
Contest Corner: The 2020 State Tournament of Mathematics Results

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Abstract: In this article, the authors summarize results from the 2020 Ohio Mathematics Tournament. Included in the summary are sample tasks from the contest. **Keywords:** Problem solving, contests

1 Introduction

One of the last in-person academic events of 2020 was the Forty-Seventh Annual State Tournament of Mathematics that was held on February 22nd. Just days after the contest COVID-19 shut things down, changing education and our lives at least for the year. A total of 728 students representing 69 schools assembled on contest Saturday at one of the 22 test centers located throughout the state. The results for the top 25 schools are summarized in Table 1.

Table 1: 2020 Overall State Tournament Results

Rank	School	Score	Rank	School	Score
1	William Mason High School	159	15	Hathaway Brown High School	119
2	Revere High School	151		Oakwood High School	119
3	Sycamore High School	150	17	Olmsted Falls High School	118
4	Columbus Academy High School	148		Strongsville High School	118
5	Dublin Jerome High School	147	19	Brecksville-Broadview Heights	117
6	Seven Hills Upper School	146	20	Hilliard Darby High School	115
7	Copley High School	141	21	Olentangy Berlin High School	110
	Upper Arlington High School	141	22	Dublin Coffman High School	108
9	Western Reserve Academy School	138		Lakota West High School	108
10	Hawken Upper School	136		Olentangy Orange High School	108
11	Walnut Hills High School	134		Thomas Worthington High School	108
12	Perry High School	132			
13	Avon Lake High School	131			
	St Xavier High School	131			

As has been done for many years, the OCTM also presented awards and recognition to participating schools by their size. In this way, small schools are not put in direct competition with larger schools. OCTM uses a five level system to group schools. For 2020 Level 1 schools had fewer than 107 students per grade level, Level 2 schools had between 107 and 203 students per grade level, Level 3 schools had between 204 and 338 students per grade level, Level 4 schools had between 339 and 479 students per grade level and Level 5 schools had more than 479 students per grade level. Table 2 and Table 3 show the 2020 tournament results by level.

Table 2: 2020 State Tournament Results by Level (Levels 1-3)

Level 1: ($n \leq 106$)	Level 2: ($106 < n \leq 203$)	Level 3: ($203 < n \leq 338$)
1. 148 Columbus	1. 136 Hawken Upper	1. 151 Revere
2. 146 Seven Hills Upper	2. 119 Oakwood	2. 141 Copley
3. 138 Western Reserve	3. 104 Taylor	3. 131 Avon Lake
4. 119 Hathaway Brown	4. 97 AThens	4. 118 Olmsted Falls
5. 105 Summit Country Day	5. 88 Carroll	5. 117 Brecksville-Broadview Heights
6. 99 Miami Valley	6. 79 Edison	6. 110 Alentangy Berlin
7. 83 Cincinnati Hills Christian	7. 76 Poland Seminary	7. 102 Archbishop Hoban
8. 77 Worthington Christian	8. 72 Jonathon Alder	8. 96 Ashland
9. 65 Ayersville	9. 71 ST Vincent-St Mary	9. 94 Aurora
10. 61 Lucas	10. 52 Mount Notre Dame	10. 85 Sylvania Northview
11. 46 Bluffton	52 Perkins	11. 83 Rocky River
12. 29 Kirtland	12. 51 Shelby	12. 50 Bedford
13. 27 Colonel Crawford	13. 38 Fairless	13. 33 Madison
14. 19 Black River	14. 13 Highland	

Table 3: 2020 State Tournament Results by Level (Levels 4-5)

Level 4: ($338 < n \leq 479$)	Level 5: ($479 < n$)
1. 150 Sycamore	1. 159 William Mason
2. 147 Dublin Jerome	2. 134 Walnut Hills
3. 141 Upper Arlington	3. 118 Strongsville
4. 132 Perry	4. 108 Dublin Coffman
5. 131 St Xavier	108 Lakota West
6. 115 Hilliard Darby	108 Olentangy Orange
7. 108 Thomas Worthington	7. 92 Hilliard Davidson
8. 86 Hoover	8. 58 Lorain
9. 85 Loveland	9. 52 Timken Early College
10. 84 Berea-Midpark	10. 45 Buckeye Valley Local
11. 82 Hilliard Bradley	11. 39 Whitmer
12. 74 Glenoard	12. 37 Reynoldsburg
13. 69 Perrysburg	13. 21 Brunswick
14. 38 New Albany	14. 13 Mentor Christian

Table 4: Frequency of scores

score	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>n</i>	1	2	1	8	13	19	23	28	31	23	25	33	28	33	30	20	25	25	25	28	24
score	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
<i>n</i>	31	26	20	27	18	10	18	5	15	15	16	9	14	2	6	11	5	8	13	14	

A tally summary describing the frequency of scores for all participants is provided in Table 4. In all, 728 students participated in the contest, representing 69 different schools. The mean, median, and mode scores were 18.38, 17, and 11 and 13, respectively.

2 Sample Contest Items

Problems from the 2020 tournament are shown in Table 3. They can be solved using principles of algebra, geometry, and arithmetic intermixed with strong problem solving skills. Calculators are always allowed on the OCTM tournament. Visit the contest website (www.octmtournament.org) for copies of previous contests as well as answers. Problems from these contests can be used with mathematics clubs or in math class to prepare mathletes for future competition.

	<u>ANSWERS</u>
1. Completely simplify $\frac{20a^{-20}b^{20}c^{20}}{(2a^{20}b^{10}c^{-20})^2}$, expressed without any negative exponents.	$\frac{5c^{60}}{a^{60}}$
2. A tank top originally cost \$20 but was marked down by 20% during winter. By what percent should the shirt now be marked up so its cost returns to \$20?	25%
3. Find the area contained within the boundary of $x^2 + 20x = 20y - y^2$.	200π
4. What is the shortest distance between the point (20, 20) and the line whose equation is $x + y = 20$?	$10\sqrt{2}$ units
5. How many integers x satisfy $ x-20 \leq 20$?	41
6. If $\ln(x) = 20$, then the value of $\ln(20x)$ is closest to what positive integer?	23
7. Let n be a positive integer for which $5n! = (n+1)!$. Find the value of n !	24

Fig. 1: Sample contest problems.

3 Get Involved! Get Ready!

Because of COVID-19 we are not sure how the 2021 contest season will look. Be sure to check the tournament website (www.octmtournament.org) to keep up to date. One of the most important things we as teachers can do for our students is to make competition available. Competition helps build comradery, a lifelong interest in mathematics and a desire to achieve while building a self-esteem to succeed. With a little luck we'll see everyone in 2021 for the Forty-Eighth Annual State Tournament of Mathematics.



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