Name: _____ **Date:** _____ **Class:** _____

Math 2 - Unit 4 Notes and Homework Packet

Day 1: Polynomial Review and Monomial Rules

Adding and Subtracting Polynomials:

1. $(4x^2 - 7x) + (2x^2 - 3x + 2)$

$6x^2 - 10x + 2$

2. $(4x + 1) - (2x - 5)$

$4x + 1 - 2x + 5$

$2x + 6$

Multiplying Monomials:

RULES for Multiplying Monomials

a. coefficients → multiply like normal

b. variable/exponential with SAME BASE → add exponents

3. $(x^5)(x^3)$

x^{5+3}

x^8

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

$2 \cdot 3\, x^{2+4}$

$6x^6$

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

$(2)(-3)\, x^{1+5}$

$-6x^6$

6. $(6x^4y^3z)(-3xy^5)$

$(6)(-3)\, x^{4+1}\, y^{3+5}$

$-18x^5y^8z$

Raising a Power to a Power:

RULES for Raising a Power to a Power

a. take coefficients to exponent like normal

b. If variable/exponential, multiply exponents

* distribute exponents to MULT/DIV only

7. $(x^4)^3$

$x^{4 \cdot 3} = x^{4 \cdot 3} = x^{12}$

8. $(2x)^4$

$(2)^4 x^4$

$16x^4$

9. $(-3xy^2)^5$

$(-3)^5 x^5 y^{2^5}$

$-243x^5y^{10}$

10. $(3pq^2)^2$

$3^2 p^2 q^{2^2}$

$9p^2q^4$

11. $(x^3y^4)^2$

$x^{3^2} y^{4^2}$

x^6y^8

12. $(xy^3)^4$

$x^4 y^{3^4}$

x^4y^{12}

Dividing Monomials:

RULES for Dividing Monomials:

a. Divide coefficients like normal (simplify the fraction)

b. Variable/exponentials with SAME BASE, subtract exponents

* negative exponents cannot be final answer

13. $\frac{a^3b^5}{a^4b^2} =$ $a^{3-4}\ b^{5-2}$ $a^{-1}\ b^3$

14. $\frac{5x^6y^9}{15x^4y^2} =$ $\frac{1x^2y^7}{3}$

15. $\frac{6a^2b^6c^8}{-8a^5b^4c^7} =$ $-\frac{3a^{-3}b^2c^1}{4}$

$$\frac{x^5}{x^5} = x^{5-5} = x^0 = 1$$

Zero Exponents:

RULE for Zero Exponents:

a. ANYTHING to 0 power = 1

16. $4^0 =$ 1

27. $x^0 =$ 1

28. $\left(\frac{4x^3y^3}{5x^2y^5}\right)^0 =$ 1

Negative Exponents

RULE for Negative Exponents:

a. Neg exponent means it is in wrong location

move from top → bottom
bottom → top
MAKE Exponent Positive

19. $\frac{x^2}{x^{-3}} =$ x^2x^3 x^5

20. $\frac{x^3y^{-2}}{x^{-5}y} =$ $\frac{x^5x^3}{y^1y^2}$ $\frac{x^8}{y^3}$

21. $\frac{a^3b^{-2}c^5}{a^2b^2c^{-3}} =$ $\frac{a^3c^5c^3}{a^2b^2b^2}$ $\frac{ac^8}{b^4}$

Putting it all together…Be careful!

22. $(2x^3)^2(y^3)$

23. $\frac{(-2x^3)^2}{(-4xy)^3}$

24. $\frac{(-4a^2b^3)^2(2a^2b)^3}{(2ab)^3}$

Day 2: Radicals and Rational Exponents

$$\boxed{} \longrightarrow \sqrt[4]{81} \longleftarrow \boxed{}$$

$$\uparrow$$

$$\boxed{}$$

$8 \wedge (2/3)$

Use your calculator to complete the table:

Expression	Numerical Value	Expression	Numerical Value
$8^{\frac{2}{3}}$	4	$\sqrt[3]{8^2}$	4
$64^{\frac{1}{2}}$	8	$\sqrt{64}$	8
$27^{-\frac{1}{3}}$	1/3	$\frac{1}{\sqrt[3]{27}}$	1/3
$4^{\frac{2}{5}} =$	1.74	$\sqrt[5]{4^2}$	1.74

Laws of Radicals and Fractional Exponents

Notice: The **exponent** of the **radicand** (inside the radical) becomes the numerator of exponent

The **index** of the **radical** becomes the denominator of exponent.

