

## LESSON 2: FACTORING TECHNIQUES



### I. OBJECTIVES

The learner completely factors different types of polynomials (polynomials with common monomial factor; difference of two squares; quadratic trinomials, including perfect square trinomials).



### II. LESSON

| Factoring Techniques                                                                                       |                                                                                                                                                                                                                               |                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Common Monomial Factoring</b>                                                                           | $3x - 12 = 3(x - 4)$                                                                                                                                                                                                          | $15x^3y^5 - 20x^5y^2z = 5x^3y^2(3y^3 - 4x^2z)$                                                                                             |
| <b>Factoring Difference of Two Squares</b>                                                                 | $a^2 - b^2 = (a + b)(a - b)$                                                                                                                                                                                                  | $y^2 - 9 = (y + 3)(y - 3)$                                                                                                                 |
| <b>Factoring Sum and Difference of Two Cubes</b>                                                           | $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$                                                                                                                                                                                         | $y^3 + 27 = (y + 3)(y^2 - 3y + 9)$                                                                                                         |
|                                                                                                            | $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$                                                                                                                                                                                         | $y^3 - 27 = (y - 3)(y^2 + 3y + 9)$                                                                                                         |
| <b>Factoring Perfect Square Trinomials</b>                                                                 | $a^2 + 2ab + b^2 = (a + b)^2$                                                                                                                                                                                                 | $y^2 + 8y + 16 = (y + 4)^2$ or $(y + 4)(y + 4)$                                                                                            |
|                                                                                                            | $a^2 - 2ab + b^2 = (a - b)^2$                                                                                                                                                                                                 | $y^2 - 8y + 16 = (y - 4)^2$ or $(y - 4)(y - 4)$                                                                                            |
| <b>Factoring General Trinomials in the form of <math>ax^2 + bx + c</math>, where <math>a = 1</math></b>    | $ax^2 + bx + c$ , where $a = 1$<br>Find the two factors whose product is equal to the last term (c) of the trinomial and a sum equal to the middle term (b) of the trinomial.                                                 | $y^2 + 7y + 10 = (y + 2)(y + 5)$<br>$ax^2 + bx + c$<br>$c = 10, b = 7$<br>2 and 5 are the numbers whose product is 10 and have a sum of 7. |
| <b>Factoring General Trinomials in the form of <math>ax^2 + bx + c</math>, where <math>a \neq 1</math></b> | $ax^2 + bx + c$ , where $a \neq 1$<br>Find the two factors whose product is equal to $a$ and $c$ of the trinomial and a sum equal to the middle term (b) of the trinomial. Use the box method for the common monomial factor. | $7y^2 - 16y + 4$<br>$7(4) = 28$<br>Factors of 28 whose sum is -16:<br>$-14(-2) = 28; -14 + (-2) = -16$<br>$(7y - 2)(y - 2)$                |



### III. ACTIVITY

Identify the technique to be used in factoring the given polynomials and determine their factored form. Choose the letter of your answer in Factored Form from the given choices below.

|                     |                             |                            |                      |
|---------------------|-----------------------------|----------------------------|----------------------|
| A. $(m + 9)(m + 9)$ | B. $(m + 3)(m + 2)$         | C. $(m + 5)(m - 5)$        | D. $(m - 10)(m + 3)$ |
| E. $(m + 3)(m - 2)$ | F. $(m - 3)(2m + 5)$        | G. $(m + 2)(m^2 - 2m + 4)$ | H. $(m - 5)(2m + 3)$ |
| I. $4m(4m + 1)$     | J. $(m - 4)(m^2 + 4m + 16)$ | K. $(m - 11)(m - 11)$      | L. $(m + 9)(m - 9)$  |

| Polynomials                | Factoring Techniques                       | Factored Form    |
|----------------------------|--------------------------------------------|------------------|
| <b>Example:</b> $x^2 - 16$ | <b>Factoring Difference of Two Squares</b> | $(x + 4)(x - 4)$ |
| 1. $m^2 - 25$              |                                            |                  |
| 2. $m^3 + 8$               |                                            |                  |
| 3. $m^2 - 22m + 121$       |                                            |                  |
| 4. $16m^2 + 4m$            |                                            |                  |
| 5. $m^2 + 5m + 6$          |                                            |                  |
| 6. $m^2 - 7m - 30$         |                                            |                  |
| 7. $m^2 - 81$              |                                            |                  |
| 8. $2m^2 - m - 15$         |                                            |                  |
| 9. $m^2 + 18n + 81$        |                                            |                  |
| 10. $m^3 - 64$             |                                            |                  |