# Laws of Exponents

Lesson 2

# Law 4: Zero Exponent

$$x^0 = 1$$

Click on the link below for a video on the Zero Exponent.

https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-arithmetic-operations/cc-6th-exponents/v/the-zeroth-power

When the video is finished, please return to the PowerPoint presentation.

# Some Practice Problems

- Simplify fully:

1. $54^0$

2. $7y^0$

3. $\left(\dfrac{134y^2x^3}{49z^5w^{17}}\right)^0$

4. $\dfrac{x^7y^3}{x^5y^0}$

5. $(17xy^2)(x^0z^3)^4$

6. $\dfrac{(13x^7y^3)^0(3y^6z^9)}{(6.3x^7z^9)^0(12y^7x^4)}$

# Answers to Practice Problems

1. $1$

2. $7$

3. $1$

4. $x^2y^3$

5. $17xy^2z^{12}$

6. $\dfrac{z^9}{4yx^4}$

# Law 5: Negative Exponents

$$x^{-n} = \frac{1}{x^n}$$

Click on the link below for a video on negative exponents.

https://www.khanacademy.org/math/pre-algebra/pre-algebra-exponents-radicals/pre-algebra-negative-exponents/v/negative-exponents

When the video is finished, please return to the PowerPoint presentation.

# Some Practice Problems

- Simplify fully (write without negative exponents):

1. $5^{-3}$

2. $(-3)^{-4}$

3. $\left(\frac{1}{2}\right)^{-5}$

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

5. $\left(-\frac{4}{5}\right)^{-2}$

6. $\frac{7x^{-5}}{5y^{-6}}$

# Answers to Practice Problems

1. $\frac{1}{125}$

2. $\frac{1}{81}$

3. $32$

4. $\frac{64}{27}$

5. $\frac{25}{16}$

6. $\frac{7y^6}{5x^5}$

# More on Negative Exponents

Click on the link below for a video on intuition for negative exponents.

https://www.khanacademy.org/math/pre-algebra/pre-algebra-exponents-radicals/pre-algebra-negative-exponents/v/negative-exponent-intuition

When the video is finished, please return to the PowerPoint presentation.

# Some More Practice Problems

- Simplify fully (write without negative exponents):

1. $7x^{-3}y^{4}$

2. $(3x^{-7}y^{4})(4x^{3}y^{-5})$

3. $(4x^{2}y^{4})^{-3}$

4. $(-2x^{-4}y^{3})^{-5}$

5. $\dfrac{5x^{-2}y^{8}}{(2x^{-3}y^{6})^{-2}}$

6. $\left(\dfrac{2x^{-5}y^{7}z}{-3x^{-4}y^{-2}z^{9}}\right)^{-3}$

# Answers to Practice Problems

1. $\dfrac{7y^4}{x^3}$

2. $\dfrac{12}{x^4y}$

3. $\dfrac{1}{64x^6y^{12}}$

4. $-\dfrac{x^{20}}{32y^{15}}$

5. $\dfrac{20y^{20}}{x^8}$

6. $-\dfrac{27x^3z^{24}}{8y^{27}}$

# Law 6: Fractional Exponents

$$x^{m/n} = \sqrt[n]{x^m}$$

Click on the link below for a video on fractional exponents.

https://www.khanacademy.org/math/algebra2/x2ec2f6f830c9fb89:exp/x2ec2f6f830c9fb89:rational-exp/v/basic-fractional-exponents

When the video is finished, please return to the PowerPoint presentation.

# More on Fractional Exponents

Click on the link below for more on fractional exponents.

https://www.khanacademy.org/math/algebra2/x2ec2f6f830c9fb89:exp/x2ec2f6f830c9fb89:eval-exp-rad/v/fractional-exponents-with-numerators-other-than-1

When the video is finished, please return to the PowerPoint presentation.

# Practice Problems

- Simplify fully:

1. $8^{3/2}$

2. $(27x^6y^9)^{1/3}$

3. $25^{-1/2}$

4. $\left(\frac{32x^{10}}{y^{15}}\right)^{2/5}$

5. $\left(\frac{81x^8}{16y^{-4}}\right)^{-3/4}$

6. $(8x^2y)^{2/3}(5x^{2/3}y^{1/3})$

# Answers to Practice Problems

1. $64$

2. $3x^2y^3$

3. $\frac{1}{5}$

4. $\frac{4x^4}{y^6}$

5. $\frac{8y^3}{27x^6}$

6. $20x^2y$

# Summary of Laws of Exponents

1. $x^a x^b = x^{a+b}$

2. $\dfrac{x^a}{x^b} = x^{a-b}$

3. $(x^a)^b = x^{ab}$

4. $x^0 = 1$

5. $x^{-n} = \dfrac{1}{x^n}$

6. $x^{m/n} = \sqrt[n]{x^m}$