

Factoring Review Sheet

Factoring Using GCF:

To factor using a GCF, take the greatest common factor (GCF), for the numerical coefficient. When choosing the GCF for the variables, if all terms have a common variable, take the ones with the lowest exponent.

Example: $9x^4 + 3x^3 + 12x^2$

GCF: Coefficients = 3
Variables (x) = x^2

GCF = $3x^2$

Next, you just divide each monomial by the GCF!

Answer = $3x^2(3x^2 + x + 4)$

Then, check by using the distributive property!

Factor each of the following using the GCF and check by using the distributive property:

1) $2a + 2b$

2) $5x^2 + 5$

3) $18c - 27d$

4) $hb + hc$

5) $6x - 18$

6) $3a^2 - 9$

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

8) $p + prt$

9) $10x - 15x^3$

10) $2x - 4x^3$

11) $8x - 12$

12) $8 - 4y$

13) $3ab^2 - 6a^2b$

14) $10xy - 15x^2y^2$

15) $21r^3s^2 - 14r^2s$

16) $2x^2 + 8x + 4$

17) $6c^3d - 12c^2d^2 + 3cd$

18) $3x^2 - 6x - 30$

19) $ay - 4aw - 12a$

20) $c^3 - c^2 + 2c$

21) $2ma + 4mb + 2mc$

22) $9ab^2 - 6ab - 3a$

23) $15x^3y^3z^3 - 5xyz$

24) $24x^{11} + 4x^{10} - 6x^9 + 2x^8$

25) $26x^4y - 39x^3y^2 + 52x^2y^3 - 13xy^4$

26) $16x^5 + 12xy - 9y^5$

Factoring Trinomials (Case I):

Case I is when there is a coefficient of 1 in front of your variable² term (x^2).

You have two hints that will help you:

- 1) When the last sign is addition, both signs are the same and match the middle term.
- 2) When the last sign is subtraction, both signs are different and the larger number goes with the sign of the middle term.

Examples:

Hint #1:

$x^2 - 5x + 6$

Hint #2:

$x^2 + 5x - 36$

$(x - \quad)(x - \quad)$

Find factors of 6, w/ sum of 5.

$(x - 3)(x - 2)$

CHECK USING FOIL

$(x - \quad)(x + \quad)$

Find factors of 36 w/ difference of 5.

$(x - 4)(x + 9)$

CHECK USING FOIL

Factor each trinomial into two binomials and check using FOIL:

1) $a^2 + 3a + 2$

2) $c^2 + 6c + 5$

3) $x^2 + 8x + 7$

4) $r^2 + 12r + 11$

5) $m^2 + 5m + 4$

6) $y^2 + 12y + 35$

7) $x^2 + 11x + 24$

8) $a^2 + 11a + 18$

9) $16 + 17c + c^2$

10) $x^2 + 2x + 1$

11) $z^2 + 10z + 25$

12) $a^2 - 8a + 7$

13) $a^2 - 6a + 5$

14) $x^2 - 5x + 6$

15) $x^2 - 11x + 10$

16) $y^2 - 6y + 8$

17) $15 - 8y + y^2$

18) $x^2 - 10x + 24$

19) $c^2 - 14c + 40$

20) $x^2 - 16x + 48$

21) $x^2 - 14x + 49$

22) $x^2 - x - 2$

23) $x^2 - 6x - 7$

24) $y^2 + 4y - 5$

25) $z^2 - 12z - 13$

26) $c^2 - 2c - 15$

27) $c^2 + 2c - 35$

28) $x^2 - 7x - 18$

29) $z^2 + 9z - 36$

30) $x^2 - 13x - 48$

31) $x^2 - 16x + 64$

32) $x^2 - 11x - 42$

33) $x^2 - 9$

34) $x^2 - 36$

35) $x^2 - 121$

36) $64x^2 - 81$

37) $9x^2 - 25$

38) $144x^2 - 49$

39) $x^2 - 225$

40) $x^2 + 100$

41) $x^2 - 44$

42) $x^2 - x - 9$

43) $x^2 - 8x + 17$

44) $x^2 + 64$

Factoring Trinomials (Case II):

Use Case II when a trinomial has a coefficient other than 1 for the x^2 term.

Let's look at the following example: $6x^2 + 5x - 4$

1) **Look for a GCF:** There is no GCF for this trinomial and the only way this method works is if you take it out right away.

2) **Take the coefficient for x^2 (6) and multiply it with the last term (4):**

$$\begin{array}{l} 6x^2 + 5x - 4 \\ x^2 + 5x - 24 \end{array} \qquad 6 * 4 = 24$$

3) **Factor the new trinomial using Case I:**

$$\begin{array}{l} x^2 + 5x - 24 \\ (x + 8)(x - 3) \end{array}$$

- 4) **Take the coefficient that you multiplied in the beginning (6) and put it back in the parenthesis (only with the x):**

$$(x + 8)(x - 3)$$
$$(6x + 8)(6x - 3)$$

- 5) **Find the GCF on each factor (of each set of parenthesis):**

$$(6x + 8) = 2(3x + 4)$$
$$(6x - 3) = 3(2x + 1)$$

- 6) **Keep the factor left in parenthesis:**

$$(3x + 4)(2x - 1)$$

- 7) **Foil Check**

Factor each of the following:

- 1) $2x^2 + 15x + 7$ 2) $3x^2 - 5x - 12$ 3) $9x^2 + 11x + 2$ 4) $7x^2 - 22x + 3$
- 5) $18x^2 - 9x - 2$ 6) $4x^2 + -7x - 2$ 7) $2x^2 + 13x + 21$ 8) $11x^2 - 98x - 9$
- 9) $3x^2 - 20x - 63$ 10) $3x^2 - 20x - 7$ 11) $8x^2 + 13x - 6$ 12) $4x^2 - 17x - 42$
- 13) $2x^2 - 9x - 18$ 14) $6x^2 + 17x - 14$ 15) $3x^2 + 5x - 12$ 16) $2x^2 + 9x + 4$

Factoring Completely:

When asked to factor completely, you will have to use a combination of the methods that we have used previously.

Factor Completely:

- 1) $4x^2 + 20x + 24$ 2) $10x^2 - 80x + 150$ 3) $9x^2 + 90x - 99$ 4) $3x^3 + 27x^2 + 60x$
- 5) $12x^6 + 27x^5 + 60x^4$ 6) $8x^9 + 24x^8 + 192x^7$