Magnolia Math Regional

Simplification and Terminology

1 Simplification Rules

1. Unless otherwise specified, all answers should be expressed as exact numbers.

2. A fractional answer should be written in simplest form, meaning that the numerator and the denominator should have no common factors other than 1. Fractions greater than 1 can be expressed in either improper fraction form or as a mixed number.

3. Answers with radicals should be expressed in simplest form, meaning that a radical with index n should not contain any perfect n^{th} power factors in the radicand. For example, $\sqrt{27}$ and $\sqrt[3]{24}$ are unacceptable, and instead should be written as $3\sqrt{3}$ and $2\sqrt[3]{3}$.

4. Denominators of fractions with radicals do not need to be rationalized. However, the radical must be expressed in simplest form. (See previous point.)

5. Answers involving π and other irrational constants should not be approximated. Instead, answers should be submitted in terms of the constant. For example, 3.14 and 22/7 are not acceptable in place of π.

6. Answers that should be expressed as ordered pairs should be written in the form (a, b).

7. Both decimal and fractional answers are acceptable. However, a decimal submitted may not be an approximation of the exact answer. For example, 0.3333 is an unacceptable replacement for the answer $1/3$, but $0.\overline{3}$ is allowed.

8. Diagrams provided on the test cannot be assumed to be drawn to scale.

9. Any simplification instruction specifically mentioned in any test problem overrules any of these aforementioned rules.

2 Terminology

The Magnolia Math Regional may use several terms that may not be familiar to most middle school students. They are explained below:

1. The symbol $n! = n \times (n-1) \times (n-2) \times \cdots \times 3 \times 2 \times 1$ is defined for nonnegative integers n. By definition, $0! = 1$. Similarly, the notation $\binom{n}{r} = \frac{n!}{r!(n-r)!}$ is defined for nonnegative integers n and r.

2. The arithmetic mean of a set of numbers $x_1, x_2, \cdots, x_n$ is defined to be the expression $\frac{x_1+x_2+\cdots+x_n}{n}$. The geometric mean of a set of numbers $x_1, x_2, \cdots, x_n$ is defined to be $\sqrt[n]{x_1 x_2 \cdots x_n}$.

3. A lattice point is an ordered pair (a, b) on the Cartesian plane such that both a and b are integers.

4. The centroid of a triangle is the intersection of the medians in a triangle. The orthocenter of a triangle is the intersection of the altitudes of a triangle. The circumcenter of a triangle is the unique point O of a triangle such that there exists a circle centered at point O that passes through the three vertices of the triangle. The incenter of the triangle is defined to be the unique point I inside of a triangle such that the exists a circle centered at point I tangent to all three sides of the triangle.