Algebra RH

Essential Question: How can we factor polynomials?

Do Now: Find the GCF of each set of terms.

(a) $36a^4b^3$ and $48a^2$

(b) $14x^2y^4$ and $21xy^3$

Let's Review Some Important Vocabulary

Factors: Numbers and variables that when multiplied together produce a given product.

Examples: Factors of 36 = {1,2,3,4,6,9,12,18,36} Factors of $6x$ = {1,6x,x,6,2x,3,2,3x}

Integral Factors: Factors that are integers.

Example: The integral factors of 4 = {1, 2, 4, -1, -2, -4}

Factoring: Rewriting a polynomial expression as a product.

Example: $6x^2 + 3$ in factored form => $3(2x^2 + 1)$

Prime Polynomials: A polynomial is prime if it cannot be written as a product of polynomials with integer coefficients.

Example: $2x + 5$ Non-example: $2x + 4$ can be factored into $2(x + 2)$

Factoring Polynomials by factoring out a Monomial (GCF) *GCF(_____)*

- **Determine the GCF of each term (1st factor)**
- **Divide each term by the GCF in order to find the second factor**

Examples:

1. $9a^4 + 6a^3 - 12a$

2. $4x^2y^3 - 2xy$

3. $64x^3 - 56x^2 + 88x$

4. $18abc + 4bc - 2a^2bc^2$

5. $24x^3 + 32x + 15$

6. $a^3b^2 + a^3b^4 + ab^4$

Factoring a Quadratic Trinomial (coefficient of x^2 is 1) $x^2 + bx + c$

AM Method

$x^2 + bx + c$ factors into 2 binomials $(x + p)(x + q)$ where $p + q = b$ and $pq = c$

Examples:

7. $x^2 + 11x + 28$

8. $x^2 - 9x + 8$

9. $x^2 + x - 20$

10. $x^2 - 10x - 21$

11. $x^2 + 14x + 40$

12. $x^4 - 2x^2 - 15$

13. $x^2 - 33x - 280$

14. $x^2 + 8xy - 33y^2$

Factoring the Difference of Two Squares ("DOTS") $a^2 - b^2$

- **In order to factor DOTS, you much recognize DOTS.**

  Example: Is $x^2 - 9$ a difference of two squares (DOTS)?

  Both x^2 and **9** are perfect squares. Since we are subtracting the perfect squares, this expression is referred to as the **difference of two squares**.

- **Once you have DOTS, take the square root of each term.**

  In $x^2 - 9$...
  - What times itself is x^2? _____
  - What times itself is **9**? _____

List the perfect squares...

- **Using each root, create a sum and difference.**

  The factors are _____ and _____.

  Therefore, the factorization of $x^2 - 9$ is _____.

Rule: $a^2 - b^2$ = _____

Factor the following expressions using the **DOTS** method.

15) $x^2 - 1$	16) $81x^2 - 25$
17) $64x^2 - 9$	18) $x^2 - y^4$
19) $x^2y^4 - 16$	20) $144 - a^2$
21) $25a^2 - 16b^2$	22) $49x^4 - 144y^8$

23) A rectangle has an area of $16x^2 - 64$. What could be the dimensions of the rectangle?

24) Is $a^2 + b^2$ factorable? Explain.

25) Is $x^9 - 4$ factorable? Explain.

Algebra RH HW #

Factor out GCF.

1. $16c^7 - 6c^3$	2. $8y^5 - 12y^3 + 4y$	3. $14z^8 + 24z^7 - 30z^3$
4. $25d^5 + 45d^4$	5. $9k^4 + 12k^3 - 6k$	6. $c^3 + c^2 - c$
7. $6n^2 - 30n + 42$	8. $100z^9 + 50z^6 - 75z^5$	9. $18p^3 - 63p^2 - 9p$
10. $36k - 30$	11. $-7m^2 - 10m + 17$	12. $2c^5d^4 - 3c^4 + 4c^3$

Factor using AM method.

13. $x^2 + 3x - 18$	14. $t^2 - t - 72$	15. $t^2 + 4t - 12$
16. $d^2 - 13d + 36$	17. $t^2 + 4t - 21$	18. $m^2 + 11m + 24$
19. $x^2 - 10x - 24$	20. $x^2 - 10x - 11$	21. $x^2 + 7xy + 12y^2$
22. $x^2 - 5xy - 50y^2$	23. $x^2 + 2xy - 15y^2$	24. $x^2 - 9xy - 36y^2$

Factor using DOTS.

25. $4x^2 - 9$	26. $64 - 100y^2$	27. $m^6 - 36n^2$
28. $121x^2y^2 - 1$	29. $(a + b)^2 - m^2$	30. $169x^4y^{10} - 225z^2$