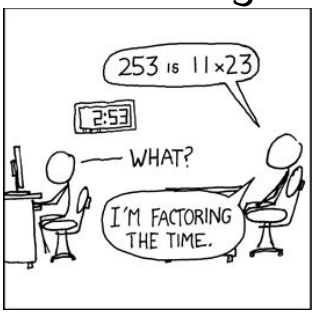
Unit 6 Notes

Factoring

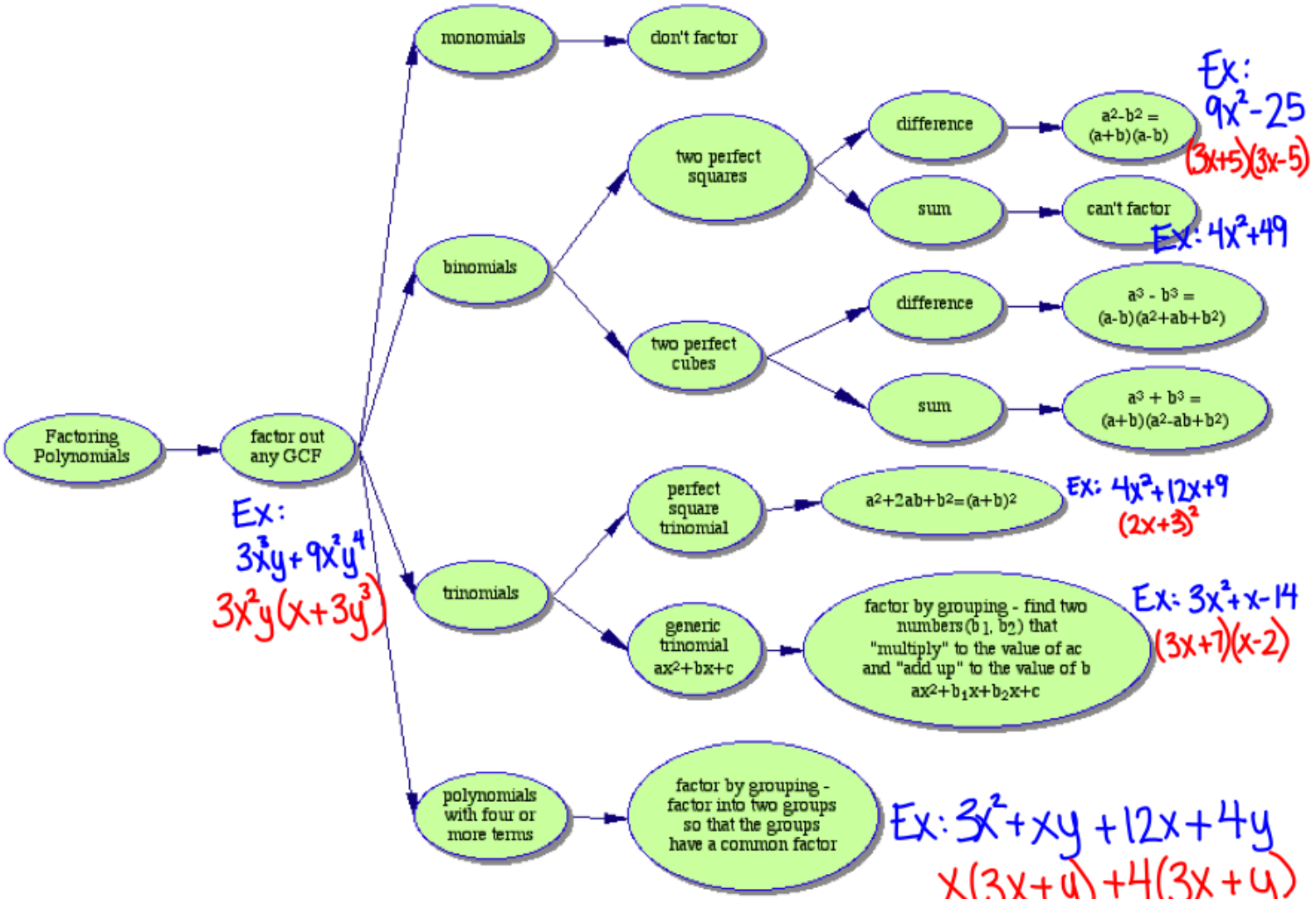


Tentative Schedule

Day	Classwork	Assignment
Mon. 11/24 (all)	Test #5	Video #6.1 with Notes: Factoring by GCF
Tues. 11/25 (S) Mon. 12/1 (R)	1 – 17	Video #6.2 with Notes: Factoring Trinomials
Tues. 12/2 (all)	18 – 37	Video #6.3 with Notes: Factoring Trinomials by Grouping
Wed. 12/3 (S) Thurs. 12/4 (R)	38 – 58	Video #6.4 with Notes: Factoring Special Cases of Binomials/Trinomials
Fri. 12/5 (all)	59 – 81	Video #6.5 with Notes: Factoring Completely
Fri. 12/5 (R) Mon. 12/8 (S)	**Quiz #6 during Lab Class**	
Mon. 12/8 (S) Tues. 12/9 (R)	82 – 100	Finish Practice Packet
Wed. 12/10 (all)	Review for Test #6	Review for Test #6
Thurs. 12/11 (S) Fri. 12/12 (R)	**Test #6**	TBA

Name: _____

Factoring Flow-Chart



Notes 6.1 - Factoring by GCF

GCF stands for:

Greatest Common Factor

Prime:	Composite:
a natural # with two unique factors (one and itself)	a natural number with more than two unique divisor

To find the GCF of a set of numbers, look for the lowest exponent.

Find the GCF of the following. Then divide each number by the GCF.

1.) 18, 24

GCF: 6

Divided by the GCF: 3, 4

2.) 90, 315

GCF: 45

Divided by the GCF: 2, 7

3.) x^8, x^7, x^6

GCF: x^6

Divided by the GCF: x^2, x, 1

4.) $9a^4b^3, 15a^3b^2, 3a^2b^4$

GCF: $3a^2b^2$

Divided by the GCF: $3a^2b$, $5a$, b^2

5.) Distribute. $3x(x^3+8x^2+4)$

$3x^4+24x^3+12x$

What is the GCF of the answer to number 5?

3x

(undistribute and you'll get): $3x(x^3+8x^2+4)$

Steps to Factoring by GCF:

