Algebra 2 Guideline for Week 2 April,27 – May,1

There are 5 Review assignments to complete this week. You can either write on binder paper or print worksheets. Make sure to

- write very neat
- show all the work
- write your name in pen

After you are done with each assignment, open it on schoology.com, take a photo and submit. Due date for these assignments is May 8th, but I strongly recommend completing and submitting your assignments daily.

Please, message me on schoology if you have questions and need help. Also, there are will be live Q&A meetings with me through Zoom scheduled on schoology if you need an additional help.

April,27

Assignment HMH 5.1 Practice A/B "Graphing Cubic Functions"

Complete assignment and submit on schoology.

Use the following resources to review:

- **Notes from our class**
- **On-line HMH interactive lesson 5.1**
- **HMH 5.1 Reteach page (attached)**

April,28

Assignment HMH 5.2 Practice A/B "Graphing Polynomials, Odd and Even, Leading coefficients and x-intercepts"

Complete assignment and submit on schoology.

Use the following resources to review:

- **Notes from our class**
- **On-line HMH interactive lesson 5.2**
- **HMH 5.2 Reteach page (attached)**

April,29

Assignment HMH 6.1 Practice A/B "Adding and Subtracting Polynomials"

Complete assignment on paper, take a photo and submit on schoology.

Use the following resources to review:

- **Notes from our class**
- **On-line HMH interactive lesson 6.1**
- **HMH 6.1 Reteach page (attached)**

April,30

Assignment HMH 6.2 Practice A/B "Multiplying Polynomials"

Complete assignment on paper, take a photo and submit on schoology.

Use the following resources to review:

- **Notes from our class**
- **On-line HMH interactive lesson 6.2**
- **HMH 6.2 Reteach page (attached)**

May,1

Assignment HMH 6.4 Practice A/B "Factoring Polynomials"

Complete assignment on paper, take a photo and submit on schoology.

Use the following resources to review:

- **Notes from our class**
- **On-line HMH interactive lesson 6.4**
- **HMH 6.4 Reteach page (attached)**

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LESSON 5-1

Graphing Cubic Functions

Reteach

The graph of the parent function $f(x) = x^3$ can be transformed into $g(x) = a\left(\frac{1}{b}(x-h)\right)^3 + k$.

Each parameter (*a*, *b*, *h*, and *k*) affects the transformation of the function:

a	$\lvert a\rvert < 1$ Vertical Compression	$\lvert a\rvert > 1$ Vertical Stretch	$a < 0$ Reflection over *x*-axis
b	$\lvert b\rvert < 1$ Horizontal Compression	$\lvert b\rvert > 1$ Horizontal Stretch	$b < 0$ Reflection over *y*-axis
h	$h < 0$ Translate Left *h*	$h > 0$ Translate Right *h*	
k	$k < 0$ Translate Down *k*	$k > 0$ Translate Up *k*	

By using reference points, a graph of the transformed function can be created.

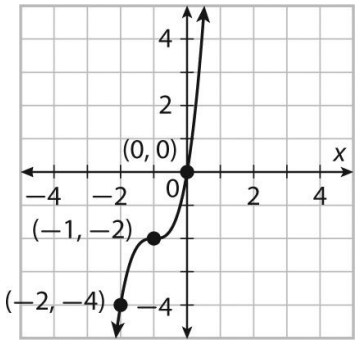
$f(x) = x^3$		$g(x) = a\left(\frac{1}{b}(x-h)\right)^3 + k$	
x	*y*	*x*	*y*
-1	-1	$-b + h$	$-a + k$
0	0	*h*	*k*
1	1	$b + h$	$a + k$

Example Identify the transformations that produce the graph of $g(x) = 2(x+1)^3 - 2$. Then, graph $g(x)$ by applying the transformations to the reference points $(-1, -1)$, $(0, 0)$, and $(1, 1)$.

