Contest Corner: The 2017 State Tournament of Mathematics Results

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Abstract: *In this article, the authors summarize results from the 2017 Ohio Mathematics Tournament. Included in the summary are sample tasks from the contest.*

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1 Introduction

The Ivy League Education Center states that the importance of mathematics competitions has been widely recognized for three reasons:

- Competitions help develop imaginative capacity and thinking skills whose value far transcends mathematics;
- Competitions constitute the most effective way of discovering and nurturing mathematical talent;
- Competitions provide a means to combat the prevalent false image of mathematics held by high school students, as either a fearsomely difficult or a dull and uncreative subject.

Our 44th annual State Tournament of Mathematics took place on February 25, 2017, with a total of 868 students representing 71 schools participating. The overall results for the top 24 schools are summarized in Table 1.

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. Level 1 schools have fewer than 102 students per grade level, Level 2 schools have between 102 and 177 students per grade level, Level 3 schools have between 178 and 301 students per grade level, Level 4 schools have between 302 and 416 students per grade level and Level 5 schools have more than 416 students per grade level. Tables 2 and 3 show the 2017 tournament results by level.

Table 1: *2017 Overall State Tournament Results*

Rank	School	Score	Rank	School	Score
1	William Mason High School	144	13	Hathaway Brown High School	109
2	Dublin Jerome High School	139	14	Seven Hills Upper School	107
3	Sycamore High School	132	14	Strongsville High School	107
3	Western Reserve Academy School	132	16	Hawken Upper School	106
5	Columbus Academy High School	124	17	Archbishop Hoban High School	104
6	Dublin Coffman High School	123	17	Aurora High School	104
7	Avon Lake High School	118	19	St. Xavier High School	103
7	Brecksville-Broadview Heights	118	20	Hudson High School	99
9	Upper Arlington High School	113	21	Lakota West High School	98
10	Copley High School	112	22	Hilliard Darby High School	97
11	Indian Hill High School	110	22	Poland Seminary High School	97
11	Summit Country Day School	110	22	Revere High School	97

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

Level 1: $(n \leq 101)$
1. 132 Western Reserve
2. 124 Columbus
3. 110 Summit Country Day
4. 109 Hathaway Brown
5. 107 Seven Hills Upper
6. 87 Miami Valley
7. 86 Wellington
8. 71 Bio-Med Science
9. 69 Worthington Christian
10. 65 Kirtland
11. 58 Bluffton
12. 55 Lucas
13. 39 Berkshire
14. 8 Columbus North International

Level 2: $(101 < n \leq 171)$
1. 110 Indian Hill
2. 106 Hawken Upper
3. 97 Poland Seminary
4. 96 Cincinnati Hills Christian
5. 92 St. Vincent–St. Mary
6. 90 Carroll
6. 90 University
8. 68 Canton South
9. 64 Black River
10. 63 Gilmour
11. 62 Shelby
12. 60 Jonathan Alder
13. 54 Edison
14. 37 Villa Angela–St. Joseph

Level 3: $(171 < n \leq 301)$
1. 118 Avon Lake
2. 112 Copley
3. 104 Archbishop Hoban
3. 104 Aurora
5. 97 Revere
6. 87 Rocky River
7. 86 Olmsted Falls
8. 81 Oakwood
9. 80 Ashland
10. 73 Shawnee
11. 71 Lake
12. 61 Sylvania Northview
13. 58 Perkins
14. 36 Madison
15. 33 Nordonia

Table 3: *2017 State Tournament Results by Level (Levels 4-5)*

Level 4: $(301 < n \leq 416)$	**Level 5:** $(416 < n)$
1. 139 Dublin Jerome	1. 144 William Mason
2. 132 Sycamore	2. 123 Dublin Coffman
3. 118 Brecksville-Broadview Hts.	3. 113 Upper Arlington
4. 103 St. Xavier	4. 107 Strongsville
5. 99 Hudson	5. 98 Lakota West
6. 97 Hilliard Darby	6. 95 Berea–Midpark
7. 91 Hilliard Davidson	7. 93 Solon
8. 82 Perrysburg	8. 90 Thomas Worthington
9. 76 Hilliard Bradley	9. 68 Walnut Hills
10. 73 Athens	10. 50 McKinley
11. 70 Westlake	11. 46 Lorain
12. 66 North Olmsted	12. 29 Beavercreek
13. 45 Loveland	13. 21 Brunswick
14. 16 Twinsburg	14. 16 Olentangy Orange

Seven problems selected from the 40 that appeared on the 2017 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 future competition.

2 Preparations

So start assembling a team to represent your school in future contests today. You can find registration information on the OCTM State Tournament of Mathematics at `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.

	ANSWERS
1. How many prime numbers less than 2017 have 17 as a factor?	1
2. Find the value of $1-2+3-4+5-6+\cdots+2015-2016+2017$.	1009
3. How many real solutions are there to the equation $\frac{20x}{17}=\frac{20x^3}{17}$?	3 solutions
4. A bag contains 20 blue marbles and 17 purple marbles. How many purple marbles should be added to the bag so that the probability of drawing one purple marble is twice the probability of drawing one blue marble?	23 marbles
5. Find the *largest* value of n for which $8^{20} * 15^{17} * 17^{20}$ is divisible by 10^n.	17
6. A famous triangular array of numbers has many patterns, and is used for things like counting combinations and expanding binomials. While mathematicians such as Tartaglia, Yang Hui, and Khayyam knew of this triangle, it is commonly named after this 17th century French mathematician, inventor, and philosopher. Name the mathematician.	Pascal
7. $log_2(log_2(log_2 x)) = 0 = log_4(log_3(log_2 y))$, *find* xy.	xy=32

Fig. 1: *A sampling from the 40 problems that appeared on the 2017 tournament test.*

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