**STUDENT NAME:** _____

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**SUBJECT: ALGEBRA 1**

**PERIOD:** _____

## Explain 1 Multiplying Binomials Using the Distributive Property

To multiply a binomial by a binomial, the Distributive Property must be applied more than once.

**Example 1** **Multiply by using the Distributive Property.**

(A) $(x + 5)(x + 2)$

$(x + 5)(x + 2) = x(x + 2) + 5(x + 2)$ Distribute.

$= x(x + 2) + 5(x + 2)$ Redistribute and simplify.

$= x(x) + x(2) + 5(x) + 5(2)$

$= x^2 + 2x + 5x + 10$

$= x^2 + 7x + 10$

(B) $(2x + 4)(x + 3)$

$(2x + 4)(x + 3) = 2x(x + 3) + \square\,(x + 3)$ Distribute.

$= 2x(x + 3) + \square\,(x + 3)$ Redistribute and simplify.

$= 2x(x) + \square\,(3) + \square\,(x) + \square\,(3)$

$= \square\, x^{\square} + \square\, x + \square\, x + \square$

$= \square\, x^{\square} + \square\, x + \square$

**Multiply.**

1. $(x + 5)(x + 6)$ _____
2. $(a - 7)(a - 3)$ _____
3. $(d + 8)(d - 4)$ _____
4. $(2x - 3)(x + 4)$ _____
5. $(5b + 1)(b - 2)$ _____
6. $(3p - 2)(2p + 3)$ _____
7. $(5k - 9)(2k - 4)$ _____
8. $(2m - 5)(3m + 8)$ _____
9. $(4 + 7g)(5 - 8g)$ _____
10. $(r + 2s)(r - 6s)$ _____
11. $(3 - 2v)(2 - 5v)$ _____
12. $(5 + h)(5 - h)$ _____

## Explain 3 Multiplying Polynomials

To multiply polynomials with more than two terms, the Distributive Property must be used several times.

**Example 3** **Multiply the polynomials.**

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

$$(x+2)(x^2-5x+4) = x(x^2-5x+4)+2(x^2-5x+4) \quad \text{Distribute.}$$
$$= x(x^2-5x+4)+2(x^2-5x+4) \quad \text{Redistribute.}$$
$$= x(x^2)+x(-5x)+x(4)+2(x^2)+2(-5x)+2(4) \quad \text{Simplify.}$$
$$= x^3-5x^2+4x+2x^2-10x+8$$
$$= x^3-3x^2-6x+8$$

(B) $(3x-4)(-2x^2+5x-6)$

$$(3x-4)(-2x^2+5x-6) = 3x(-2x^2+5x-6) - \square(-2x^2+5x-6) \quad \text{Distribute.}$$
$$= 3x(-2x^2+5x-6) - \square(-2x^2+5x-6) \quad \text{Redistribute.}$$
$$= 3x(-2x^2)+3x\left(\square\right)+3x\left(\square\right)-4\left(\square\right)-4\left(\square\right)-4\square$$

Simplify.

$$= \square x^{\square} + \square x^{\square} - \square x + \square x^{\square} - \square x + \square$$
$$= \square x^{\square} + \square x^{\square} - \square x + \square$$

**Multiply the polynomials.**

**13.** $(x-3)(x^2+2x+1)$

**14.** $(x+5)(x^3+6x^2+18x)$

**15.** $(x+4)(x^4+x^2+1)$

**16.** $(x-6)(x^5+4x^3+6x^2+2x)$

**17.** $(x^2+x+3)(x^3-x^2+4)$

**18.** $(x^3+x^2+2x)(x^4-x^3+x^2)$

**FACTORING BY GROUPING.**

1)

STEP 1: Separate the polynomial in groups of 2. Use parenthesis to separate them.
STEP 2: Take out the common factor in each group.
STEP 3: Write the the binomial that's common to both groups in front, then write the remaining terms as another binomial.
STEP 4: Check your work by multiplying the binomials back. See if you get the original prolem back.

EXAMPLE 1: $2x^3 - 6x^2 + 5x - 15 = (2x^3 - 6x^2) + (5x - 15)$ STEP 1

$= 2x^2(x - 3) + 5(x - 3)$ STEP 2

$= (x - 3)(2x^2 + 5)$ STEP 3

THIS IS YOUR ANSWER.

Check your work: $(x - 3)(2x^2 + 5) = x(2x^2 + 5) - 3(2x^2 + 5)$

$= 2x^3 + 5x - 6x^2 - 15$ this can also be written in standard form (exponents in descending order) as

$= 2x^2 - 6x^2 + 5x - 15$ IT'S THE SAME!!

2) EXAMPLE 2:

$3x^3 + 15x^2 - 2x - 10 = (3x^3 + 15x^2) - (2x + 10)$ ** Notice that the sign for 10 has changed. That's because you placed the negative sign outside the parenthesis. Watch out for this each time you separate terms of a polynomial by grouping.

$= 3x^2(x + 5) - 2(x + 5)$ STEP 2

$= (x + 5)(3x^2 - 2)$ STEP 3

Now check by multiplying the binomials and see if you get the original problem back:

$(x + 5)(3x^2 - 2) =$ _____

_____

_____

**Factor each completely. Show all steps and box your final answer. Remember to check by multiplying the binomials back.**

3) $15x^3 + 40x^2 + 9x + 24$

4) $3x^3 + 24x^2 - x - 8$

5) $16x^3 + 4x^2 - 12x - 3$

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

7) $6x^3 + 15x^2 - 2x - 5$

8) $18x^3 + 21x^2 - 6x - 7$

9) $18x^3 + 6x^2 + 3x + 1$

10) $49x^3 - 28x^2 + 35x - 20$

11) $7x^3 + 56x^2 + 6x + 48$

12) $49x^3 + 28x^2 + 35x + 20$