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Algebraic Formulas

- $(a + b)^2 = a^2 + b^2 + 2ab$
- $(a – b)^2 = a^2 + b^2 – 2ab$
- $a^2 – b^2 = (a + b)\ (a – b)$
- $a^2 + b^2 = (a + b)^2 – 2ab$ **or** $a^2 + b^2 = (a – b)^2 + 2ab$
- $a^3 + b^3 = (a + b)\ (a^2 – ab + b^2) = (a + b)^3 – 3ab(a + b)$
- $a^3 – b^3 = (a – b)\ (a^2 + ab + b^2) = (a – b)^3 + 3ab(a – b)$
- $2(a^2 + b^2) = (a+ b)^2 + (a – b)^2$
- $(a + b)^2 – (a – b)^2 = 4ab$
- $a^4 + b^4 = (a + b)\ (a – b)\ [(a + b)^2 – 2ab)]$
- $(a – b)^2 = (a + b)^2 – 4ab$
- $(a + b)^2 = (a – b)^2 + 4ab$
- $a^4 + b^4 = [(a + b)^2 – 2ab]^2 – 2(ab)^2$
- $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
- $(a + b – c)^2 = a^2 + b^2 + c^2 + 2ab – 2bc – 2ca$
- $(a – b – c)^2 = a^2 + b^2 + c^2 – 2ab + 2bc – 2ca$
- $a^3 + b^3 + c^3 – 3abc = (a + b + c)\ (a^2 + b^2 + c^2 – ab – bc – ca)$
- $a^4 + a^2b^2 + b^4 = (a^2 + ab + b^2)\ (a^2 – ab + b^2)$
- $a^4 + a^2 + 1 = (a^2 + a + 1)\ (a^2 – a + 1)$

  if $a + b + c = 0$ **then** $a^3 + b^3 + c^3 = 3abc$

  $a^8 – b^8 = (a^4 + b^4)\ (a^2 + b^2)\ (a + b)\ (a – b)$