Name: Key Hour: ___ Date: _____

Multiplying Polynomials Notes

Multiply the following polynomials and write their products in STANDARD FORM.
Classify each product by their degree/number of terms and describe their end behavior.

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

$(x+1)(x^2+3x+2x+6)$

$(x+1)(x^2+5x+6)$

$x^3+5x^2+6x+x^2+5x+6$

$\boxed{x^3+6x^2+11x+6}$

Cubic Polynomial with four terms.

Positive Odd (↓ ↑)

Left: $x \to -\infty$ $y \to -\infty$

Right: $x \to +\infty$ $y \to +\infty$

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

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

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

$x^3+x^2-2x+x^2+x-2$

$\boxed{x^3+2x^2-x-2}$

Cubic polynomial with four terms

Positive Odd (↓ ↑)

Left: $x \to -\infty$ $y \to -\infty$

Right: $x \to +\infty$ $y \to +\infty$

3) $x(x-3)^2$ ← write twice!

$x(x-3)(x-3)$

$x(x^2-3x-3x+9)$

$x(x^2-6x+9)$

$\boxed{x^3-6x^2+9x}$

Cubic Trinomial

Positive Odd (↓ ↑)

Left: $x \to -\infty$ $y \to -\infty$

Right: $x \to +\infty$ $y \to +\infty$

4) $x^2(x^2-9)$

x^4-9x^2

Quartic Binomial

Positive Even (↑ ↑)

Left: $x \to -\infty$ $y \to +\infty$

Right: $x \to +\infty$ $y \to +\infty$

5) $(x-2)^3$ ← write out three times!

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

$(x-2)(x^2-2x-2x+4)$

$(x-2)(x^2-4x+4)$

$x^3-4x^2+4x-2x^2+8x-8$

$x^3-6x^2+12x-8$

Cubic Polynomial with 4 terms

Positive Odd (↓ ↑)

Left: $x \to -\infty$ $y \to -\infty$

Right: $x \to +\infty$ $y \to +\infty$