INTERMEDIATE ALGEBRA

Chapter 5 POLYNOMIALS AND POLYNOMIAL FUNCTIONS

PowerPoint Image Slideshow

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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.

	$8\ a\ b^2$		
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	

$$a^m = \underbrace{a \cdot a \cdot a \cdot \ldots \cdot a}_{m \text{ factors}} \qquad (-9)^5 = \underbrace{(-9)(-9)(-9)(-9)(-9)}_{5 \text{ factors}}$$

a^m ← exponent

↑

base

a^m means multiply a, m times

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

$\frac{a^m}{a^m}$	$\frac{a^m}{a^m}$
a^{m-m}	$\frac{\overbrace{\cancel{a} \cdot \cancel{a} \cdot \cancel{a} \cdot \ldots\ldots \cdot \cancel{a}}^{m \text{ factors}}}{\underbrace{\cancel{a} \cdot \cancel{a} \cdot \cancel{a} \cdot \ldots\ldots \cdot \cancel{a}}_{m \text{ factors}}}$
a^0	1

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

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

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

$4000. = 4 \times 10^{3}$

Moved the decimal point 3 places to the left.

$0.004 = 4 \times 10^{-3}$

Moved the decimal point 3 places to the right.

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

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

Move the decimal point 4 places to the right.

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

$$\_\,\_\,\_9.12 \times 10^{-4} = 0.000912$$

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

$x^2 + 10x + 21$

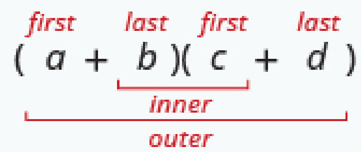
Step 1. Multiply the *First* terms.

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.



Say it as you multiply!
FOIL
- First
- Outer
- Inner
- Last

23		
×46		
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.
1058	product	Last you add the partial products.

$(x+9)^2$	$(y-7)^2$	$(2x+3)^2$
$(x+9)(x+9)$	$(y-7)(y-7)$	$(2x+3)(2x+3)$
$x^2+9x+9x+81$	$y^2-7y-7y+49$	$4x^2+6x+6x+9$
$x^2+18x+81$	$y^2-14y+49$	$4x^2+12x+9$

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

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

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

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

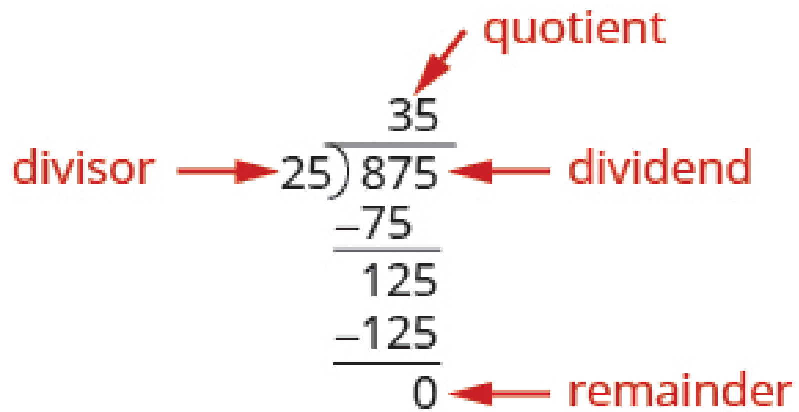
$(x+9)(x-9)$	$(y-8)(y+8)$	$(2x-5)(2x+5)$
$x^2-9x+9x-81$	$y^2+8y-8y-64$	$4x^2+10x-10x-25$
x^2-81	y^2-64	$4x^2-25$

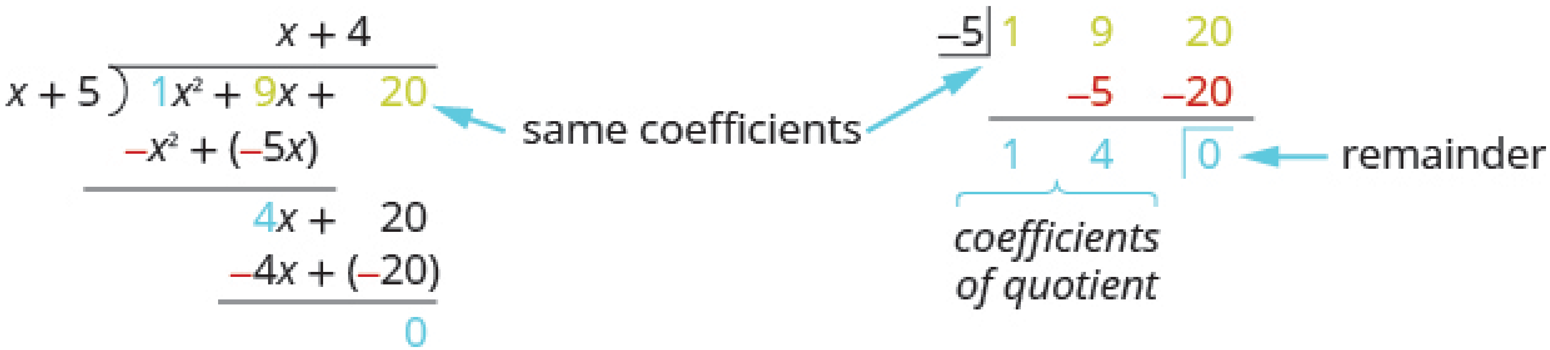
$$(a-b)(a+b)=a^2-b^2$$

difference

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

conjugates squares


quotient
35
divisor
25
875
dividend
–75
125
–125
0
remainder


x + 4
x + 5) 1x² + 9x + 20
−x² + (−5x)
4x + 20
−4x + (−20)
0
same coefficients
−5 | 1 9 20
−5 −20
1 4 0
remainder
coefficients
of quotient