Unit 4: 1/31/17 or 2/1/17

1. Review of Properties of Exponents
2. Simplifying Expressions
3. Converting between Rational and Exponent Form

Jan 31-8:26 AM

Properties of Exponents

Let a and b be real numbers and let m and n be integers.

Product of Powers Property $a^m \bullet a^n = a^{m+n}$

Power of a Power Property $\left(a^m\right)^n = a^{mn}$

Power of a Product Property $(ab)^m = a^m b^m$

Negative Exponent Property $a^{-m} = \frac{1}{a^m} \quad a \neq 0$

Zero Exponent Property $a^0 = 1 \quad a \neq 0$

Quotient of Powers Property $\frac{a^m}{a^n} = a^{m-n} \quad a \neq 0$

Power of a Quotient Property $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m} \quad b \neq 0$

Properties of Exponents Worksheet

Name_______________

Evaluate the expression.

1. $4^2 \bullet 4^4$
2. $\left(5^{-2}\right)^3$
3. $\frac{5^2}{5^5}$
4. $\left(\frac{3}{7}\right)^3$
5. $\frac{2^2}{2^{-9}}$
6. $(-9)(-9)^3$

Simplify the expression.

7. $a^6 \bullet a^3$
8. $\left(x^5\right)^2$
9. $\left(4a^2b^3\right)^5$
10. $\frac{x^8}{x^6}$
11. $\frac{x^5}{x^8}$
12. $\frac{x^6}{x^6}$
13. $\left(\frac{4a^3}{2b^4}\right)^2$
14. $\left(2^3x^2\right)^5$
15. $\left(x^4y^7\right)^{-3}$
16. $\frac{x^{11}y^{10}}{x^{-3}y^{-1}}$
17. $-3x^{-4}y^0$
18. $\frac{5x^3y^9}{20x^2y^{-2}}$
19. $\frac{x^5}{x^{-2}}$
20. $\frac{x^5y^2}{x^4y^0}$
21. $\left(x^3\right)^0$
22. $\left(10x^5y^3\right)^{-3}$
23. $\frac{x^{-1}y}{xy^{-2}}$
24. $\left(4x^2y^5\right)^{-2}$
25. $\frac{2x^2y}{6xy^{-1}}$
26. $\frac{xy^9}{3y^{-2}} \bullet \frac{-7y}{21x^5}$
27. $\frac{12xy}{7x^4} \bullet \frac{7x^5y^2}{4y}$

Properties of Exponents Worksheet

Name Key

Evaluate the expression.

1. $4^2 \bullet 4^4$ $4^6 = 4096$
2. $(5^{-2})^3$ $5^{-6} = \frac{1}{15625}$
3. $\frac{5^2}{5^5}$ $= \frac{1}{5^3} = \frac{1}{125}$
4. $\left(\frac{3}{7}\right)^3$ $\frac{27}{343}$
5. $\frac{2^2}{2^{-9}}$ $= 2^{11} = 2048$
6. $(-9)(-9)^3$ $= (-9)^4 = 6561$

Simplify the expression.

7. $a^6 \bullet a^3$ $= a^9$
8. $(x^5)^2$ $= x^{10}$
9. $(4a^2b^3)^5$ $= 4^5 a^{10} b^{15}$ $1024 a^{10} b^{15}$
10. $\frac{x^8}{x^6}$ $= x^2$
11. $\frac{x^5}{x^8}$ $= x^{-3}$
12. $\frac{x^6}{x^6}$ $= x^0 = 1$
13. $\left(\frac{4a^3}{2b^4}\right)^2$ $= \frac{16a^6}{4b^8} = \frac{4a^6}{b^8}$
14. $(2^3x^2)^5$ $= 2^{15}x^{10}$ $= 32{,}768x^{10}$
15. $(x^4y^7)^{-3}$ $= x^{-12}y^{-21}$
16. $\frac{x^{11}y^{10}}{x^{-3}y^{-1}}$ $= x^{14}y^{11}$
17. $-3x^{-4}y^0$ $-3x^{-4}$
18. $\frac{5x^3y^9}{20x^2y^{-2}}$ $= \frac{xy^{11}}{4}$
19. $\frac{x^5}{x^{-2}}$ $= x^7$
20. $\frac{x^5y^2}{x^4y^0}$ $= xy^2$
21. $(x^3)^0$ $= 1$
22. $(10x^5y^3)^{-3}$ $= 10^{-3}x^{-15}y^{-9}$ $\frac{1}{1000x^{15}y^9}$
23. $\frac{x^{-1}y}{xy^{-2}}$ $= \frac{y^3}{x^2}$
24. $(4x^2y^5)^{-2}$ $= \frac{1}{16x^4y^{10}}$
25. $\frac{2x^2y}{6xy^{-1}}$ $\frac{xy^2}{3}$
26. $\frac{xy^9}{3y^{-2}} \bullet \frac{-7y}{21x^5}$ $\frac{-7xy^{10}y^2}{(21)(3)x^5} = \frac{-y^{12}}{9x^4}$
27. $\frac{12xy}{7x^4} \bullet \frac{7x^5y^2}{4y}$ $= 3x^2y^2$

