# Chapter Pre-3 Factoring

## Algebra 2

# 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)
2. Difference of Two Squares

   Difference of Two Cubes

   Sum of Two Cubes
3. ~~Perfect Square Trinomial~~ (#4)
4. General Trinomials
5. Grouping

1. Greatest Common Factor (GCF)

$2a^2 + 6a + 10$

2. Difference of Two Squares

$4x^2 - 25$

| | | | | |
|---|---|---|---|---|
| 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 | $x^{10}$ |

Difference of Two Cubes

$a^3 - 64$

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

Sum of Two Cubes

$a^3 + 27$

3. ~~Perfect Square Trinomial~~

$a^2 + 10a + 25$

$a^2 - 14a + 49$

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

$a^2 + 7a + 12$

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

$a^2 - a - 20$

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

$2a^2 - 11a - 21$

5. Grouping

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

**Factor**

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

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

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

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

5. $a^3 + 125$

6. $a^4 - 81$

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

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

# 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. $16m^2n+12mn^2$
2. $25k^4p^2-15k^3p^3+3k^2p^4$
3. $4a^2-24a-28$

4. $12k^3-60k^2+72k$
5. $16x^2-4x$
6. $-3x+12$

**<u>Trinomial with lead coefficient of 1:</u>**
**Factor completely. If the polynomial is not factorable, write *prime*.**

7. $6x^2+25x+4$
8. $-x^2-x+20$
9. $10x^2+70x+15$

10. $x^2-5x-6$
11. $4x^2-31x+21$
12. $2x^2-5x-12$

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

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

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

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

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

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

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

**Factor by Grouping:**

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

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

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

# 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. $6x^2 - 11x + 4$
2. $4x^2 - 17x - 21$
3. $3x^2 + 9x + 6$
4. $4x^2 + 12xy + 9y^2$

# 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. $z^2-81$
2. $4c^2-9$
3. $9a^2+4$

| | | | | |
|---|---|---|---|---|
| 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. $x^4-81$
5. $16z^2-64$

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

| **Sum or Difference of 2 Perfect Cubes** | |
|---|---|
| $a^3+b^3=(a+b)(a^2-ab+b^2)$<br>$a^3-b^3=(a-b)(a^2+ab+b^2)$ | |

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

6. $x^3-27$
7. $x^3+64$
8. $8x^3-125$

| | |
|---|---|
| 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. $x^4+5x^2-36$

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

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

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

# Simplifying Radicals – Day 6

## Algebra 2

**Target:** I can simplify square roots.

**Simplify**

1. $\sqrt{48}$
2. $\sqrt{125}$
3. $\sqrt{200}$
4. $\sqrt{108}$

You Try!

**Simplify**

5. $\sqrt{216}$
6. $\sqrt{512}$
7. $\sqrt{80}$
8. $\sqrt{45}$

9. $\sqrt{147}$
10. $\sqrt{128}$
11. $\sqrt{75}$
12. $\frac{3\pm\sqrt{150}}{2}$