Contest Corner: The 2021 State Tournament of Mathematics Results

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Abstract: *The article presents the top scores and statistics for student and schools for the Fall 2021 State Tournament of Mathematics. Also presented are a sampling of problems from previous contests.*

Keywords: *Problem solving, contest*

Introduction

The 48th OCTM State Tournament of Mathematics returned from its COVID hiatus in its new format. The tournament took place on a school day between September 20 and October 8 at each participant's home school and the contest was administered and scored by teachers at the participating school. The contest consisted of 40 questions and was designed to be completed in 45 minutes to fit most school schedules. The competition was open to any student taking high school mathematics courses. As in the past, the questions covered a wide range of high school mathematics topics from algebra through pre-calculus and statistics. Participants were able to use any calculator but could not have internet access.

The top 20 school teams for the contest are summarized in Table 1. Each team score is the sum of the top four individual student scores at the participating school. Similarly top student scores are summarized in Table 2.

Table 1: *2021 State Tournament of Mathematics Top 20 Schools*

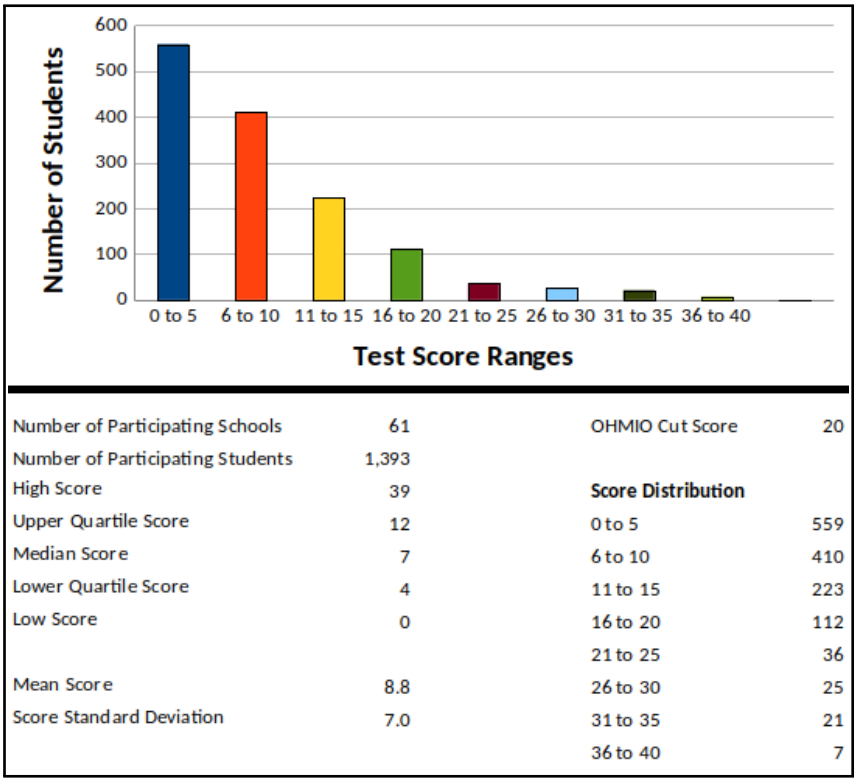
Rank	School	Score	Rank	School	Score
1	Solon High School	137	11	Western Reserve Academy	101
	Upper Arlington High School	137	12	Aurora High School	97
3	William Mason High School	136		Hawken Upper School	97
4	Revere High School	135	14	The Seven Hills	95
5	Dublin Jerome High School	122		Worthington Killbourne High School	95
6	Columbus Academy	118	16	Dublin Coffman High School	92
7	Perry High School	110	17	Walnut Hills High School	89
8	Hathaway Brown High School	108	18	The Miami Valley School	83
9	Sycamore High School	107	19	Taylor High School	82
10	Hilliard Darby High School	102	20	Mentor High School	81

Table 2: *2021 State Tournament of Mathematics Top Students*

Rank	Student	School
1	Easton Singer	Solon High School
2	Drake Du	Revere High School
3	Tanishq Pauskar	Perry High School
	Ryan Li	Solon High School
	Evan Huang	Upper Arlington High School
	Michael Zuo	William Mason High School
7	Emir Hussain Naduvil Valappil	Solon High School
8	Philip Yao	Aurora High School
	Dinesh Bojja	Dublin Jerome High School
	Luke Hann	Granville High School
	Devin Zhao	Olentangy Orange High School
12	Max Li	Dublin Coffman High School
	Nathan Zhou	Oakwood High School
	Joseph Gardner	Upper Arlington High School
	Riddhi Gupta	Upper Arlington High School
	Jason Wang	William Mason High School
	Aja Sampath	Worthington Kilbourne HS
18	Grace Luo	Columbus Academy
	Rohit Dasanoor	Revere High School
	Will Krew	Revere High School
	Eddie Kong	William Mason High School

The 48th State Tournament of Mathematics had 1,393 individual student participants representing 61 schools. The cut score for students to advance to the next level, the Ohio Mathematics Invitational Olympiad (OHMIO) was 20. Detailed statistics from the tournament are in Figure 1.

Figure 1: *Summary Statistics for the 2021 Competition.*

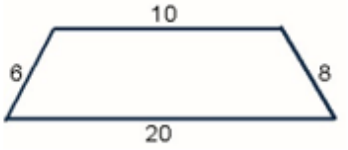


Number of Participating Schools	61	OHMIO Cut Score	20
Number of Participating Students	1,393		
High Score	39	**Score Distribution**	
Upper Quartile Score	12	0 to 5	559
Median Score	7	6 to 10	410
Lower Quartile Score	4	11 to 15	223
Low Score	0	16 to 20	112
		21 to 25	36
Mean Score	8.8	26 to 30	25
Score Standard Deviation	7.0	31 to 35	21
		36 to 40	7

Sample Contest Items

Problems from the 2021 tournament are shown in Figure 2. 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 previous contests can be used with mathematics clubs or in math class to prepare mathletes for future competition. School intramural contests are a great way to spark interest in problem solving while developing mathematical insight and problem solving skills. Always check OCTM's contest website for information about future events:https://ohioctm.org/Student-Contests

Figure 2: *Sample Contest Problems*

	ANSWERS
1. Simplify $19 + 9 \cdot 9$	100
2. Determine the area of this trapezoid 	72
3. $R = 4\sin(\theta)$ is the equation of a polar graph. Find the Cartesian coordinates of the center of that graph. Express as an ordered pair (x, y).	(0,2)
4. Solve for x: $log_{10}(x+1) - log_{10}(x-1) = 1$	$\frac{11}{9}$
5. Given: $f(x) = -x^2 - x + 1$. The domain is {-2, 0, 2}, find the ***SUM*** of all the values of the range.	-5
6. Find the **larger** of the two values of x which satisfy $(x+5)^2 = \sum_{k=0}^{4}(k!) + \sum_{k=0}^{4} k.$	$-5 + 2\sqrt{11}$
7. In a cage are 40 cats and dogs, each one being black or white. 11 of these animals are white, and 12 of the dogs are black. If there are 19 cats, how many cats are white?	2

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