Contest Corner: The 2016 State Tournament of Mathematics Results

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Abstract: *In this article, the authors summarize results from the 2016 Ohio Mathematics Tournament. Included in the summary are sample tasks from the contest.*

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1 Introduction

This year the State Tournament of Mathematics found Ohio experiencing very mild weather with average temperatures near 50 degrees across the state. Inclement weather that has affected the tournament in previous years was a non-factor. The 43rd State Tournament of Mathematics took place on February 27th and now is the time to start assembling a team to represent your school in the 2017 competition. The 2017 tournament will take place on March 4, 2017, at test centers located throughout Ohio. You can find registration information on the OCTM State Tournament of Mathematics at `www.octmtournament.org`. A total of 1107 students representing 80 schools competed this year. The overall results for the top 22 schools are summarized in Table 1.

Table 1: *2016 Overall State Tournament Results*

Rank	School	Score	Rank	School	Score
1	William Mason High School	152	12	Revere High School	118
2	Dublin Jerome High School	146	13	Hudson High School	116
3	Columbus Academy High School	143	13	Summit Country Day School	116
4	Sycamore High School	139	13	Upper Arlington High School	116
5	Dublin Coffman High School	133	16	Brecksville-Broadview Heights	114
6	Copley High School	131	16	Walnut Hills High School	114
7	Western Reserve Academy School	128	18	Hilliard Darby High School	113
8	Seven Hills Upper School	120	19	Lakota West High School	106
8	Thomas Worthington High School	120	19	St. Vincent-St Mary High School	106
8	Westlake High School	120	19	St. Xavier High School	106
11	Avon Lake High School	119			

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 2016 Level 1 schools have fewer than 95 students per grade level, Level 2 schools have from 95 and 171 students per grade level, Level 3 schools have from 172 and 286 students per grade level, Level 4 schools have from 287 and 406 students per grade level and Level 5 schools have more than 406 students per grade level. Tables 2 and 3 show the 2016 tournament results by level.

Table 2: *2016 State Tournament Results by Level (Levels 1-3)*

Level 1: ($n \leq 94$)	Level 2: ($94 < n \leq 171$)	Level 3: ($171 < n \leq 286$)
1 143 Columbus	1 128 Western Reserve	1 131 Copley
2 120 Seven Hills Upper	2 106 St Vincent-St Mary	2 118 Revere
3 116 Summit Country Day	3 103 Beachwood	3 103 Aurora
4 92 Wellington	3 103 Hathaway Brown	4 97 Archbishop Hoban
5 80 Ayersville	5 96 Hawken Upper	5 95 Lake
6 79 Dayton Christian HS	6 94 Cincinnati Hills Christian	5 95 Rocky River
6 79 Trinity	7 91 Gilmour	7 92 Shawnee
8 76 Cincinnati Country Day	8 76 Edison	8 85 Poland Seminary
9 72 Worthington Christian	9 75 Carlisle	9 80 Ashland
10 71 Bluffton	10 72 Jonathan Alder	9 80 Celina
10 71 Kirtland	11 68 Bio-Med Science	11 79 Carroll
10 71 Miami Valley	12 60 Black River	12 74 Ross
13 55 Highland	13 62 Central Catholic	13 73 Perkins
14 35 Columbus N Intern	14 59 Lake Ridge	14 57 Walsh Jesuit
15 35 Shelby	15 41 Purcell Marian	15 47 Madison

Table 3: *2016 State Tournament Results by Level (Levels 4-5)*

Level 4: ($286 < n \leq 406$)	Level 5: ($406 < n$)
1 146 Dublin Jerome	1 152 William Mason
2 139 Sycamore	2 133 Dublin Coffman
3 120 Westlake	3 120 Thomas Worthington
4 119 Avon Lake	4 116 Upper Arlington
5 116 Hudson	5 114 Walnut Hills
6 114 Brecksville-Broadview Hts	6 106 Lakota West
7 113 Hilliard Darby	7 103 Strongsville
8 106 St Xavier	8 97 Jackson
9 98 Perrysburg	9 94 Berea-Midpark
10 96 Mayfield	9 94 Hilliard Davidson
11 89 Sylvania Northview	11 86 Oak Hills
12 87 Hilliard Bradley	12 80 Glenoak
13 83 Olmsted Falls	13 69 Beavercreek
14 76 Loveland	14 52 McKinley
15 75 Athens	15 25 Lincoln

Seven problems selected from the 40 that appeared on the 2016 tournament are shown in Figure 1. All of the problems 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 competition in 2017.
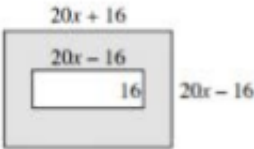
	ANSWERS
1. The points $(-2, 0)$, $(1, 6)$, and $(a, 4)$ lie on the same line. Find the value of a.	-1/5
2. If $\sqrt{x} = 2(\sqrt[3]{y}) =$, then find x^3 in terms of y	$64y^2$
3. The graph of $y = ax^2 + bx + c$ passes through $(2,0)$, $(1,6)$ and $(0,8)$. Find the value of the product abc.	0
4. What is the maximum value of $sin^6x + 3sin^4xcos^2x + 3sin^2xcos^4x + cos^6x$	1
5. In the figure shown, find a simplified expression for the shaded area.	$80x(5x - 4)$
6. In the arithmetic series $20 + 16 + 12 + \dots$, what is the fewest number of terms (including the three given) needed so the sum is less than -2016?	38
7. Write the dimensions of a rectangle with integer side lengths that has the same perimeter as a 20 by 16 rectangle but with greater area.	18 by 18

Fig. 1: *A sampling from the 40 problems that appeared on the 2016 tournament test.*

2 Preparations

Start assembling a team to represent your school in the 2017 tournament today. The 2017 tournament will take place on March 4, 2017 at test centers located throughout Ohio. Visit the tournament website to find a wealth of information about the State Tournament of Mathematics (`www.octmtournament.org`). 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 self-esteem to succeed. The calendar of events for the 2017 tournament is shown below. Hope to see your school as a participant in February at the 2017 State Tournament of Mathematics!

3 Contest Timeline of Events

September 15, 2016	Coaches Begin Sign-up
September 15, 2016	Student Tournament Registration Opens Online
October 1, 2016	Tournament Announcement Letter Mailed
February 15, 2017	Deadline for receiving Registration Fee without late fee. (no late fee if postmarked by this date)
February 22, 2017	LAST Day for receiving Registration Fee - must include $25.00 late fee
February 22, 2017	Student Tournament Registration Closes - No Registrations accepted after this date.
February 27, 2017	Deadline for Coaches to Finalize Student List Online
March 4, 2017	Tournament Test Day held at 25 Ohio Sites

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