Transformations | Reference Points | Graph

Transformations
$a = 2$ Vertical Stretch by 2
$b = 1$ No Horizontal Stretch or Compression
$h = -1$ Translate Left 1
$k = -2$ Translate Down 2

Original Points	*x*	*y*
$(-1, -1)$	$-1 + (-1) = -2$	$-2 + (-2) = -4$
$(0, 0)$	-1	-2
$(1, 1)$	$1 + (-1) = 0$	$2 + (-2) = 0$



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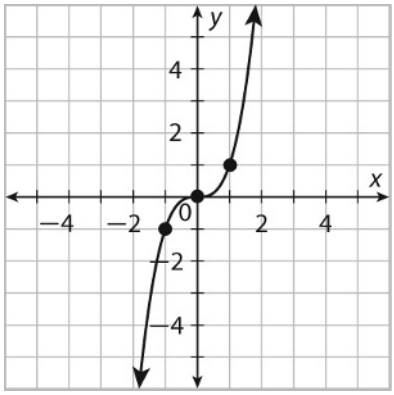
LESSON 5-1

Graphing Cubic Functions

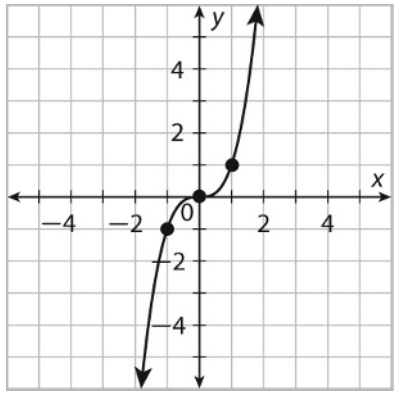
Practice and Problem Solving: A/B

Calculate the reference points for each transformation of the parent function $f(x) = x^3$. Then graph the transformation. (The graph of the parent function is shown.)

1. $g(x) = (x - 3)^3 + 2$

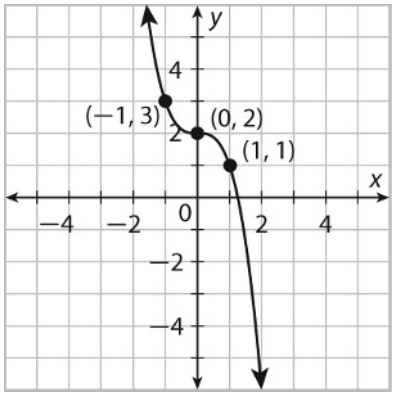


2. $g(x) = -3(x + 2)^3 - 2$

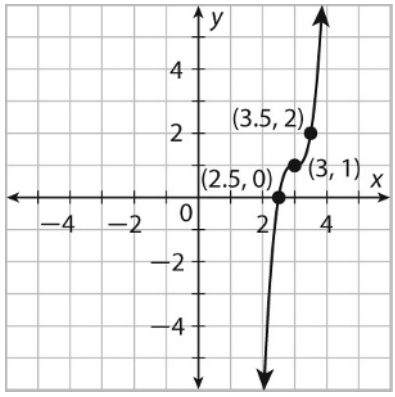


Write the equation of the cubic function whose graph is shown.

3.



4.



Solve.

5. The graph of $f(x) = x^3$ is reflected across the x-axis. The graph is then translated 11 units up and 7 units to the left. Write the equation of the transformed function.

6. The graph of $f(x) = x^3$ is stretched vertically by a factor of 6. The graph is then translated 9 units to the right and 3 units down. Write the equation of the transformed function.

