Name : ANSWERS Score : _____

Teacher : _____ Date : _____

Powers of Products and Quotients

Simplify the exponents.

1) $(2b \cdot 4b^2)^3 = 8^3 b^9$

2) $(3k^3 \cdot 2k)^2$

3) $(2b^2 \cdot 3b \cdot b^2)^3 = 6^3 b^{15}$

4) $(4r^2 \cdot r)^3 = 4^3 r^9$

5) $(3r^2 \cdot r^3)^2$

6) $(2w^3 \cdot 3w^2)^3$

7) $\left(\frac{5^6}{5}\right)^2 = 5^{10}$

8) $\left(\frac{7^2}{7^5}\right)^3$

9) $\left(\frac{7d^3}{9d}\right)^3 = \frac{7^3 d^6}{9^3}$

10) $\left(\frac{k}{k^3}\right)^3 = \frac{1}{k^6}$

11) $\left(\frac{n^3}{n^5}\right)^3$

12) $\left(\frac{9r}{3r^5}\right)^3$

Name : _____ Score : _____

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Operations with Exponents

Simplify the exponents.

1) $3w^4 \cdot 7w^2h^6$

2) $(2y \cdot 4y^3)^3$

3) $\left(\frac{3d^6}{6d}\right)^2$

4) $\frac{w}{w^5}$

5) $\frac{9y^{-3}}{5y^2} = \frac{9}{5y^5}$

6) $7n \cdot 4n^{-3} = 28n^{-2} = \frac{28}{n^2}$

7) $\frac{b^3}{b^5}$

8) $\left(\frac{5y^2s^5}{2y^6s^4}\right)^3 = \frac{5^3s^3}{2^3y^{12}}$

9) $(8c^2)^2$

10) $(2z^2 \cdot z^3 \cdot 4z)^3$

11) $8z^4c^5 \cdot 5zc^6$

12) $\left(\frac{6^4}{6^5}\right)^2$

Kuta Software - Infinite Algebra 2 Name_____

Radicals and Rational Exponents

Date_____ Period____

Write each expression in radical form.

1) $7^{\frac{1}{2}} = \sqrt{7}$

2) $4^{\frac{4}{3}} = \sqrt[3]{4^4}$

3) $2^{\frac{5}{3}} = \sqrt[3]{2^5}$

4) $7^{\frac{4}{3}} = \sqrt[3]{7^4}$

5) $6^{\frac{3}{2}}$

6) $2^{\frac{1}{6}}$

Write each expression in exponential form.

7) $(\sqrt{10})^3 = 10^{3/2}$

8) $\sqrt[6]{2} = 2^{1/6}$

9) $(\sqrt[4]{2})^5 = 2^{5/4}$

10) $(\sqrt[4]{5})^5 = 5^{5/4}$

11) $\sqrt[3]{2}$

12) $\sqrt[6]{10}$

Write each expression in radical form.

13) $(5x)^{-\frac{5}{4}} = \frac{1}{\sqrt[4]{(5x)^5}}$

14) $(5x)^{-\frac{1}{2}} = \frac{1}{\sqrt{5x}}$

15) $(10n)^{\frac{3}{2}} = \sqrt{(10n)^3} = \sqrt{1000n^3}$

16) $a^{\frac{6}{5}} = \sqrt[5]{a^6}$

17) $(6v)^{1.5} = \sqrt{(6v)^3}$

(because $1.5 = \frac{3}{2}$)

18) $m^{-\frac{1}{2}}$

Write each expression in exponential form.

19) $(\sqrt[4]{m})^3 = m^{3/4}$

20) $(\sqrt[3]{6x})^4 = (6x)^{4/3}$

21) $\sqrt[4]{v} = v^{1/4}$

22) $\sqrt{6p}$

23) $(\sqrt[3]{3a})^4$

24) $\frac{1}{(\sqrt{3k})^5} = (3k)^{-5/2}$

Simplify.

