

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) $1.21^{1.5}$

$16^{15/10}$
i) $16^{3/2}$
 $= (\sqrt{16})^3$
 $= 4^3$
 $= 64$

$81^{35/100}$
ii) $81^{3/4}$
 $= (\sqrt[4]{81})^3$
 $= 3^3$
 $= 27$

$(-32)^{8/10}$
iii) $(-32)^{4/5}$
 $= (\sqrt[5]{-32})^4$
 $= (-2)^4$
 $= 16$


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

$1.21^{15/10}$
v) $1.21^{3/2}$
 $= (\sqrt{1.21})^3$
 $= 1.1^3$
 $= 1.331$



What do negative exponents represent??

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


LOOK

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

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

$$8^2$$

$$\frac{\cancel{8} \cancel{8} \cancel{8}}{\cancel{8} \cancel{8} \cancel{8} \cdot 8 \cdot 8} = \frac{1}{8^2}$$

$$8^{-2}$$

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



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

Flip
Base

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

NEVER
EVER ||| = $\frac{81}{16}$

Flip the exponent

Express with positive exponents:

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



Express with positive exponents:

$$\frac{25n^4m^{-7}p^{-1}}{z^{-6}}$$



Express with positive exponents:

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

Powers with Negative Exponents

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

Flip It and Turn the Exponent Positive



Let's Give it a Try!

a) 3^{-2}

$$\frac{1}{3^2}$$
$$\frac{1}{9}$$

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

$$\left(\frac{5}{4}\right)^2$$
$$\frac{5^2}{4^2}$$
$$= \frac{25}{16}$$

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

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

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

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

$$\frac{1}{-125}$$

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

$$\frac{1}{8^{2/3}}$$

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

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

$$\frac{1}{4}$$

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

$$\left(\frac{9}{1}\right)^{3/2}$$

$$(9)^{3/2}$$

*3 ← exp.
2 ← root*

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

$$(3)^3$$

$$= 27$$

g) $(8/27)^{-2/3}$ h) $(-125)^{-1/3}$ i) $(-14/5)^0$

$$\begin{aligned} & \left(\frac{27}{8}\right)^{2/3} \\ & \frac{27^{2/3}}{8^{2/3}} \quad \leftarrow \text{cube root} \\ & \frac{(3\sqrt[3]{27})^2}{(3\sqrt[3]{8})^2} \\ & \frac{3^2}{2^2} \\ & = \frac{9}{4} \end{aligned}$$