From the Teacher: Mr. Haut

Class: Algebra 2

Periods: 3 and 4

Assignment: Week 3

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 3 (May 4th-May 8th)

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 3 is not officially due until 5/15/2020. 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 3 complete by 5/8/2020.

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 3: Day 1 (turn in by May 15, 2020):

Dividing Polynomial, Long Division and Synthetic Division

Resources that can help:

- Textbook pg. 321-327
- The HMH Reteach 6.5 (attached)
- HMH Online Interactive Student Edition Lesson 6.5 (my.hrw.com)

Assignment #1 : Wrksht HMH 6.5 Practice A/B *Put all work on a separate piece of paper.*

Week 3: Day 2 (turn in by May 15, 2020):

Finding Rational Solutions of Polynomial Equations

Resources that can help:

- Textbook pg. 342-346
- The HMH Reteach 7.1 (attached)
- HMH Online Interactive Student Edition Lesson 7.1 (my.hrw.com)

Assignment #2: Wrksht HMH 7.1 Practice A/B *Put all work on a separate piece of paper.*

Week 3: Day 3 (turn in by May 15, 2020):

Finding Complex Solutions of Polynomial Equations

Resources that can help:

- Textbook pg. 353-361
- The HMH Reteach 7.2 (attached)
- HMH Online Interactive Student Edition Lesson 7.2 (my.hrw.com)

Assignment #3 : Wrksht HMH 7.2 Practice A/B *Put all work on a separate piece of paper.*

Week 3: Day 4 (turn in by May 15, 2020):

Adding, Subtracting Rational Expressions

Resources that can help:

- Textbook pg. 425-430
- The HMH Reteach 9.1 (attached)
- HMH Online Interactive Student Edition Lesson 9.1 (my.hrw.com)

Assignment #4 : Wrksht HMH 9.1 Practice A/B *Put all work on a separate piece of paper.*

Week 3: Day 5 (turn in by May 15, 2020):

Multiplying and Dividing Rational Expressions

Resources that can help:

- Textbook pg. 439-444
- The HMH Reteach 9.2 (attached)
- HMH Online Interactive Student Edition Lesson 9.2 (my.hrw.com)

Assignment #5 : Wrksht HMH 9.2 Practice A/B *Put all work on a separate piece of paper.*

Name _____ Date _____ Class_____

LESSON 6-5

Dividing Polynomials

Reteach

Example Divide $(x^3 - 2x^2 - 22x + 45)$ by $(x - 5)$ using synthetic division.

$$\begin{array}{r|} 5 \\ \hline \\ \hline \quad\quad \lfloor \end{array} \rightarrow \begin{array}{r|cccc} 5 & 1 & -2 & -22 & 45 \\ \hline \\ \hline \quad\quad & & & & \lfloor \end{array} \rightarrow \begin{array}{r|cccc} 5 & 1 & -2 & -22 & 45 \\ \hline & & & & \\ \hline 1 & & & & \lfloor \end{array} \rightarrow$$

$$\rightarrow \begin{array}{r|cccc} 5 & 1 & -2 & -22 & 45 \\ \hline & & 5 & & \\ \hline 1 & & & & \lfloor \end{array} \rightarrow \begin{array}{r|cccc} 5 & 1 & -2 & -22 & 45 \\ \hline & & 5 & & \\ \hline 1 & 3 & & & \lfloor \end{array} \rightarrow \begin{array}{r|cccc} 5 & 1 & -2 & -22 & 45 \\ \hline & & 5 & 15 & \\ \hline 1 & 3 & & & \lfloor \end{array} \rightarrow$$

$$\rightarrow \begin{array}{r|cccc} 5 & 1 & -2 & -22 & 45 \\ \hline & & 5 & 15 & \\ \hline 1 & 3 & -7 & & \lfloor \end{array} \rightarrow \begin{array}{r|cccc} 5 & 1 & -2 & -22 & 45 \\ \hline & & 5 & 15 & -35 \\ \hline 1 & 3 & -7 & & \lfloor \end{array} \rightarrow \begin{array}{r|cccc} 5 & 1 & -2 & -22 & 45 \\ \hline & & 5 & 15 & -35 \\ \hline 1 & 3 & -7 & & \lfloor 10 \end{array}$$

Quotient: $x^2 + 3x - 7$
Remainder: 10

Name _____ Date _____ Class _____

LESSON 6-5

Dividing Polynomials

Practice and Problem Solving: A/B

Divide by using long division.

