algebra rules

February 12, 2023

1. The Commutative Property of Addition:

$$a + b = b + a$$
$$(a + b) + c = a + (b + c)$$

2. The Commutative Property of Multiplication:

$$a \cdot b = b \cdot a$$
$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

3. The Associative Property of Addition:

$$(a + b) + c = a + (b + c)$$
$$a + (b + c) = a + b + c$$

4. The Associative Property of Multiplication:

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$
$$a \cdot (b \cdot c) = a \cdot b \cdot c$$

5. The Distributive Property:

$$a \cdot (b + c) = a \cdot b + a \cdot c$$
$$(a + b) \cdot c = a \cdot c + b \cdot c$$

6. The Identity Property of Addition:

$$a + 0 = a$$
$$0 + a = a$$

7. The Identity Property of Multiplication:

$$a \cdot 1 = a$$
$$1 \cdot a = a$$

8. The Inverse Property of Addition:

$$a + (-a) = 0$$
$$(-a) + a = 0$$

9. The Inverse Property of Multiplication:

$$a \cdot \frac{1}{a} = 1, a \neq 0$$
$$\frac{1}{a} \cdot a = 1, a \neq 0$$

10. The Transitive Property:

$$If\ a = b\ and\ b = c,\ then\ a = c$$

11. The Substitution Property:

$$If\ a = b,\ then\ a\ can\ be\ substituted\ for\ b\ in\ any\ expression\ or\ equation$$

12. The Symmetric Property of Equality:

$$If\ a = b,\ then\ b = a$$

13. The Transitive Property of Equality:

$$If\ a = b\ and\ b = c,\ then\ a = c$$

Reflexive Property of Equality:

$$a = a$$

14. The Squaring Property:

$$(a^2)^2 = a^4 \quad (ab)^2 = a^2b^2$$

15. The Cubing Property:

$$(a^3)^3 = a^9 \quad (ab)^3 = a^3b^3$$

16. The Addition Property of Equality:

$$If\ a = b,\ then\ a + c = b + c\ and\ c + a = c + b$$

17. The Multiplication Property of Equality:

$$If\ a = b,\ then\ a \cdot c = b \cdot c\ and\ c \cdot a = c \cdot b$$

18. The Power of a Power Property:

$$(a^b)^c = a^{bc}$$

19. The Power of a Product Property:

$$(ab)^c = a^c b^c$$

20. The Power of a Quotient Property:

$$\left(\frac{a}{b}\right)^c = \frac{a^c}{b^c}$$

21. The Zero Exponent Property:

$$a^0 = 1$$

22. The Negative Exponent Property:

$$\frac{1}{a^b} = a^{-b}$$

23. The Product of Powers Property:

$$a^m \cdot a^n = a^{m+n}$$

24. The Quotient of Powers Property:

$$\frac{a^m}{a^n} = a^{m-n}$$

25. The Power of One Property:

$$a^1 = a$$

26. The Distributive Property:

$$a(b+c) = ab + ac \ (b+c)a \qquad = ba + ca$$

27. The Commutative Property of Addition:

$$a + b = b + a$$

28. The Associative Property of Addition:

$$(a + b) + c = a + (b + c)$$

29. The Commutative Property of Multiplication:

$$a \cdot b = b \cdot a$$

30. The Associative Property of Multiplication:

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

31. The Identity Property of Addition:

$$a + 0 = a$$

32. The Identity Property of Multiplication:

$$a \cdot 1 = a$$

33. The Inverse Property of Addition:

$$a + (-a) = 0$$

34. The Inverse Property of Multiplication:

$$a \cdot \frac{1}{a} = 1$$

35. The Transitive Property of Equality:

$$If \ a = b \ and \ b = c, \ then \ a = c$$

36. The Identity Property of Addition:

$$a + 0 = a$$

37. The Identity Property of Multiplication:

$$a \cdot 1 = a$$

38. The Associative Property of Addition:

$$(a + b) + c = a + (b + c)$$

39. The Associative Property of Multiplication:

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

40. The Commutative Property of Addition:

$$a + b = b + a$$

41. The Commutative Property of Multiplication:

$$a \cdot b = b \cdot a$$