25) $9^{\frac{1}{2}} = 3$

26) $343^{-\frac{4}{3}} = \frac{1}{7^4} = \frac{1}{2401}$

27) $1000000^{\frac{1}{6}} = 10$

28) $36^{\frac{3}{2}} = 6^3 = 216$

29) $(x^6)^{\frac{1}{2}} = x^3$

30) $(9n^4)^{\frac{1}{2}} = 3n^2$

31) $(64n^{12})^{-\frac{1}{6}} = 2n^{-2} = \frac{2}{n^2}$

32) $(81m^6)^{\frac{1}{2}} = 9m^3$

Name : _____ Score : _____

Teacher : _____ Date : _____

Simplifying Radical Expressions

Simplify each Radical Expression. If necessary use absolute value signs.

1) $\sqrt{64} = 8$

2) $\sqrt[3]{40c^7} = 2\sqrt[3]{5c^7}$

3) $\sqrt[3]{81} = 3\sqrt[3]{3}$

4) $\sqrt[3]{189c^6q^7}$

5) $\sqrt{81q^2}$

6) $\sqrt[3]{375c^6p^2} = 5\sqrt[3]{3}c^2\sqrt[3]{p^2}$

7) $\sqrt[3]{189g^7d^4} = 3\sqrt[3]{7g^7d^4}$

8) $\sqrt{45b}$

9) $\sqrt{49h^2} = 7h$

10) $\sqrt{245t^5s} = 7\sqrt{5t^5s}$

8.6 Practice - Rational Exponents

Write each expression in radical form.

1) $m^{\frac{3}{5}}$

2) $(10r)^{-\frac{3}{4}} = \frac{1}{\sqrt[4]{(10r)^3}}$

3) $(7x)^{\frac{3}{2}}$

4) $(6b)^{-\frac{4}{3}}$

Write each expression in exponential form.

5) $\frac{1}{(\sqrt{6x})^3} = (6x)^{-3/2}$

6) $\sqrt{v}$

7) $\frac{1}{(\sqrt[4]{n})^7}$

8) $\sqrt{5a} = (5a)^{1/2}$

Evaluate.

9) $8^{\frac{2}{3}} = 4$

10) $16^{\frac{1}{4}} = 2$

11) $4^{\frac{3}{2}} = 8$

12) $100^{-\frac{3}{2}} = \frac{1}{1000}$

Simplify. Your answer should contain only positive exponents.

13) $yx^{\frac{1}{3}} \cdot xy^{\frac{3}{2}} = x^{4/3}y^{5/2}$

14) $4v^{\frac{2}{3}} \cdot v^{-1} = \frac{4}{v^{1/3}}$

15) $(a^{\frac{1}{2}}b^{\frac{1}{2}})^{-1}$

16) $(x^{\frac{5}{3}}y^{-2})^0 = 1$

17) $\frac{a^2b^0}{3a^4}$

18) $\frac{2x^{\frac{1}{2}}y^{\frac{1}{3}}}{2x^{\frac{4}{3}}y^{-\frac{7}{4}}} = \frac{y^{25/12}}{x^{5/6}}$

19) $uv \cdot u \cdot (v^{\frac{3}{2}})^3$

20) $(x \cdot xy^2)^0$

21) $(x^0y^{\frac{1}{3}})^{\frac{3}{2}}x^0$

22) $u^{-\frac{5}{4}}v^2 \cdot (u^{\frac{3}{2}})^{-\frac{3}{2}}$

23) $\frac{a^{\frac{3}{4}}b^{-1} \cdot b^{\frac{7}{4}}}{3b^{-1}}$

24) $\frac{2x^{-2}y^{\frac{5}{3}}}{x^{-\frac{5}{4}}y^{-\frac{5}{3}} \cdot xy^{\frac{1}{2}}}$

25) $\frac{3y^{-\frac{5}{4}}}{y^{-1} \cdot 2y^{-\frac{1}{3}}}$

26) $\frac{ab^{\frac{1}{3}} \cdot 2b^{-\frac{5}{4}}}{4a^{-\frac{1}{2}}b^{-\frac{2}{3}}}$