1. $(x^2 - x - 6) \div (x - 3)$

2. $(2x^3 - 10x^2 + x - 5) \div (x - 5)$

3. $(-3x^2 + 20x - 12) \div (x - 6)$

4. $(3x^3 + 9x^2 - 14) \div (x + 3)$

Divide by using synthetic division.

5. $(3x^2 - 8x + 4) \div (x - 2)$

6. $(5x^2 - 4x + 12) \div (x + 3)$

7. $(9x^2 - 7x + 3) \div (x - 1)$

8. $(-6x^2 + 5x - 10) \div (x + 7)$

Use synthetic substitution to evaluate *P*(*x*) for the given value.

9. $P(x) = 4x^2 - 9x + 2$ for $x = 3$

10. $P(x) = -3x^2 + 10x - 4$ for $x = -2$

Determine whether the given binomial is a factor of *P*(*x*).

11. $(x - 4)$; $P(x) = x^2 + 8x - 48$

12. $(x + 5)$; $P(x) = 2x^2 - 6x - 1$

Solve.

13. The total number of dollars donated each year to a small charitable organization has followed the trend $d(t) = 2t^3 + 10t^2 + 2000t + 10{,}000$, where d is dollars and t is the number of years since 1990. The total number of donors each year has followed the trend $p(t) = t^2 + 1000$. Write an expression describing the average number of dollars per donor.

Name _____ Date _____ Class _____

LESSON 7-1

Finding Rational Solutions of Polynomial Equations

Reteach

Rational Root Theorem:	Possible rational roots are of the form $\frac{m}{n}$ where m = factor of the constant term n = factor of the leading coefficient

Example Find the rational zeros of $x^3 - 11x^2 + 23x + 35$, then write the function in factored form.

Step 1: List possible rational roots.

$x^3 - 11x^2 + 23x + 35$	Constant term: 35 Factors: $\pm 1, \pm 5, \pm 7, \pm 35$	Leading Coefficient: 1 Factors: ± 1
Possible Rational Roots: $\frac{m}{n} = \frac{\pm 1, \pm 5, \pm 7, \pm 35}{\pm 1} = \pm 1, \pm 5, \pm 7, \pm 35$		

Step 2: Use synthetic division to test for a zero remainder.

$\underline{1}\,\vert\; 1 \;\; -11 \;\; 23 \;\; 35$ $\qquad\quad 1 \;\; -10 \;\; 13$ $\qquad 1 \;\; -10 \;\; 13 \;\; \vert 48$	$\underline{5}\,\vert\; 1 \;\; -11 \;\; 23 \;\; 35$ $\qquad\quad 5 \;\; -30 \;\; -35$ $\qquad 1 \;\; -6 \;\; -7 \;\; \vert 0$
Remainder is not 0, so 1 is not a root.	Remainder is 0, so 5 is a root.

Step 3: Factor the remaining quadratic to find the zeros and write the polynomial in factored form.

$x^3 - 11x^2 + 23x + 35 = (x-5)(x^2 - 6x - 7)$ $= (x-5)(x-7)(x+1)$	Rational zeros are 5, 7, and -1, and $f(x) = (x-5)(x-7)(x+1)$.

Name _____ Date _____ Class _____

LESSON 7-1

Finding Rational Solutions of Polynomial Equations

Practice and Problem Solving: A/B

Solve each polynomial equation by factoring.

1. $4x^3 + x^2 - 4x - 1 = 0$

_____

2. $x^5 - 2x^4 - 24x^3 = 0$

_____

3. $3x^5 + 18x^4 - 21x^3 = 0$

_____

4. $-x^4 + 2x^3 + 8x^2 = 0$

_____

Identify the rational zeros of each function. Then write the function in factored form.

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

_____

6. $f(x) = x^3 + 5x^2 - 8x - 48$

_____

Identify all the rational roots of each equation.

7. $x^3 + 10x^2 + 17x = 28$

_____

8. $3x^3 + 10x^2 - 27x = 10$

_____

Solve.

9. An engineer is designing a storage compartment in a spacecraft. The compartment must be 2 meters longer than it is wide, and its depth must be 1 meter less than its width. The volume of the compartment must be 8 cubic meters.

   a. Write an equation to model the volume of the compartment.

   _____

   b. List all possible rational roots. _____

   c. Use synthetic division to find the roots of the polynomial equation. Are the roots all rational numbers?

   _____

   d. What are the dimensions of the storage compartment? _____

Name _____ Date _____ Class _____

LESSON 7-2

Finding Complex Solutions of Polynomial Equations

Reteach

$a + bi$ and $a - bi$ are complex conjugates.

