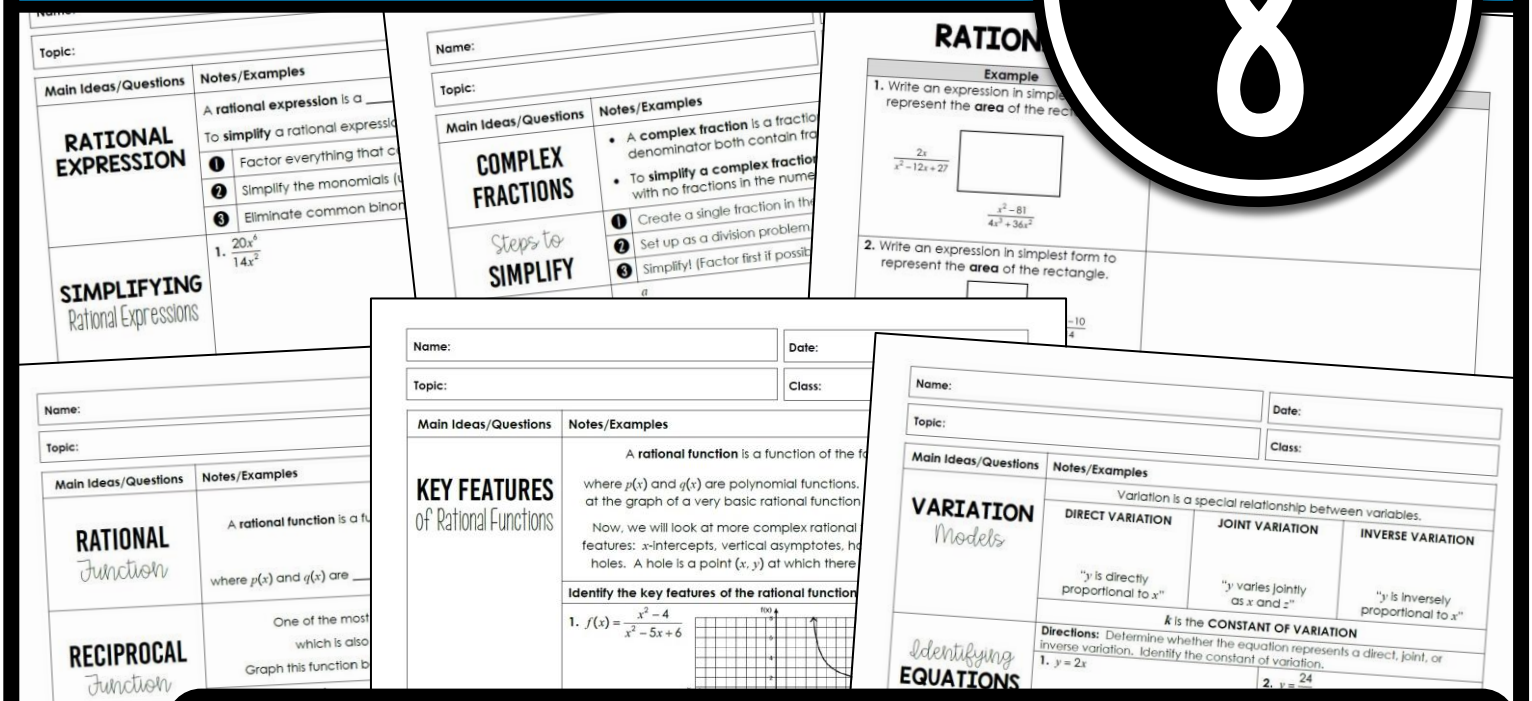
ALGEBRA 2

Unit 8



RATIONAL FUNCTIONS

NOTES • HOMEWORK • QUIZZES • TEST

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Unit 8 – Rational Functions: Sample Unit Outline