27) $\left(\frac{m^{\frac{3}{2}}n^{-2}}{(mn^{\frac{4}{3}})^{-1}}\right)^{\frac{7}{4}}$

28) $\frac{(y^{-\frac{1}{2}})^{\frac{3}{2}}}{x^{\frac{3}{2}}y^{\frac{1}{2}}}$

29) $\frac{(m^2n^{\frac{1}{2}})^0}{n^{\frac{3}{4}}}$

30) $\frac{y^0}{(x^{\frac{3}{4}}y^{-1})^{\frac{1}{3}}} = \frac{y^{1/3}}{x^{1/4}}$

31) $\frac{(x^{-\frac{4}{3}}y^{-\frac{1}{3}} \cdot y)^{-1}}{x^{\frac{1}{3}}y^{-2}}$

32) $\frac{(x^{\frac{1}{2}}y^0)^{-\frac{4}{3}}}{y^4 \cdot x^{-2}y^{-\frac{2}{3}}}$

33) $\frac{(uv^2)^{\frac{1}{2}}}{v^{-\frac{1}{4}}v^2}$

Kuta Software - Infinite Algebra 2 Name_____

Simplifying Rational Exponents

Date_____ Period____

Simplify.

1) $(n^4)^{\frac{3}{2}} = n^6$

2) $(27p^6)^{\frac{5}{3}} = 243\,p^{10}$

3) $(25b^6)^{-1.5} = \frac{1}{125} \cdot \frac{1}{b^9}$ (−3/2)

4) $(64m^4)^{\frac{3}{2}} = 512\,m^6$

5) $(a^8)^{\frac{3}{2}} = a^{12}$

6) $(9r^4)^{0.5} = 3r^2$

7) $(81x^{12})^{1.25} = 243x^{15}$ (5/4)

8) $(216r^9)^{\frac{1}{3}}$

Simplify. Your answer should contain only positive exponents with no fractional exponents in the denominator.

9) $2m^2 \cdot 4m^{\frac{3}{2}} \cdot 4m^{-2} = 32m^{3/2}$

10) $3b^{\frac{1}{2}} \cdot b^{\frac{4}{3}} = 3b^{2/3}$

11) $\left(p^{\frac{3}{2}}\right)^{-2} = p^{-3} = \frac{1}{p^3}$

12) $\left(a^{\frac{1}{2}}\right)^{\frac{3}{2}} = a^{3/4}$

13) $\dfrac{2x^{-\frac{7}{4}}}{4x^{\frac{4}{3}}} = \dfrac{1}{x^{37/12}}$

14) $\dfrac{4x^2}{2x^{\frac{1}{2}}} = 2x^{3/2}$

15) $\dfrac{3x^{-\frac{1}{2}} \cdot 3x^{\frac{1}{2}} y^{-\frac{1}{3}}}{3y^{-\frac{7}{4}}}$

16) $\dfrac{3y^{\frac{1}{4}}}{4x^{-\frac{2}{3}} y^{\frac{3}{2}} \cdot 3y^{\frac{1}{2}}}$

17) $\left(m \cdot m^{-2} n^{\frac{5}{3}}\right)^2 = \dfrac{n^{10/3}}{m^2}$

18) $\left(a^{-1} b^{\frac{1}{3}} \cdot a^{-\frac{4}{3}} b^2\right)^2$

19) $\left(\dfrac{x^{\frac{1}{2}} y^{-2}}{y x^{-\frac{7}{4}}}\right)^4$

20) $\dfrac{\left(x^3 y^2\right)^{\frac{3}{2}}}{\left(x^{-1} y^{-\frac{2}{3}}\right)^{\frac{1}{4}}}$

21) $\dfrac{\left(x^{-\frac{1}{2}} y^2\right)^{-\frac{5}{4}}}{x^2 y^{\frac{1}{2}}}$

22) $\dfrac{\left(x^{-\frac{1}{2}} y^4\right)^{\frac{1}{4}}}{x^{\frac{2}{3}} y^{\frac{3}{2}} \cdot x^{-\frac{3}{2}} y^{\frac{1}{2}}}$

