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Livestream #1

September 1, 2025

Grade 9

Algebra

Polynomials III

Goals

- Learn the basic techniques of factoring.
- Common factoring.
- Factoring by grouping.
- Trinomial factoring (decomposition).
- Difference of squares

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Common Factoring

Factor the following binomials by using common factoring.

1. $4x - 10$

2. $x^5 - 2x^3$

3. $3x^2 - 12x$

4. $5x^3 + 20x^2$

5. $2x^2y - 16xy^2$

6. $-x^3 + x^4y$

Factor the following trinomials by using common factoring.

7. $6m^3n^2 - 2m^2n^3 + 4m^2n^2$

8. $9xyz - 3x^2y + 6xyz^2$

9. $16p^2q^2 - 8p^2q^4 - 24p^4q^2$

Factor each expression below by identifying a binomial that is a common factor.

10. $3x(x + y) - 4(x + y)$

11. $2a(a - b) + 5b(a - b)$

12. $3p(p + 5) - 7(p + 5)$

Factoring by Grouping

Factor each expression by using grouping.

1. $ay + a + 4y + 4$

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

3. $x^3 - 7x^2y - 3xy + 21y^2$

4. $xy + 3xz + 2yz + 6z^2$

Factor each expression by using grouping. Remember to look for a common factor first.

5. $3x^2 - 12x - 3xy + 12y$

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

7. $-4x^2 + 8xy - 20x + 40y$

8. $60x^2 - 30xy + 10xy^2 - 5y^3$

Trinomial Factoring

Each trinomial below can be factored with the short cut method (because $a = 1$). Factor each by using this method.

1. $x^2 + 8x + 15$

2. $n^2 - 8n - 9$

3. $x^2 + 6x - 16$

4. $m^2 - 6m + 9$

Factor each trinomial by using the decomposition method.

5. $2x^2 + 5x + 3$

6. $6x^2 + 17x - 3$

7. $3x^2 + 8x + 4$

8. $6x^2 - 5x - 1$

Factor each two-variable trinomial by using the decomposition method.

9. $2n^2 - 7mn - 15m^2$

10. $9a^2 + 12ab + 4b^2$

11. $8a^2 - 14ab + 3b^2$

12. $15p^2 - pq - 2q^2$

Factor each trinomial. Remember to first look for a common factor.

13. $6x^3 + 33x^2 + 45x$

14. $24x^2 - 72xy + 54y^2$

15. $20b^2 + 70b + 60$

16. $4x^2y - 17xy - 15y$

Difference of Squares

Factor each expression using difference of squares.

1. $4x^2 - 1$

2. $64d^2 - 25$

3. $1 - 49x^2$

4. $16t^2 - 121$

Factor each two-variable binomial by using difference of squares.

5. $25x^2 - 36y^2$

6. $100u^2 - 81v^2$

7. $x^2y^2 - 4$

8. $n^4 - 36m^2$

Factor each binomial. Remember to first look for a common factor.

9. $50y^2 - 72$

10. $x^2z - 25y^2z$

11. $36c - 121cd^2$

12. $20a^2b - 5bc^2$

Answers

Common Factoring

1. $2(2x-5)$

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

3. $3x(x-4)$

4. $5x^2(x+4)$

5. $2xy(x-8y)$

6. $-x^3(1-xy) = x^3(xy-1)$

7. $2m^2n^2(3m-n+2)$

8. $3xy(3z-x+2z^2)$

9. $8p^2q^2(2-q^2-3p^2)$

10. $(x+y)(3x-4)$

11. $(a-b)(2a+5b)$

12. $(p+5)(3p-7)$

Grouping

1. $(y+1)(a+4)$

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

3. $(x-7y)(x^2-3y)$

4. $(y+3z)(x+2z)$

5. $3(x-4)(x-y)$

6. $2y(x-1)(x-y)$

7. $-4(x-2y)(x+5)$

8. $5(2x-y)(6x+y^2)$

Answers

Trinomial Factoring

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

2. $(n-9)(n+1)$

3. $(x+8)(x-2)$

4. $(m-3)^2$

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

6. $(6x-1)(x+3)$

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

8. $(6x+1)(x-1)$

9. $(2n+3m)(n-5m)$

10. $(3a+2b)^2$

11. $(4a-b)(2a-3b)$

12. $(3p+q)(5p-2q)$

13. $3x(2x+5)(x+3)$

14. $6(2x-3y)^2$

15. $10(2b+3)(b+2)$

16. $y(4x+3)(x-5)$

Difference of Squares

1. $(2x-1)(2x+1)$

2. $(8d-5)(8d+5)$

3. $(1-7x)(1+7x)$

4. $(4t-11)(4t+11)$

5. $(5x-6y)(5x+6y)$

6. $(10u-9v)(10u+9v)$

7. $(xy-2)(xy+2)$

8. $(n^2-6m)(n^2+6m)$

9. $2(5y-6)(5y+6)$

10. $z(x-5y)(x+5y)$

11. $c(6-11d)(6+11d)$

12. $5b(2a-c)(2a+c)$