

## Specialized Grouping Practice

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Factor the following polynomials by grouping.

For this worksheet you may always group the first two and the last two!

1.  $12x^2 - 8xy - 15xy + 10y^2$

$$(12x^2 - 8xy) + (-15xy + 10y^2)$$

$$4x(3x - 2y) - 5y(3x - 2y)$$

$$(4x - 5y)(3x - 2y)$$

2.  $5x^2 - 10x + 4x - 8$

$$5x^2 - 10x + 4x - 8$$

$$5x(x - 2) + 4(x - 2)$$

$$(5x + 4)(x - 2)$$

3.  $64x^2 - 8x - 8x + 1$

$$(64x^2 - 8x) + (-8x + 1)$$

$$8x(8x - 1) - 1(8x - 1)$$

$$(8x - 1)(8x - 1) \quad \text{OR} \quad (8x - 1)^2$$

4.  $-x^2 - x - x - 1$

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

$$-x(x + 1) - 1(x + 1)$$

$$(-x - 1)(x + 1)$$

5.  $-8x^2 + 2xy + 4xy - y^2$

$$(-8x^2 + 2xy) + (4xy - y^2)$$

$$2x(-4x + y) - y(-4x + y)$$

$$(2x - y)(-4x + y) \quad \text{OR} \quad (-2x + y)(4x - y)$$

6.  $10x^2 + 4x - 5x - 2$

$$(10x^2 + 4x) + (-5x - 2)$$
$$2x(5x + 2) - 1(5x + 2)$$
$$(2x - 1)(5x + 2)$$

7.  $-4x^2 - x + 20x + 5$

$$(-4x^2 - x) + (20x + 5)$$
$$-1x(4x + 1) + 5(4x + 1)$$
$$(-x + 5)(4x + 1)$$

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

$$(2x^2 - 3x) + (-4x + 6)$$
$$x(2x - 3) - 2(2x - 3)$$
$$(x - 2)(2x - 3)$$

9.  $-6x^2 - 3xy + 4xy + 2y^2$

$$(-6x^2 - 3xy) + (4xy + 2y^2)$$
$$-3x(2x + y) + 2y(2x + y)$$
$$(-3x + 2y)(2x + y)$$

10.  $2x^2 - 2x - x + 1$

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

11.  $-7x^2 - 14xy + xy + 2y^2$

$$(-7x^2 - 14xy) + (xy + 2y^2)$$
$$-7x(x + 2y) + y(x + 2y)$$
$$(-7x + y)(x + 2y)$$

12.  $4y^2 - 2y - 2y + 1$

$$(4y^2 - 2y) + (-2y + 1)$$
$$2y(2y - 1) - 1(2y - 1)$$
$$(2y - 1)(2y - 1) \text{ OR } (2y - 1)^2$$

13.  $-12x^2 - 4xy + 3xy + y^2$

$$(-12x^2 - 4xy) + (3xy + y^2)$$
$$-4x(3x + y) + y(3x + y)$$
$$(-4x + y)(3x + y)$$

14.  $-18x^2 - 3x + 12x + 2$

$$(-18x^2 - 3x) + (12x + 2)$$
$$-3x(6x + 1) + 2(6x + 1)$$
$$(-3x + 2)(6x + 1)$$

15.  $-4y^2 + 8xy + xy - 2x^2$

$$(-4y^2 + 8xy) + (xy - 2x^2)$$
$$4y(-y + 2x) - x(-y + 2x)$$
$$(4y - x)(-y + 2x)$$

