Factoring – Day 1
Algebra 2

Targets:

1. I can factor polynomials
2. I can use factoring to simplify polynomial quotients.

Factor Rules

1. Greatest Common Factor (GCF) – What's in common
2. Difference of Two Squares
   Difference of Two Cubes
   Sum of Two Cubes
   } 2 Terms Binomial
3. ~~Perfect Square Trinomial~~ (#4)
4. General Trinomials
   } 3 Terms
5. Grouping 4+ Terms

* To get list of factors on TI-84. $Y= \frac{24}{X}$, 2nd table

1. Greatest Common Factor (GCF)

$2a^2 + 6a + 10$ $2(a^2+3a+5)$

2. Difference of Two Squares

1	36	121	256	x^2
4	49	144	289	x^4
9	64	169	324	x^6
16	81	196	361	x^8
25	100	225	400	x^{10}

$4x^2 - 25$ $(2x+5)(2x-5)$ opp

Difference of Two Cubes

1	x^3
8	x^6
27	x^9
64	x^{12}
125	x^{15}
216	x^{18}

$a^3 - 64$ a^3 64 $(a-4)(a^2+4a+16)$ opp Always recopy

Sum of Two Cubes

$a^3 + 27$ $(a+3)(a^2-3a+9)$

3. ~~Perfect Square Trinomial~~

$a^2 + 10a + 25$ $(a+5)(a+5) = (a+5)^2$

$a^2 - 14a + 49$ $(a-7)(a-7) = (a-7)^2$

4. General Trinomial (Second sign: + same, - different; Same – Sum, Different, Difference)

$a^2 + 7a + 12$

$(a+3)(a+4)$

$a^2 - a - 20$

$(a-5)(a+4)$

Same Sign, Sum

+	+	= (+)(+)
-	+	= (-)(-)
+	-	= (+)(-)
-	-	= (+)(-)

First, then

Different Sign, Difference

$2a^2 - 11a - 21$

$\frac{2a^2}{3a}$ $\frac{2a^2}{-14a}$

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

42

+3 −14

5. Grouping

$a^3 - 3a^2 + 4a - 12$

$a^2(a-3) + 4(a-3)$

$(a^2+4)(a-3)$

Factor

1. $16m^2 + 12mn^2$

$4mn(4m + 3n)$

2. $a^2x - b^2x + a^2y - b^2y$

$x(a^2-b^2) + y(a^2-b^2)$

$(x+y)(a^2-b^2)$

$(x+y)(a-b)(a+b)$

3. $4a^2 + 7a + 3$

$\frac{4a^2}{3a}$ $\frac{4a^2}{4a}$ $\quad 12 \quad 3\ 4$

$(4a+3)(a+1)$

4. $3a^2z - 27z$

$3z(a^2-9)$

$3z(a+3)(a-3)$

5. $a^3 + 125$

$(a+5)(a^2-5a+25)$

6. $a^4 - 81$

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

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

7. $4a^2 + 20a + 25$

$\frac{4a^2}{10a}$ $\frac{4a^2}{10a}$ $\quad 100 \quad +10\ +10$

$(2a+5)(2a+5)$

$(2a+5)^2$

8. $a^2 - 10a - 24$

$(a-12)(a+2)$

Factoring – Day 2
Algebra 2

Targets:

3. I can factor out a greatest common factor (GCF).
4. I can factor trinomial with a lead coefficient of 1.
5. I can factor trinomial with a lead coefficient not equal to 1.
6. I can factor a polynomial by grouping.

Greatest Common Factor (GCF):

Factor completely. If the polynomial is not factorable, write *prime*.

1. $16m^2n+12mn^2$

$4mn(4m+3n)$

2. $25k^4p^2-15k^3p^3+3k^2p^4$

$k^2p^2(25k^2-15kp+3p^2)$

3. $4a^2-24a-28$

$4(a^2-6a-7)$

$4(a-7)(a+1)$

4. $12k^3-60k^2+72k$

$12k(k^2-5k+6)$

$12k(k-2)(k-3)$

5. $16x^2-4x$

$4x(4x-1)$

6. $-3x+12$

$-3(x-4)$

Trinomial with lead coefficient of 1:

Factor completely. If the polynomial is not factorable, write *prime*.

For Factors: Calculator $y=\frac{24}{x}$

7. $6x^2+25x+4$

$\frac{6x^2}{x}$ $\frac{6x^2}{24x}$ 24 ^ 1 24

$(6x+1)(x+4)$

8. $-x^2-x+20$

$-1(x^2+x-20)$

$-1(x+5)(x-4)$

9. $10x^2+70x+15$

$5(2x^2+14x+3)$

10. x^2-5x-6

$(x-6)(x+1)$

11. $4x^2-31x+21$ $y=\frac{84}{x}$

$\frac{4x^2}{-3x}$ $\frac{4x^2}{-28x}$ 84 ^ $-3-28$

$(4x-3)(x-7)$

12. $2x^2-5x-12$

$\frac{2x^2}{3x}$ $\frac{2x^2}{-8x}$ 24 ^ $+3-8$

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

Factoring – Day 3
Algebra 2

Targets:

1. I can factor trinomial with a lead coefficient not equal to 1.
2. I can factor a polynomial by grouping.

Factoring steps using shortcut:

1. GCF
2. Multiply A and C
3. Find the factors (f_1, f_2) of AC that add to equal B
4. Write down A twice and put answers to part 3 underneath.
5. Write $\frac{A}{f_1}$ and $\frac{A}{f_2}$.
6. Simply and write your answer in ( )( ).

Factor completely. If the polynomial is not factorable, write *prime*.

