Warm Up Questions

a) $243^{0.6}$ $\frac{6}{10} \div 2 \; \frac{3}{5}$

exp 3, root 5 (2nd, 1st)

243

$\left(\sqrt[5]{243}\right)^3$

$= 3^3$

$= 27$

b) $\left(\frac{9}{25}\right)^{3/2}$ exp 3, root 2

$\left(\sqrt{\frac{9}{25}}\right)^3$

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

$= \frac{27}{125}$

c) $0.008^{2/3}$ $\frac{8}{1000}$ exp 2, root 3

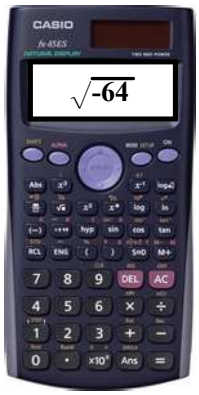
$\left(\sqrt[3]{\frac{8}{1000}}\right)^2$

$\left(\frac{2}{10}\right)^2$

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

$= \frac{1}{25}$

Can You Find the Root of a Negative Number?



Calculate $\sqrt{-64}$ = Error !!!

DOES THIS MEAN WE CAN'T TAKE THE ROOT OF A NEGATIVE NUMBER?

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

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

$\sqrt[5]{-64} = -2.29739....$

What do you Notice?

Look at the Index !!

Even index - Can not be evaluated

Odd index - Can be evaluated


$50^{1/3}$
9
Negative Exponents and Reciprocals !!!
4
50^{-3}
$\sqrt[3]{50}$

What do negative exponents represent??

$\frac{8^5}{8^3} = 8^2$

$\frac{8 \cdot 8 \cdot 8 \cdot 8 \cdot 8}{8 \cdot 8 \cdot 8} = 8^2$

$\frac{8^3}{8^5} = 8^{-2}$

$\frac{8 \cdot 8 \cdot 8}{8 \cdot 8 \cdot 8 \cdot 8 \cdot 8} = 8^{-2}$

$\frac{1}{8 \times 8} = 8^{-2}$

$\frac{1}{8^2} = 8^{-2}$

Express with positive exponents:

$$\frac{15y^4}{x^5}$$

Express with positive exponents:

$$\frac{25n^4z^6}{m^7p}$$

Express with positive exponents:

$12a^{-2}b^5c^{-7}$

$$\frac{12b^5}{a^2c^7}$$

Powers with Negative Exponents

$x^{-n} = 1/x^n$ AND $1/x^n = x^{-n}$ $x \neq 0$

Flip It and Turn the Exponent Positive

$$\left(\frac{4}{9}\right)^{-2}$$

When a negative exponent comes along, you must FLIP IT . Always flip the base, when you FLIP IT. Your exponent will turn positive when you FLIP IT. Flip it now, it's not to late, I say FLIP IT

FLIP IT GOOD:)

Let's Give it a Try!

a) 3^{-2}

$\frac{1}{1}$

$\frac{1}{3}$

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

$\frac{1}{9}$

b) $(4/5)^{-2}$

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

$= \frac{25}{16}$

c) $(1/2)^{-2}$

$\left(\frac{2}{1}\right)^2$

$(2)^2$

$= 4$

d) $(-5)^{-3}$

$\frac{1}{1}$

$\frac{1}{(-5)^{3}}$

$\frac{1}{-125}$

e) $8^{-2/3}$

$\frac{1}{1}$

$\frac{1}{8^{+2/3}}$ (+2/3: exp. ← root)

$\frac{1}{(\sqrt[3]{8})^{2}}$

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

$= \frac{1}{4}$

f) $(1/9)^{-3/2}$

$\left(\frac{9}{1}\right)^{+3/2}$ (+3/2: exp. ← root)

$(9)^{\frac{3}{2}}$

$\left(\sqrt{9}\right)^{3}$

3^{3}

$= 27$

g) $(8/27)^{-2/3}$

$\left(\frac{27}{8}\right)^{+2/3}$ ← exp. ← root

$\left(\sqrt[3]{\frac{27}{8}}\right)^{2}$

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

$= \frac{9}{4}$

h) $(-125)^{-1/3}$

$\frac{1}{(-125)^{1/3}}$

$\frac{1}{\sqrt[3]{-125}}$

$= \frac{1}{-5}$

i) $(-14/5)^{0}$

$= 1$

a) $144^{-1/2}$ b) $(9/64)^{-1/2}$ c) $81^{-3/2}$

a) $(-64)^{-1/3}$ b) $(100/49)^{-3/2}$ c) $0.36^{1/2}$

a) $144^{-1/2}$

$= 1/144^{1/2}$
$= 1/\sqrt{144}$

$= 1/12$

b) $(9/64)^{-1/2}$

$= (64/9)^{1/2}$
$= \sqrt{64} \ / \ \sqrt{9}$

$= 8/3$

c) $81^{-3/2}$

$= 1/81^{3/2}$
$= 1/ (\sqrt{81})^3$
$= 1/ 9^3$

$= 1/729$

a) $(-64)^{-1/3}$

$= (1/-64)^{1/3}$
$= (\sqrt[3]{1} \ / \ \sqrt[3]{-64})$

$= 1 \ / \ -4$

b) $(100/49)^{3/2}$

$= (49/100)^{3/2}$
$= (\sqrt{49})^3 \ / \ (\sqrt{100})^3$
$= 7^3 \ / \ 10^3$

$= 343/1000$

c) $0.36^{1/2}$

$= 1/0.36^{1/2}$
$= 1/\sqrt{0.36}$

$= 1/ 0.6$

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#3, 4, 5, 6, 7, 8, 9, 12, 13

Warm Up Questions

1. Arrange these numbers in order from least to greatest. Describe your strategy.

$$\sqrt[3]{4},\ 4^{\frac{3}{2}},\ 4^2,\ \left(\frac{1}{4}\right)^{\frac{3}{2}}$$

2. Evaluate.

i) $16^{1.5}$ **ii)** $81^{0.75}$

iii) $(-32)^{0.8}$ **iv)** $36^{0.5}$

v) $1.21^{1.5}$

1. Arrange these numbers in order from least to greatest. Describe your strategy.

$\sqrt[3]{4}, 4^{\frac{3}{2}}, 4^2, \left(\frac{1}{4}\right)^{\frac{3}{2}}$

$4^{1/3}$, $4^{3/2}$, 4^2 , $4^{-3/2}$

Least to Greatest

$4^{-3/2}$, $4^{1/3}$, $4^{3/2}$, 4^2

Evaluate.

i) $16^{1.5}$ ii) $81^{0.75}$

iii) $(-32)^{0.8}$ iv) $36^{0.5}$

v) $1.21^{1.5}$

i) $16^{3/2}$
$= (\sqrt{16})^3$
$= 4^3$
$= 64$

ii) $81^{3/4}$
$= (\sqrt[4]{81})^3$
$= 3^3$
$= 27$

iii) $(-32)^{4/5}$
$= (\sqrt[5]{-32})^4$
$= (-2)^4$
$= 16$

iv) $36^{1/2}$
$= \sqrt{36}$
$= 6$

v) $1.21^{3/2}$
$= (\sqrt{1.21})^3$
$= 1.1^3$
$= 1.331$