

Title: Simplifying expressions with negative exponents

Class: Math 100

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Instructions to tutor: Do the first problem with the student. Do not deviate from the “suggested steps.” Do not teach the student “short-cuts.” Then watch the student do the second problem.

Keywords/Tags: exponents, negative exponents, simplify expressions with exponents, properties of exponents

Objective: To show a student a basic way to simplify expressions with negative exponents, utilizing “definition” rather than “short-cut” or “gimmick”. To provide structured directions/steps, thus ensuring that the support the student receives outside of class complements the approaches presented in class.

Activity: If a student needs help simplifying negative exponents then he/she should complete the first page of the handout (below) with a tutor. Once the first page is complete, the student should do the practice problems. Once the practice problems are complete, the student should submit the practice problems to the tutor or teacher and have the work checked to verify mastery or lead into further discussion and support.

Simplifying Expressions with Negative Exponents

Student Directions: Do not do the first page on your own! Instead, find a tutor, and together work out problems #1 and #2. Do not deviate from the suggested steps. As you become more experienced in simplifying expressions with negative exponents you will become comfortable and knowledgeable in when and how you can deviate from the prescribed steps, but for now I want you to stay with the approach that has been explained in class and outlined here.

1. Simplify the expression by following the steps outlined below:

$$\left(\frac{c^{-6}d^4}{2c^{-9}d^{-2}} \right)^{-2} (cd^{-3})$$

Suggested Steps

Step 0: Simplify within the () if you can.

Step 1: Get rid of ()

Step 2: Get rid of negative exponents.

Remember “ a^{-3} ” means “I’m a^3 but I’m in the wrong place so move me!”
(Once it’s been moved, don’t forget to drop the negative sign.)

Step 3: Combine on top and combine on bottom. And calculate.

Step 4: Cancel (reduce) from top and bottom.

2. Simplify the expression by following the steps outlined below:

$$(2^{-1}a^2b)^{-3} \left(\frac{a^0b^{-4}}{4a^{-1}b} \right)$$

Suggested Steps

Step 0: Simplify within the () if you can.

Step 1: Get rid of ()

Step 2: Get rid of negative exponents.

Remember “ a^{-3} ” means “I’m a^3 but I’m in the wrong place so move me!”
(Once it’s been moved, don’t forget to drop the negative sign.)

Step 3: Combine on top and combine on bottom.

Step 4: Cancel from top and bottom.

Practice Problems

Student Directions: On your own, simplify each expression. Your final answers should have no negative exponents!! (CAUTION!! Remember that a negative sign in the exponent means “reciprocal –move me.” It does not change the sign of the base.) Box your final answer. Then have a tutor or your instructor check your work for accuracy.

a) $-3x^{-4}$

b) $(y^{-3} w^{-1})^{-2}$

c) $s^4(s^{-3})(-s^5)(s)^{-7}$

d) $(-m^{-5}n^4)^0$

e) $\frac{1}{(4x)^{-3}}$

f) $\frac{x^2y^{-1}}{(2y)^3}$

g) $\left(\frac{x^4y^{-2}}{3^{-6}}\right)^{-2}$

h) $\frac{(x^4y^{-2})^{-3}}{(x^{-1}y)^{-2}}$

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

k) $(-2)^3 + 2^{-3}$

For tutor use: Please check the appropriate box.

- Student has completed worksheet but may need further assistance. Recommend a follow-up with instructor.
- Student has mastered topic.