

# Factoring by Grouping Assignment

Factor the following polynomials by grouping.

1.  $ax + an + bx + bn$

2.  $y^3 + y^2 + y + 1$

3.  $p^2 + 2p + 5p + 10$

4.  $x^2 - 2x + 5x - 10$

5.  $n^2 - 6n + 4n - 24$

6.  $ax + 3x + ay + 3y$

7.  $ax - 2ay + 6by - 3bx$   
=

8.  $y^3 - 2y^2 + 4y - 8$

9.  $a^2 + 2a + 5a + 10$

10.  $x^2 - 3nx + 2ax - 6an$

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

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11.  $3ac + 3bc + ad + bd$

12.  $3y^3 - 2y^2 + 6y - 4$

13.  $2cx + cy - 2dx - dy$

14.  $3aw - 6ak + 2bw - 4bk$

15.  $4hx - 4bh + 5cx - 5bc$

16.  $8b^2 + 6bc + 12bc + 9c^2$

17.  $7r^2 + 3rs + 14rs + 6s^2$

18.  $18x^2 + 12xy - 3xy - 2y^2$

19.  $6 - 2mn + 3m - m^2n$

20.  $3c^3 + 3cd^2 + 2c^2d + 2d^3$

# Factoring by Grouping Assignment

Answer:

Factor the following polynomials by grouping.

$$\begin{aligned}
 1. & ax + an + bx + bn \\
 &= (ax + an) + (bx + bn) \\
 &= a(x + n) + b(x + n) \\
 &= (a + b)(x + n)
 \end{aligned}$$

$$\begin{aligned}
 2. & y^3 + y^2 + y + 1 \\
 &= (y^3 + y^2) + (y + 1) \\
 &= y^2(y + 1) + (y + 1) \\
 &= (y^2 + 1)(y + 1)
 \end{aligned}$$

$$\begin{aligned}
 3. & p^2 + 2p + 5p + 10 \\
 &= (p^2 + 2p) + (5p + 10) \\
 &= p(p + 2) + 5(p + 2) \\
 &= (p + 5)(p + 2)
 \end{aligned}$$

$$\begin{aligned}
 4. & x^2 - 2x + 5x - 10 \\
 &= (x^2 - 2x) + (5x - 10) \\
 &= x(x - 2) + 5(x - 2) \\
 &= (x + 5)(x - 2)
 \end{aligned}$$

$$\begin{aligned}
 5. & n^2 - 6n + 4n - 24 \\
 &= (n^2 - 6n) + (4n - 24) \\
 &= n(n - 6) + 4(n - 6) \\
 &= (n + 4)(n - 6)
 \end{aligned}$$

$$\begin{aligned}
 6. & ax + 3x + ay + 3y \\
 &= (ax + 3x) + (ay + 3y) \\
 &= x(a + 3) + y(a + 3) \\
 &= (x + y)(a + 3)
 \end{aligned}$$

$$\begin{aligned}
 7. & ax - 2ay + 6by - 3bx \\
 &= (ax - 2ay) + (6by - 3bx) \\
 &= a(x - 2y) - 3b(-2y + x) \\
 &= (a - 3b)(x - 2y)
 \end{aligned}$$

$$\begin{aligned}
 8. & y^3 - 2y^2 + 4y - 8 \\
 &= (y^3 - 2y^2) + (4y - 8) \\
 &= y^2(y - 2) + 4(y - 2) \\
 &= (y^2 + 4)(y - 2)
 \end{aligned}$$

$$\begin{aligned}
 9. & a^2 + 2a + 5a + 10 \\
 &= (a^2 + 2a) + (5a + 10) \\
 &= a(a + 2) + 5(a + 2) \\
 &= (a + 5)(a + 2)
 \end{aligned}$$

$$\begin{aligned}
 10. & x^2 - 3nx + 2ax - 6an \\
 &= (x^2 - 3nx) + (2ax - 6an) \\
 &= x(x - 3n) + 2a(x - 3n) \\
 &= (x + 2a)(x - 3n)
 \end{aligned}$$

$$\begin{aligned}
 11. & 3ac + 3bc + ad + bd \\
 &= (3ac + 3bc) + (ad + bd) \\
 &= 3c(a + b) + d(a + b) \\
 &= (3c + d)(a + b)
 \end{aligned}$$

$$\begin{aligned}
 12. & 3y^3 - 2y^2 + 6y - 4 \\
 &= (3y^3 - 2y^2) + (6y - 4) \\
 &= y^2(3y - 2) + 2(3y - 2) \\
 &= (y^2 + 2)(3y - 2)
 \end{aligned}$$

$$\begin{aligned}
 13. & 2cx + cy - 2dx - dy \\
 &= (2cx + cy) + (-2dx - dy) \\
 &= c(2x + y) - d(2x + y) \\
 &= (c - d)(2x + y)
 \end{aligned}$$

$$\begin{aligned}
 14. & 3aw - 6ak + 2bw - 4bk \\
 &= (3aw - 6ak) + (2bw - 4bk) \\
 &= 3a(w - 2k) + 2b(w - 2k) \\
 &= (3a + 2b)(w - 2k)
 \end{aligned}$$

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$$\begin{aligned} 15. & 4hx - 4bh + 5cx - 5bc \\ &= (4hx - 4bh) + (5cx - 5bc) \\ &= 4h(x - b) + 5c(x - b) \\ &= (4h + 5c)(x - b) \end{aligned}$$

$$\begin{aligned} 17. & 7r^2 + 3rs + 14rs + 6s^2 \\ &= (7r^2 + 3rs) + (14rs + 6s^2) \\ &= r(7r + 3s) + 2s(7r + 3s) \\ &= (r + 2s)(7r + 3s) \end{aligned}$$

$$\begin{aligned} 19. & 6 - 2mn + 3m - m^2n \\ &= (6 - 2mn) + (3m - m^2n) \\ &= 2(3 - mn) + m(3 - mn) \\ &= (2 + m)(3 - mn) \end{aligned}$$

$$\begin{aligned} 16. & 8b^2 + 6bc + 12bc + 9c^2 \\ &= (8b^2 + 6bc) + (12bc + 9c^2) \\ &= 2b(4b + 3c) + 3c(4b + 3c) \\ &= (2b + 3c)(4b + 3c) \end{aligned}$$

$$\begin{aligned} 18. & 18x^2 + 12xy - 3xy - 2y^2 \\ &= (18x^2 + 12xy) + (-3xy - 2y^2) \\ &= 6x(3x + 2y) - y(3x + 2y) \\ &= (6x - y)(3x + 2y) \end{aligned}$$

$$\begin{aligned} 20. & 3c^3 + 3cd^2 + 2c^2d + 2d^3 \\ &= (3c^3 + 3cd^2) + (2c^2d + 2d^3) \\ &= 3c(c^2 + d^2) + 2d(c^2 + d^2) \\ &= (3c + 2d)(c^2 + d^2) \end{aligned}$$