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LESSON 5-2

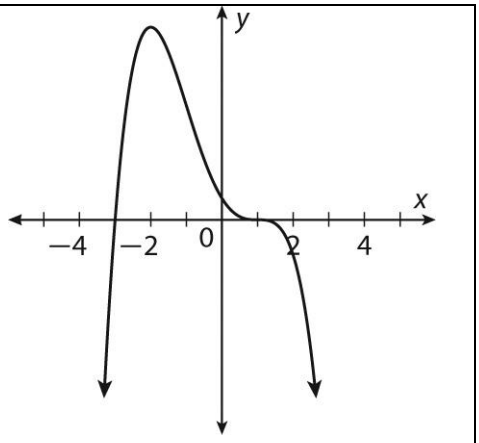
Graphing Polynomial Functions

Reteach

To sketch $f(x) = a(x - x_1)(x - x_2)...(x - x_n)$:

n = degree a = constant factor	End Behavior	Graph Description	x-intercepts
n odd $a > 0$	as $x \to -\infty$, $f(x) \to -\infty$ as $x \to +\infty$, $f(x) \to +\infty$	Uphill	$(x - x_1)^{odd}$ Crosses x-axis at x_1
n odd $a < 0$	as $x \to -\infty$, $f(x) \to +\infty$ as $x \to +\infty$, $f(x) \to -\infty$	Downhill	
n even $a > 0$	as $x \to -\infty$, $f(x) \to +\infty$ as $x \to +\infty$, $f(x) \to +\infty$	Opens up	$(x - x_2)^{even}$ Tangent to x-axis at x_2
n even $a < 0$	as $x \to -\infty$, $f(x) \to -\infty$ as $x \to +\infty$, $f(x) \to -\infty$	Opens down	

Example Sketch the graph of the polynomial function $f(x) = \left(-\frac{1}{5}\right)(x + 3)(x - 1)^3$.

$n = 4$ (even), $a = -\frac{1}{5}$ $(a < 0) \to$ Opens down	
$(x + 3)$ raised to an odd power $\to$ crosses at $x = -3$	
$(x - 1)$ raised to an odd power $\to$ crosses at $x = 1$	

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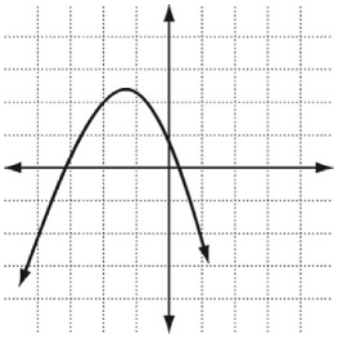
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LESSON 5-2

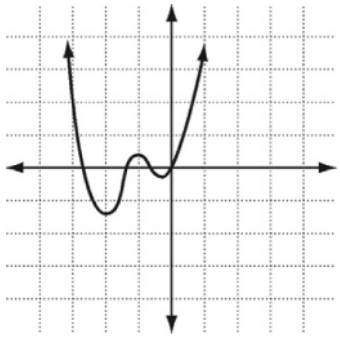
Graphing Polynomial Functions

Practice and Problem Solving: A/B

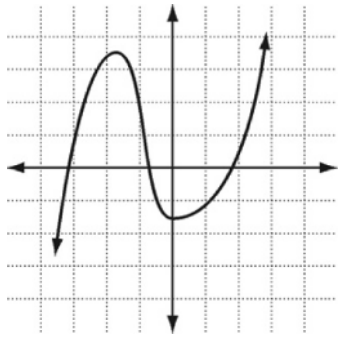
Identify whether the function graphed has an odd or even degree and a positive or negative leading coefficient.

1. 

_____

2. 

_____

3. 

_____

Use a graphing calculator to determine the number of turning points and the number and type (global or local) of any maximum or minimum values.

4. $f(x) = x(x-4)^2$

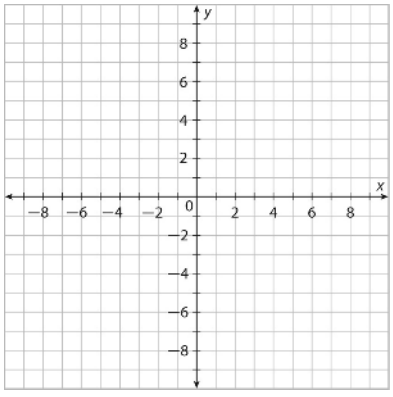
_____

5. $f(x) = -x^2(x-2)(x+1)$

_____

Graph the function. State the end behavior, *x*-intercepts, and intervals where the function is above or below the *x*-axis.

