	
P-4	95	
1-1	9 [eagles]	
1-2	3	
1-3	24	
1-4	1/1296	
2-1	9	
2-2	16 [pets]	
2-3	[Day] 5	
2-4	12960 [inches]	

"Math is Cool" Championships -- 2018-19

5th Grade

College Bowl Round #1 Solutions

5th	Answer	Solution
1	104	
2	108[inches]	
3	13[miles]	
4	Monday	62 / 7 = 8 R 6 → 6 days from Tu to M
5	9 [gallons]	27.45/3.05 = 8.8 → 9 gal.
6	[$] 9.15	(13×0.10) + (25×0.25) + (32×0.05) = 1.30 + 6.25 + 1.60 9.15
7	75 [pounds]	x + y = 90 and y = x – 60 → x + x – 60 = 90 → 2x = 150 → x = 75
8	4 [ways]	ZXWY ZYWX ZWXY ZXYW
9	254 [problems]	2+4+8+16+32+64+128
10	424	$(10^2 + 6)\times 4 = 424$

"Math is Cool" Championships -- 2018-19

5th Grade

College Bowl Round #2 Solutions

5th	Answer	Solution
1	1000[calories]	
2	56[pints]	
3	43	
4	36 [cm^2]	(2×6×9)/3
5	200 [cups]	12 × 4 + 2 = 48 + 2 = 50 q 50 × 2 = 100 p 100 × 2 = 200 c
6	5/26	5/(5 + 12 + 9) = 5/26
7	4 [units]	Trial and error should quickly get you to a 4×4 square (A = 16, P = 16)
8	40 [page numbers]	
9	24	
10	15 [dollars]	460 – 530 + 175 – 90 = 15

"Math is Cool" Championships -- 2018-19

5th Grade

College Bowl Round #3 Solutions

5th	Answer	Solution
1	190[minutes]	
2	11/2 [inches]	(5×12 + 6) / 2 / 3 / 2 = (60 + 6) / 12 = 66 / 12 = 11/2
3	80[ounces]	
4	1262	
5	7:28 PM	64 – 12 = 52 52 / 2 = 26 26×14 = 364 min. = 6 h + 4 min. 1:24 + 6:04 = 7:28
6	2	688/7 = 98 R 2
7	Saturday	$247 \equiv 2 \pmod 7$ → 2 days after Thurs.
8	14 [chairs]	13 – 6 = 7 → 7 × 2 = 14
9	45 [years old]	$\frac{1}{2} \cdot 10 = 5$ = difference → 50 – 5 = 45
10	124 [beans]	4 × 31 = 124

"Math is Cool" Championships -- 2018-19

5th Grade

College Bowl Round #4 Solutions

5th	Answer	Solution
1	830[minutes]	
2	12[hours]	
3	87 [cranes]	$29 \times 3 = 87$
4	16 [days]	$18 = 100\%$ $17 = 50\ \%$ $16 = 25\%$
5	3	
6	24 [years old]	$x + (x - 4)/5 = 28$ $5x + x - 4 = 28 \cdot 5 = 140$ $6x = 136 \rightarrow x = 24$
7	11:48 PM	
8	72 [baseballs]	$9 \times 8 = 72$
9	75 [percent]	$18/24 = 3/4$
10	34	Sequence is to add 1, 2, 4, 8, 16

"Math is Cool" Championships -- 2018-19

5th Grade

College Bowl Round #5 Solutions

5th	Answer	Solution
1	1	
2	840[minutes]	
3	12[weeks]	
4	1/10	Only 1 is neither prime nor composite
5	7 [trips]	$\frac{33}{5}$ = 6 r 3 → 6 + 1 = 7
6	[$] 10.21	20 – 9.79 = 10.21
7	30383 [feet]	29035 – (-1348) = 30383
8	5	(20 / 2) / 2
9	[x =] 5	5(3x + 2) = 15x + 10 = 85 → 15x=75 x = 5
10	75 [cars]	120 / (5 + 3) = 15 15 × 5

"Math is Cool" Championships -- 2018-19

5th Grade

College Bowl Round #6 Solutions

5th	Answer	Solution
1	700[sticks of wood]	
2	20[decades]	
3	0	
4	14 [Misps]	$(14 \times 3 \times 6) / (9 \times 2) = 14$
5	1/8	$1/4 \times 1/2 = 1/8$
6	50 [seconds]	$(1/10 - 1/25)^{-1} = 50/7$ seconds $\rightarrow 7 \times 50/7 = 50$
7	4/15	$1 - 1/3 - 2/5 = 1 - (5 + 6)/15 = 4/15$
8	17 [pencils]	LCM(3,5) = 15 15 + 2 = 17
9	53	
10	24	$x = 2y$ and $y = 3\sqrt{16} = 12 \rightarrow x = 24$

"Math is Cool" Championships -- 2018-19

5th Grade

College Bowl Round (Extra) Solutions

5th	Answer	Solution
1	45 [numbers]	Use systematic counting
2	2	
3	30 [feet]	
4	2401[songs]	
5	21[inches]	
6	17π[miles]	
7		
8		
9		
10		