Properties of Exponents Worksheet

Name________________

Evaluate the expression.

1. $4^2 \bullet 4^4$
2. $\left(5^{-2}\right)^3$
3. $\frac{5^2}{5^5}$
4. $\left(\frac{3}{7}\right)^3$
5. $\frac{2^2}{2^{-9}}$
6. $(-9)(-9)^3$

Simplify the expression.

7. $a^6 \bullet a^3$
8. $\left(x^5\right)^2$
9. $\left(4a^2b^3\right)^5$
10. $\frac{x^8}{x^6}$
11. $\frac{x^5}{x^8}$
12. $\frac{x^6}{x^6}$
13. $\left(\frac{4a^3}{2b^4}\right)^2$
14. $\left(2^3x^2\right)^5$
15. $\left(x^4y^7\right)^{-3}$
16. $\frac{x^{11}y^{10}}{x^{-3}y^{-1}}$
17. $-3x^{-4}y^0$
18. $\frac{5x^3y^9}{20x^2y^{-2}}$
19. $\frac{x^5}{x^{-2}}$
20. $\frac{x^5y^2}{x^4y^0}$
21. $\left(x^3\right)^0$
22. $\left(10x^5y^3\right)^{-3}$
23. $\frac{x^{-1}y}{xy^{-2}}$
24. $\left(4x^2y^5\right)^{-2}$
25. $\frac{2x^2y}{6xy^{-1}}$
26. $\frac{xy^9}{3y^{-2}} \bullet \frac{-7y}{21x^5}$
27. $\frac{12xy}{7x^4} \bullet \frac{7x^5y^2}{4y}$

Simplify the following:

$(\sqrt{4})^2$

$(\sqrt[3]{8})^3$

$(\sqrt[4]{16})^4$

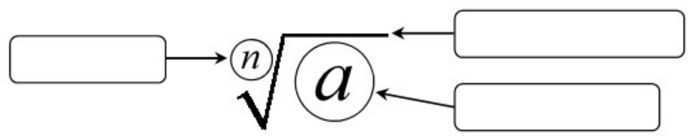
$(\sqrt{10})^2$

Name:	**Date:**
Topic: Converting Between Radical and Exponents	Block:

Main Ideas/Questions	Notes/Examples
Warm-Up List the perfect squares, cubes, and fourths.	**Perfect Squares:**
	Perfect Cubes:
	Perfect Fourths:

Parts of a Radical

The n^{th} root of a real number, a, can be written as the radical expression $\sqrt[n]{a}$



*If there is **no index**, it is assumed that ____________.

Number of Roots

Give ALL POSSIBLE ROOTS to the radicals below.

$\sqrt{16} =$	$\sqrt{121} =$	$\sqrt{289} =$	$\sqrt{\frac{4}{25}} =$
$\sqrt[3]{8} =$	$\sqrt[3]{343} =$	$\sqrt[3]{-125} =$	$\sqrt[3]{-\frac{1}{27}} =$
$\sqrt[4]{1} =$	$\sqrt[4]{2,401} =$	$\sqrt[4]{4,096} =$	$\sqrt[4]{\frac{81}{16}} =$

Index	Radicand	Type of Roots	# of Roots
Even	Positive		
Odd	Positive		
Odd	Negative		
★ Even	Negative		

Simplifying Radicals

*If a radical has **more than one root**, the radical sign indicates only the **principal, or positive, root.**