1. $6x^2-11x+4$

$\frac{6x^2}{-3x}$ $\frac{6x^2}{-8x}$

$(2x-1)(3x-4)$

2. $4x^2-17x-21$

$\frac{4x^2}{4x}$ $\frac{4x^2}{-21x}$

$(x+1)(4x-21)$

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

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

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

4. $4x^2+12xy+9y^2$

$\frac{4x^2}{6xy}$ $\frac{4x^2}{6xy}$

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

$(2x+3y)^2$

13. $x^2+7x-18$

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

14. $6x^2-11xy-10y^2$

$\frac{6x^2}{4xy}$ $\frac{6x^2}{-15xy}$

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

15. $x^2+13x+20$

Prime

16. $x^2-15xy+36y^2$

$(x-3y)(x-12y)$

17. $x^2-16xy+39y^2$

$(x-3y)(x-13y)$

18. $x^2-4x-12$

$(x-6)(x+2)$

19. x^3+7x^2+12x

$x(x^2+7x+12)$

$x(x+3)(x+4)$

Factor by Grouping:

Factor completely. If the polynomial is not factorable, write *prime*.

20. $7b^2-14b+2b-4$

$7b(b-2)+2(b-2)$

$(7b+2)(b-2)$

21. $a^2x-b^2x+a^2y-b^2y$

$x(a^2-b^2)+y(a^2-b^2)$

$(x+y)(a^2-b^2)$

$(x+y)(a+b)(a-b)$

Factoring – Day 4

Algebra 2

Targets:

1. I can factor the difference of perfect squares.
2. I can factor the sum and difference of perfect cubes.

Difference of Squares: *There must be subtraction problem...not an addition problem.*

Difference of 2 Perfect Squares	$a^2 - b^2 = (a+b)(a-b)$

Factor completely. If the polynomial is not factorable, write *prime*.

1. $z^2 - 81$

$(z+9)(z-9)$

2. $4c^2 - 9$

$(2c+3)(2c-3)$

3. $9a^2 + 4$

$(3a+2)(3a-2)$

1	36	121	256	x^2
4	49	144	289	x^4
9	64	169	324	x^6
16	81	196	361	x^8
25	100	225	400	x^{10}

4. $x^4 - 81$

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

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

5. $16z^2 - 64$

$16(z^2-4)$

$16(z+2)(z-2)$

Difference and Sum of Cubes: *Be careful with the signs in your answer.*

Sum or Difference of 2 Perfect Cubes	
$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$	

Factor completely. If the polynomial is not factorable, write *prime*.

6. $x^3 - 27$

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

7. $x^3 + 64$

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

8. $8x^3 - 125$

$(2x-5)(4x^2+10x+15)$

1	x^3
8	x^6
27	x^9
64	x^{12}
125	x^{15}
216	x^{18}

Factoring – Day 5

Algebra 2

Targets:

1. I can factor a polynomial that is in quadratic form.

Original Equation	Substitution	$au^2+bu+c=0$ Form
$x^4-8x^2+15=0$	$u=x^2$	$u^2-8u+15=0$
$x^6+x^3-12=0$	$u=x^3$	$u^2+u-12=0$
$x^{1/2}-9x^{1/4}+20=0$	$u=x^{1/4}$	$u^2-9u+20=0$
$2x^{2/3}+7x^{1/3}-4=0$	$u=x^{1/3}$	$2u^2+7u-4=0$
$15x^{-2}+7x^{-1}-2=0$	$u=x^{-1}$	$15u^2+7u-2=0$

Factor completely. If the polynomial is not factorable, write *prime*.

1. x^4+5x^2-36

$(x^2)^2+5(x^2)^1-36$

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

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

$\frac{x^4}{9x^2}$ $\frac{x^4}{-4x^2}$

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

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

2. $6x^2y^2-xy-12$

$\frac{6x^2y^2}{-9xy}$ $\frac{6x^2y^2}{8xy}$ -72 -9 8

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

3. $2x^4-15x^2-27$

$2(x^2)^2-15(x^2)^1-27$

$\frac{2x^4}{3x^2}$ $\frac{2x^4}{-18x^2}$ -54 3 -18

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

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

4. $3x^{2/3}-5x^{1/3}-2$

$\frac{3x^{2/3}}{x^{1/3}}$ $\frac{3x^{2/3}}{}$

$(3x^{1/3}+1)(x^{1/3}-2)$

Simplifying Radicals – Day 6

Algebra 2

Target: I can simplify square roots.

Simplify

1. $\sqrt{48}$

$\sqrt{16 \cdot 3}$

$4\sqrt{3}$

2. $\sqrt{125}$

$\sqrt{25 \cdot 5}$

$5\sqrt{5}$

3. $\sqrt{200}$

$\sqrt{100 \cdot 2}$

$10\sqrt{2}$

4. $\sqrt{108}$

$\sqrt{36 \cdot 3}$

$6\sqrt{3}$

You Try!

Simplify

5. $\sqrt{216}$

$\sqrt{36 \cdot 6}$

$6\sqrt{6}$

6. $\sqrt{512}$

$\sqrt{256 \cdot 2}$

$16\sqrt{2}$

7. $\sqrt{80}$

$\sqrt{16 \cdot 5}$

$4\sqrt{5}$

8. $\sqrt{45}$

$\sqrt{9 \cdot 5}$

$3\sqrt{5}$

9. $\sqrt{147}$

$\sqrt{49 \cdot 3}$

$7\sqrt{3}$

10. $\sqrt{128}$

$\sqrt{64 \cdot 2}$

$8\sqrt{2}$

11. $\sqrt{75}$

$\sqrt{25 \cdot 3}$

$5\sqrt{3}$

12. $\frac{3 \pm \sqrt{150}}{2}$

$\frac{3 \pm \sqrt{25 \cdot 6}}{2}$

$\frac{3 \pm 5\sqrt{6}}{2}$