



## Lesson 04 Solving equations having rational &amp; variable exponents

Many times it is desirable to "get rid" of an exponent in the process of solving an equation. For example, consider:

$$(x-2)^{10} = 5$$

Simply raise both sides to the 3 power and  $x-2$  will be left with no exponent. From that point it is easy to solve for  $x$ .

$$[(x-2)^3]^3 = [5]^3$$

$$(x-2)^9 = 125$$

$$\frac{9}{x-2} = 125$$

$$x-2 = \sqrt[9]{125}$$

**Rule:** When raising both sides of an equation to an even power (or if the numerator of a fractional power is even), extraneous roots (answers) can be produced. In this case substitute prospective roots back into the original equation to see if they really work.

$$\text{Example 1: } x^{10} = 5$$

$$\text{Example 2: } (4x)^{10} + 5 = 0$$

$$[x^4]^2 \cdot 2^2 = 5$$

$$x = [1^2]^{1/2} \cdot 2^{1/2}$$

$$x = \pm \sqrt{2}$$

$$(4x)^4 \cdot -5 = 0$$

$$[4x^4]^1 \cdot [-5]^{1/4} = 0$$

$$x = \pm \sqrt[4]{-5}$$

Hand written as a "real person" would do

Teacher models notes and examples during lecture.

## Assignment:

Solve for the variable and check for extraneous roots when appropriate.

$$1. x^{10} - 18 = 54$$

$$x^{\frac{10}{2}} = 52$$

$$[x^5]^2 = [52]^2$$

$$x = [\pm 22^2]^2$$

$$x = (\pm \sqrt{22})^2$$

$$x = (\pm 4\sqrt{5})^2 = \boxed{64(5)}$$

$$2. (2x-1)^{10} - 2 = 0$$

$$(2x-1)^{\frac{10}{2}} = 2$$

$$[2x-1]^5 = 2^2$$

$$2x-1 = 2^2$$

$$2x = 2^2 + 1$$

$$2x = 3$$

## Student version

## Solving equations having rational &amp; variable exponents

Many times it is desirable to "get rid" of an exponent in the process of solving an equation. For example, consider:

Simply raise both sides to the 3 power and  $x-2$  will be left with no exponent. From that point it is easy to solve for  $x$ .

When raising both sides of an equation to an even power (or if the power is even), extraneous roots can be produced. In this case substitute prospective roots back into the original equation to see if they really work.

$$\text{Example 1: } (4x)^{10} + 5 = 0$$

It is better to take notes and work the examples here. Blank assignment area.

Solve for the variable and check for extraneous roots when appropriate.

$$2. (2x-1)^{10} - 2 = 0$$

## Absent-student version

## Solving equations having rational &amp; variable exponents

Many times it is desirable to "get rid" of an exponent in the process of solving an equation. For example, consider:

Simply raise both sides to the 3 power and  $x-2$  will be left with no exponent. From that point it is easy to solve for  $x$ .

$$[x^5]^2 = 5$$

$$125$$

$$125/2 = \boxed{62.5}$$

When raising both sides of an equation to an even power (or if the power is even), extraneous roots can be produced. In this case substitute prospective roots back into the original equation to see if they really work.

$$\text{Example 2: } (4x)^{10} + 5 = 0$$

$$(4x)^4 = -5$$

$$[4x^4]^1 = [-5]^{1/4}$$

It is better to take notes and work the examples here. Blank assignment area.

Solve for the variable and check for extraneous roots when appropriate.

$$2. (2x-1)^{10} - 2 = 0$$

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**David Baud**

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**Forthcoming Books** Rose Arny,1999-08

Paperbound Books in Print ,1968

**Cruising World** ,1980-07

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**Scientific and Technical Books and Serials in Print** ,1989

Hoard's Dairyman ,1913

**New York Times Saturday Review of Books and Art** ,1970

**Who's who in America** Harriet L. Tiger,1995

*El-Hi Textbooks & Serials in Print* ,2005 ,2005

*Pre-Calculus For Dummies* Yang Kuang,Elleyne Kase,2012-05-21

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