NOAGL Junior Equations® Variations 2012

SPECIAL RULE: The following two variations are in effect for all shakes.

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

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

The following variations may be chosen beginning at Round One.

3. 0 or x wild The 0 or x 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 or x cube if it stands for anything other than itself in the Equation. The player selecting this variation specifies whether 0 or x (but not both) is wild for the shake.

4. 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.

5. Factorial 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. However, if multiple of *k* is also chosen for the shake, no factorial may be placed in the Goal.

6. Number of factors x*A* means "the number of counting number factors of *A*," where *A* is a counting number.

7. 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*.

8. Exponent 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.

The following variations may be chosen beginning at Round Two.

9. 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, eleven, or twelve. Two-digit numerals are allowed in Solutions. For bases eleven and twelve, * may be used for the digit ten; in base twelve √ may be used for the digit eleven.

10. 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.

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NOAGL Senior Equations® Variations 2012

The following variations may be chosen beginning with Round ONE.

All the Junior variations for this year plus the following:

1. Decimal in Goal Each Equation-writer may determine where decimal points occur in the Goal.

The following variations may be chosen beginning with Round TWO.

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

3. Log A sideways ÷ represents the log operation. Thus if a and b are positive real numbers ($b \neq 1$), $a \cdot\text{I}\cdot b$ equals $\log_b a$.

EQUATIONS 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

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