1. Find the GCF.
2. Divide the expression by the GCF.
3. Write the answer as GCF (quotient). (Undistribute)

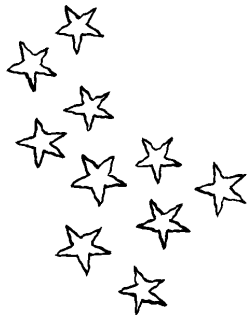
Try these.

6.) $-5x^3y+25x$

$-5x(x^2y-5)$

7.) $4x^2y+7xy$

$xy(4x+7)$



8.) Solve for a. $5a+10ax=4b$

$5a(1+2x)=4b$

$a=\frac{4b}{5(1+2x)}$

9.) Solve for y. $3xy+9y=14$

$3y(x+3)=14$

$y=\frac{14}{3(x+3)}$

Notes 6.2 - Factoring Trinomials by Trial-and-Error

General form of a quadratic expression: $ax^2 + bx + c$

Multiply each expression below:

1.) $(3x+4)(x+2)$

	3x	4
x	$3x^2$	4x
2	2x	8

$3x^2+6x+8$

2.) $(5x+3)(2x+1)$

$5x(2x+1)+3(2x+1)$

$10x^2+5x+6x+3$

$10x^2+11x+3$

When you factor, you are "un-distributing" the trinomial into the product of two binomials. Try the following examples:

3.) $3x^2-2x-8$

$(3x+4)(x-2)$

3	
1	3

8	
1	8
2	4

4.) $3x^2+x-14$

$(3x+7)(x-2)$

14	
1	14
2	7

5.) x^2+x-20

$(x+5)(x-4)$

20	
1	20
2	10
4	5

6.) $-2x^2+3x+9$

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

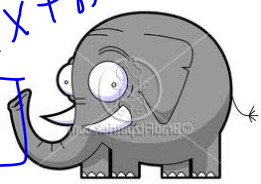
2	
1	2

9	
1	9
3	3

Notes 6.3 - Factoring Trinomials by Grouping

Multiply the following binomials: $(3x+2)(4x-7)$ $= 3x(4x-7)+2(4x-7) = 12x^2-21x+8x-14$

$= \boxed{12x^2-13x-14}$



Example: $6x^2+5x-6$

A. Consider the product (a)(c): $(6)(-6) = -36$

B. List out all possible factor pairs of (a)(c):

$(-1, 36)$ $(-2, 18)$ $(-3, 12)$ $(-4, 9)$ $(6, -6)$

$(1, -36)$ $(2, -18)$ $(3, -12)$ $(4, -9)$

C. Find the pair that satisfies the requirements of the product-sum method (i.e., a pair of numbers whose product equals ac and whose sum is *b*).

