Practice Exercises on Factoring by Grouping

A. Finding the Common Factor

Find the greatest common monomial factor of each polynomial. One point each.

1. $6x^2 + 28x^3y$
2. $21a^2bx + 28ab$
3. $20x^2y - 60xy^2$
4. $24ab^2 + 42b^3$
5. $18a^2 - 27a^4$

B. Factoring by Grouping

Factor each polynomial completely. Write the final answers only. One point each.

1. $8r^3 - 64r^2 + r - 8$
2. $12x^3 + 2x^2 - 30x - 5$
3. $63n^3 + 54n^2 - 105n - 90$
4. $25v^3 + 5v^2 + 30v + 6$
5. $96n^3 - 84n^2 + 112n - 98$
6. $4v^3 - 12v^2 - 5v + 15$
7. $24p^3 + 15p^2 - 56p - 35$
8. $56xw + 49xk^2 - 24yw - 21yk^2$
9. $12x^2u + 3x^2v + 28yu + 7yv$
10. $12bc - 4bd - 15xc + 5xd$

C. Fill in the Blank

Factor each polynomial completely then supply the missing terms. One point each.

1. $12p^3 - 21p^2 + 28p - 49 = (\_\_\_\_ + 7)(4p - 7)$
2. $6v^3 - 16v^2 + 21v - 56 = (2v^2 + 7)(\_\_\_\_ - 8)$
3. $21k^3 - 84k^2 + 15k - 60 = \_\_\_\_(7k^2 + 5)(k - 4)$
4. $105n^3 + 175n^2 - 75n - 125 = 5(\_\_\_\_ - 5)(3n + 5)$
5. $28v^3 + 16v^2 - 21v - 12 = (4v^2 - 3)(\_\_\_\_ + 4)$
6. $49x^3 - 35x^2 + 56x - 40 = (7x^2 + \_\_\_\_)(7x - 5)$
7. $24r^3 - 64r^2 - 21r + 56 = (\_\_\_\_ - 7)(3r - 8)$
8. $42mc + 36md - 7n^2c - 6n^2d = (6m - \_\_\_\_)(7c + 6d)$
9. $40ac^2 + 25ak^2 + 32bc^2 + 20bk^2 = (5a + 4b)(\_\_\_\_ + 5k^2)$
10. $16mn - 4m^2 + 28n - 7m = (4m + \_\_\_\_)(4n - m)$

Answer Key

A. Finding the Common Factor

1. $2x^2$
2. $7ab$
3. $20xy$
4. $6b^2$
5. $9a^2$

B. Factoring by Grouping

1. $8r^3 - 64r^2 + r - 8 = (r - 8)\left(8r^2 + 1\right)$
2. $12x^3 + 2x^2 - 30x - 5 = (6x + 1)\left(2x^2 - 5\right)$
3. $63n^3 + 54n^2 - 105n - 90 = 3\left(7n + 6\right)\left(3n^2 - 5\right)$
4. $25v^3 + 5v^2 + 30v + 6 = (5v + 1)\left(5v^2 + 6\right)$
5. $96n^3 - 84n^2 + 112n - 98 = 2\left(8n - 7\right)\left(6n^2 + 7\right)$
6. $4v^3 - 12v^2 - 5v + 15 = (v - 3)\left(4v^2 - 5\right)$
7. $24p^3 + 15p^2 - 56p - 35 = (8p + 5)\left(3p^2 - 7\right)$
8. $56xw + 49xk^2 - 24yw - 21yk^2 = \left(7k^2 + 8w\right)(7x - 3y)$
9. $12x^2u + 3x^2v + 28yu + 7yv = (4u + v)\left(3x^2 + 7y\right)$
10. $12bc - 4bd - 15xc + 5xd = (4b - 5x)\left(3c - d\right)$

C. Fill in the Blank

1. $3p^2$
2. $3v$
3. 3
4. $7n^2$
5. $7v$
6. 8
7. $8r^2$
8. n^2
9. $8c^2$
10. 7