

Michigan League of Academic Games
Senior Equations Variations 2011-12

NOTE: In Adventurous, up to six cubes may be used to create a Goal

The following two variations will be in effect for every shake:

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.

The following may be used in September and October

0 Wild: The 0 cube may vary and equal any numeral on the cubes, but it must equal the same numeral everywhere it occurs (Goal and Solution). The interpretation of the 0 cube in the Solution is specified in writing by each player who has the burden of proof as part of the Solution. If a 0 stands for 0 in a Solution, this fact need not be specified in writing. A 0 in the Goal and a 0 in the Solution must stand for the same thing.

Factorial (!): There are two occurrences of the factorial operator (!) available, like parentheses, to be used in a Solution, as those with the burden of proof choose to use them. All uses of ! in the Solution must be in writing.

Any Color Exponent: The player who picks this variation names the color. The numerals on that color cube may be used as an exponent without an * or ^ cube.

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 a whole number from eight to twelve, inclusive. Two-digit numerals are allowed in Solutions when this variation is called.

X wild: The X cube may vary and represent any symbol (numeral or operation) on the cubes, but it must stand for the same symbol everywhere it occurs (Goal or Solution). The interpretation of the X cube is to be specified in writing by each player who has the burden of proof as part of the Solution. If X stands for X in a Solution, this fact need not be specified in writing.

Powers of the base: 1 (one) may vary any stand for 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.

The following may be added in November

Number of factors: x may be used to indicate the number of counting number factors of a counting number, including the number itself and one. That is, $x_A =$ the number of factors of A, where A is a counting number.

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 twelve, inclusive.

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

Add to Goal: On his turn, instead of a regular move, a player may add a cube to the Goal. The cube may be placed anywhere in the Goal. However, the limit of six cubes in the Goal, with no numeral containing more than two consecutive digits, still prevails.

$\sqrt{\quad} = i$: $\sqrt{\quad}$ shall not represent the root operation but instead may represent the imaginary number i , such that $i^2 = -1$. The $\sqrt{\quad}$ may be placed immediately before or after a numeral without the x sign.

Decimal in Goal: Each Solution-writer may determine where decimal points occur in the Goal. A Solution is correct if it satisfies at least one interpretation of the Goal.

\div as log: \div may represent the log operation or the division operation. This $A \div B$ may be interpreted as the quotient of A divided by B (provided $b \neq 0$), or, if A and B are positive real numbers as $\log_B A$. A sideways division sign in the Goal must be interpreted as log.