Trial/Pilot Event

Contact the organizers of your tournament to find out what trial/pilot events will be held.

WE'VE GOT YOUR NUMBER

(B/C Division)

DESCRIPTION: Students will use their knowledge of whole-number operations and problem-solving ability to represent integers as expressions involving given digits.

EVENT PARAMETERS: Participants must provide their own pencils or pens. They will not be allowed to bring anything else to the contest, including calculators and paper. Scratch paper will be provided.

A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 minutes

THE COMPETITION: Participants will be given 2 sets of problems. In each set, students will be given 4 or 5 of the 10 digits, along with the real-number operations of addition, subtraction, multiplication, division, exponentiation, logarithm base b (where b is one of the digits), factorials, plus the operation of writing single digits together to form a multi-digit number. The goal is to write as many as possible of the integers from 1 through 100 as expressions using all of the given digits and some of the given operations. All given digits must be used exactly as many times as given in each expression; the operations may be used as many or as few times as desired. The usual algebraic order of operations (exponentiation, multiplication/division, addition/subtraction) will take precedence, but parentheses may be used as desired to override this order. Since these are whole-number operations, decimal points are not allowed.

Symbols allowed for operation are as follows:

(1) addition… +, as in 3 + 4

(2) subtraction… –, as in 4 – 3

(3) multiplication… X, or parentheses, as in 3 X 4 or 3(4). The dot (·) is NOT allowed, as it is easily confused with subtraction.

(4) division… slanted fraction bar (/), or a horizontal fraction bar, as in 8/4 or $\frac{8}{4}$. The division sign (÷) is NOT allowed, as it is easily confused with addition.

(5) exponentiation… either with superscript or the caret (^), as in 4^3 or 4^3.

(6) factorial… !, as in 4!

(7) logarithm… the usual log with base, as in $\log_3 9$. The base must be formed as part of the use of the supplied digits.

For each of the two sets of digits, contestants will be given a test form, with the given digits printed at the top of each page, consisting of 100 spaces numbered 1 through 100. Opposite each of these 100 numbers the contestants should write the expression that they obtain for that number. Contestants will have a total of 40 minutes to prepare their papers, with warnings about the time remaining during the contest, along with a countdown from 10 seconds to zero. At that time, pencils must be put away.

For more info contact: Nancy Magnussen nancy@science.tamu.edu

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EXAMPLES:

(1) Given digits 2, 3, 4, and 9, the number 26 can be expressed as 234 / 9, and 18 can be expressed as 3 ^ (4 – 2) + 9.

(2) Given digits 2, 3, 3, 4, and 5, the number 94 can be expressed as $4^3 + 5(3)(2)$, and 69 can be expressed as $2^5 + 4 + 33$.

(3) Given digits 1, 3, 5, and 8, the number 20 can be expressed as $5\log_3 81 = 20$, and 87 can be expressed as $\frac{(5+1)!}{8} - 3$.

SCORING: Each of the 100 numbers in each of the 2 sets represented correctly will score 1 point, for a maximum score of 200. Each incorrect expression will result in a 1-point deduction. Illegible answers will be scored as incorrect, and blank answers will have no effect on the score. Scratchouts of wrong expressions are allowed, provided they are clearly indicated, and will be counted the same as if the scratched out portions were blank space. Rulings regarding legibility or scratchouts will be solely at the discretion of the event officials. Ties will be broken by comparing papers to see which has the most correct expressions for 100 (among the possible 2). If the tie is not broken, the expressions for 99 will be similarly compared, and so forth. In the extremely unlikely event that teams have exactly the same amount of correctly represented answers for all 100 numbers, the highest-numbered expressions on which the papers differ will be compared, with the advantage given to the more creative solution. Participants still writing after time expires will be penalized 1 point for each five seconds elapsing until pencils are put away. Possession of a calculator will result in disqualification.

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