

P.5: Factoring Polynomials

I. Common Factors

a. Students will learn about factoring out the GCF

b. Examples Include:

- i. $18x^3 + 27x^2 = 9x^2(2x + 3)$
- ii. $x^2(x + 3) + 5(x + 3) = (x^2 + 5)(x + 3)$
- iii. $10x^3 - 4x^2 = 2x^2(5x - 2)$
- iv. $2x(x - 7) + 3(x - 7) = (2x + 3)(x - 7)$

II. Factoring by Grouping

a. Students will be able to factor polynomials with four terms using grouping then factoring the GCF

b. Examples Include:

- i. $x^3 + 4x^2 + 3x + 12 = (x^2 + 3)(x + 4)$
- ii. $x^3 + 5x^2 - 2x - 10 = (x^2 - 2)(x + 5)$
- iii. $x^3 + 6x^2 + 2x + 12 = (x^2 + 2)(x + 6)$
- iv. $x^3 - x^2 - 5x + 5 = (x^2 - 5)(x - 1)$

III. Factoring Trinomials

a. Students will be able to factor GCF and then factor the remaining part either using the special products or trial and error.

b. Examples Include:

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|---|---|
| i. $x^2 + 6x + 8$
$(x + 4)(x + 2)$ | viii. $2x^2 - 7xy + 3y^2$
$(2x - y)(x - 3y)$ |
| ii. $x^2 + 13x + 40$
$(x + 8)(x + 5)$ | ix. $x^2 - 4$
$(x + 2)(x - 2)$ |
| iii. $x^2 + 3x - 18$
$(x - 3)(x + 6)$ | x. $81x^2 - 49$
$(9x + 7)(9x - 7)$ |
| iv. $x^2 - 5x - 14$
$(x - 7)(x + 2)$ | xi. $x^2 - 81$
$(x - 9)(x + 9)$ |
| v. $8x^2 - 10x - 3$
$(4x + 1)(2x - 3)$ | xii. $36x^2 - 25$
$(6x - 5)(6x + 5)$ |
| vi. $6x^2 + 19x - 7$
$(2x + 7)(3x - 1)$ | xiii. $x^4 - 81$
$(x^2 - 9)(x^2 + 9)$ |
| vii. $3x^2 - 13xy + 4y^2$
$(3x - y)(x - 4y)$ | xiv. $81x^4 - 16$
$(9x^2 - 4)(9x^2 + 4)$ |

IV. Factoring Sums/Difference of Two Cubes

a. Students will be able to use the sum/difference of two cubes formula to factor.

b. Examples Include:

- i. $x^3 + 8 = (x + 2)(x^2 - 2x + 4)$
- ii. $64x^3 - 125 = (4x - 5)(16x^2 + 20x + 25)$
- iii. $x^3 + 1 = (x + 1)(x^2 - x + 1)$
- iv. $125x^3 - 8 = (5x - 2)(25x^2 + 10x + 4)$