-4 and 9

D. Rewrite the expression with the same first and last term but with an expended b term using that pair of factors as coefficients:

$6x^2+5x-6$

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

E. We now have four terms that can be entered into a tabular model or factored by grouping.

$(6x^2-4x)+(9x-6)$

F. Pair the first two and the last two. Factor out a common factor for each group.

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

$\boxed{(3x-2)(2x+3)}$

Try the following examples:

7.) $3x^2 - 2x - 8$ $(3)(-8) = -24$

1	24
2	12
3	8
4	6

$(3x^2 - 6x) + (4x - 8)$

$3x(x-2) + 4(x-2)$

$(x-2)(3x+4)$

8.) $3x^2 + x - 14$ $(3)(-14) = -42$

1	42
2	21
3	14
6	7

$3x^2 + 7x - 6x - 14$

$(3x^2 + 7x) - (6x + 14)$ careful!

$x(3x+7) - 2(3x+7)$

$(3x+7)(x-2)$

9.) $x^2 + x - 20$ $(1)(20) = 20$

1	20
2	10
4	5

$x^2 - 4x + 5x - 20$

$(x^2 - 4x) + (5x - 20)$

$x(x-4) + 5(x-4)$

$(x-4)(x+5)$

10.) $-2x^2 + 3x + 9$ $(-2)(9) = -18$

1	18
2	9
3	6

$-2x^2 - 3x + 6x + 9$

$(-2x^2 - 3x) + (6x + 9)$

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

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

Notes 6.4 - Special Cases of Factoring

Multiply the following binomials together:

1.) $(x-4)(x+4)$

$x^2+4x-4x-16$

x^2-16

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

	$3x$	5
$3x$	$9x^2$	$15x$
-5	$-15x$	-25

$9x^2-25$

General form for a difference of perfect squares:

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

Factor:

3.) x^2-9

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

4.) $-9+x^2$

x^2-9

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

5.) x^2+16

prime

6.) x^4-81

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

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

Multiply the following binomials together:

7.) $(x+4)(x+4)$

$x^2+4x+4x+16$

$x^2+8x+16$

8.) $(3x+5)(3x+5)$

	3x	5
3x	$9x^2$	15x
5	15x	25

$9x^2+30x+25$

General form for squaring a binomial:

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

Factor.

9.) x^2+6x+9

$(x+3)^2$

10.) $25x^2+60xy+36y^2$

$(5x+6y)^2$

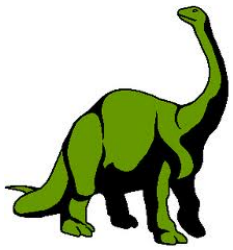
11.) $x^2-14x+49$

$(x-7)^2$

12.) $x^2-10x-25$

prime

Notes 6.5 - Factoring Completely



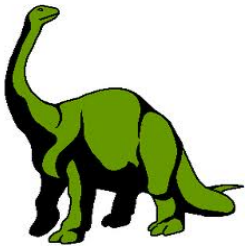
Try these steps in the following order.

A. Is there a GCF?

B. Does it look a Difference of Perfect Squares?

C. Can I factor a trinomial by grouping or trial-and-error?

D. Is my final answer completely factored?



Factor completely.

1.) $50x^2 - 242y^4$

$2(25x^2 - 121y^4)$

$2(5x+11y^2)(5x-11y^2)$

2.) $c^3 + 2c^2 - 35c$

$C(c^2+2c-35)$

$\boxed{c(c+7)(c-5)}$

3.) $9x^2 - 78x - 27$

$3(3x^2 - 26x - 9)$

$3[(3x^2-27x)+(x-9)]$

$3[3x(x-9)+1(x-9)]$

$\boxed{3(x-9)(3x+1)}$

$(3)(-9) = -27$

27 | 1 27 | 3 9

4.) $x^2y^2 + 7x^2y - 60x^2$

$x^2(y^2+7y-60)$

$\boxed{x^2(y+12)(y-5)}$