Pre-AP Algebra 2 **Name:** _____
9-1 Pair Work

Practice with Rational Exponents

1) **Rewrite** each radical using rational exponent notation.

a. $\sqrt[3]{7} = 7^{1/3}$ b. $\left(\sqrt{11}\right)^5 = 11^{5/2}$ c. $\sqrt[4]{x^8} = x^2$

2) **Rewrite** each power using radical notation.

a. $43^{1/5} = \sqrt[5]{43}$ b. $8^{-3/4} = \frac{1}{\sqrt[4]{8^3}}$ c. $x^{5/2} =$

3) **Find** the exact, simplified value of each expression **without a calculator**. *If you are stuck, try converting between radical and rational exponential notation first, and then simplify.* Sometimes, simplifying the exponent (or changing a decimal to a fraction) is very helpful.

a. $8^{2/3} = 4$ b. $(-27)^{2/3} = 9$ c. $25^{-3/2} = \frac{1}{125}$

d. $\left(\frac{8}{27}\right)^{-2/3} = \frac{9}{4}$ e. $4^{1.5} = 8$ f. $\left(\frac{1}{4}\right)^{-1.5} = 8$

g. $\left(\sqrt[3]{64}\right)^4 = 256$ h. $\left(\sqrt{3}\right)^6 = 27$ i. $\left(\sqrt[4]{3}\right)^{-8} = \frac{1}{9}$

4) **Simplify** each expression completely.

a. $5^{1/4} \times 5^{7/4} = 25$ b. $(2^{1/3})^{3/4} = \sqrt[4]{2}$

c. $\frac{7^{1/5}}{7^{3/5}} = \frac{1}{\sqrt[5]{49}}$ d. $\left(2^{1/4} \times 2^{1/3}\right)^6 =$

e. $\frac{12^{11/8}}{12^{-5/8}} = 144$ f. $\frac{5x^{3/4}yz^{-1/3}}{10x^{1/4}z^{2/3}} =$

Pre-AP Algebra 2 **Name:** _____
Homework #9-1

Homework #9-1: Rational Exponents

Part 1

1) **Find** the exact, simplified value of each expression **without a calculator**. *If you are stuck, try converting between radical and rational exponential notation first, and then simplify.* Sometimes, simplifying the exponent (or changing a decimal to a fraction) is very helpful.

a. $125^{1/3} = 5$

b. $64^{-1/2} = \frac{1}{8}$

c. $64^{1/6} = 2$

d. $81^{1/2} = 9$

e. $32^{-1/5} = \frac{1}{2}$

f. $81^{-1/4} = \frac{1}{3}$

g. $4^{3/2} =$

h. $(-64)^{2/3} =$

i. $(-8)^{-5/3} =$

j. $9^{-3/2} = \frac{1}{27}$

k. $\left(\frac{9}{4}\right)^{3/2} = \frac{27}{8}$

l. $16^{-1.5} = \frac{1}{64}$

m. $\left(\sqrt[3]{-27}\right)^2 = 9$

n. $\sqrt[3]{125^2} = 25$

o. $\left(\sqrt[3]{4}\right)^6 = 16$

p. $\left(\sqrt{5}\right)^{-2} = \frac{1}{5}$

q. $\left(\sqrt[4]{2}\right)^{-4} = \frac{1}{2}$

r. $\left(\sqrt[5]{3}\right)^5 = 3$

2) **Simplify** each expression completely.

a. $3^{5/3} \times 3^{1/3} = 9$

b. $\left(5^{2/3}\right)^{1/2} = \sqrt[3]{5}$

c. $\frac{1}{36^{-1/2}} = 6$

d. $\left(\frac{5^2}{8^2}\right)^{-1/2} = \frac{8}{5}$

e. $\frac{125^{1/9}}{5^{1/4}} =$

f. $\left(10^{3/4} \times 4^{3/4}\right)^{-4} = \frac{1}{6400}$