1. $\sqrt{117}$

2. $4\sqrt{320}$

3. $2\sqrt[3]{48}$

4. $3\sqrt[3]{108}$

	5. $\sqrt[3]{-250}$		**6.** $6\sqrt[3]{-2}$
	7. $3\sqrt[4]{162}$		**8.** $5\sqrt[4]{2,592}$
Radicals with Variables	**Square Roots** Exponents must be multiples of _____!	**Cube Roots** Exponents must be multiples of _____!	**4th Roots** Exponents must be multiples of _____!
	9. $\sqrt{32x^4y^9}$		**10.** $\sqrt{324a^3b^7}$
	11. $\sqrt[3]{216m^3n^6}$		**12.** $\sqrt[3]{56r^8s^4}$
	13. $\sqrt[3]{-64x^{10}y^{21}}$		**14.** $\sqrt[3]{-81p^2q^{12}}$
	15. $\sqrt[4]{w^4v^{17}}$		**16.** $\sqrt[4]{48m^8n^3}$
	17. $\sqrt[4]{625c^{23}d^{11}}$		**18.** $\sqrt[4]{(y+3)^8}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples		
RATIONAL EXPONENTS	Expressions with rational exponents can be rewritten as radicals using the following rules:		
	Exponential Form	**Meaning**	**Radical Form**
	$a^{\frac{1}{n}}$	The n^{th} root of a	$a^{\frac{1}{n}} =$
	$a^{\frac{m}{n}}$	The n^{th} root of a, raised to the m^{th} power	$a^{\frac{m}{n}} =$
Converting between Exponential & Radical Form	**Directions:** Write each expression in **radical form**. Simplify if needed.		
	1. $x^{\frac{1}{4}}$	**2.** $(15n)^{\frac{1}{2}}$	**3.** $24^{\frac{1}{3}}$
	4. $7^{\frac{2}{3}}$	**5.** $k^{\frac{7}{2}}$	**6.** $3^{\frac{5}{4}}$
	7. $(ab)^{\frac{3}{4}}$	**8.** $(-6x)^{\frac{2}{3}}$	**9.** $7(12w)^{\frac{1}{2}}$
	Directions: Write each expression in **exponential form**.		
	10. $\sqrt[3]{16}$	**11.** $\sqrt{xy}$	**12.** $\sqrt[4]{8w}$
	13. $\sqrt[3]{11^2}$	**14.** $\sqrt[4]{k^5}$	**15.** $\left(\sqrt{3m}\right)^7$
	16. $\left(\sqrt[4]{-2a}\right)^5$	**17.** $\sqrt{10^5 a^3 b}$	**18.** $\sqrt[3]{9x^7y^4}$

Simplifying Expressions with Rational Exponents

①	Rewrite all radicals in **exponential form**.
②	Use the **exponent rules** to simply the expression.
③	Write your **answer as a radical in simplest form**. Rationalize if needed.

19. $x^{\frac{1}{3}} \cdot x^{\frac{4}{3}}$	**20.** $p^{\frac{1}{4}} \cdot p^{\frac{3}{2}}$
21. $\dfrac{m^{\frac{5}{2}}}{m^{\frac{7}{4}}}$	**22.** $\left(a^{\frac{1}{3}}\right)^{\frac{5}{2}}$
23. $\left(32^{\frac{1}{2}}\right)^{\frac{1}{2}}$	**24.** $(8x^2)^{\frac{2}{3}}$
25. $100^{-\frac{1}{2}}$	**26.** $16^{\frac{2}{3}} \cdot 16^{-\frac{1}{3}}$
27. $(-216)^{-\frac{1}{3}}$	**28.** $\left(\dfrac{112}{7}\right)^{-\frac{1}{4}}$
29. $\sqrt[3]{v} \cdot \sqrt{v}$	**30.** $\sqrt[4]{r^3} \cdot \sqrt{r}$
31. $\dfrac{4}{\sqrt[3]{4}}$	**32.** $\dfrac{\sqrt{7^3}}{\sqrt{7}}$
33. $\sqrt[4]{x^{10}}$	**34.** $\sqrt[4]{25m^2}$

Name: ______________________________ **Unit 6:** Radical Functions

Date: ____________________ **Bell:** ______ **Homework 4:** Rational Exponents

Directions: Rewrite each expression in **radical form**. Simplify if needed.		
1. $28^{\frac{1}{2}}$	**2.** $2^{\frac{4}{3}}$	**3.** $x^{\frac{5}{4}}$
4. $(256x)^{\frac{1}{4}}$	**5.** $(mn)^{\frac{7}{2}}$	**6.** $(-2a)^{\frac{4}{3}}$