16.  $-2x^2 + 3x + 10x - 15$

$$(-2x^2 + 3x) + (10x - 15)$$
$$x(-2x + 3) - 5(-2x + 3)$$
$$(x - 5)(-2x + 3)$$

17.  $3x^2 - 6x - x + 2$

$$(3x^2 - 6x) + (-x + 2)$$
$$3x(x - 2) - 1(x - 2)$$
$$(3x - 1)(x - 2)$$

18.  $2y^2 - 4yz - yz + 2z^2$

$$(2y^2 - 4yz) + (-yz + 2z^2)$$

$$2y(y - 2z) - z(y - 2z)$$

$$(2y - z)(y - 2z)$$

19.  $-b^2 - 3b + 2b + 6$

$$(-b^2 - 3b) + (2b + 6)$$

$$-b(b + 3) + 2(b + 3)$$

$$(-b + 2)(b + 3)$$

20.  $4m^2 - 16mn - mn + 4n^2$

$$(4m^2 - 16mn) + (-mn + 4n^2)$$

$$4m(m - 4n) - n(m - 4n)$$

$$(4m - n)(m - 4n)$$

21.  $15s^2 - 3st - 10st + 2t^2$

$$(15s^2 - 3st) + (-10st + 2t^2)$$

$$3s(5s - t) - 2t(5s - t)$$

$$(3s - 2t)(5s - t)$$

22.  $6p^2 - 18p - p + 3$

$$(6p^2 - 18p) + (-p + 3)$$

$$-6p(-p + 3) + 1(-p + 3)$$

$$(-6p + 1)(-p + 3) \quad \text{OR} \quad (6p - 1)(p - 3)$$

23.  $3y^2 - 12y - y + 4$

$$(3y^2 - 12y) + (-y + 4)$$

$$3y(y - 4) - 1(y - 4)$$

$$(3y - 1)(y - 4)$$

24.  $9b^2 - 3b - 3b + 1$

$$(9b^2 - 3b) + (-3b + 1)$$
$$3b(3b - 1) - 1(3b - 1)$$
$$(3b - 1)(3b - 1) \text{ OR } (3b - 1)^2$$

25.  $5x^2 - 25xy - xy + 5y^2$

$$(5x^2 - 25xy) + (-xy + 5y^2)$$
$$5x(x - 5y) - y(x - 5y)$$
$$(5x - y)(x - 5y)$$

26.  $8d^2 - 2de - 12de + 3e^2$

$$(8d^2 - 2de) + (-12de + 3e^2)$$
$$2d(4d - e) - 3e(4d - e)$$
$$(2d - 3e)(4d - e)$$

27.  $-f^2 - 5f + 4f + 20$

$$(-f^2 - 5f) + (4f + 20)$$
$$-f(f + 5) + 4(f + 5)$$
$$(-f + 4)(f + 5)$$

28.  $2x^2 - 2x + x - 1$

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

29.  $-3x^2 + 9xy + xy - 3y^2$

$$(-3x^2 + 9xy) + (xy - 3y^2)$$
$$3x(-x + 3y) - y(-x + 3y)$$
$$(3x - y)(-x + 3y) \text{ OR } (-3x + y)(x - 3y)$$

30.  $3y^2 + 3y - 2y - 2$

$$(3y^2 + 3y) + (-2y - 2)$$

$$3y(y+1) - 2(y+1)$$

$$(3y-2)(y+1) \checkmark$$

31.  $7g^2 + 2g - 21g - 6$

$$(7g^2 + 2g) + (-21g - 6)$$

$$g(7g+2) - 3(7g+2)$$

$$(g-3)(7g+2) \checkmark$$

32.  $2x^2 - 2x + x - 1$

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

$$2x(x-1) + 1(x-1)$$

$$(2x+1)(x-1) \checkmark$$

33.  $-h^2 - 5h + 3h + 15$

$$(-h^2 - 5h) + (3h + 15)$$

$$-h(h+5) + 3(h+5)$$

$$(-h+3)(h+5) \checkmark$$

34.  $3k^2 - 9kl - kl + 3l^2$

$$(3k^2 - 9kl) + (-kl + 3l^2)$$

$$3k(k-3l) - l(k-3l)$$

$$(3k-l)(k-3l) \checkmark$$

35.  $c^2 - 2c + c - 2$

$$(c^2 - 2c) + (c - 2)$$

$$c(c-2) + 1(c-2)$$

$$(c+1)(c-2) \checkmark$$