

Algebra II Factoring Unit

Factoring I: Common monomials and factoring $x^2 + bx + c$

EX 1: Find the GCF of $18x^2$ and $24x$:
GCF = Greatest Common Factor

EX 2: Factor: $12x^2y^3 + 6xy^4 - 24xy^5$
What is common to every item in there? _____
Put that on the outside and "pull it out" of every term -- divide. Remainder goes inside the parenthesis.

EX 3: Factor $x^2 - 9x + 20$
Product of the factors must be 20 and the sum of the factors must be (-9).

Factors	Sum

EX 4: FOIL $(x - 4)(x - 5)$. Write answer in standard form for a quadratic.

EX 5: Factor $x^2 - x - 2$
Product = -2

Sum = -1

<u>Factors</u>	<u>Sum</u>

EX 6: Factor $3x^3 - 6x^2 - 24x$
Common factor first?

EX 7: Factor: $x^2 + 16$ ($x^2 + 0x + 16$)
Looking for two numbers whose product is +16 and sum = 0

Homework: Complete factoring worksheet 1.

Factoring Worksheet # 1

Algebra II (CP)

I. FACTOR (GCF)

1. $27b^3 - 27c^3 + 27bc$

2. $23a^3 + a^2$

3. $12a + 16a^2$

4. $14p^3 - 21p^2q$

5. $8x^3 + 40x$

6. $8a^2b + 4ab^2$

II. FACTOR (into the product of two binomials)

7. $x^2 + 7x + 10$

8. $p^2 + 14p + 13$

9. $w^2 - w - 30$

10. $x^2 - 10x + 16$

11. $n^2 + 4n - 12$

12. $x^2 - 12x + 35$

13. $x^2 - 11x - 12$

14. $x^2 - 9x + 18$

15. $w^2 + 2w - 8$

16. $m^2 + 3m - 10$

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

18. $y^2 - 6y + 5$

III. FACTOR (pull out a common factor first)

19. $2m^2 + 18m + 36$

20. $4y^3 - 20y^2 - 24y$

21. $a^3 - 8a^2b + 7ab^2$

Factoring II: Special Case Factoring

Perfect square trinomials:

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

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

EX 1: Factor: $x^2 + 8x + 16$

Product =	Sum =

EX 2: Factor: $2x^2 - 20x + 50$

Pull out a common factor first: _____

Result is a perfect square trinomial. Factor it.

Factoring difference of squares: $a^2 - b^2 = (a - b)(a + b)$

EX 3: Factor $x^2 - 81$

EX 4: Factor: $16x^4 - 25$

EX 5: Factor: $25 - x^2y^4$

Factoring by grouping:

EX 6: Factor: $x^2 + 3x + ax + 3a$

Notice a pattern -- there are x's and a's

EX 7: Factor by grouping: $xy + x^2 + 5y + 5x$

Homework: Complete factoring worksheet 2.

Factoring Worksheet #2

Algebra II (CP)

I. FACTOR (perfect square trinomials)

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

2. $y^2 - 16y + 64$

3. $m^2 - 10m + 25$

4. $x^2 - 18x + 81$

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

6. $9 - 6d + d^2$

II. FACTOR (difference of squares)

7. $x^2 - 4$

8. $x^2 - 36$

9. $2x^2 - 18$

10. $9x^2 - 25$

11. $x^2 - 121$

12. $2x^4 - 32$

13. $25 - m^2$

14. $m^4 - 1$

15. $9x^4 - 9x^2$

III. FACTOR (by grouping)

16. $x^2 + xy + 3x + 3y$

17. $m^2 + 3m - xm - 3x$

18. $ab + a^2 + 3a + 3b$

19. $4x + 20 + x^3 + 5x^2$

20. $8x + 16 - x^3 - 2x^2$

21. $x + xy - 2 - 2y$

22. $16 - 8x + 4b - 2bx$

23. $3x - 15 - ax + 5a$

Factoring IV: Solve by factoring.

Rule: If $ab = 0$, then a , b , or both must = 0 (Zero Product Property)

EX 1: Solve by factoring: $x^2 + 11x + 18 = 0$

(1) Factor: Product = 18, Sum = 11

(2) Set each term = to 0 and solve:

EX 2: Solve by factoring: $x^2 - 14x + 33 = 0$

EX 3: Solve by factoring: $3x^2 - 3x = 6$

EX 4: Solve by factoring: $x^3 + 4x^2 + 3x = 0$

Homework: Complete factoring worksheet 4.

Factoring Worksheet #4

Algebra II (CP)

I. SOLVE BY FACTORING:

1. $x^2 + 2x - 3 = 0$

2. $m^2 - 4m - 5 = 0$

3. $x^2 + 13x + 36 = 0$

4. $t^2 - 64 = 0$

5. $v^2 + 14v + 49 = 0$

6. $7p^2 + 7p - 84 = 0$

7. $0 = x^3 - 4x^2 + 4x$

8. $12m = -35 - m^2$

9. $h^2 + h - 42 = 0$

10. $x^2 - 2x - 15 = 0$

11. $m^2 + 2m = 35$

12. $2v^2 = 3v$

Factoring VI: Factoring with $a > 1$

EX 1: Factor $2x^2 + 5x + 3$

Part of this is trial and error -- you know the product of the first terms must be 2 -- where do you put everything else? Also know both signs will be +.

$$(2x + \underline{\quad}) (x + \underline{\quad})$$

EX 2: Factor $6x^2 - 7x + 2$

Know both signs will be negative (-, +) means both are negative
(+, +) means both will be positive
(-, -) or (+, -) means one of each sign

Factors of a:

Factors of c:

EX 3: Solve by factoring: $4x^2 - 4x - 3 = 0$

EX 4: Solve by factoring: $0 = 10y^3 + 26y^2 - 12y$
Pull out a (2y):

Factor the quadratic:

Set each piece (3 of them) equal to 0 and solve:

Factoring Worksheet #6

Algebra II (CP)

I. FACTOR

1. $2x^2 + 7x + 5$

2. $7x^2 - 36x + 5$

3. $y^2 + 10y + 9$

4. $4x^2 - 12x - 7$

5. $3x^2 + 11x - 4$

6. $10k^2 - 23k + 12$

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

8. $5y^2 + 13y + 6$

9. $4n^2 - 3n - 7$

II. SOLVE BY FACTORING:

10. $4x^2 - 4x - 3 = 0$

11. $3x^2 - 14x - 5 = 0$

12. $3x^2 + 14x - 49 = 0$

13. $6a^2 - 11a = 10$

14. $2p^2 + 5p = 12$

15. $0 = 9x^4 + 12x^3 + 4x^2$