Directions: Rewrite each expression in **exponential form**.			
7. $\sqrt[4]{10^3}$	**8.** $\sqrt{3ab}$	**9.** $\left(\sqrt[3]{2w}\right)^5$	**10.** $\sqrt[4]{18x^9y^2}$

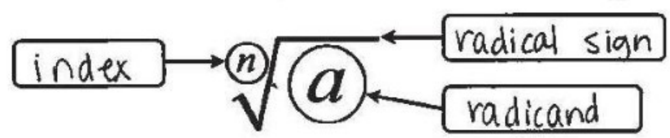
Directions: Simplify each expression. **Give final answers in simplest radical form.**		
11. $9^{\frac{1}{2}} \cdot 9^{\frac{5}{2}}$	**12.** $\dfrac{x^{\frac{7}{3}}}{x^{\frac{2}{3}}}$	**13.** $\left(28^{\frac{3}{5}}\right)^{\frac{5}{6}}$
14. $(-64)^{-\frac{1}{3}}$	**15.** $45^{-\frac{3}{2}} \cdot 45^2$	**16.** $2\left(\dfrac{48}{3}\right)^{-\frac{1}{4}}$
17. $\sqrt[4]{p} \cdot \sqrt{p^3}$	**18.** $\dfrac{\sqrt[3]{24^4}}{24}$	**19.** $\dfrac{m}{\sqrt[4]{m}}$
20. $\dfrac{16}{\sqrt[4]{16^3}}$	**21.** $\sqrt[4]{a^2b^{14}}$	**22.** $\sqrt[4]{36w^6}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Warm-Up List the perfect squares, cubes, and fourths.	**Perfect Squares:** 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...
	Perfect Cubes: 1, 8, 27, 64, 125, 216, 343, 512, 729, ...
	Perfect Fourths: 1, 16, 81, 256, 625, 1296, 2401, 4096, ...

Parts of a Radical

The n^{th} root of a real number, a, can be written as the radical expression $\sqrt[n]{a}$



*If there is no index, it is assumed that $n = 2$.

Number of Roots

Give ALL POSSIBLE ROOTS to the radicals below.

$\sqrt{16} = \pm 4$	$\sqrt{121} = \pm 11$	$\sqrt{289} = \pm 17$	$\sqrt{\frac{4}{25}} = \pm\frac{2}{5}$
$\sqrt[3]{8} = 2$	$\sqrt[3]{343} = 7$	$\sqrt[3]{-125} = -5$	$\sqrt[3]{-\frac{1}{27}} = -\frac{1}{3}$
$\sqrt[4]{1} = \pm 1$	$\sqrt[4]{2,401} = \pm 7$	$\sqrt[4]{4,096} = \pm 8$	$\sqrt[4]{\frac{81}{16}} = \pm\frac{3}{2}$

Index	Radical	Type of Roots	# of Roots
Even	Positive	real	2 (±)
Odd	Positive	real	1 (+)
Odd	Negative	real	1 (-)
★ Even	Negative	imag	2 (±)

Simplifying Radicals

*If a radical has **more than one root**, the radical sign indicates only the **principal, or positive, root.**

1. $\sqrt{117}$

$\sqrt{9}\,\sqrt{13} = \boxed{3\sqrt{13}}$

2. $4\sqrt{320}$

$4\cdot\sqrt{64}\,\sqrt{5}$

$4\cdot 8\,\sqrt{5} = \boxed{32\sqrt{5}}$

3. $2\sqrt[3]{48}$

$2\cdot\sqrt[3]{8}\,\sqrt[3]{6}$

$2\cdot 2\,\sqrt[3]{6} = \boxed{4\sqrt[3]{6}}$

4. $3\sqrt[3]{108}$

$3\cdot\sqrt[3]{27}\,\sqrt[3]{4}$

$3\cdot 3\,\sqrt[3]{4} = \boxed{9\sqrt[3]{4}}$

	5. $\sqrt[3]{-250}$ $\sqrt[3]{-125}\ \sqrt[3]{2}$ $= -5\sqrt[3]{2}$	**6.** $6\sqrt[3]{-2}$ $6\cdot\sqrt[3]{-1}\ \sqrt[3]{2}$ $6\cdot -1\ \sqrt[3]{2} = -6\sqrt[3]{2}$
	7. $3\sqrt[4]{162}$ $3\cdot\sqrt[4]{81}\ \sqrt[4]{2}$ $3\cdot 3\ \sqrt[4]{2} = 9\sqrt[4]{2}$	**8.** $5\sqrt[4]{2,592}$ $5\cdot\sqrt[4]{1296}\ \sqrt[4]{2}$ $5\cdot 6\ \sqrt[4]{2} = 30\sqrt[4]{2}$

Radicals with Variables	**Square Roots** Exponents must be multiples of 2 !	**Cube Roots** Exponents must be multiples of 3 !	**4th Roots** Exponents must be multiples of 4 !

