

6.4: Common Factor

SWBAT factor polynomial expression by finding the common factor.

Assignments:
HW46

- ▶ We can find zeros of polynomial functions that are in ***factored form***,
 - ▶ e.g. $f(x) = x(x - 3)(3x - 8)(x + 4)$
 - ▶ Note that all of our adding/subtracting is inside parentheses
 - ▶ Parentheses are multiplied
- ▶ What about polynomial functions that are in ***standard form***?
 - ▶ e.g. $f(x) = 3x^2 + x - 14$
- ▶ We can't "split" the function using the zero product property if it is in standard form because we don't have multiplication

Review: Factoring

- ▶ **Factors** are things that we can multiply together to get another number.
 - ▶ Ex: 3 and 10 are factors of 30, because $3 \times 10 = 30$.
- ▶ **Common factors** are numbers that are factors of two different numbers.
- ▶ The **greatest common factor** is the biggest common factor.
 - ▶ Ex: Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24
 - ▶ Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36
- ▶ Find the common factors.
 - ▶ 22, 28
 - ▶ 14, 40
 - ▶ 18, 81

Factoring and Polynomials

- ▶ Polynomials also have factors: terms or expressions that can be multiplied to get the longer polynomial.
 - ▶ For example, $4x - 7$ and $x + 5$ are factors of $4x^2 + 13x - 35$
- ▶ Finding the factors of a polynomial helps us find the zeros
- ▶ Common factors in a polynomial could be numbers, variables, terms, or expressions
- ▶ Find the GCF in the polynomial. (*Hint: what are the factors of each term?*)
 1. $3x^3 - 3x + 3$
 2. $x^3 - 2x^2 + 3x$
 3. $-4a^3 + 2a^2 + 4a$
 4. $5x^4 + 15x^3 - 250x^2$

If the leading coefficient/first term in the polynomial is negative, make the GCF negative as well

Factoring by Common Factor

▶ “Factoring the polynomial” means to rewrite it as a product of its factors.

1. Find the GCF of the polynomial
2. Write the GCF outside a set of parentheses
3. Divide each term in the original polynomial by the GCF.
4. Write the new polynomial *inside* the parentheses from step 2

▶ Example

▶ $30x^3 - 24x^2 + 27x$

Factor the common factor out of each expression

1) $54 + 42p - 36p^3$

2) $-45 - 20x - 20x^6$

3) $18r^2 + 24r + 15$

4) $4x^4 + 5x^2 + 2x$

5) $7x + 5x^2 - 9x^4$

6) $-7n^5 - 9n^2 + 3n$

7) $49n^3 + 14n^2 + 63n$

8) $15a^6 + 9a^2 + 6a$

9) $5n^3 + 40n^2 + 25n$

10) $63v^4 + 21v^2 + 7v$

11) $-70n^3 - 70n^2 - 20n$

12) $-5v^8 + 5v^5 + 2v^4$

13) $5p^4 - 6p^3 - p^2$

14) $35x^6 + 15x^5 + 45x^4$

15) $10k^5 + 20k^3 + 100k^2$

16) $81k^5 - 63k^3 + 63k^2$

If the leading coefficient is negative, make the GCF negative as well

Factor the polynomials.

► *Recall:*

1. *Find the GCF*
2. *Write the GCF outside the parentheses*
3. *Divide the terms in the polynomial by the GCF*
4. *Write the new terms in the parentheses*

► $x(x - 7) + 8(x - 7)$

1. $x(x - 2) + 4(x - 2)$

2. $v^2(v + 3) + (v + 3)$

3. $n(3n - 7) + 4(3n - 7)$

4. $-5x(3x + 1) - 8(3x + 1)$

5. $4x(x - 3) - 3(x - 3)$