**From the Teacher: Mr. Haut**

**Class: Algebra 2**

**Periods: 3 and 4**

**Assignment: Week 2**

If turning in paper packet and work, make sure to include this header information on all pages!

From the Student:
Student Name
Teacher Name
Name of class
Period #
Assignment #

## Distance Learning 2020 Week 2 (April 27th-May 1st)

Assignments are accessible in Microsoft Teams on Office 365. Work can also be submitted in Teams, which I highly encourage you to do if you are able to. You can contact Mr. Haut if you need help with Teams. You must write your name in pen on each page of your assignment.

The work for week 2 is not officially due until 5/8/2020. However, I have broken down the work into daily chunks to help you manage your time. I encourage you to have the work from week 2 complete by 5/1/2020.

My office hours are 1 pm – 3 pm, M–F. You can reach me through Remind (@haut-alg2), email (dhaut@tusd.net) or chat on Teams. Please continue to check your e-mail regularly.

*If turning in work on Teams (which I highly encourage you to do if you are able to), complete your work on binder paper or graph paper (just like in the olden days) Please write your name in pen on each page before you take a picture. Make sure your picture is clear and your work is readable.

### Week 2: Day 1 (turn in by May 8, 2020):

**Graphing Cubic Functions**

Resources that can help:

- Textbook pg. 236-240
- The HMH Reteach 5.1 (attached)
- HMH Online Interactive Student Edition Lesson 5.1 ( my.hrw.com )

**Assignment #1** : Wrksht HMH 5.1 Practice A/B *Put all work on a separate piece of paper.*

**Week 2: Day 2 (turn in by May 8, 2020):**

**Graphing Polynomials, Odd, and Even, Leading Coefficients and x-Intercepts**

Resources that can help:

- See our notes on Section 5-2 (remember our discussion of End Behavior, and the "dance pose" it would look "odd" to see Mr. Haut do at a dance.)
- The HMH Reteach 5.2 (attached)
- HMH Online Interactive Student Edition Lesson 5.2 ( my.hrw.com )

**Assignment #2**: Wrksht HMH 5.2 Practice A/B *Put all work on a separate piece of paper.*

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**Week 2: Day 3 (turn in by May 8, 2020):**

**Adding & Subtracting Polynomials**

Resources that can help:

- Textbook pg. 272-274
- The HMH Reteach 6.1 (attached)
- HMH Online Interactive Student Edition Lesson 6.1 ( my.hrw.com )

**Assignment #3** : Wrksht HMH 6.1 Practice A/B *Put all work on a separate piece of paper.*

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**Week 2: Day 4 (turn in by May 8, 2020):**

**Multiplying Polynomials**

Resources that can help:

- Textbook pg. 284-286
- The HMH Reteach 6.2 (attached)
- HMH Online Interactive Student Edition Lesson 6.2 ( my.hrw.com )

**Assignment #4** : Wrksht HMH 6.2 Practice A/B *Put all work on a separate piece of paper.*

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**Week 2: Day 5 (turn in by May 8, 2020):**

**Complex Solutions of Quadratic Equations**

Resources that can help:

- Textbook pg. 310-314
- The HMH Reteach 6.4 (attached)
- HMH Online Interactive Student Edition Lesson 6.4 ( my.hrw.com )

**Assignment #5** : Wrksht HMH 6.4 Practice A/B *Put all work on a separate piece of paper.*

Name _____ Date _____ Class _____

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.