9. $\sqrt{32x^4y^9}$ $\sqrt{16x^4y^8}\ \sqrt{2y}$ $= 4x^2y^4\sqrt{2y}$	**10.** $\sqrt{324a^3b^7}$ $\sqrt{324a^2b^6}\ \sqrt{ab}$ $= 18ab^3\sqrt{ab}$
11. $\sqrt[3]{216m^3n^6}$ $= 8mn^2$	**12.** $\sqrt[3]{56r^8s^4}$ $\sqrt[3]{8r^6s^3}\ \sqrt[3]{7r^2s}$ $= 2r^2s\sqrt[3]{7r^2s}$
13. $\sqrt[3]{-64x^{10}y^{21}}$ $\sqrt[3]{-64x^9y^{21}}\ \sqrt[3]{x}$ $= -4x^3y^7\sqrt[3]{x}$	**14.** $\sqrt[3]{-81p^2q^{12}}$ $\sqrt[3]{-27q^{12}}\ \sqrt[3]{3p^2}$ $= -3q^4\sqrt[3]{3p^2}$
15. $\sqrt[4]{w^4v^{17}}$ $\sqrt[4]{w^4v^{16}}\ \sqrt[4]{v}$ $= wv^4\sqrt[4]{v}$	**16.** $\sqrt[4]{48m^8n^3}$ $\sqrt[4]{16m^8}\ \sqrt[4]{3n^3}$ $= 2m^2\sqrt[4]{3n^3}$
17. $\sqrt[4]{625c^{23}d^{11}}$ $\sqrt[4]{625c^{20}d^8}\ \sqrt[4]{c^3d^3}$ $= 5c^5d^2\sqrt[4]{c^3d^3}$	**18.** $\sqrt[4]{(y+3)^8}$ $= (y+3)^2$ $= y^2+6y+9$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples		
RATIONAL EXPONENTS	Expressions with rational exponents can be rewritten as radicals using the following rules:		
	Exponential Form	Meaning	Radical Form
	$a^{\frac{1}{n}}$	The n^{th} root of a	$a^{\frac{1}{n}} = \sqrt[n]{a}$
	$a^{\frac{m}{n}}$	The n^{th} root of a, raised to the m^{th} power	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$
Converting between Exponential & Radical Form	**Directions:** Write each expression in **radical form**. Simplify if needed.		
	1. $x^{\frac{1}{4}}$ $= \sqrt[4]{x}$	**2.** $(15n)^{\frac{1}{2}}$ $= \sqrt{15n}$	**3.** $24^{\frac{1}{3}}$ $= \sqrt[3]{24}$ $= \sqrt[3]{8} \cdot \sqrt[3]{3} = 2\sqrt[3]{3}$
	4. $7^{\frac{2}{3}}$ $= \sqrt[3]{7^2}$ $= \sqrt[3]{49}$	**5.** $k^{\frac{7}{2}}$ $= k^{6/2} \cdot k^{1/2}$ $= k^3\sqrt{k}$	**6.** $3^{\frac{5}{4}}$ $= 3^{\frac{4}{4}} \cdot 3^{\frac{1}{4}}$ $= 3\sqrt[4]{3}$
	7. $(ab)^{\frac{3}{4}}$ $= \sqrt[4]{(ab)^3}$ $= \sqrt[4]{a^3b^3}$	**8.** $(-6x)^{\frac{2}{3}}$ $= \sqrt[3]{(6x)^2}$ $= \sqrt[3]{36x^2}$	**9.** $7(12w)^{\frac{1}{2}}$ $= 7\sqrt{12w}$ $= 7\sqrt{4}\sqrt{3w}$ $= 14\sqrt{3w}$
	Directions: Write each expression in **exponential form**.		
	10. $\sqrt[3]{16}$ $= (16)^{1/3}$	**11.** $\sqrt{xy}$ $= (xy)^{1/2}$	**12.** $\sqrt[4]{8w}$ $= (8w)^{1/4}$
	13. $\sqrt[3]{11^2}$ $= (11)^{2/3}$	**14.** $\sqrt[4]{k^5}$ $= (k)^{5/4}$	**15.** $(\sqrt{3m})^7$ $= (3m)^{7/2}$
	16. $(\sqrt[4]{-2a})^5$ $= (-2a)^{5/4}$	**17.** $\sqrt{10^5a^3b}$ $= (10^5a^3b)^{1/2}$	**18.** $\sqrt[3]{9x^7y^4}$ $= (9x^7y^4)^{1/3}$