	TOPIC	HOMEWORK
DAY 1	Simplifying Rational Expressions; Multiplying & Dividing Rational Expressions	HW #1
DAY 2	Adding and Subtracting Rational Expressions	HW #2
DAY 3	**Quiz 8-1**	None
DAY 4	Complex Fractions	HW #3
DAY 5	Review all Operations	HW #4
DAY 6	Applications	HW #5
DAY 7	**Quiz 8-2**	None
DAY 8	Graphing Basic Rational Functions (Reciprocal Function)	HW #6
DAY 9	Key Features of Rational Functions (x-Intercepts, Vertical & Horizontal Asymptotes, Holes)	HW #7
DAY 10	Graphing Rational Functions	HW #8
DAY 11	Graphing Review	HW #9
DAY 12	Solving Rational Equations	HW #10
DAY 13	**Quiz 8-3**	None
DAY 14	Direct, Inverse, Joint, and Constant Variation	HW #11
DAY 15	Unit 8 Review	Study for Test
DAY 16	**UNIT 8 TEST**	None

Name: Date:

Topic: Class:

Main Ideas/Questions	Notes/Ex
RATIONAL EXPRESSION	A rationa To simpli ❶ Fac ❷ Sim ❸ Elim
SIMPLIFYING Rational Expressions	1. $\frac{20x^6}{14x^2}$

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Quiz 8-1: Simplifying & Operations with Rational Expressions

Simplify each expression.

1. $\frac{20x^2+30x}{4x^4+6x^3}$ 2. $\frac{k^2+13k+40}{k^2-2k-35}$

1. _____

2. _____

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Topic: Class:

Main Ideas/Questions	Notes/Examples
COMPLEX FRACTIONS	• A **complex fraction** is a fraction in which the numerator and denominator both contain fractions. • To **simplify a complex fraction** means to rewrite as a single fraction with no fractions in the numerator or denominator.
Steps to **SIMPLIFY**	❶ Create a single fraction in the numerator and denominator. ❷ Set up as a division problem, then multiply by the reciprocal. ❸ Simplify! (Factor first if possible.)
EXAMPLES	1. $\frac{\frac{a}{2}}{\frac{a^2}{4}}$ 2. $\frac{\frac{6}{xy}}{\frac{3y}{8x^3}}$

RATIONAL EXPRESSIONS: Applications

Example	Work and Solution
1. Write an expression in simplest form to represent the **area** of the rectangle. $\frac{2x}{x^2-12x+27}$ by $\frac{x^2-81}{4x^3+36x^2}$	

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Main Ideas/Questions	Notes/Examples
RATIONAL Function	A **rational function** is a function of the form where $p(x)$ and $q(x)$ are _____
RECIPROCAL	One of the most basic rational function which is also known as a **reciprocal**

RATIONAL Functions

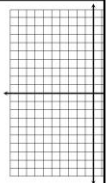
EQUATION FORM:

X-INTERCEPTS:

VERTICAL ASYMPTOTES:

EXAMPLES

❶ $f(x)=\frac{x^2-9}{x+2}$



x-int: _____ Holes: _____

Vertical Asymptote: _____ D: _____

Horizontal Asymptote: _____ R: _____

Name: Date:

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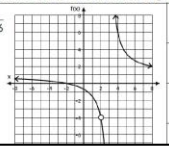
Main Ideas/Questions	Notes/Examples
KEY FEATURES of Rational Functions	A **rational function** is a function of the form $f(x)=\frac{p(x)}{q(x)}$, where $p(x)$ and $q(x)$ are polynomial functions. So far, we have looked at the graph of a very basic rational function (a reciprocal function). Now, we will look at more complex rational functions and their key features: x-intercepts, vertical asymptotes, horizontal asymptoes, and holes. A hole is a point (x, y) at which there is a break in the graph.

Identify the key features of the rational function given each graph below.

1. $f(x)=\frac{x^2-4}{x^2-5x+6}$



x-intercept(s):

Vertical Asymptote(s):

Horizontal Asymptote:

Hole(s):

Name: Date:

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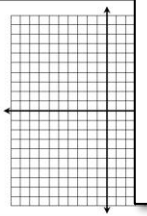
Main Ideas/Questions	Notes/Examples
GRAPHING Rational Functions	**Use the key features** ❶ Write the function in FA ❷ Find the x-**intercept(s)** ❸ Find the **vertical asymp** ❹ Find the **horizontal asy** CASE degree of $p >$ degree degree of $p <$ degree degree of $p =$ degree ❺ Identify any **holes** in the A hole is a point **(x, y)** at whi when there is a **common fac** » **To find the x-coodina** » **To find the y-coordina** simplified function.

