WARM-UP: Simplify...

- write answers with positive exponents!

a) $\dfrac{-28a^{6}b^{-3}c^{5}}{7a^{11}b^{-5}c^{5}}$

$= -4a^{6-11}b^{-3-5}c^{5-5}$

$= -4a^{-5}b^{2}c^{0}$

$= \dfrac{-4b^{2}(1)}{a^{5}}$

b) $\sqrt[3]{-27a^{3}b^{9}}$

$(-27a^{3}b^{9})^{1/3}$

$(-27^{1/3}(a^{3})^{1/3}(b^{9})^{1/3})$

$(-3ab^{3})$

c) $\left(\dfrac{\sqrt[3]{x^{5}}}{\sqrt{x}}\right)^{3}$

$= \dfrac{(\sqrt[3]{x^{5}})^{3}}{(\sqrt{x})^{3}}$

$= \dfrac{x^{5}}{(x^{\frac{1}{2}})^{3}}$

$= \dfrac{x^{5}}{x^{\frac{3}{2}}}$

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

$= x^{\frac{7}{2}}$

Solving For a Variable

Solve for x:

$(x^2)^{\frac{1}{2}} = (81)^{\frac{1}{2}}$

$= \sqrt{81}$

$= 9$

$(x^3)^{\frac{1}{3}} = 64$

$x = 64^{\frac{1}{3}}$

$x = 4$

Solve each of the following...

a) $x^{\frac{5}{2}} = 32$

$(x^{5/2})^{2/5}$

$x^1 = (32)^{2/5}$

$= (\sqrt[5]{32})^2$

$= 2^2$

$= 4$

b) $a^{\frac{2}{3}} = 49$

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

$a = 49^{3/2}$

$= (\sqrt{49})^3$

$= 7^3$

$= 343$

c) $\frac{2a^{-\frac{3}{2}}}{2} = \frac{128}{2}$

$a^{-3/2} = 64$

$(a^{-3/2})^{-2/3}$

$a = 64^{-2/3}$

$a = (\sqrt[3]{64})^{-2}$

$a = 4^{-2}$

$a = \frac{1}{4^2}$

$a = \frac{1}{16}$

What number is larger?

a

2^{800}

or

b

8^{300}

2^{800}

6.7×10^{240}

$(2^3)^{300}$

$= 2^{900}$

8.5×10^{270}

Now you Try

a) 16^{40} or 8^{50}

$(2^4)^{40}$ or $(2^3)^{50}$

2^{160} or 2^{150}

b) 27^{250} or 81^{200}

$(3^3)^{250}$ or $(3^4)^{200}$

3^{750} or 3^{800}

Re-writing Bases

$2^{?} = 8$ 2^3

$3^{?} = 81$ 3^4

$\left(\frac{1}{16}\right) = 2^{?}$ $= 2^{-4}$ $\frac{1}{2^4} = \frac{1}{16}$

$4^3 = 2^{?}$ $(2^2)^3$ $2^6 =$ 6

$\left(\frac{1}{64}\right)^{2} = 4^{?}$ $\left(\left(\frac{1}{4}\right)^3\right)^2$ $\left(\frac{1}{4}\right)^6 = 4^{-6}$

$125^{x} = 5^{?}$ $(5^3)^x = 5$

$32^{3x+1} = 2^{?}$ $(2^5)^{3x+1} = 2$ $2^{15x+5} = 2^{?}$

$$32^{3x+1} = 2^{5}$$

$$2^{5(3x+1)} = 2^{6}$$

$$5(3x+1) = 6$$

$$15x + 5 =$$

$$15x = 6 - 5$$

$$15x = 1$$

$$x = \frac{1}{15}$$