Example Give the complex conjugate of each number.

$-2 - i$ Complex Conjugate: $-2 + i$

$4 + 3i$ Complex Conjugate: $4 - 3i$

$5i$ Complex Conjugate: $-5i$

Complex Conjugate Root Theorem:	If $a + bi$ is an imaginary root of a polynomial equation with real-number coefficients, then $a - bi$ is also a root.

Example Write the polynomial function with the least degree and a leading coefficient of 1 that has zeros $1 - 2i$, 5, and -1.

Complex roots come in conjugate pairs $\rightarrow$ zeros are $1 - 2i$, $1 + 2i$, 5, and -1.

Write the function in factored form.
$$p(x) = (x - (1 - 2i))(x - (1 + 2i))(x - 5)(x + 1)$$

Multiply the complex conjugate factors using FOIL, then simplify.
$$= \left[x^2 - (1 + 2i)x - (1 - 2i)x + (1 - 2i)(1 + 2i)\right](x - 5)(x + 1)$$
$$= \left[x^2 + (-1 - 2i - 1 + 2i)x + (1 - 4i^2)\right](x - 5)(x + 1)$$
$$= (x^2 - 2x + 5)(x - 5)(x + 1)$$

Multiply the binomials.
$$= (x^2 - 2x + 5)(x^2 - 4x - 5)$$

Use the distributive property.
$$= x^2(x^2 - 4x - 5) - 2x(x^2 - 4x - 5) + 5(x^2 - 4x - 5)$$
$$= x^4 - 4x^3 - 5x^2 - 2x^3 + 8x^2 + 10x + 5x^2 - 20x - 25$$

Combine like terms.
$$= x^4 - 6x^3 + 8x^2 - 10x - 25$$

Name _____ Date _____ Class _____

LESSON 7-2

Finding Complex Solutions of Polynomial Equations

Practice and Problem Solving: A/B

Write the simplest polynomial function with the given roots.

1. 1, 4, and -3

2. $\frac{1}{2}$, 5, and -2

3. $2i$, $\sqrt{3}$, and 4

4. $\sqrt{2}$, -5, and $-3i$

Solve each equation by finding all roots.

5. $x^4 - 2x^3 - 14x^2 - 2x - 15 = 0$

6. $x^4 - 16 = 0$

7. $x^4 + 4x^3 + 4x^2 + 64x - 192 = 0$

8. $x^3 + 3x^2 + 9x + 27 = 0$

Solve.

9. An electrical circuit is designed such that its output voltage, V, measured in volts, can be either positive or negative. The voltage of the circuit passes through zero at $t = 1$, 2, and 7 seconds. Write the simplest polynomial describing the voltage $V(t)$.

Name _____ Date _____ Class _____

LESSON 9-1

Adding and Subtracting Rational Expressions

Reteach

To add or subtract rational expressions, they must have common denominators.

Example Add $\frac{x+2}{x-3}+\frac{x-1}{x+1}$.

Step 1 Multiply each rational expression by a common factor to get equivalent fractions with a common denominator.

$$\frac{x+2}{x-3}+\frac{x-1}{x+1}$$

Multiply by $\frac{x+1}{x+1}$

Multiply by $\frac{x-3}{x-3}$

$$\frac{x+2}{x-3}\cdot\frac{x+1}{x+1}=\frac{(x+2)(x+1)}{(x-3)(x+1)}=\frac{x^2+3x+2}{(x-3)(x+1)} \qquad \frac{x-1}{x+1}\cdot\frac{x-3}{x-3}=\frac{(x-1)(x-3)}{(x+1)(x-3)}=\frac{x^2-4x+3}{(x-3)(x+1)}$$

Common Denominators

Step 2 Add the fractions.

$$\frac{x^2+3x+2}{(x-3)(x+1)}+\frac{x^2-4x+3}{(x+1)(x-3)}=\frac{2x^2-x+5}{(x+1)(x-3)}$$

Step 3 Give excluded values that make the denominator 0.

$x \neq -1,\ x \neq 3$

Name _____ Date _____ Class _____

LESSON 9-1

Adding and Subtracting Rational Expressions

Practice and Problem Solving: A/B

Identify the excluded values for each expression.

1. $\frac{x-7}{9x^2-63x}$

2. $\frac{x^2+3x-18}{-x^2+6x-9}$

Simplify the given expression stating any excluded values.

