CHAPTER 0
REVIEW OF ALGEBRA
05. Factoring

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1 Summary

Rules for Factoring

Expression	Factored Form	Type of Factoring
$xy + xz$	$x(y + z)$	*Common Factor*
$x^2 + (a + b)x + ab$	$(x + a)(x + b)$	-
$abx^2 + (ad + cb)x + cd$	$(ax + c)(bx + d)$	-
$x^2 + 2ax + a^2$	$(x + a)^2$	*Perfect Square Trinomial*
$x^2 - 2ax + a^2$	$(x - a)^2$	*Perfect Square Trinomial*
$x^2 - a^2$	$(x + a)(x - a)$	*Difference of Two Squares*
$x^3 + a^3$	$(x + a)(x^2 - ax + a^2)$	*Sum of Two Cubes*
$x^3 - a^3$	$(x - a)(x^2 + ax + a^2)$	*Difference of Two Cubes*

Always factor as completely as you can.

For example:

- $2x^2 - 8$

- $2(x^2 - 4)$

- $2(x + 2)(x - 2)$

Examples

Expression	Factored Form	Type of Factoring
$x^2 + 8x + 16$	$(x+4)^2$	4. Perfect Square Trinomial
$9x^2 + 9x + 2$	$(3x+1)(3x+2)$	3. -
$6y^3 + 3y^2 - 18y$	$3y(2y^2 + y - 6)$	1. Common Factor
$6y^3 + 3y^2 - 18y$	$3y(2y+3)(y-2)$	3. -
$x^2 - 6x + 9$	$(x-3)^2$	5. Perfect Square Trinomial
$z^{\frac{1}{4}} + z^{\frac{5}{4}}$	$z^{\frac{1}{4}}(1+z)$	1. Common Factor
$x^4 - 1$	$(x^2+1)(x^2-1)$	6. Difference of Two Squares
$x^4 - 1$	$(x^2+1)(x+1)(x-1)$	6. Difference of Two Squares
$x^{\frac{2}{3}} - 5x^{\frac{1}{3}} + 4$	$(x^{\frac{1}{3}}-4)(x^{\frac{1}{3}}-1)$	2. -
$ax^2 - ay^2 + bx^2 - by^2$	$a(x^2-y^2) + b(x^2-y^2)$	1. Common Factor
$ax^2 - ay^2 + bx^2 - by^2$	$(a+b)(x^2-y^2)$	1. Common Factor
$ax^2 - ay^2 + bx^2 - by^2$	$(a+b)(x+y)(x-y)$	6. Difference of Two Squares
$8 - x^3$	$(2)^3 - x^3$	8. Difference of Two Cubes
$8 - x^3$	$(x^2 + 2x + 4)(-x+2)$	8. Difference of Two Cubes
$x^6 - y^6$	$(x^3)^2 - (y^3)^2$	-
$x^6 - y^6$	$(x^3 + y^3)(x^3 - y^3)$	6. Difference of Two Squares
$x^6 - y^6$	$(x+y)(x^2 - xy + y^2)(x-y)(x^2 + xy + y^2)$	7, 8