Honors Algebra 2
Roots & Radicals Practice Worksheet

Name: _____
Period: ____ Date: _____

SHOW WORK FOR CREDIT!!

1) Write the powers of 2 from 2^0 to 2^8.

$2^0 = 1$ $2^3 = 8$ $2^6 = 64$
$2^1 = 2$ $2^4 = 16$ $2^7 = 128$
$2^2 = 4$ $2^5 = 32$ $2^8 = 256$

2) Write the powers of 3 from 3^0 to 3^5.

$3^0 = 1$ $3^3 = 27$
$3^1 = 3$ $3^4 = 81$
$3^2 = 9$ $3^5 = 243$

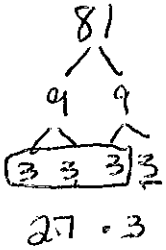
3) Write the powers of 5, 6, & & from 0 to 3.

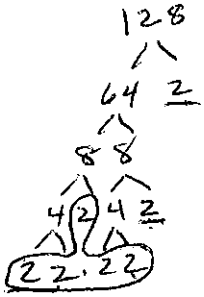
$5^0 = 1$ $6^0 = 1$ $7^0 = 1$
$5^1 = 5$ $6^1 = 6$ $7^1 = 7$
$5^2 = 25$ $6^2 = 36$ $7^2 = 49$
$5^3 = 125$ $6^3 = 216$ $7^3 = 343$

49
7
7 3

4) Simplify each radical expression.

a) $\sqrt{64}$ 8	d) $\sqrt[3]{81}$ $3\sqrt[3]{3}$	g) $\sqrt[3]{64}$ 4	j) $\sqrt[3]{-125}$ -5
b) $\sqrt{75}$ $5\sqrt{3}$	e) $\sqrt[4]{64}$ $2\sqrt[4]{4}$	h) $\sqrt[3]{216}$ 6	k) $\sqrt[3]{250}$ $5\sqrt[3]{2}$
c) $\sqrt{32}$ $4\sqrt{2}$	f) $\sqrt[5]{128}$ $2\sqrt[5]{4}$	i) $\sqrt[3]{128}$ $4\sqrt[3]{2}$	l) $\sqrt[5]{-64}$ $-2\sqrt[5]{2}$





16
16
96
16

5) Write each perfect square as a number or a term with the exponent 2. [i.e. $64x^2 = (8x)^2$]

a) 25 5^2	c) x^{10} $(x^5)^2$	e) $169x^6y^{12}$ $(13x^3y^4)^2$	g) $225m^2n^{20}$ $(15mn^{10})^2$
b) 4/49 $\left(\frac{2}{7}\right)^2$	d) x^4y^2 $(x^2y)^2$	f) $144x^8y^{10}$ $(12x^4y^5)^2$	h) $256a^{16}b^{12}$ $(16a^8b^6)^2$

6) Write each perfect cube as a number or a term with the exponent 3. [i.e. $8x^6y^{18} = (2x^2y^6)$]

a) 27 3^3	c) x^6 $(x^2)^3$	e) $125x^{15}y^{12}$ $(5x^5y^4)^3$	g) $-216x^3y^{24}$ $(-6xy^8)^3$
b) -64 $(-4)^3$	d) $-x^{12}y$ $(-x^4)^3y = (-x^4y^{\frac{1}{3}})^3$	f) $\frac{27}{1000}m^{18}n^{21}$ $\left(\frac{3}{10}m^6n^7\right)^3$	h) $-x^6y^{12}z^{30}$ $(-x^2y^4z^{10})^3$

7) Simplify these radical expressions. Be sure to rationalize all denominators!! SHOW WORK!!

a) $2|x|y^2$ $\sqrt{4x^2y^4}$

b) $-3c^2$ $\sqrt[3]{-27c^6}$

c) $2|x|y^2$ $\sqrt[4]{16x^4y^8}$

d) $5x^3y$ $\sqrt[3]{125x^9y^3}$

e) $-2xy^3$ $\sqrt[5]{-32x^5y^{15}}$

f) $2xy\sqrt[5]{2xy^2}$ $\sqrt[5]{64x^6y^7}$

g) $3x|y|^2\sqrt[4]{3x^2y}$ $\sqrt[4]{243x^6y^9}$ $3|x|y^2\sqrt[4]{3x^2y}$

81 3

h) $-2xy\sqrt[5]{4y^4}$ $\sqrt[5]{-128x^5y^9}$

-32 4 2

$(-2)^5$ (2)

Here are some EXAMPLES of rationalizing for you:

1) $\frac{\sqrt{3x}}{\sqrt{6}} * \frac{\sqrt{6}}{\sqrt{6}} = \frac{\sqrt{18x}}{6} = \frac{3\sqrt{2x}}{6} = \frac{\sqrt{2x}}{2}$

2) $\frac{\sqrt[3]{10}}{\sqrt[3]{5xy^2}} * \frac{\sqrt[3]{25x^2y}}{\sqrt[3]{25x^2y}} = \frac{\sqrt[3]{250x^2y}}{\sqrt[3]{125x^3y^3}} = \frac{5\sqrt[3]{2x^2y}}{5xy}$

