

Michigan Leagues of Academic Games

Middle Equations Variations Odd Year

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 symbol (numeral or operation) on the cubes, but it must represent the same symbol 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.

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

Base m: Both the Goal and the Solution must be interpreted as base m expressions, where the player choosing this variation specifies m for the shake as eight, nine, or ten. Two-digit numerals are allowed in Solutions.

Multiple of k: A Solution must not equal the Goal but must differ from the Goal by a non-zero multiple of k , where the player choosing this variation specifies k for the shake as a whole number from six to eleven, inclusive. The Goal must not be greater than 1000 or less than -1000 .

Powers of the Base: 1 (one) may represent any integral power of ten. (If 1 is used in a two-digit numeral, it stands for 1.) If Base m is also chosen, 1 represents any integral power of m .

Number of Factors: x_A means “the number of counting number factors of A ,” where A is a counting number and A is less than or equal to 1000.

Any Color Exponent: Any numeral on a ___cube may be used as an exponent without being accompanied by an * (or ^) cube. The player selecting this variation chooses a color: red, blue, green, or black and should announce “Red Exponent” or “Blue Exponent”, etc. to indicate the color.

AB+: The Goal and/or Solution may be or may include a three-cube expression of the form $AB+$, which is interpreted as a repeating decimal, either as $.ABABAB\dots$ or as $.ABBBBB$. When the form $AB+$ is used in a Solution, the writer must indicate, in either decimal or fractional form, which interpretation of $AB+$ is being used in the Solution.