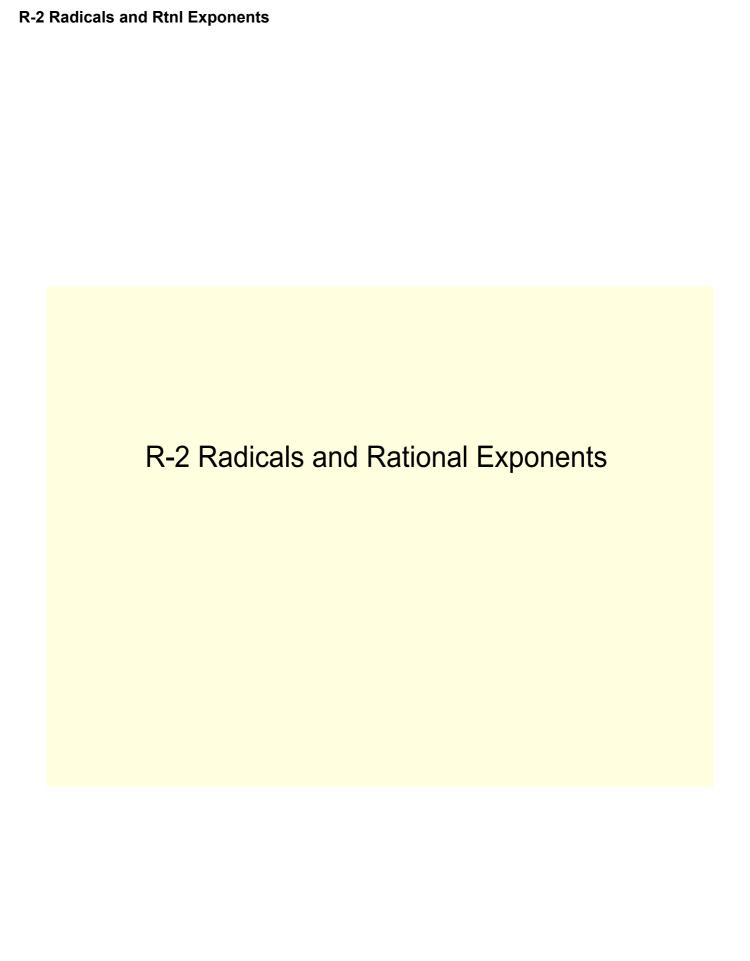
SAT

If $x^{-2} = 16$, what is the value of x^{2} ?



Why do negative exponents mean "move it"?

Consider $\frac{a^2}{a^5}$. Simplify this in 2 different ways:

- By writing out all the variables in the top and bottom and cancelling
- By using the rules of exponents

$$\frac{a^2}{a^5} = \frac{a \cdot b}{a \cdot a \cdot a \cdot a}$$

$$= \frac{1}{a^3}$$

$$\frac{a^2}{a^5} = 0$$

$$= 0$$

$$= 0$$

$$= 0$$

$$= 0$$

What do you notice?

Why do fraction exponents mean "roots"?

$$\sqrt{3} \cdot \sqrt{3} = 3$$

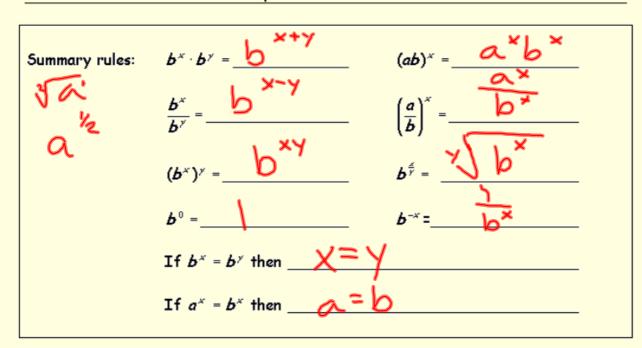
$$\sqrt{a} \cdot \sqrt{a} = \bigcirc$$

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

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

What do you notice?

Radicals and Rational Exponents: Practice Exercises



Simplify each expression without negative exponents. Do not use a calculator.

1.
$$8^{-2} = \frac{1}{8^2} = \frac{1}{69}$$

3.
$$\left(\frac{3}{xy}\right)^{-2} = \left(\frac{xy}{3}\right)^{2} = \frac{x^{2}y^{3}}{9}$$

4.
$$\frac{(-2)^8}{(-2)^3} = (-2)^5$$

6.
$$\frac{12^3}{6^3} = 2^3 = 8$$

7.
$$(2^{-1} + 4^{-1})^{-1} \left(\frac{1}{2} + \frac{1}{4}\right)^{-1}$$

$$\left(\frac{3}{4}\right)^{-1} = \frac{1}{3}$$

9.
$$\frac{u^2v^{-2}}{u^{-1}v^3} = \frac{3}{\sqrt{5}}$$

10.
$$(a^2b^3)(2a^2b^4)$$

(ab4 $(4a)(3)(2a^2b^4)$

(ab4 $(5a)(3)(2a^2b^2) = 2a^2b^4$

12.
$$\frac{5b^{3} + 10b^{6}}{5b^{-2}} + \frac{5b^{-2}b^{-2}}{5b^{-2}}$$

Solve each equation for x.

13.
$$3^{2x} = 3^{12}$$

14. $9^{x} = 3^{5}$

15.

$$2x = 12$$

$$x = 6$$

$$3^{2x} = 3^{5}$$

$$3^{2x} = 3^{5}$$

$$x = 5$$

$$x = 5$$

$$x = 5$$

$$(5/2)$$

Radicals and Rational Exponents: Practice Exercises

Fractional exponents are easy to understand if you remember that $x^{\sigma/b} = \sqrt[b]{x^{\sigma}}$:

- the number in the numerator is the power inside the radical
- · the number in the denominator is the root outside the radical
- · all other exponent rules still apply...
- and negative exponents still mean "move it"...

Examples:

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

$$x^{-2/5} = \frac{1}{\sqrt[5]{x^2}}$$

$$x^{1/2} = \sqrt{x}$$
 $x^{4/3} = \sqrt[3]{x^4}$ $x^{-2/5} = \frac{1}{\sqrt[5]{x^2}}$ $x^{2/3} \cdot x^{3/4} = x^{(2/3)+(3/4)}$ $= x^{17/12}$

Rewrite each expression using radicals and no negative exponents.

1.
$$x^{2/3} = 3 \chi^2$$

3.
$$5^{1/2} \cdot x^{-1/2}$$

$$= 4 \int_{0.3}^{3} 4 \int_{0.5}^{3} b$$

$$= 4 \int_{0.3}^{3} \int_{0.5}^{3} \int_$$

Rewrite each expression in its simplest exponential form.

$$10. \quad \sqrt{x^5} = \chi^{\frac{5}{2}}$$

12.
$$(\sqrt[6]{2a})^5 = ((2a)^{\frac{1}{4}})^3$$

$$= (2a)^{\frac{5}{4}}$$

14.
$$\sqrt[3]{27x^{-6}y^2}$$

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

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

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

18.
$$\sqrt[3]{\frac{x^2}{y}} = \frac{\left(\chi^2\right)^{\frac{3}{3}}}{\frac{y^{\frac{1}{3}}}{y^{\frac{1}{3}}}}$$

