Intermediate Algebra
Skill-Builder # PF -1
Factoring out the GCF

Apply the distributive property of multiplication over addition in reverse:

$$ab+ac=a(b+c) \quad \text{or} \quad ab+ac=(b+c)a$$

Examples

1. $4x+4y$

Solution:

$$\boxed{4}\cdot x+\boxed{4}\cdot y=4(x+y)$$

2. $ab^2y+2ab^2z-9ab^2w$

Solution:

$$\boxed{ab^2}\cdot y+2\cdot\boxed{ab^2}\cdot z-9\cdot\boxed{ab^2}\cdot w=ab^2(y+2z-9w)$$

3. $12x^2y+20x^3y^2=4x^2y(3+5xy)$

Solution:

$$12x^2y+20x^3y^2=\boxed{4x^2y}\cdot 3+\boxed{4x^2y}\cdot 5xy$$
$$=4x^2y(3+5xy)$$

4. $30ab^3c-48a^3bc^2+60a^3b^3c^3$

Solution:

$$30ab^3c-48a^3bc^2+60a^3b^3c^3$$
$$=\boxed{3abc}\cdot 10b^2-\boxed{3abc}\cdot 16a^2c+\boxed{3abc}\cdot 20a^2b^2c^2$$
$$=3abc\left(10b^2-16a^2c+20a^2b^2c^2\right)$$

5. $2a(x+y)+5b(x+y)=(x+y)(2a+5b)$

Solution:

$$2a\cdot\boxed{(x+y)}+5b\cdot\boxed{(x+y)}=(x+y)(2a+5b)$$

6. $5n(8-9x)+7m(9x-8)$

Solution:

$$5n(8-9x)+7m(9x-8)$$
$$=5n\cdot\boxed{(8-9x)}-7m\cdot\boxed{(8-9x)}$$
$$=(8-9x)(5n-7m)$$

7. $8K(2T-5P)-11(5P-2T)=8K(2T-5P)+11(2T-5P)=(2T-5P)(8K+11)$

Solution:

$$8K(2T-5P)-11(5P-2T)$$
$$=8K\cdot\boxed{(2T-5P)}+11\cdot\boxed{(2T-5P)}$$
$$=(2T-5P)(8K+11)$$

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Factor out the GCF:

1. $an - am - ax + ay$

2. $2xy + 4x^2y - 10xy^2$

3. $12y - 18y^2 + 27xy^5$

4. $-10a^3b^2c^5 + 15a^5b^3c^2 - 75a^2b^5c^3$

5. $a(3x + 2y) - 2b(3x + 2y)$

6. $2x^2(3t - 4p) + y^3(4p - 3t)$

7. $8am(x^2 - 2x) + 10pm(2x - x^2)$

8. $12pm(18a - 15b) - 9am(15b - 18a)$

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Answers

1. $a(n-m-x+y)$
2. $2xy(1+2x-5y)$
3. $3y(4-6y+9xy^4)$
4. $-5a^2b^2c^2(2ac^3-3a^3b+15b^3c)$
5. $(3x+2y)(a-2b)$
6. $(3t-4p)(2x^2+y^3)$
7. $2mx(x-2)(4a+5p)$
8. $9m(6a-5b)(4p-3a)$

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