Try these examples:

Write the following in radical form:

a) $x^{\frac{3}{5}}$

$\sqrt[5]{x^3}$

b) $y^{\frac{5}{2}}$

$\sqrt[2]{y^5}$

c) $z^{-\frac{3}{8}}$

$\frac{1}{z^{3/8}}$

$\frac{1}{\sqrt[8]{z^3}}$

$\cancel{\sqrt[8]{z^{-3}}}$

d) $w^{\frac{2}{3}}$

$\sqrt[3]{w^2}$

e) $x^{\frac{4}{3}}$

$\sqrt[3]{x^4}$

f) $y^{-\frac{1}{4}}$

$\frac{1}{\sqrt[4]{y}}$

g) $(2z)^{\frac{6}{5}}$

$\sqrt[5]{(2z)^6}$

$\sqrt[5]{64z^6}$

h) $2w^{\frac{8}{3}}$

$2\sqrt[3]{w^8}$

BACKWARDS!
Write the following in exponent form:

a) $\sqrt[5]{x^2}$ $x^{2/5}$

b) $\sqrt[3]{y^4}$ $y^{4/3}$

c) $\sqrt[2]{z^5}$ $z^{5/2}$

d) $\frac{1}{\sqrt{w}}$ $\frac{1}{w^{\frac{1}{2}}}$ $= w^{-1/2}$

e) $\sqrt[6]{(4x)^7}$ $(4x)^{7/6}$

f) $\frac{1}{\sqrt[2]{y^7}}$ $\frac{1}{y^{7/2}}$ $y^{-7/2}$

g) $\frac{1}{\sqrt[4]{(3x)^3}}$ $\frac{1}{(3x)^{3/4}}$ $(3x)^{-3/4}$

h) $\sqrt{5w^3}$

5

CHALLENGE!! (Hint: Use your exponent rules!)

1) $(16y^{-8})^{-\frac{3}{4}}$

2) $(8x^{15})^{-\frac{1}{3}}$

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

Homework 4.2

Convert the following expression to a radical

1. $y^{\frac{1}{2}}$

2. $4^{\frac{4}{3}}$

3. $2^{-\frac{5}{3}}$

4. $x^{\frac{2}{5}}$

Convert the following expressions to have fractional exponents

5. $\sqrt[4]{8^3}$

6. $\frac{1}{\sqrt[3]{x^2}}$

7. $\sqrt[5]{z}$

8. $\sqrt[7]{x^4}$

Day 3: Solving Equations with Rational Exponents
An "inverse" is…

Practicing Inverses to Solve Equations

1. $x^{\frac{1}{5}} = 3$

2. $\sqrt[5]{x^9} = 26$

3. $\sqrt[4]{x} = 5$

4. $(x^{\frac{1}{7}})^3 = 21$

Solving Equations with more than 1 term

1. $x^{1/4} - 2 = 3$

2. $5\sqrt[3]{2x} + 9 = 29$

3. $3\left(x^{2/3} + 5\right) = 207$

4. $3x^{3/4} + 5 = 53$

5. $\sqrt[3]{x-2}=4$	6. $\sqrt{x+2}-2=12$
7. $\sqrt{x+2}-2=10$	8. $\sqrt{3x-2}=5$

Homework 4.3

1. $4x^{\frac{3}{2}}-5=103$	2. $(7x-3)^{\frac{1}{2}}=5$
3. $\sqrt{2\mathrm{x}-4}=-2$	4. $(x-2)^{\frac{3}{2}}-4=5$
5. $\sqrt{-2x}-8=4$	6. $(2x+1)^{\frac{3}{5}}=11$

Day 4: Direct and Inverse Variation

1. _____ – a relationship between 2 variables – when 1 variable _____, the other variable _____.

