

Factor this:

$$4x^2 - 25 \\ = (2x + 5)(2x - 5)$$

Can you factor this?

$$9x^2 + 49$$

NO, you can only factor
the **Difference** of perfect
squares.

Can you factor each?

$$x^2 - 9$$

$$= (x + 3)(x - 3)$$

$$x^3 - 8$$

Yes, but not the same
way as factoring $x^2 - 9$.
Neither x^3 nor 8 are
perfect squares.

what are these numbers? 1, 8, 27, 64, 125, ...



$$1^3, 2^3, 3^3, 4^3, 5^3, \dots$$



Perfect Cubes

Factoring the difference of perfect cubes:

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Factor the following:

$$1. \ x^3 - 8 \implies \underset{a=x}{(x)}^3 - \underset{b=2}{(2)}^3$$

$$= (x - 2)(x^2 + 2x + 4)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Factor: $125x^3 - 216 \Rightarrow (5x)^3 - (6)^3$
 $a = 5x \quad b = 6$

$$= (5x - 6)(25x^2 + 30x + 36)$$

You can't factor the sum of perfect squares, but there **IS** a way to factor the sum of perfect cubes.

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

Factor the following:

$$x^3 + 27 \rightarrow (x)^3 + (3)^3$$

$$a = x \quad b = 3$$

$$= (x + 3)(x^2 - 3x + 9)$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

Factor the following: $64x^6 + 125$

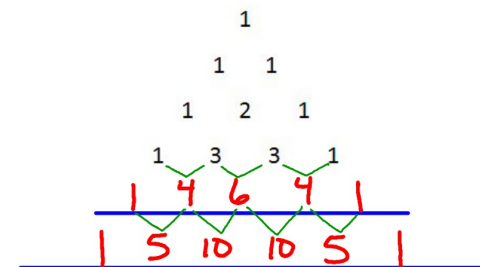
$$= (4x^2)^3 + (5)^3$$

$$a = 4x^2 \quad b = 5$$

$$= (4x^2 + 5)(16x^4 - 20x^2 + 25)$$

Find the next two rows of this pattern of numbers.

This pattern is called:
Pascal's Triangle.



Each row starts and ends with a 1. The numbers inbetween are the sum of the 2 numbers above

What do you notice about how many terms each has?

$$(a + b)^0 = 1$$

$$(a + b)^1 = a + b$$

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$(a + b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$

The number of terms is one more than the power on $(a + b)$.