المدرسة الوطنية الأرثوذكسية الشميساني

The National Orthodox School Shmaisani

Worksheet (3) | Lower Secondary Stage (6-8)

1st Semester | 2023-2024

Name: ..... **Subject:** math
Date: / / **Class:** Grade 8
Objective: ***Factorise by grouping***

- Goal: To be able to factor polynomials with 4 terms by grouping

Steps for factoring by grouping:

1. A polynomial must have 4 terms to factor by grouping.

$$ex.\ x^3+x^2+2x+2$$

2. We factor the first two terms and the second two terms separately. Use the rules for GCF to factor these.

The GCF of x^3+x^2 is x^2.	x^3+x^2	$+2x+2$	The GCF of $2x+2$ is 2.
	$x^2(x+1)$	$+2(x+1)$	

3. Finally, we factor out the "common factor" from both terms. This means we write the $(x+1)$ term in front and the 2 terms left over, x^2+2, in a separate set of parentheses.

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

Factoring by Grouping

Use when there are 4 Terms

***Example* (1):**

$$x^3 + x^2 + x + 1$$

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

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

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

***Example* (2):**

$$8x^3 + 2x^2 + 12x + 3$$

The GCF of $8x^3 + 2x^2$ is $2x^2$.

$$\begin{array}{l|l} 8x^3 + 2x^2 & +12x + 3 \\ 2x^2(4x+1) & +3(4x+1) \end{array}$$

The GCF of $12x + 3$ is 3.

$$= (4x+1)(2x^2+3)$$

***Example* (3):**

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

The GCF of $4x^3 - 6x^2$ is $2x^2$.

$$4x^3 - 6x^2 \mid -6x + 9$$
$$2x^2(2x - 3) \mid -3(2x - 3)$$

The GCF of $-6x + 9$ is -3.

When you factor a negative out of a positive, you will get a negative.

$$= (2x - 3)(2x^2 - 3)$$

***EXERCISE* :**

Factor completely if possible…

1. $5ab + 10a + 7b + 14$

2. $6m^3 - 12mn + m^2n - 2n^2$

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

4. $4s^2 - s + 12st - 3t$

5 $y - 2y^2 - 18y + 9$

6 $48ab - 90a + 32b - 60$

7 $2m(7m-3) + 4(3-7m)$

8 $15x - 5xy + 6y^2 - 18y$

9 $a(r-t) + m(t-r)$

10 $2t - 14st + 7st^2 - t^2$

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