

# Sum & Difference Of Powers

$$a^n - b^n = (a - b)(a^{n-1} + a^{n-2}b + a^{n-3}b^2 + \dots + a^2b^{n-3} + ab^{n-2} + b^{n-1})$$

$$a^n + b^n = (a + b)(a^{n-1} - a^{n-2}b + a^{n-3}b^2 - \dots + a^2b^{n-3} - ab^{n-2} + b^{n-1})$$

**NOTE:**  $n$  must be odd

$$\begin{aligned}a^3 + b^3 &= a^3 - (-b)^3 \\ &= (a - (-b))(a^2 + a(-b) + (-b)^2) \\ &= (a + b)(a^2 - ab + b^2)\end{aligned}$$

e.g.  $x^5 - 32 = x^5 - 2^5$

$$= \underline{(x - 2)(x^4 + 2x^3 + 4x^2 + 8x + 16)}$$

**Exercise 6M; 1dhlo, 2bdf, 4b**