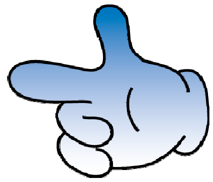
$$\sqrt[3]{64} = 64^{\frac{1}{3}}$$

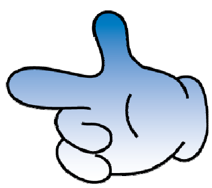


You need to know how to convert back and forth between *radical* form and *rational exponent* form.

$$\left(\sqrt[5]{11}\right)^4 = 11^{\frac{4}{5}} \text{ or } \sqrt[5]{11^4}$$

$$8^{\frac{4}{3}} = \sqrt[3]{8^4} \text{ or } \left(\sqrt[3]{8}\right)^4 = (2)^4 = 16$$

Solve:



You need to know how to solve an equation by isolating the base, then extracting the appropriate root.

$$\frac{6x^3}{6} = \frac{384}{6}$$

$$\sqrt[3]{x^3} = \sqrt[3]{64}$$

$$x = 4$$

$$\sqrt[5]{(x - 8)^5} = \sqrt[5]{100}$$

$$100^{\frac{1}{5}}$$

100 ^ (1/5)

$$x - 8 = 2.5$$

$$x = 10.5$$

Property

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

2. $(a^m)^n = a^{mn}$

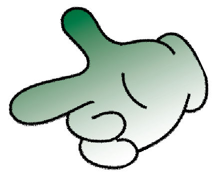
3. $(ab)^m = a^m b^m$

4. $a^{-m} = \frac{1}{a^m}, a \neq 0$

5. $\frac{a^m}{a^n} = a^{m-n}, a \neq 0$

6. $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$

$$\frac{x^8}{x^{-2}} = x^{10}$$



Know the basic properties of exponents.

You need to be able to find roots of powers of common bases.
(Be familar with those on the cheat-sheet that I gave you.)

$$125^{\frac{2}{3}}$$

$$\left(\sqrt[3]{125}\right)^2 = 5^2 = 25$$

$$(-32)^{\frac{3}{5}}$$

$$\left(\sqrt[5]{-32}\right)^3 = (-2)^3 = -8$$

$$9^{\frac{5}{2}} = \left(\sqrt[2]{9}\right)^5 = 3^5$$

$$\begin{array}{r} 81 \\ 3 \\ \hline 243 \end{array}$$

KEY CONCEPT *For Your Notebook*

Operations on Functions

Let f and g be any two functions. A new function h can be defined by performing any of the four basic operations on f and g.

Operation	Definition	Example: $f(x) = 5x$, $g(x) = x + 2$
Addition	$h(x) = f(x) + g(x)$	$h(x) = 5x + (x + 2) = 6x + 2$
Subtraction	$h(x) = f(x) - g(x)$	$h(x) = 5x - (x + 2) = 4x - 2$
Multiplication	$h(x) = f(x) \cdot g(x)$	$h(x) = 5x(x + 2) = 5x^2 + 10x$
Division	$h(x) = \dfrac{f(x)}{g(x)}$	$h(x) = \dfrac{5x}{x + 2}$

The domain of h consists of the x-values that are in the domains of both f and g. Additionally, the domain of the quotient does not include x-values for which $g(x) = 0$.

$8x^3 - 2x^2 + 7$ $\quad\mathbb{R}$

$\sqrt{x} + 8$ $\quad x \geq 0$

$\dfrac{x^2 - 7}{x + 5}$ $\quad\mathbb{R};\ x \neq -5$

composition of functions $f(g(x))$

Perform function "g" on x, to find g(x). This becomes the input value that you input into function "f."

$f(x) = 3x - 4$ and $g(x) = x^2 - 1$

This answer is a <u>number</u>.

What is the value of $f(g(-3))$?

$g(-3) = (-3)^2 - 1 = 9 - 1 = 8$

$f(8) = 3(8) - 4 = 20$

Write a simplified expression for $f(g(x))$.

These answers are <u>expressions.</u>

$3(x^2 - 1) - 4$

$3x^2 - 3 - 4$

$f(g(x)) = 3x^2 - 7$

Write a simplified expression for $g(f(x))$.

$(3x - 4)^2 - 1$

$\cancel{9x^2 - 16}$

$(3x-4)(3x-4)$

$9x^2 - 12x - 12x + 16$

$9x^2 - 24x + 16$

$9x^2 - 24x + 16 - 1$

$g(f(x)) = 9x^2 - 24x + 15$

inverses of functions

If in terms of f(x)= or y =

$f(x) = 2x^2 - 3$

$y = 2x^2 - 3$

$x = 2y^2 - 3$

$+3 \qquad +3$

Switch x and y.

Solve for y.

$\frac{x+3}{2} = \frac{2y^2}{2}$

$\sqrt{\frac{x+3}{2}} = \sqrt{y^2}$

$\sqrt{\frac{x+3}{2}} = y$

If it is in a context, such as

Do not switch.

Solve for the other variable.

$F = \frac{9}{5}C + 32$

$-32 \qquad -32$

$\frac{5}{9}(F - 32) = \frac{9}{5}C \cdot \frac{5}{9}$

$\frac{5}{9}(F - 32) = C$

verifying inverses

$f(x) = 5x^2 - 2$, $x \geq 0$; $g(x) = \left(\frac{x+2}{5}\right)^{1/2}$

$f(x) = 5x^2 - 2$
$g(x) = \left(\frac{x+2}{5}\right)^{\frac{1}{2}}$

Show that f(g(x)) = x and g(f(x)) = x

$$f(g(x)) = 5\left(\left(\frac{x+2}{5}\right)^{\frac{1}{2}}\right)^2 - 2$$

$$= 5\left(\frac{x+2}{5}\right) - 2$$

$$= x + 2 - 2 = x$$

$$g(f(x)) = \left(\frac{(5x^2-2)+2}{5}\right)^{\frac{1}{2}}$$

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