

1-4 Rational Exponents

Rational exponent Calc task

$1^{\frac{1}{2}} = 1$ , 1, 4, 9, 16, 25, 36

$4^{\frac{1}{2}} = 2$   
 $9^{\frac{1}{2}} = 3$   
 $16^{\frac{1}{2}} = 4$   
 $\vdots$

$a^{\left(\frac{1}{2}\right)} = \underline{\sqrt{a}}$

Aug 20-3:41 PM

1, 8, 27, 64, 125, 216

$1^{\frac{1}{3}} = 1$   
 $8^{\frac{1}{3}} = 2$   
 $27^{\frac{1}{3}} = 3$   
 $64^{\frac{1}{3}} = 4$   
 $\vdots$

$a^{\left(\frac{1}{3}\right)} = \underline{\sqrt[3]{a}}$

Aug 20-4:03 PM

1, 8, 27, 64, 125, 216

$a^{\left(\frac{2}{3}\right)} = \underline{\sqrt[3]{a^2}}$

*power* (pointing to 2)  
*root* (pointing to 3)

Aug 28-10:52 AM

1, 16, 81, 256, 625, 1296

$a^{\left(\frac{3}{4}\right)} = \underline{\sqrt[4]{a^3}}$

Aug 20-4:04 PM

$a^{\left(\frac{m}{n}\right)} = \underline{\sqrt[n]{a^m}}$

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Fractional exponent

$a^{\frac{1}{n}} = \sqrt[n]{a}$

n is an integer bigger then or equal to 2

Feb 15-8:55 AM

Write each of the following as a radical and simplify, if possible.

$$9^{\frac{1}{2}} = \sqrt{9} = 3 \quad (-64)^{\frac{1}{3}}$$

$$\sqrt[3]{-64} = -4$$

$$100^{\frac{1}{2}} \quad -100^{\frac{1}{2}} \quad z^{\frac{1}{2}}$$

$$\sqrt{100} = \sqrt{100}$$

$$= 10$$

Feb 15-9:05 AM

You try

$$25^{\frac{1}{2}} \quad (-27)^{\frac{1}{3}}$$

$$-64^{\frac{1}{2}} \quad b^{\frac{1}{2}}$$

Feb 15-9:08 AM

Rewrite in exponent form

$$\sqrt[7]{x^1} = x^{\frac{1}{7}}$$

$$\sqrt[4]{b} = b^{\frac{1}{4}}$$

Feb 15-9:10 AM

You try

$$\sqrt[12]{r} \quad \sqrt[5]{d}$$

Feb 15-9:25 AM

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

$a$  is real,  $m/n$  is a rational number in lowest terms with  $n$  bigger or equal to 2

Feb 15-9:26 AM

Write each of the following as a radical and simplify, if possible.

$$25^{\frac{3}{2}} \quad 64^{\frac{2}{3}} \quad -9^{\frac{5}{2}}$$

$$\sqrt{25^3} \quad \sqrt[3]{64^2} \quad (-8)^{\frac{4}{3}}$$

$$5^3 = 125 \quad 2^4 = 16 \quad 81^{\frac{7}{2}}$$

Feb 15-9:35 AM

You try

$$27^{\frac{2}{3}} \qquad 16^{\frac{3}{2}}$$

$$-25^{\frac{5}{2}} \qquad -16^{\frac{3}{4}}$$

Feb 15-9:38 AM

Rewrite in exponent form

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

Feb 15-9:39 AM

You try

$$\sqrt[8]{a^3} \qquad (\sqrt[3]{h})^9$$

Feb 15-9:42 AM

$$a^{-\frac{m}{n}} = \frac{1}{a^{\frac{m}{n}}} \qquad \text{and} \qquad \frac{1}{a^{\frac{m}{n}}} = a^{-\frac{m}{n}}$$

$\frac{m}{n}$  is a rational number, and  $a$  is a nonzero real number

Feb 15-9:42 AM

Write each of the following as a radical and simplify, if possible.

$$x^{-\frac{1}{3}} = \frac{1}{x^{\frac{1}{3}}} = \frac{1}{\sqrt[3]{x}}$$

$$36^{-\frac{1}{2}} = \frac{1}{36^{\frac{1}{2}}} = \frac{1}{\sqrt{36}} = \frac{1}{6}$$

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\*Just a reminder.

Exponent Rules

$$a^0 = 1 \quad \text{if } a \neq 0$$

$$a^{-n} = \frac{1}{a^n} \quad \text{or} \quad \frac{1}{a^{-n}} = a^n \quad \text{if } a \neq 0$$

$$a^m \cdot a^n = a^{m+n}$$

$$\frac{a^m}{a^n} = a^{m-n} \quad \text{if } a \neq 0$$

$$(a^m)^n = a^{m \cdot n}$$

$$(a \cdot b)^n = a^n \cdot b^n$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \quad \text{if } b \neq 0$$

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n \quad \text{if } a \neq 0, b \neq 0$$

Feb 17-7:13 PM

After you simplify you should have:

- Only positive exponents.
- Each base only occurring once.
- Have no parentheses in the expression.
- No powers written to powers.

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Simplify using properties of exponents. Leave answers with rational exponents

$\frac{1}{2} + \frac{1}{3}$  use calc or  $\frac{3k}{6k} + \frac{k2}{36} = \frac{5}{6}$

$$x^{\frac{1}{2}} \cdot x^{\frac{1}{3}} = x^{\frac{5}{6}}$$

$$\frac{x^{\frac{1}{3}}}{x^{\frac{5}{3}}} = x^{\frac{1}{3} - \frac{5}{3}} = \frac{1}{x^{\frac{4}{3}}}$$

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You Try

$$r^{\frac{3}{4}} \cdot r^{\frac{1}{6}}$$

$$\frac{x^{\frac{2}{3}}}{x^{\frac{1}{5}}}$$

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Simplify each of the following:

$$\left(x^{\frac{2}{5}}\right)^{\frac{5}{4}} = x^{\frac{1}{2}}$$

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

Feb 17-7:28 PM

You Try

$$\left(100^{\frac{3}{8}}\right)^{\frac{4}{3}}$$

$$\left(a^{\frac{3}{2}} \cdot b^{\frac{5}{4}}\right)^{\frac{2}{3}}$$

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Simplify the following:

$$\left(16x^{-4}y^6\right)^{\frac{3}{2}} = 16^{-\frac{3}{2}} x^6 y^{-9} = \frac{x^6}{16^{\frac{3}{2}} y^9}$$

$$\frac{-\frac{3}{2}}{1} \cdot \frac{-3}{2} = 6$$

$$\frac{3\cancel{6}}{1} \cdot \frac{-3}{\cancel{2}} = -9$$

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Use rational exponents to simplify the radicals.

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

$$\sqrt{\sqrt[3]{z}}$$

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Aug 28-11:06 AM

## Attachments

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