6. $f(x) = -(x-1)^2(x+3)$



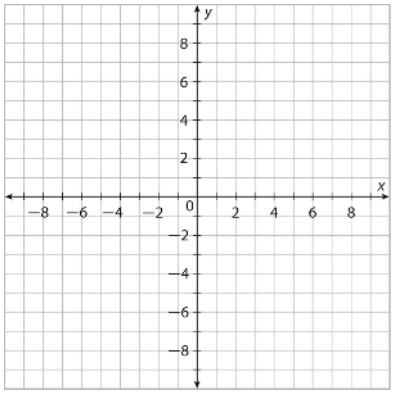
End behavior: _____

x-intercepts: _____

Above *x*-axis: _____

Below *x* axis: _____

7. $f(x) = (x+2)(x-3)(x-1)$



End behavior: _____

x-intercepts: _____

Above *x*-axis: _____

Below *x*-axis: _____

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LESSON 6-1

Adding and Subtracting Polynomials

Reteach

Example $\left(-3x^4+2x-x^3-12\right)+\left(4+2x^4-x^2+9x\right)$

1. Write in standard form.	$-3x^4 \quad -x^3 \quad +2x \quad -12$
2. Align like terms.	$+\ 2x^4 \quad -x^2 \quad +9x \quad +4$
3. Add.	$-x^4 \quad -x^3 \quad -x^2 \quad +11x \quad -8$

$$\left(-3x^4+2x-x^3-12\right)+\left(4+2x^4-x^2+9x\right)=-x^4-x^3-x^2+11x-8$$

_____

Example $\left(-x+5x^3+2x^4-10x\right)-\left(4x^2-2x-x^4+1\right)$

1. Write in standard form.	$2x^4 \quad +5x^3 \quad -x^2 \quad -10x$
2. Align like terms and add the opposite.	$+\ x^4 \quad -4x^2 \quad +2x \quad -1$
3. Add.	$3x^4 \quad +5x^3 \quad -5x^2 \quad -8x \quad -1$

$$\left(-x+5x^3+2x^4-10x\right)-\left(4x^2-2x-x^4+1\right)=3x^4+5x^3-5x^2-8x-1$$

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LESSON 6-1

Adding and Subtracting Polynomials

Practice and Problem Solving: A/B

Identify the degree of each monomial.

1. $6x^2$ _____

2. $3p^3m^4$ _____

3. $2x^8y^3$ _____

Rewrite each polynomial in standard form. Then identify the leading coefficient, degree, and number of terms.

4. $6 + 7x - 4x^3 + x^2$

_____

5. $x^2 - 3 + 2x^5 + 7x^4 - 12x$

_____

Add or subtract. Write your answer in standard form.

6. $(2x^2 - 2x + 6) + (11x^3 - x^2 - 2 + 5x)$

_____

7. $(x^2 - 8) - (3x^3 - 6x - 4 + 9x^2)$

_____

8. $(5x^4 + x^2) + (7 + 9x^2 - 2x^4 + x^3)$

_____

9. $(12x^2 + x) - (6 - 9x^2 + x^7 - 8x)$

_____

Solve.

10. An accountant finds that the gross income, in thousands of dollars, of a small business can be modeled by the polynomial $-0.3t^2 + 8t + 198$, where t is the number of years after 2010. The yearly expenses of the business, in thousands of dollars, can be modeled by the polynomial $-0.2t^2 + 2t + 131$.

    a. Find a polynomial that predicts the net profit of the business after t years.

    _____

    b. Assuming that the models continue to hold, how much net profit can the business expect to make in the year 2016?

    _____

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LESSON 6-2

Multiplying Polynomials

Reteach

You can multiply polynomials horizontally or vertically.

Example Find the product by multiplying horizontally. $(x-5)(3x+x^2-7)$

Multiply each term of the first polynomial by each term of the second polynomial, then simplify.