Equation: _____ K: _____

2. _____ – a relationship between 2 variables – when 1 variable _____, the other variable _____.

Equation: _____ K: _____

Determine if the tables represent direct or inverse variation.

1. _____

X	**2**	**4**	**6**
Y	**6**	**12**	**18**

2. _____

X	**10**	**12**	**14**
Y	**3**	**2**	**1**

3. _____

X	**30**	**20**	**10**
Y	**14**	**11**	**8**

How to write the equations:

4. Y varies directly as X. When y = 27, x = 6. What does y equal when x = 10?

5. Y varies inversely as X. When y = 18, x = 2. What does y equal when x = 12?

6. Y varies inversely as X. When y = 25, x = 4.5. What does x equal when y = 10?

7. Y varies directly as X. When y = 150, x = 35. What does y equal when x = 99?

Word Problems:

8. The cost of an item in Euros (€) varies directly as the cost of the item in dollars ($). An item that is €3.85 is $5.00.What does an item cost in dollars when in Euros, it costs €10?

9. The area of a rectangle varies directly as its length. If the area is $50m^2$ when the length is 10m, find the area when the length is 25m.

10. The current in an electrical circuit varies inversely as the resistance. When the current is 80amps, the resistance is 3amps. What is the current when the resistance changes to 7amps?

Homework 4.4

1. Y varies inversely as X. When y = 29, x = 13. What does x equal when y = 45?

2. Y varies directly as X. When y = 12, x = 70. What does x equal when y = 30?

3. The average speed that you drive varies inversely as the time it takes to travel. It takes Sally 230 minutes to drive to Disney World when she averages 60mph. How long will it take her friend Abby to travel the same distance to Disney if she averages 53mph?

4. The amount of money that student government makes selling homecoming t-shirts varies directly as the number of students who buy them. If SGA makes $350 when 25 people buy a shirt, how much money will they make if 55 people buy a shirt?

Day 5: Solving Rational Equations

Solving Rational Equations with 2 terms

YOU CAN SOLVE BY _____

1. $\frac{x+3}{2} = \frac{x+1}{4}$

2. $\frac{x+1}{4} = \frac{2x-16}{5}$

3. $\frac{3}{x-7} = \frac{x-2}{x-7}$

Solving Rational Equations with more than 2 terms

YOU MUST GET A _____

4. $\frac{x}{4} - \frac{3x}{8} = \frac{1}{2}$

5. $\frac{x}{x-1} - \frac{2}{x} = \frac{1}{x-1}$

6. $1 + \frac{6}{x} = \frac{2x-4}{x} - 3$

7. $\frac{1}{x} + \frac{1}{x-3} = \frac{x-2}{x-3}$

8. $\frac{x}{x+7} + \frac{x}{x-9} = \frac{x^2-2x+81}{(x+7)(x-9)}$

9. $\frac{x-5}{(x-2)(x+4)} + \frac{3}{x-2} = \frac{5}{x+4}$

Homework 4.5

Cross Multiply to Solve the Rational Equations

1. $\frac{x+2}{3} = \frac{3x-2}{6}$

2. $\frac{5}{x+2} = \frac{x}{3}$

3. $\frac{x-2}{x} = \frac{x-4}{x-6}$

Get a Common Denominator to Solve the Rational Equations

4. $\frac{4}{x-3} + \frac{2}{x+3} = \frac{2x+2}{(x-3)(x+3)}$

5. $\frac{x}{x-5} + \frac{3}{x+2} = \frac{7x}{(x-5)(x+2)}$

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

7. $2 - \frac{1}{x(x+1)} = \frac{3}{x+1}$