

Did You Forget Something?
(Things you learned in Algebra II)

Special Products

$$x^2 - a^2 = (x-a)(x+a)$$

$$x^3 - a^3 = (x-a)(x^2 + ax + a^2)$$

$$x^3 + a^3 = (x+a)(x^2 - ax + a^2)$$

Some instances of the Binomial Theorem

$$(x+a)^2 = x^2 + 2ax + a^2 \quad (\text{so } (x-a)^2 = x^2 - 2ax + a^2)$$

$$(x+a)^3 = x^3 + 3ax^2 + 3a^2x + a^3$$

$$(x+a)^4 = x^4 + 4ax^3 + 6a^2x^2 + 4a^3x + a^4$$

...

$$(x+a)^n = x^n + nx^{n-1}a + (\text{terms that have a factor } = a^2 \text{ or higher power of } a)$$

Factoring by Grouping. Often you can group terms to factor more easily.

$$\begin{aligned} \text{Here's an example: } acx^3 + adx^2 + bcx + bd &= ax^2(cx+d) + b(cx+d) \\ &= (ax^2+b)(cx+d) \end{aligned}$$

****Exercises****

Factor these:

1. $3x^3 - 2x^2 - 6x + 4 =$ _____

2. $2x^3 + 54 =$ _____

3. $8x^3 - 64 =$ _____

4. $x^2 - 5x + 6 =$ _____

5. $16x^4 - 1 =$ _____

6. $4x^2 - y^4 =$ _____

7. $x^3 - 6x^2 + 12x - 8 =$ _____

Expand these:

1. $(3x - y^2)^3 =$ _____

2. $(x + h)^4 =$ _____

3. $(x + h)^3 - 2(x + h) =$ _____

4. If $f(x) = x^3 - 2x$, find $\frac{f(x+h) - f(x)}{h}$: _____