Simplifying Expressions with Rational Exponents		
	①	Rewrite all radicals in **exponential form.**
	②	Use the **exponent rules** to simply the expression.
	③	Write your **answer as a radical in simplest form.** Rationalize if needed.

19. $x^{\frac{1}{3}} \cdot x^{\frac{4}{3}} = x^{5/3} = x^{3/3} \cdot x^{2/3} = \boxed{x\sqrt[3]{x^2}}$	**20.** $p^{\frac{1}{4}} \cdot p^{\frac{6}{4}} = p^{7/4} = p^{4/4} \cdot p^{3/4} = \boxed{p\sqrt[4]{p^3}}$
21. $\frac{m^{\frac{10}{4}}}{m^{\frac{7}{4}}} = m^{3/4} = \boxed{\sqrt[4]{m^3}}$	**22.** $\left(a^{\frac{1}{3}}\right)^{\frac{5}{2}} = a^{5/6} = \boxed{\sqrt[6]{a^5}}$
23. $\left(32^{\frac{1}{2}}\right)^{\frac{1}{2}} = 32^{1/4} = \sqrt[4]{32} = \sqrt[4]{16}\sqrt[4]{2} = \boxed{2\sqrt[4]{2}}$	**24.** $(8x^2)^{\frac{2}{3}} = 8^{2/3}x^{4/3} = \sqrt[3]{64x^4} = \sqrt[3]{64x^3}\sqrt[3]{x} = \boxed{4x\sqrt[3]{x}}$
25. $100^{-\frac{1}{2}} = \frac{1}{\sqrt{100}} = \boxed{\frac{1}{10}}$	**26.** $16^{\frac{2}{3}} \cdot 16^{-\frac{1}{3}} = 16^{1/3} = \sqrt[3]{16} = \sqrt[3]{8}\sqrt[3]{2} = \boxed{2\sqrt[3]{2}}$
27. $(-216)^{-\frac{1}{3}} = \frac{1}{\sqrt[3]{-216}} = \boxed{\frac{1}{-6}}$	**28.** $\left(\frac{112}{7}\right)^{-\frac{1}{4}} = \left(\frac{7}{112}\right)^{1/4} = \left(\frac{1}{16}\right)^{1/4} = \boxed{\frac{1}{2}}$
29. $\sqrt[3]{v} \cdot \sqrt{v} = v^{1/3} \cdot v^{1/2} = v^{5/6} = \boxed{\sqrt[6]{v^5}}$	**30.** $\sqrt[4]{r^3} \cdot \sqrt{r} = r^{3/4} \cdot r^{1/2} = r^{5/4} = r^{4/4} \cdot r^{1/4} = \boxed{r\sqrt[4]{r}}$
31. $\frac{4}{\sqrt[3]{4}} = \frac{4}{4^{1/3}} = 4^{2/3} = \sqrt[3]{16} = \boxed{2\sqrt[3]{2}}$	**32.** $\frac{\sqrt{7^3}}{\sqrt{7}} = \frac{7^{3/2}}{7^{1/2}} = 7^{2/2} = \boxed{7}$
33. $\sqrt[4]{x^{10}} = x^{10/4} = x^{5/2} = x^{4/2} \cdot x^{1/2} = \boxed{x^2\sqrt{x}}$	**34.** $\sqrt[4]{25m^2} = 25^{1/4} \cdot m^{2/4} = (5^2)^{1/4} \cdot m^{1/2} = 5^{1/2} \cdot m^{1/2} = \boxed{\sqrt{5m}}$

