Algebra 1R – Mr. Bo
Unit 12 – Day 3 Notes

Name _____
Date _____

Factoring – GCF & Difference of Squares

What is factoring? Rewrite an expression as a product.

GCF Factoring:

To find the GCF of numbers: pick the largest # that divides into each of the #'s.

To find the GCF of variables: pick the smallest exponent of each of the letters.

Examples: Find the Greatest Common Factor

1. $5v^5 + 10v^3$

GCF = $5v^3$

2. $3x^2 - 18$

GCF = 3

3. $4x^3 - 2x^2 - 6x$

GCF = $2x$

Examples: Factor Using a GCF

4. $8x^2 - 12x$ GCF = $4x$

$= 4x(2x - 3)$

$8 \div 4$ $12 \div 4$

Check: $4x(2x - 3)$

$= 8x^2 - 12x$ ✓

5. $5d^3 + 10d$ GCF = $5d$

$= 5d(d^2 + 2)$

Check: $5d(d^2 + 2) = 5d^3 + 10d$ ✓

6. $6x^3 - 12x^2 - 24x$

GCF = $6x$

$= 6x(x^2 - 2x - 4)$

Check: $6x(x^2 - 2x - 4)$

$= 6x^3 - 12x^2 - 24x$ ✓

7. $13ab^3 + 39a^2b^4$

GCF = $13ab^3$

$= 13ab^3(1 + 3ab)$

Check: $13ab^3(1 + 3ab)$

$= 13ab^3 + 39a^2b^4$ ✓

Difference of Perfect Squares Factoring:

Make a list of perfect squares using numbers: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, ...

Make a list of perfect squares using variables: $x^2, x^4, x^6, x^8, x^{10}, \ldots$

a perfect square — a perfect square

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

subtraction.

Examples:

8. $x^2 - 64$

$= (x-8)(x+8)$

Check:

$(x-8)(x+8)$

$= x^2 + 8x - 8x - 64$

$= x^2 - 64$ ✓

9. $x^2 - 36$

$= (x-6)(x+6)$

Check:

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

$= x^2 + 6x - 6x - 36$

$= x^2 - 36$ ✓

10. $4x^2 - 25$

$= (2x-5)(2x+5)$

Check: $(2x-5)(2x+5)$

$= 4x^2 + 10x - 10x - 25$

$= 4x^2 - 25$ ✓

11. $9 - 121x^2$

$= (3-11x)(3+11x)$

Check:

$(3-11x)(3+11x)$

$= 9 + 33x - 33x - 121x^2$

$= 9 - 121x^2$ ✓

12. $144 - x^4$

$= (12 - x^2)(12 + x^2)$

Check: $(12-x^2)(12+x^2)$

$= 144 + 12x^2 - 12x^2 - x^4$

$= 144 - x^4$ ✓

13. $9x^6 - 225y^2$

$= (3x^3 - 15y)(3x^3 + 15y)$

Check:

$(3x^3 - 15y)(3x^3 + 15y)$

$= 9x^6 + 45y - 45y - 225y^2$

$= 9x^6 - 225y^2$ ✓

Factor Completely. If the expression is not factorable, write "Does Not Factor".

14. $2x^2 - 16$

GCF = 2

$= 2(x^2 - 8)$

* no perfect squares!

15. $x^2 + 25$

Does not factor.

*not a difference.

16. $3x^2 - 27$

GCF = 3

$= 3(x^2 - 9)$ ← diff of squares.

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

17. $4x^3 - x$

GCF = x

$= x(4x^2 - 1)$ ← diff of squares.

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

18. $3x^4 - 9x^5$

GCF = $3x^4$

$= 3x^4(1 - 3x)$ ← no perfect squares.