Needed to make perfect cube radicand in your denominator

3) $\frac{\sqrt{3xy^2}}{\sqrt{5xy^3}} = \frac{\sqrt{3}}{\sqrt{5y}} * \frac{\sqrt{5y}}{\sqrt{5y}} = \frac{\sqrt{15y}}{5y}$

4) $\frac{16}{\sqrt[3]{-2x^4y}} * \frac{\sqrt[3]{4x^2y^2}}{\sqrt[3]{4x^2y^2}} = \frac{16\sqrt[3]{4x^3y^2}}{\sqrt[3]{-8x^6y^3}} = \frac{16\sqrt[3]{4x^3y^2}}{-2x^2y} = \frac{-8\sqrt[3]{4x^3}}{x^2y}$

i) $\frac{x\sqrt{5y}}{5y}$ $\quad \frac{\sqrt{2x^3}}{\sqrt{10xy}} \quad \frac{\sqrt{x^2}}{\sqrt{5y}} \cdot \frac{\sqrt{5y}}{\sqrt{5y}} = \frac{\sqrt{5x^2y}}{5y}$

j) $\frac{\sqrt{3xy}}{y^2}$ $\quad \frac{\sqrt{15x^2}}{\sqrt{5xy^3}} \quad \frac{\sqrt{3x}}{\sqrt{y^3}} = \frac{\sqrt{3x}}{y\sqrt{y}} \cdot \frac{\sqrt{y}}{\sqrt{y}}$

k) $\frac{\sqrt[3]{18x^2}}{3x}$ $\quad \frac{\sqrt[3]{4}}{\sqrt[3]{6x}} \quad \frac{\sqrt[3]{2}}{\sqrt[3]{3x}} \cdot \frac{\sqrt[3]{9x^2}}{\sqrt[3]{9x^2}} = \frac{\sqrt[3]{18x^2}}{\sqrt[3]{27x^3}}$

l) $\frac{\sqrt[3]{18y}}{3y}$ $\quad \frac{\sqrt[3]{14x}}{\sqrt[3]{21xy^2}} \quad \sqrt[3]{\frac{2}{3y^2}} = \frac{\sqrt[3]{2}}{\sqrt[3]{3y^2}} \cdot \frac{\sqrt[3]{9y}}{\sqrt[3]{9y}} = \frac{\sqrt[3]{18y}}{\sqrt[3]{27y^3}}$

m) $\frac{2\sqrt[3]{ab^2}}{ab}$ $\quad \frac{\sqrt[3]{80a^3b}}{\sqrt[3]{10a^5b^2}} \quad \frac{\sqrt[3]{8}}{\sqrt[3]{a^2b}} \quad \frac{2}{\sqrt[3]{a^2b}} * \frac{\sqrt[3]{ab^2}}{\sqrt[3]{ab^2}} = \frac{2\sqrt[3]{ab^2}}{\sqrt[3]{a^3b^3}}$

n) $2x^2y^2\sqrt{2}$ $\quad \frac{\sqrt{56x^5y^5}}{\sqrt{7xy}} \quad \sqrt{8x^4x^4}$

o) $\frac{\sqrt[4]{9x^2y^2}}{|x|y^2}$ $\quad \frac{\sqrt[4]{27xy}}{\sqrt[4]{9x^3y^7}} \quad \frac{\sqrt[4]{3}}{y^4\sqrt[4]{x^2y^2}} * \frac{\sqrt[4]{x^2y^2}}{\sqrt[4]{x^2y^2}} = \frac{\sqrt[4]{3x^2y^2}}{y\sqrt[4]{x^4y^4}} = \frac{\sqrt[4]{3x^2y^2}}{xy^2}$

p) $\frac{|x|\sqrt[4]{8x^2y^2}}{2}$ $\quad \frac{\sqrt[4]{32x^6y^5}}{\sqrt[4]{64xy^3}} \quad \frac{\sqrt[4]{x^5y^2}}{\sqrt[4]{2}} \cdot \frac{\sqrt[4]{8}}{\sqrt[4]{8}} = \frac{\sqrt[4]{8x^5y^2}}{\sqrt[4]{16}}$

q) $\frac{\sqrt[3]{20x^2y}}{2y}$ $\quad \frac{\sqrt[3]{5x^4y}}{\sqrt[3]{2x^2y^3}} \quad \frac{x\sqrt[3]{5xy}}{y\sqrt[3]{2x^2}} * \frac{\sqrt[3]{4x}}{\sqrt[3]{4x}} = \frac{x\sqrt[3]{20x^4y}}{y\sqrt[3]{8x^3}}$

r) $\frac{-2\sqrt[3]{25x}}{x}$ $\quad \frac{10}{\sqrt[3]{-5x^2}} * \frac{\sqrt[3]{25x}}{\sqrt[3]{25x}} = \frac{10\sqrt[3]{25x}}{\sqrt[3]{-125x^3}} = \frac{10\sqrt[3]{25x}}{-5x}$