ELEMENTARY Equations® Variations 2018-19

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

GENERAL RULE: If * (or ^) is used for raising to a power, both base and exponent must be whole numbers. If √ is used for the root operation, the index must be a counting number and the base and total value must be whole numbers.

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 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.

4. <u>Factorial</u> 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.

5. <u>Multiple Operations</u> Any operation sign not in Forbidden (or the Goal) 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>Three-operation Solution</u> Any Solution must contain at least three operation symbols. The operation symbols are +, −, x, ÷, * (or ^), √ , and ! if Factorial is chosen.

7. <u>Remainder</u> $A \cdot\!\vert\!\cdot B$ ($\cdot\!\vert\!\cdot$ 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.

8. <u>Two-digit Numerals</u> Two-digit numerals are allowed in Solutions.

9. <u>LCM</u> √ may represent the LCM (least common multiple) of two counting numbers.

10. <u>GCF</u> ^ (or *) may represent the GCF (greatest common factor) of two whole numbers, provided at least one of them is not 0.

11. <u>Number of Factors</u> xA means "the number of counting number factors of A," where A is a counting number less than or equal to 200.

DO NOT MARK THIS SHEET!