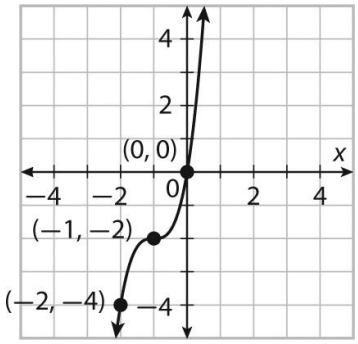
| $f(x) = x^3$ | | $g(x) = a\left(\frac{1}{b}(x-h)\right)^3 + k$ | |
|---|---|---|---|
| *x* | *y* | *x* | *y* |
| $-1$ | $-1$ | $-b + h$ | $-a + k$ |
| 0 | 0 | *h* | *k* |
| 1 | 1 | $b + h$ | $a + k$ |

**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* |
|---|---|---|
| $(-1, -1)$ | $-1 + (-1) = -2$ | $-2 + (-2) = -4$ |
| $(0, 0)$ | $-1$ | $-2$ |
| $(1, 1)$ | $1 + (-1) = 0$ | $2 + (-2) = 0$ |



Name _____ Date _____ Class _____

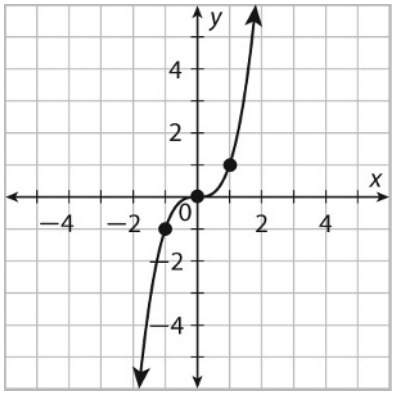
LESSON 5-1

# Graphing Cubic Functions

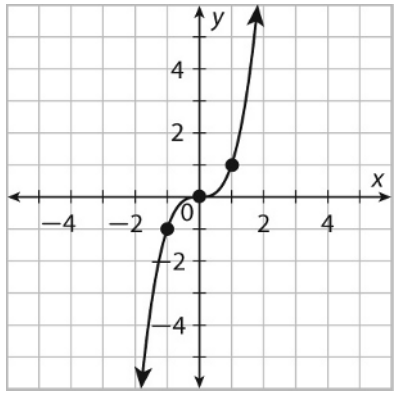
## *Practice and Problem Solving: A/B*

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

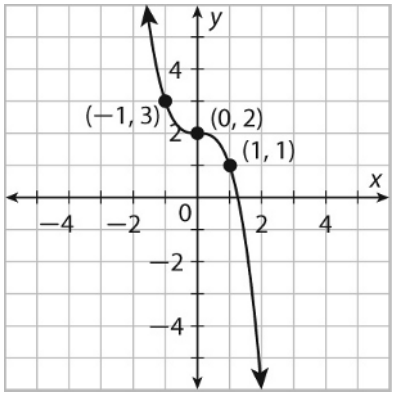



2. $g(x) = -3(x + 2)^3 - 2$

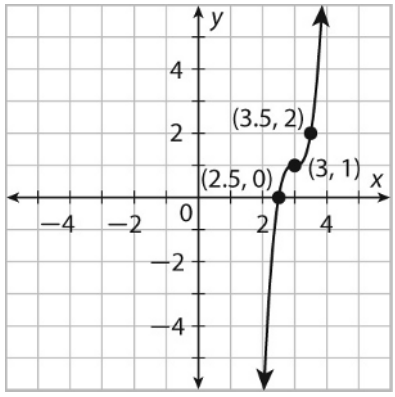



**Write the equation of the cubic function whose graph is shown.**

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.

