

Basic Properties of Algebra

0. Assume x , y and z are numbers in a number set \mathbb{S} then:
 1. Closure Property of Addition: $x + y$ is a number in set \mathbb{S}
 2. Associative Property of Addition: $x + (y + z) = (x + y) + z$
 3. Commutative Property of Addition: $x + y = y + x$
 4. Identity Property of Addition: $x + 0 = x$
 5. Inverse Property of Addition: $x + (-x) = 0$
 6. Closure Property of Multiplication: xy is a number in set \mathbb{S}
 7. Associative Property of Multiplication: $x(yz) = (xy)z$
 8. Commutative Property of Multiplication: $xy = yx$
 9. Identity Property of Multiplication: $x1 = x$
 10. Inverse Property of Multiplication: $x(1/x) = 1$, $x \neq 0$
 11. Zero Multiplication Property: $0x = 0$
 12. Identities Not Equal Property: $0 \neq 1$
 13. Distributive Property of Multiplication Over Addition: $x(y + z) = xy + xz$
 14. Zero Product Property: $xy = 0$ implies $x = 0$ or $y = 0$
 15. Reflexive Property of Equality: $x = x$
 16. Symmetric Property of Equality: If $x = y$, then $y = x$.
 17. Transitive Property of Equality: If $x = y$ and $y = z$, then $x = z$.
 18. Substitution Property of Equality: If $x = y$, then y may replace each occurrence of x .
 19. Addition Property of Equality: If $x = y$ then $x + z = y + z$.
 20. Multiplication Property of Equality: If $x = y$ then $xz = yz$.
 21. Subtraction Property of Equality: If $x = y$ then $x - z = y - z$.
 22. Division Property of Equality: If $x = y$ then $x/z = y/z$ for $z \neq 0$.
23. Addition Property of Order: If $x < y$ then $x + z < y + z$
24. Transitive Property of Order: If $x < y$ and $y < z$ then $x < z$
25. Multiplication Property of Order: If $x < y$ and $z > 0$ then $xz < yz$
26. Trichotomy Property of Order: $x < y$ or $x = y$ or $x > y$