

Factoring Practice

I. Greatest Common Factor (GCF)

Find the GCF of the numbers.

$$\begin{array}{l} 18, 30 \\ 18 = 2 \cdot 3 \cdot 3 \\ 30 = 2 \cdot 3 \cdot 5 \\ 2 \cdot 3 = 6 \\ 6 = \text{GCF} \end{array}$$

1. 12, 18
2. 10, 35
3. 8, 30
4. 16, 24
5. 28, 49
6. 27, 63
7. 30, 45
8. 48, 72

II. Greatest Common Monomial Factor

Factor, write prime if prime.

$$12a^3b + 15ab^3 = 3ab(4a^2 + 5b^2)$$

1. $6x + 3$
2. $24x^2 - 8x$
3. $6x - 12$
4. $2x^2 + 8x$
5. $4x + 10$
6. $10x^2 + 35x$
7. $10x^2y - 15xy^2$
8. $12x^2 - 9x + 15$
9. $3n^3 - 12n^2 - 30n$
10. $9m^2 - 4n + 12$
11. $2x^3 - 3x^2 + 5x$
12. $13m + 26m^2 - 39m^3$
13. $17x^2 + 34x + 51$
14. $18m^2n^4 - 12m^2n^3 + 24m^2n^2$

III. Factoring the Difference of Two Squares

$$\begin{array}{l} a^2 - 36 = (a + 6)(a - 6) \\ 3x^2 - 48 = 3(x^2 - 16) = 3(x + 4)(x - 4) \end{array}$$

Factor, write prime if prime.

1. $x^2 - 1$
2. $x^2 - 9$
3. $x^2 + 4$
4. $x^2 - 25$
5. $9y^2 - 16$
6. $4x^2 - 25$
7. $9x^2 - 1$
8. $a^2 - x^2$
9. $25 - m^2$
10. $x^2 - 16y^2$
11. $25m^2 - n^2$
12. $-x^2 + 16$
13. $36m^2 - 121$
14. $2x^2 - 8$
15. $25 + 4x^2$
16. $4a^2 - 81b^2$
17. $12x^2 - 75$
18. $a^2b - b^3$
19. $-98 + 2x^2$
20. $5x^2 - 45y^2$
21. $9x^4 - 4$
22. $16x^4 - y^2$

X. Factoring: Putting It All Together

$$5x^2 + 20x - 60 = 5(x^2 + 4x - 12) = 5(x + 6)(x - 2)$$

Factor Completely, write prime if prime.

- $2x^2 - 8$
- $2x^2 + 8x + 6$
- $3n^2 + 9n - 30$
- $6x^2 - 26x - 20$
- $2x^2 + 12x - 80$
- $5t^2 + 15t + 10$
- $8n^2 - 18$
- $14x^2 + 7x - 21$
- $4x^2 + 16x + 16$
- $18x + 12x^2 + 2x^3$
- $2x - 2xy^2$
- $3t^3 - 27t$
- $24a^2 - 30a + 9$
- $10x^2 + 15x - 10$
- $3x^2 - 42x + 147$
- $4x^4 - 4x^2$

XI. ...More Factoring: Putting It All Together

- $16x^2 - 40x - 24$
- $27x^2 - 36x + 12$
- $5x^2 - 60x - 140$
- $6m^3 + 54m^2 - 6m$
- $5k^4 + 8k^3 - 4k^2$
- $x^2y^4 - x^6$
- $y^4 - 6y^2 - 16$
- $x^4 - 3x^2 - 4$
- $h^2 - (a^2 - 6a + 9)$
- $81x^4 - 16y^4$
- $4mn^2 - 4m^2n^2 + m^3n^2$
- $(2a + 3)^2 - (a - 1)^2$
- $16d^8 - 8d^4 + 1$
- $x^2(x^2 - 4) + 4x(x^2 - 4) + 4(x^2 - 4)$

XII. Extra: Factoring by Grouping

$$\begin{aligned} 6ax - 2b - 3a + 4bx &= 6ax - 3a + 4bx - 2b \\ &= 3a(2x - 1) + 2b(2x - 1) \\ &= (2x - 1)(3a + 2b) \end{aligned}$$

- $x^2 + 2x + xy + 2y$
- $3a^2 - 2b - 6a + ab$
- $t^3 - t^2 + t - 1$ Hint: $t - 1 = 1(t - 1)$
- $10 + 2t - 5s - st$
- $\frac{2}{3}bc - \frac{14}{3}b + c - 7$
- $4u^2 + v + 2uv + 2u$
- $ad + 3a - d^2 - 3d$
- $n^2 + 2n + 3mn + 6m$
- $2ax^2 + bx^2 - 2ay^2 - by^2$
- $yz^2 - y^3 + z^3 - y^2z$
- $y^3 - y^2 - 4y + 4$
- $x^2a + x^2b - 16a - 16b$
- $x^3 + x^2 - x - 1$
- $a^3 - a^2 - 8a + 8$