Name: ______________________ **Unit 6:** Radical Functions

Date: ______________ **Bell:** _____ **Homework 4:** Rational Exponents

Directions: Rewrite each expression in **radical form.** Simplify if needed.		
1. $28^{\frac{1}{2}} = \sqrt{28} = \sqrt{4}\sqrt{7} = \boxed{2\sqrt{7}}$	**2.** $2^{\frac{4}{3}} = \sqrt[3]{2^4} = \sqrt[3]{2^3}\cdot\sqrt[3]{2} = \boxed{2\sqrt[3]{2}}$	**3.** $x^{\frac{5}{4}} = \sqrt[4]{x^5} = \sqrt[4]{x^4}\cdot\sqrt[4]{x} = \boxed{x\sqrt[4]{x}}$
4. $(256x)^{\frac{1}{4}} = \sqrt[4]{256x} = \boxed{4\sqrt[4]{x}}$	**5.** $(mn)^{\frac{7}{2}} = \sqrt{(mn)^7} = \sqrt{(mn)^6}\,\sqrt{mn} = \boxed{m^3n^3\sqrt{mn}}$	**6.** $(-2a)^{\frac{4}{3}} = \sqrt[3]{(-2a)^4} = \sqrt[3]{16a^4} = \sqrt[3]{8a^3}\,\sqrt[3]{2a} = \boxed{2a\sqrt[3]{2a}}$

Directions: Rewrite each expression in **exponential form.**			
7. $\sqrt[4]{10^3} = \boxed{(10)^{3/4}}$	**8.** $\sqrt{3ab} = \boxed{(3ab)^{1/2}}$	**9.** $(\sqrt[3]{2w})^5 = \boxed{(2w)^{5/3}}$	**10.** $\sqrt[4]{18x^9y^2} = \boxed{(18x^9y^2)^{1/4}}$

Directions: Simplify each expression. **Give final answers in simplest radical form.**		
11. $9^{\frac{1}{2}}\cdot 9^{\frac{5}{2}} = 9^{6/2} = 9^3 = \boxed{729}$	**12.** $\frac{x^{\frac{7}{3}}}{x^{\frac{2}{3}}} = x^{5/3} = \sqrt[3]{x^5} = \sqrt[3]{x^3}\,\sqrt[3]{x^2} = \boxed{x\sqrt[3]{x^2}}$	**13.** $\left(28^{\frac{3}{5}}\right)^{\frac{5}{6}} = 28^{\frac{15}{30}} = 28^{1/2} = \sqrt{28} = \sqrt{4}\sqrt{7} = \boxed{2\sqrt{7}}$
14. $(-64)^{-\frac{1}{3}} = \frac{1}{(-64)^{1/3}} = \frac{1}{\sqrt[3]{-64}} = \boxed{\frac{1}{-4}}$	**15.** $45^{-\frac{3}{2}}\cdot 45^2 = 45^{1/2} = \sqrt{45} = \sqrt{9}\sqrt{5} = \boxed{3\sqrt{5}}$	**16.** $2\left(\frac{48}{3}\right)^{-\frac{1}{4}} = 2\left(\frac{1}{16}\right)^{1/4} = 2\left(\frac{1}{2}\right) = \boxed{1}$
17. $\sqrt[4]{p}\cdot\sqrt{p^3} = p^{1/4}\cdot p^{3/2} = p^{7/4} = p^{4/4}\cdot p^{3/4} = \boxed{p\sqrt[4]{p^3}}$	**18.** $\frac{\sqrt[3]{24^4}}{24} = \frac{24^{4/3}}{24} = 24^{1/3} = \sqrt[3]{24} = \sqrt[3]{8}\,\sqrt[3]{3} = \boxed{2\sqrt[3]{3}}$	**19.** $\frac{m}{\sqrt[4]{m}} = \frac{m}{m^{1/4}} = m^{3/4} = \boxed{\sqrt[4]{m^3}}$
20. $\frac{16}{\sqrt[4]{16^3}} = \frac{16}{16^{3/4}} = 16^{1/4} = \boxed{2}$	**21.** $\sqrt[4]{a^2b^{14}} = (a^2b^{14})^{1/4} = a^{1/2}b^{7/2} = \boxed{b^3\sqrt{ab}}$	**22.** $\sqrt[4]{36w^6} = (36w^6)^{1/4} = (6^2w^6)^{1/4} = 6^{1/2}w^{3/2} = \boxed{w\sqrt{6w}}$

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