

Michigan Leagues of Academic Games **Elementary Equations Variations Even Year**

GENERAL RULE: If * or ^ is used for an exponent, both base and exponent must be whole numbers. If $\sqrt{\quad}$ is used for the root operation, the index must be a counting number and the base and total value must be whole numbers.

Note: {counting numbers} = {natural numbers} = {positive integers} = {1,2,3,4...}
{whole numbers} = {0,1,2,3,4...}

The following may be used in September and October

Sideways Cube: A cube representing a non-zero number may be used sideways in the Goal or a Solution to equal the reciprocal of the number it represents.

Upside-Down Cube: In the Goal or a Solution, any numeral may be used upside-down to equal the additive inverse of the number represented by that numeral.

0 Wild: The 0 cube may represent any numeral on the cubes, but it must represent the same numeral everywhere it occurs (Goal and Solution). Each Equation-writer must specify in writing the interpretation of the 0 cube if it stands for anything other than 0 in the Equation.

Factorial (!): There are two occurrences of the factorial operator (!) available to be used in the Solution and/or the Goal as the Equation-writer chooses to use them. All uses of ! in the Equation must be in writing.

Three-operation Solution: Any Solution must contain at least three operation symbols. The operation symbols are +, -, x, \div , * (or ^), $\sqrt{\quad}$, and !.

Multiple Operations: Every operation sign in Required or Permitted may be used many times in any Solution. If the Factorial variation is also chosen for the shake, an unlimited number of factorial operators may be used in each Solution. At most two factorials may be used in the Goal.

The following may be added in November:

Remainder: $A \cdot \vdash B$ ($\cdot \vdash$ is a sideways \div) equals the remainder when A is divided by B. A and B are positive integers, and A is less than or equal to 1000.

Percent: $\text{---}\wedge$ (upside down root) means "percent of." That is, $A \text{---}\wedge B = A\%$ of B, where A and B are numbers. In the Goal or a Solution, A and/or B may be a two-digit numeral.

Decimal point: * (or ^) may be used as a decimal point. If so used in the Goal or a Solution, an * (or ^) may be combined in a numeral with at most three digits. When used as a decimal, * (or ^) takes precedence over all other operations.

Next Prime Number: x_A means "the next prime number bigger than A", where A is a rational number ≤ 200 .

+ = Average: + shall not represent addition; instead, it shall represent the operation of averaging two numbers.

