**The properties of operations**. Here a, b and c stand for arbitrary numbers in a given number system. The properties of operations apply to the rational number system, the real number system, and the complex number.

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| Associative property of addition | (a + b) + c = a + (b + c) |
| Commutative property of addition | a + b = b + a |
| Additive identity property of 0 | a + 0 = 0 + a = a |
| Existence of additive inverses | For every *a* there exists *-a* so that a + (-a) = (-a) + a = 0 |
| Associative property of multiplication | (a × b) × c = a × (b × c) |
| Commutative property of multiplication | a × b = b × a |
| Multiplicative identity property 1 | a × 1 = 1 × a = a |
| Existence of multiplicative inverses | For every *a* ≠ 0 there exists 1/*a* so that *a* × 1/*a* = 1/*a* × *a* = 1 |
| Distributive property of multiplication over additions | a × (b + c) = a × b + a × c |

**The properties of equality**. Here a, b and c stand for arbitrary numbers in the rational, real, or complex number systems.

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| Reflexive property of equality | a = a. |
| Symmetric property of equality | If a = b, then b = a. |
| Transitive property of equality | If a = b and b = c , then a = c. |
| Addition property of equality | If a = b, then a + c = b + c. |
| Subtraction property of equality | If a = b then a – c = b – c. |
| Multiplication property of equality | If a = b, then a × c = b × c. |
| Division property of equality | If a = b and c ≠ 0, then a ÷ c = b ÷ c. |
| Substitution property of equality | If a = b, then b may be substituted for a in any expression containing a. |

**The properties of inequality**. Here a, b, and c stand for arbitrary numbers in the rational or real number systems.

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| Exactly one of the following is true: a < b, a = b, a > b. |
| If a > b and b > c then a > c. |
| If a > b, b < a. |
| If a > b, then -a < -b. |
| If a > b, then a ± c > b ± c. |
| If a > b and c > 0, then a × c > b × c. |
| If a > b and c < 0, then a × c < b × c. |
| If a > b and c > 0, then a ÷ c > b ÷ c. |
| If a > b and c < 0, then a ÷ c < b ÷ c. |