

INTERMEDIATE ALGEBRA

Chapter 5 POLYNOMIALS AND POLYNOMIAL FUNCTIONS

PowerPoint Image Slideshow



FIGURE 5.1



There are many different kinds of coins in circulation, but a new type of coin exists only in the virtual world. It is the bitcoin.

	8	a	b^2
		\downarrow	\downarrow
exponents		1	2
degree of monomial		3	(1 + 2)

Monomials	14	$8ab^2$	$-9x^3y^5$	$-13a$
Degree	0	3	8	1
Binomial	$h + 7$	$7b^2 - 3b$	$x^2y^2 - 25$	$4n^3 - 8n^2$
Degree of each term	1 0	2 1	4 0	3 2
Degree of polynomial	1	2	4	3
Trinomial	$x^2 - 12x + 27$	$9a^2 + 6ab + b^2$	$6m^4 - m^3n^2 + 8mn^5$	$z^4 + 3z^2 - 1$
Degree of each term	2 1 0	2 2 2	4 5 6	4 2 0
Degree of polynomial	2	2	6	4
Polynomial	$y - 1$	$3y^2 - 2y - 5$	$4x^4 + x^3 + 8x^2 - 9x + 1$	
Degree of each term	1 0	2 1 0	4 3 2 1 0	
Degree of polynomial	1	2	4	

$$a^m = \underbrace{a \cdot a \cdot a \cdot \dots \cdot a}_{m \text{ factors}}$$

$$(-9)^5 = \underbrace{(-9)(-9)(-9)(-9)(-9)}_{5 \text{ factors}}$$

a^m ← exponent
↑
base

a^m means multiply a , m times

$$a^m = \underbrace{a \cdot a \cdot a \cdot \dots \cdot a}_{m \text{ factors}}$$

$$\frac{a^m}{a^m}$$

$$\frac{a^m}{a^m}$$

m factors

$$a^{m-m}$$

$$\frac{\overbrace{a \cdot a \cdot a \cdot \dots \cdot a}^{m \text{ factors}}}{\underbrace{a \cdot a \cdot a \cdot \dots \cdot a}_{m \text{ factors}}}$$

m factors

$$a^0$$

$$1$$

$$\frac{x^2}{x^5}$$

$$\frac{\cancel{x} \cdot \cancel{x}}{\cancel{x} \cdot \cancel{x} \cdot x \cdot x \cdot x}$$

$$\frac{1}{x^3}$$

$$\underbrace{4000.}_{\text{3 places}} = 4 \times 10^3$$

Moved the decimal point
3 places to the left.

$$\underbrace{0.004}_{\text{3 places}} = 4 \times 10^{-3}$$

Moved the decimal point
3 places to the right.

$$9.12 \times 10^4 = 91,200$$

$$9.12\underbrace{\quad\quad}_{} \times 10^4 = 91,200$$

Move the decimal point
4 places to the right.

$$9.12 \times 10^{-4} = 0.000912$$

$$\underbrace{\quad\quad}_{} 9.12 \times 10^{-4} = 0.000912$$

Move the decimal point
4 places to the left.

Distributive Property

$$(x + 3)(x + 7)$$

$$x(x + 7) + 3(x + 7)$$

$$x^2 + 7x + 3x + 21$$

F O I L

$$x^2 + 10x + 21$$

FOIL

$$(x + 3)(x + 7)$$


$$x^2 + 7x + 3x + 21$$

F O I L

$$x^2 + 10x + 21$$

Step 1. Multiply the *First* terms.

Step 2. Multiply the *Outer* terms.

Step 3. Multiply the *Inner* terms.

Step 4. Multiply the *Last* terms.

Step 5. Combine like terms, when possible.

$$\begin{array}{ccccccc}
 \textit{first} & & \textit{last} & & \textit{first} & & \textit{last} \\
 (& a & + & b &) (& c & + & d &) \\
 & & & \underbrace{\hspace{1.5cm}} & & & & \\
 & & & \textit{inner} & & & & \\
 & & & \textit{outer} & & & &
 \end{array}$$

Say it as you multiply!

FOIL

First

Outer

Inner

Last

23		
<u>x46</u>		
138	partial product	Start by multiplying 23 by 6 to get 138.
92	partial product	Next, multiply 23 by 4, lining up the partial product in the correct columns.
<u>1058</u>	product	Last you add the partial products.

$$(x + 9)^2$$

$$(y - 7)^2$$

$$(2x + 3)^2$$

$$(x + 9)(x + 9)$$

$$(y - 7)(y - 7)$$

$$(2x + 3)(2x + 3)$$

$$x^2 + 9x + 9x + 81$$

$$y^2 - 7y - 7y + 49$$

$$4x^2 + 6x + 6x + 9$$

$$x^2 + 18x + 81$$

$$y^2 - 14y + 49$$

$$4x^2 + 12x + 9$$

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

$$\underbrace{(a + b)^2}_{\text{(binomial)}^2} = \underbrace{a^2}_{\text{(first term)}^2} + \underbrace{2ab}_{2(\text{product of terms})} + \underbrace{b^2}_{\text{(last term)}^2}$$

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

$$\underbrace{(a - b)^2}_{\text{(binomial)}^2} = \underbrace{a^2}_{\text{(first term)}^2} - \underbrace{2ab}_{2(\text{product of terms})} + \underbrace{b^2}_{\text{(last term)}^2}$$

$$(x + 9)(x - 9)$$

$$(y - 8)(y + 8)$$

$$(2x - 5)(2x + 5)$$

$$x^2 - 9x + 9x - 81$$

$$y^2 + 8y - 8y - 64$$

$$4x^2 + 10x - 10x - 25$$

$$x^2 - 81$$

$$y^2 - 64$$

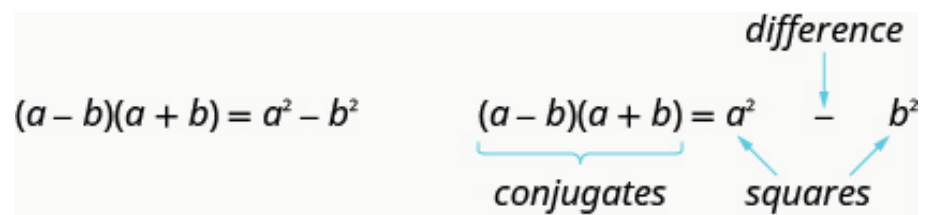
$$4x^2 - 25$$

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

difference

conjugates

squares

The diagram shows the equation (a - b)(a + b) = a^2 - b^2. A light blue bracket under the first two terms (a - b)(a + b) is labeled "conjugates". A light blue arrow points from the word "difference" to the minus sign between a^2 and b^2. Two light blue arrows point from the word "squares" to a^2 and b^2 respectively.

$$\begin{array}{r} \text{quotient} \nearrow 35 \\ \text{divisor} \rightarrow 25 \overline{) 875} \leftarrow \text{dividend} \\ \underline{-75} \\ 125 \\ \underline{-125} \\ 0 \leftarrow \text{remainder} \end{array}$$

$$\begin{array}{r}
 x + 4 \\
 x + 5 \overline{) 1x^2 + 9x + 20} \\
 \underline{-x^2 + (-5x)} \\
 4x + 20 \\
 \underline{-4x + (-20)} \\
 0
 \end{array}$$

same coefficients

$$\begin{array}{r}
 -5 \overline{) 1 \quad 9 \quad 20} \\
 \underline{-5 \quad -20} \\
 1 \quad 4 \quad \overline{) 0}
 \end{array}$$

coefficients of quotient

remainder

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