Directions: Graph each function and identify its key ch

1. $f(x)=\frac{x-4}{x+4}$



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Main Ideas/Questions	Notes/Examples
VARIATION Models	Variation is a special relationship betw DIRECT VARIATION: "y is directly proportional to x" JOINT VARIATION: "y varies jointly as x and z" k is the **CONSTANT OF VARIA**
Identifying **EQUATIONS**	**Directions:** Determine whether the equation repres inverse variation. Identify the constant of variation. 1. $y=2x$ 2. $y=\frac{24}{x}$ 3. $y=5xz$ 4. $3y=x$ 5. $xy=36$ 6. $\frac{4}{3}y=xz$ 7. $\frac{y}{x}=\frac{2}{5}$ 8. $2A=bh$
DIRECT VARIATION Examples	**9.** If y is directly proportional to x and $y = 28$ when $x = 7$, find x when $y = 52$. **10.** If r is di square $s = 12$,
	11. The dollar amount d that Megan earns varies of hours h that she works. In her last paychec working 18 hours. If her next paycheck is $90. she work?

Unit 8 Test Study Guide (Rational Functions)

Name: _____

Date: _____ Per: _____

Topic 1: Simplifying Rational Expressions

1. $\frac{12x^2-30x}{20x^3-50x^2}$ 2. $\frac{4a^2-36}{24-8a}$ 3. $\frac{n^2-13n+40}{3n^2-14n-5}$

Topic 2: Operations with Rational Expressions

4. $\frac{6p^2-13p+5}{2p^2+17p-9}\cdot\frac{p^2+16p+63}{4p+28}$

5. $\frac{50-2w^2}{3w^2+9w-30}\div\frac{w^2+5w-14}{6w-30}$

6. $\frac{5y+5}{2}\div\frac{25y-20}{40y^2-32y}$

7. $\frac{2c^2+4c-6}{4c^2-7c+3}\div\frac{16c^2+48c}{16c^2-9}$

8. $\frac{6x}{x^2-16}-\frac{x-20}{x^2-16}$

9. $\frac{16}{3}-\frac{4k+56}{3k+15}$

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Unit 8 Test
Rational Functions

1. Simplify the expression below.

$$\frac{2a^3-32a}{2a^3+16a+32a}$$

A. $2(a-4)$ C. $\frac{(a-4)}{(a+4)}$

B. -2 D. $\frac{2(a-4)}{(a+4)}$ ☐

2. Simplify the expression below.

$$\frac{4yz^2}{3xy^4z}\cdot\frac{15x^2y}{8x^3yz}$$

A. $\frac{5}{2x^2y^3}$ C. $\frac{2x^2y^3}{5z}$

B. $\frac{5z}{2x^2y^3}$ D. $\frac{2x^2y^3}{5}$ ☐

3. Simplify the expression below.

$$\frac{2-18w^2}{3w^2-8w-3}\cdot\frac{3w^2-7w-6}{12w^2+80w-28}$$

A. $\frac{3w+2}{2(w+7)}$ C. $\frac{-(3w+2)}{2(w+7)}$

B. $\frac{3w+2}{w+7}$ D. $\frac{-2(3w+2)}{w+7}$ ☐

4. Simplify the expression below.

$$\frac{2c^2-5c-3}{c^2+4c-21}\div(2c+1)$$

A. $\frac{2c+1}{c+7}$ C. $\frac{(c+3)}{(c+7)(c-3)}$

B. $\frac{1}{c+7}$ D. $c+7$ ☐

5. Simplify the expression below.

$$\frac{p^2-14p+40}{16p^3}\div\frac{3p^2-18p+24}{2p^2-4p}$$

A. $\frac{24p^2}{p-10}$ C. $\frac{p-10}{24p^2}$

B. $\frac{24(p-10)}{p^2}$ D. $\frac{1}{24p^2(p-10)}$ ☐

6. Simplify the expression below.

$$\frac{17x-9}{3x+6}-\frac{2x-3}{3x+6}$$

A. $-5x$ C. $\frac{5x-2}{x+2}$

B. $\frac{5x-2}{3x}$ D. $\frac{5x-4}{x+2}$ ☐