Lesson 1.9 Objective: SWBAT perform operations with polynomials.

Kickoff

1) Using your graphing calculator, find the relative maximums, relative minimums, zeros, increasing and decreasing for the function: $f(x) = x^3 - 5x + 1$

Three Decimal places

min: (1.28, -3.30) increasing: $(-\infty, -1.28)(1.28, \infty)$

max: (-1.28, 5.30) decreasing: $(-1.28, 1.28)$

.0.202, 2.128, -2.330

Describe in words each transofrmation in the correct order.

1) $f(x-1)+5$
① right 1
② up 5

2) $2g(x-1)$
② Narrower / Stretch
① right 1

3) $-3g(x)-7$
① Reflection over x-axis
② Narrower / Stretch
③ Down 7

4) $-\frac{1}{2}h(x-4)+1$
② Reflection over x-axis
③ wider / Shrink
① right 4
④ up 1

5) $10g(x-5)-7$
② Narrower / Stretch
① Right 5
③ Down 7

6) $-h(x+2)+3$
② Reflection over x-axis
① left 2
③ up 3

Write each description using function notation.

7) A reflection over the x axis and a shift left 2 $-f(x+2)$

8) A vertical stretch of ½ and a shift up 7 $\frac{1}{2}f(x)+7$

9) A vertical stretch of 3, a reflection over the x-axis, and a shift down 3 $-3f(x)-3$

10) A reflection over the x-axis, a vertical stretch of ¾ and a shift up 1 and right 1 $-\frac{3}{4}f(x-1)+1$

Write each discription using the function given.

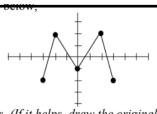
11) A quadratic function with a vertical stretch of 4, a shift up 2 and right 7 $f(x) = 4(x-7)^2 + 2$

12) A cubic function that has a horizontal shift right 3 and then reflects over the x- axis and then shifts down 4 units. $f(x) = -(x-3)^3 - 4$

13) A square root function that has a horizontal shift left 2 and then reflects over the y- axis and then shifts up 6 units. $f(x) = \sqrt{-(x+2)} + 6$

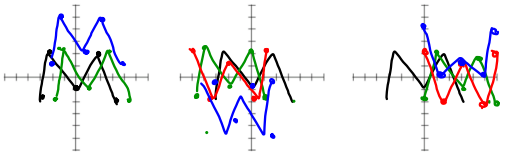
14) An absolute value function that has a horizontal shift right 1 and then reflects over the x- axis, has a vertical stretch of 4 and then then shifts down 7 units. $f(x) = -4|x-1| - 7$

15) Using the graph of h(x) pictured below,



Sketch the following transformations. (If it helps, draw the original function)

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



Fill in the missing parts to the chart.

Equation	Parent Function	Description of shifts	New Vertex Point
$f(x) = \lvert x-3\rvert + 1$	Absolute value	right 3 up 1	(3,1)
$g(x) = -(x+6)^2 - 2$	Quadratic	Reflection over x left 6 / down 2	(-6,2)
$h(x) = 2\sqrt{-x} + 5$	Square root	Narrower / up 5 Reflect over y	(0,5)
$j(x) = -3(x-4)^3 + 9$	Cubic	Reflect over x Right 4 up 9 Stretch 3	(4,9)
$f(x) = \frac{1}{2}(x+2)^2$	Quadratic	wider left 2	(-2,0)
$f(x) = 4\lvert x-10\rvert - 7$	Absolute value	right 10 down 7 Narrower	(10,-7)
* $h(x) = 2\sqrt{x-9} + 5$ $\sqrt{-(x+9)}$	Square root	Narrower reflection over y up 5 left 9	(-9,5)

Adding & Subtracting Polynomials

1) $(9r^3 + 5r^2 + 11r) + (-2r^3 + 9r - 8r^2)$

$f(x) + g(x)$

Combine like terms! → $7r^3 - 3r^2 + 20r$

① Keep 1st poly.
② Change +
③ Change 2nd signs

2) $(3a^2 + 2a - 2) + (a^2 + 3a + 7)$

$4a^2 + 5a - 9$

Multiplying Polynomials

① multiply coeff.
② add exponents
③ Combine!

3) $(8a - 3b)(2a - 9b)$

	$8a$	$-3b$
$2a$	$16a^2$	$-6ab$
$-9b$	$-72ab$	$+27b^2$

$16a^2 - 78ab + 27b^2$

4) $(2x^2 + 7x)^2$

$(2x^2+7x)(2x^2+7x)$

$4x^4 + 14x^3 + 14x^3 + 49x^2$

$4x^4 + 28x^3 + 49x^2$

Dividing Polynomials

① divide coeff.
② Subtract exponents

5) $\frac{18a^2g + 27a^2g^2 - 9ag^2}{9a^2g}$

$2 + 3g - \frac{1g}{a}$

$a^{-1} = \frac{1}{a}$

$\frac{a^{-3}}{1} = \frac{1}{a^3}$

6) $\frac{25x^2y^2 + 35xy^3 + 50x^3y^2}{-5xy}$

$-5xy - 7y^2 - 10x^2y$

Worksheet

11) $g(t) = -4t + 4$
$h(t) = t^2 + 2t$
Find $g(n^2) - h(n^2)$

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

$-4n^2 + 4 + -n^4 - 2n^2$

$-n^4 - 6n^2 + 4$

Find your partner from yesterday, complete at least the front page of the worksheet!