Lesson 12-6

Objective - To use several different techniques to multiply binomials.

Horizontal Method

$(x+5)(2x-3)$

$(x+5)\bullet 2x + (x+5)\bullet -3$

$2x^2+10x-3x-15$

$2x^2+7x-15$

Vertical Method

$2x-3$

$x+5$

$10x-15$

$2x^2-3x$

$2x^2+7x-15$

Multiply the binomials below using the horizontal and vertical methods.

Horizontal Method

$(x-6)(3x+8)$

$(x-6)\bullet 3x + (x-6)\bullet 8$

$3x^2-18x+8x-48$

$3x^2-10x-48$

Vertical Method

$3x+8$

$x-6$

$-18x-48$

$3x^2+8x$

$3x^2-10x-48$

Multiply the binomials using the horizontal method.

1) $(y+3)(3y+4)$

$(y+3)\bullet 3y + (y+3)\bullet 4$

$3y^2+9y+4y+12$

$3y^2+13y+12$

2) $(2p-3)(5p-6)$

$(2p-3)\bullet 5p + (2p-3)\bullet -6$

$10p^2-15p-12p+18$

$10p^2-27p+18$

Multiply the binomials using the vertical method.

3) $(t+4)(5t-7)$

$5t-7$

$t+4$

$20t-28$

$5t^2-7t$

$5t^2+13t-28$

4) $(2t-1)(3t+8)$

$3t+8$

$2t-1$

$-3t-8$

$6t^2+16t$

$6t^2+13t-8$

Multiplying Binomials Using FOIL

Often the product of two binomials = Trinomial

$(x+3)(x-5) = x^2-2x-15$

Quadratic Term, Linear Term, Constant Term

$x+3$

$x-5$

$-5x-15$

x^2+3x

$x^2-2x-15$

Takes too long!

F O I L

$(x+3)(x-5)$

First Outer Inner Last

Lesson 12-6 (cont.)

F O I L

$(x+3)(x-5)$

First Outer Inner Last

F O I L

$(x+3)(x-5)$

First Outer Inner Last

F O I L

$(x+3)(x-5)$

First Outer Inner Last

F O I L

$(x+3)(x-5)$

First Outer Inner Last

F O I L

$(x+3)(x-5)$

First Outer Inner Last

x^2

F O I L

$(x+3)(x-5)$

First Outer Inner Last

x^2 $-5x$

Lesson 12-6 (cont.)

F O I L

$(x+3)(x-5)$

First	Outer	Inner	Last
x^2	$-5x$	$+3x$	

F O I L

$(x+3)(x-5)$

First	Outer	Inner	Last
x^2	$-5x$	$+3x$	-15

F O I L

$(x+3)(x-5)$

First	Outer	Inner	Last
x^2	$-5x$	$+3x$	-15

$x^2-2x-15$

F O I L

Try...

$(m+3)(m+6)$

First	Outer	Inner	Last
m^2	$+6m$	$+3m$	$+18$

$m^2+9m+18$

Use FOIL to multiply the binomials below.

1) $(y+7)(y+4)$ — $y^2+11y+28$

2) $(m+2)(m+8)$ — $m^2+10m+16$

3) $(x+6)(x-4)$ — $x^2+2x-24$

4) $(t-10)(t+6)$ — $t^2-4t-60$

5) $(x-4)(x-5)$ — $x^2-9x+20$

6) $(x+3)(x-8)$ — $x^2-5x-24$

7) $(y-7)(y-9)$ — $y^2-16y+63$

8) $(x+2)(x-11)$ — $x^2-9x-22$

9) $(2+m)(7-m)$ — $14+5m-m^2$

10) $(6-k)(4-k)$ — $24-10k+k^2$

Use FOIL to multiply the binomials below.

11) $(2x+3)(x+6)$ — $2x^2+15x+18$

12) $(k-5)(2k-7)$ — $2k^2-17k+35$

13) $(m+6)(2m-5)$ — $2m^2+7m-30$

14) $(3x+4)(x-7)$ — $3x^2-17x-28$

15) $(2x-9)(x-6)$ — $2x^2-21x+54$

16) $(x^2+9)(x^2-5)$ — x^4+4x^2-45

17) $(k^2+1)(6k+3)$ — $6k^3+3k^2+6k+3$

18) $(m+5)(m-5)$ — m^2-25

19) $(4t+7)(4t-7)$ — $16t^2-49$

20) $(2x+3)(m-5)$ — $2mx-10x+3m-15$

Lesson 12-6 (cont.)

Simplifying Binomial Squares

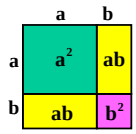
Simplify. F O I L

$(x+7)^2 = (x+7)(x+7)$

$= x^2+14x+49$

Binomial Squares Pattern

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



Area $= (a+b)(a+b)$

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

Binomial Square Pattern

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

Simplify.

1) $(p+9)^2 = p^2+18p+81$

2) $(y-12)^2 = y^2-24y+144$

3) $(m-6)^2 = m^2-12m+36$

4) $(x+3)^2 = x^2+6x+9$

Simplify the binomial squares.

1) $(x+5)^2$

$(x+5)(x+5)$

$x^2+10x+25$

2) $(y-4)^2$

$(y-4)(y-4)$

$y^2-8y+16$

3) $(m-9)^2$

$(m-9)(m-9)$

$m^2-18m+81$

4) $(2y+7)^2$

$(2y+7)(2y+7)$

$4y^2+28y+49$

5) $(3x-1)^2$

$(3x-1)(3x-1)$

$9x^2-6x+1$

6) $(p^3+1)^2$

$(p^3+1)(p^3+1)$

p^6+2p^3+1

If the statement below is true, write "True". If it is false, correct the statement so that it is true.

1) $(n+7)(n-7) = n^2-49$ True

2) $(p-4)^2 = p^2-8p-16$ False

$= p^2-8p+16$

3) $(t+8)^2 = t^2+8t+64$ False

$= t^2+16t+64$

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

5) $(t-6)^2 = t^2-12t+36$ True

Difference of Squares

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

2) $(y+7)(y-7) = y^2-7y+7y-49 = y^2-49$

3) $(m+4)(m-4) = m^2-4m+4m-16 = m^2-16$

4) $(t+5)(t-5) = t^2-5t+5t-25 = t^2-25$

Outer and Inner terms cancel.

Recognizing the Pattern

Difference of Squares

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

Perfect square minus Perfect square

1) $(p+8)(p-8) = p^2-64$

2) $(y+12)(y-12) = y^2-144$

3) $(m+6)(m-6) = m^2-36$

Lesson 12-6 (cont.)

Simplify.

1) $(p+2)(p-2) =$ p^2-4

2) $(x-9)(x+9) =$ x^2-81

3) $(w-10)(w+10) =$ w^2-100

4) $(2p+3)(2p-3) =$ $4p^2-9$

5) $(6+t)(6-t) =$ $36-t^2$

6) $(n+5)(n-5) =$ n^2-25

7) $(3x-7)(3x+7) =$ $9x^2-49$

8) $(4-q)(4+q) =$ $16-q^2$

9) $(8d+1)(8d-1) =$ $64d^2-1$

10) $(2+5g)(2-5g) =$ $4-25g^2$