1. Write polynomials in standard form. $(x-5)(x^2+3x-7)$
2. Distribute x and -5. $x(x^2)+x(3x)+x(-7)+(-5)(x^2)+(-5)(3x)+(-5)(-7)$
3. Simplify. $x^3+3x^2-7x-5x^2-15x+35$
4. Combine like terms. $x^3-2x^2-22x+35$

Example Find the product by multiplying vertically. $(x-5)(3x+x^2-7)$

1. Write each polynomial in standard form.
2. Multiply -5 and $(3x+x^2-7)$.
3. Multiply x and $(3x+x^2-7)$.
4. Combine like terms.

$$\begin{array}{rrrr} & x^2 & +3x & -7 \\ & & x & -5 \\ \hline & -5x^2 & -15x & +35 \\ x^3 & +3x^2 & -7x & \\ \hline x^3 & -2x^2 & -22x & +35 \end{array}$$

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LESSON 6-2

Multiplying Polynomials

Practice and Problem Solving: A/B

Find each product.

1. $4x^2(3x^2 + 1)$

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

3. $-6x^2(x^3 + 7x^2 - 4x + 3)$

4. $x^3(-4x^3 + 10x^2 - 7x + 2)$

5. $-5m^3(7n^4 - 2mn^3 + 6)$

6. $(x + 2)(y^2 + 2y - 12)$

7. $(p + q)(4p^2 - p - 8q^2 - q)$

8. $(2x^2 + xy - y)(y^2 + 3x)$

Expand each expression.

9. $(3x - 1)^3$

10. $(x - 4)^4$

11. $3(a - 4b)^2$

12. $5(x^2 - 2y)^3$

Solve.

13. A biologist has found that the number of branches on a certain rare tree in its first few years of life can be modeled by the polynomial $b(y) = 4y^2 + y$. The number of leaves on each branch can be modeled by the polynomial $l(y) = 2y^3 + 3y^2 + y$, where y is the number of years after the tree reaches a height of 6 feet. Write a polynomial describing the total number of leaves on the tree.

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LESSON 6-4

Factoring Polynomials

Reteach

Factoring a sum of two cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Example Factor $125a^3 + 8$.

	$125x^3 + 8$
	$(5x)^3 + (2)^3$
Recognize the sum of two cubes.	$(5x + 2)((5x)^2 - (5x)(2) + (2)^2)$
Factor using factoring pattern.	$(5x + 2)(25x^2 - 10x + 4)$
Simplify.	

Factoring a difference of two cubes: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Example Factor $27a^3 - 64$.

	$27a^3 - 64$
	$(3a)^3 - (4)^3$
Recognize the difference of two cubes.	$(3a - 4)((3a)^2 + (3a)(4) + (4)^2)$
Factor using factoring pattern.	$(3a - 4)(9a^2 + 12a + 16)$
Simplify.	

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LESSON 6-4

Factoring Polynomials

Practice and Problem Solving: A/B

Simplify each polynomial, if possible. Then factor it.

1. $3n^2 - 48$

2. $3x^3 - 75x$

3. $9m^4 - 16$

4. $16r^4 - 9$

5. $3n^6 - 12$

6. $x^6 - 9$

7. $3b^7 + 12b^4 + 12b$

8. $50v^6 + 60v^3 + 18$

9. $x^3 - 64$

10. $x^3 - 125$

11. $x^6 - 64$

12. $x^6 - 1$

Factor each polynomial by grouping.

13. $8n^3 - 7n^2 + 56n - 49$

14. $5x^3 - 6x^2 - 15x + 18$

15. $9r^3 + 3r^2 - 21r - 7$

16. $25v^3 + 25v^2 - 15v - 15$

17. $120b^3 + 105b^2 + 200b + 175$

18. $120x^3 - 80x^2 - 168x + 112$

Solve.

19. A square concert stage in the center of a fairground has an area of $4x^2 + 12x + 9$ ft^2. The dimensions of the stage have the form $cx + d$, where c and d are whole numbers. Find an expression for the perimeter of the stage. What is the perimeter when $x = 2$ ft?

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