

ALGEBRAIC FORMULAS

1. $(a + b)^2 = a^2 + 2ab + b^2$; $a^2 + b^2 = (a + b)^2 - 2ab$
2. $(a - b)^2 = a^2 - 2ab + b^2$; $a^2 + b^2 = (a - b)^2 + 2ab$
3. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
4. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$; $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$
5. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$; $a^3 - b^3 = (a - b)^3 + 3ab(a - b)$
6. $a^2 - b^2 = (a + b)(a - b)$
7. $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
8. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
9. $a^n - b^n = (a - b)(a^{n-1} + a^{n-2}b + a^{n-3}b^2 + \dots + b^{n-1})$
10. $a^n = a.a.a \dots n \text{ times}$
11. $a^m \cdot a^n = a^{m+n}$
12. $\frac{a^m}{a^n} = a^{m-n}$ if $m > n$
 $= 1$ if $m = n$
 $= \frac{1}{a^{m-n}}$ if $m < n$; $a \in R, a \neq 0$
13. $(a^m)^n = a^{mn} = (a^n)^m$
14. $(ab)^n = a^n \cdot b^n$
15. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
16. $a^0 = 1$ where $a \in R, a \neq 0$
17. $a^{-n} = \frac{1}{a^n}$, $a^n = \frac{1}{a^{-n}}$
18. $a^{\frac{p}{q}} = \sqrt[q]{a^p}$
19. If $a^m = a^n$ and $a = \pm 1, a \neq 0$, then $m = n$
20. If $a^n = b^n$ where $n \neq 0$, then $a = \pm b$