Intermediate Algebra
Skill Builder # PF – 13
Combined Factoring Techniques

A polynomial can be factored using two or more techniques.

Examples

1. $18x^3 - 32xy^2$

Solution:

$18x^3 - 32xy^2 = 2x(9x^2 - 16y^2)$ Factor out the GCF $2x$.

$= 2x(3x - 4y)(3x + 4y)$ Factor the difference of squares $9x^2 - 16y^2$.

2. $24a^4b + 3ab^4$

Solution:

$24a^4b + 3ab^4 = 3ab(8a^3 + b^3)$ Factor out the GCF $3ab$.

$= 3ab(2a + b)(4a^2 - 2ab + b^2)$ Factor the sum of cubes $8a^3 + b^3$.

3. $5a^2x^3y - 30a^2x^2y^2 + 40a^2xy^3$

Solution:

$5a^2x^3y - 30a^2x^2y^2 + 40a^2xy^3$

$= 5a^2xy(x^2 - 6xy + 8y^2)$ Factor out the GCF $5a^2xy$.

$= 5a^2xy(x - 2y)(x - 4y)$ Factor the quadratic trinomial $x^2 - 6xy + 8y^2$.

4. $72x^5 - 66x^4 - 90x^3$

Solution:

$72x^5 - 66x^4 - 90x^3$

$= 6x^3(12x^2 - 11x - 15)$ Factor out the GCF $6x^3$.

$= 6x^3(3x - 5)(4x + 3)$ Factor the quadratic trinomial $12x^2 - 11x - 15$.

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Factor.

1. $16a^2b - 36a^2bc^2$

2. $63x^3y^3 - 175xy^5$

3. $40m^3n + 5n^4$

4. $81ab^3 - 3ab^3c^3$

5. $3t^3 + 36t^2 + 96t$

6. $2p^5 - 4p^4 - 70p^3$

7. $36a^3 - 102a^2 + 30a$

8. $56y^4 + 42y^3 - 189y^2$

9. $2x^6 - 8x^4 + 2x^3 - 8x$

10. $2a^6b - 2a^4b^3 - 2a^3b^4 + 2ab^6$

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Answers

1. $4a^2b(2-3c)(2+3c)$

2. $7xy^3(3x-5y)(3x+5y)$

3. $5n(2m+n)(4m^2-2mn+n^2)$

4. $3ab^3(3-c)(9+3c+c^2)$

5. $3t(t+8)(t+4)$

6. $2p^3(p-7)(p+5)$

7. $6a(2a-5)(3a-1)$

8. $7y^2(4y+9)(2y-3)$

9. $2x(x-2)(x+2)(x+1)(x^2-x+1)$

10. $2ab(a-b)^2(a+b)(a^2+ab+b^2)$