3. $\frac{2x^2-12x+16}{7x^2-28x}$

4. $\frac{5x^2+6x-8}{6x^2-24}$

5. $\frac{9x^3+9x^2}{7x^2-2x-9}$

6. $\frac{2x^2+13x-24}{7x+56}$

Add or subtract. Identify any *x*-values for which the expression is undefined.

7. $\frac{2x-3}{x+4}+\frac{4x-5}{x+4}$

8. $\frac{x+12}{2x-5}-\frac{3x-2}{2x-5}$

9. $\frac{x+4}{x^2-x-12}+\frac{2x}{x-4}$

10. $\frac{3x^2-1}{x^2-3x-18}-\frac{x+2}{x-6}$

11. $\frac{x+2}{x^2-2x-15}+\frac{x}{x+3}$

12. $\frac{x+6}{x^2-7x-18}-\frac{2x}{x-9}$

Solve.

13. A messenger is required to deliver 10 packages per day. Each day, the messenger works only for as long as it takes to deliver the daily quota of 10 packages. On average, the messenger is able to deliver 2 packages per hour on Saturday and 4 packages per hour on Sunday. What is the messenger's average delivery rate on the weekend?

Name _____ Date _____ Class _____

LESSON 9-2

Multiplying and Dividing Rational Expressions

Reteach

Example Find the product and any excluded values. $\frac{x^2-2x-8}{x^2-1} \cdot \frac{x-1}{x^2-x-6}$

Step 1 Factor and multiply. $= \frac{(x-4)(x+2)(x-1)}{(x+1)(x-1)(x-3)(x+2)}$

Step 2 Cancel common factors. $= \frac{(x-4)\cancel{(x+2)}\cancel{(x-1)}}{(x+1)\cancel{(x-1)}(x-3)\cancel{(x+2)}}$

Step 3 Write simplified product. $= \frac{x-4}{(x+1)(x-3)}$

Step 4 Note excluded values. $x \neq -2, x \neq -1, x \neq 1, x \neq 3$

Example Find the quotient and any excluded values. $\frac{x^2-x-12}{x+5} \div \frac{x^2+9x+18}{2x+10}$

Step 1 Rewrite as multiplication by reciprocal of divisor. $= \frac{x^2-x-12}{x+5} \cdot \frac{2x+10}{x^2+9x+18}$

Step 2 Factor $= \frac{(x-4)(x+3)}{x+5} \cdot \frac{2(x+5)}{(x+6)(x+3)}$

Step 3 Multiply $= \frac{2(x-4)(x+3)(x+5)}{(x+5)(x+6)(x+3)}$

Step 4 Cancel common factors. $= \frac{2(x-4)\cancel{(x+3)}\cancel{(x+5)}}{\cancel{(x+5)}(x+6)\cancel{(x+3)}}$

Step 5 Write simplified product. $= \frac{2(x-4)}{(x+6)}$

Step 6 Note excluded values. $x \neq -6, x \neq -5, x \neq -3$

Name _____ Date _____ Class _____

LESSON 9-2

Multiplying and Dividing Rational Expressions

Practice and Problem Solving: A/B

Multiply. State any excluded values.

1. $\frac{6x}{10} \cdot \frac{6x}{3x^3}$

2. $\frac{4x}{3} \cdot \frac{8x}{2}$

3. $\frac{1}{x+9} \cdot \frac{7x^3+49x^2}{x+7}$

4. $\frac{6x^2-54x}{x-9} \cdot \frac{7x}{6x}$

5. $\frac{18x-36}{4x-8} \cdot \frac{2}{9x+18}$

6. $\left(56+11x-15x^2\right) \cdot \frac{10}{15x^2-11x-56}$

Divide. State any excluded values.

7. $\frac{4x}{5x} \div \frac{4x}{6}$

8. $\frac{6(x-2)}{(x-1)(x-10)} \div \frac{x-2}{x-10}$

9. $(2x+6) \div \frac{14x^2+42x}{10}$

10. $\frac{27x+9}{10} \div \frac{3x^2-8x-3}{10}$

11. $\frac{24x+56}{10x^3-90x^2} \div \frac{15x+35}{5}$

12. $\frac{2x+20}{12x^3-30x^2} \div \frac{2}{14x-35}$

Solve.

13. The distance, d, traveled by a car undergoing constant acceleration, a, for a time, t, is given by $d = v_0 t + \frac{1}{2}at^2$, where v_0 is the initial velocity of the car. Two cars are side by side with the same initial velocity. One car accelerates, $a = A$, and the other car does not accelerate, $a = 0$. Write an expression for the ratio of the distance traveled by the accelerating car to the distance traveled by the nonaccelerating car as a function of time.