NOAGL Middle Equations® Variations 2012

The following variations may be chosen beginning at Round ONE.

1. <u>Sideways</u> A cube representing a non-zero number may be used sideways in the Goal or Solution to equal the reciprocal of that number.

2. <u>Upside-down</u> A cube representing a number may be used upside-down in the Goal or Solution to equal the additive inverse of that number.

3. <u>0 wild</u> The 0 cube may represent any symbol 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.

4. <u>Factorial</u> There are two occurrences of the factorial operator (!) available, like parentheses, 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.

5. <u>Multiple operations</u> 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.

6. <u>Exponent</u> Any numeral on a ___ cube may be used as an exponent without being accompanied by an * (or ^) cube. The player selecting this variation fills the blank in the previous sentence with one of the colors red, blue, green, or black.

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

The following variations may be chosen beginning at Round TWO.

8. <u>Remainder</u> $A \cdot l \cdot B$ ($\cdot l \cdot$ is a sideways ÷) equals the remainder when A is divided by B. A and B are positive integers, and A is less than or equal to 1000.

9. <u>Powers of the base</u> 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.

10. <u>Percent</u> ─╱ (upside-down radical) means "percent of." That is, A ─╱ $B = A\%$ of B where A and B are numbers. In the Goal or Solution, A and/or B may be a two-digit numeral.

11. <u>Base m</u> 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.

DO NOT MARK THIS SHEET!

EQUATIONS/ON-SETS SCORING CHART

Scoring During a Shake

Situation	Correct	Incorrect
Challenge Now *or* Never	6	2
Challenged against (Last Mover)	6	2
Third Party siding with Challenger	4	2
Third Party siding with Last Mover	6	2
Write a Solution after all cubes moved	4	2

Note A student who is late or absent for a shake scores -4 for that shake.

Scoring at the End of a Match (Round)

Three-Player Match	
1st place alone	6
Two-way tie for 1st	5
Three-way tie for 1st	4
2nd place alone	4
Two-way tie for 2nd	3
Third place alone	2
Did not play	0

Two-Player Match	
1st place alone	6
Two-way tie for 1st	5
2nd place alone	4
Did not play	0