Name _____ Date _____ Class_____

LESSON 5-2

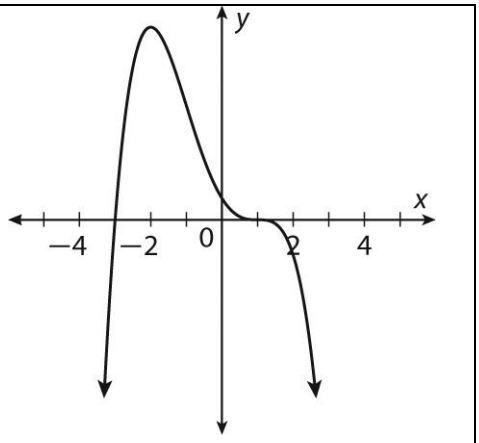
# Graphing Polynomial Functions

***Reteach***

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

| $n$ = degree<br>$a$ = constant factor | End Behavior | Graph Description | $x$-intercepts |
|---|---|---|---|
| $n$ odd<br>$a > 0$ | as $x \to -\infty$, $f(x) \to -\infty$<br>as $x \to +\infty$, $f(x) \to +\infty$ | Uphill | $(x - x_1)^{odd}$<br>Crosses $x$-axis at $x_1$ |
| $n$ odd<br>$a < 0$ | as $x \to -\infty$, $f(x) \to +\infty$<br>as $x \to +\infty$, $f(x) \to -\infty$ | Downhill | |
| $n$ even<br>$a > 0$ | as $x \to -\infty$, $f(x) \to +\infty$<br>as $x \to +\infty$, $f(x) \to +\infty$ | Opens up | $(x - x_2)^{even}$<br>Tangent to $x$-axis at $x_2$ |
| $n$ even<br>$a < 0$ | as $x \to -\infty$, $f(x) \to -\infty$<br>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 $x = 1$ | |

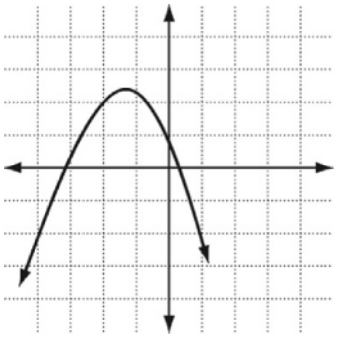
Name _____ Date _____ Class _____

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. 

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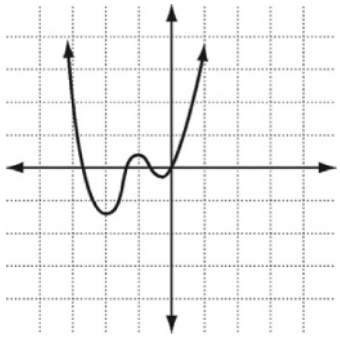
2. 

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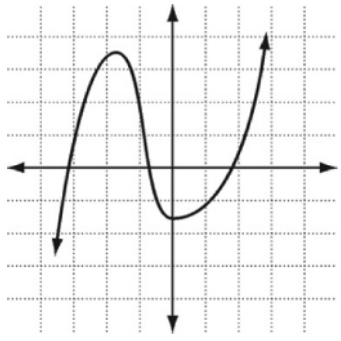
3. 

_____

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

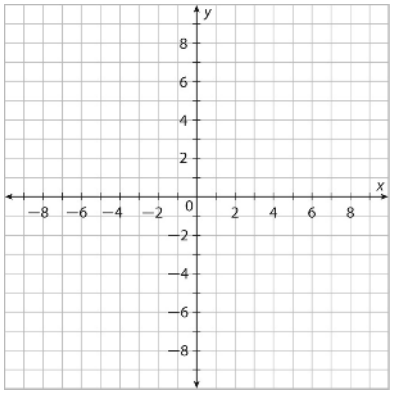
_____

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



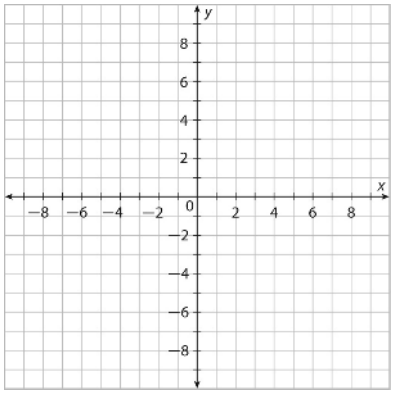

End behavior: _____

*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: _____

Name _____ Date _____ Class_____

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. | $3x^4 \quad +5x^3 \quad -5x^2 \quad -8x \quad -1$ |

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

Name _____ Date _____ Class _____

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?

    _____

Name _____ Date _____ Class_____

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.

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

Name _____ Date _____ Class _____

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. | |

Name _____ Date _____ Class _____

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?