

# Lean Manufacturing Overview 130

---

As with the “Five S Approach” there are rules that help to stream line or shorten the steps needed to complete some mathematical problems. One such area is when working with Exponents. Below are some of the rules of Exponents that will help in solving the following problems.

## Exponents rules and properties

Rule Name	Rule	Example
Product rules	$a^n \cdot a^m = a^{n+m}$	$2^3 \cdot 2^4 = 2^{3+4}$
Power rules	$(b^n)^m = b^{n \cdot m}$	$(2^3)^2 = 2^{3 \cdot 2}$
Quotient rules	$a^n / a^m = a^{n-m}$	$2^5 / 2^3 = 2^{5-3}$
Zero rules	$b^0 = 1$	$5^0 = 1$
Negative exponents	$b^{-n} = 1 / b^n$	$2^{-3} = 1/2^3$

1. SPACE SHUTTLE: The cost of each flight of the Space Shuttle is about \$10,000,000. Write this amount in exponential form.

2. Grinders: One of the largest grinders in the plant weighs about 8 tons. Write this amount in exponential form.

3. VOLUME: To find the volume of a rectangular box, you multiply the length times the width times the height. In a cube, all sides are the same length. If the cube has length, width, and height of 6 inches, write the volume as a product. Then write it in exponential form.

4. SCIENCE: A certain type of cell doubles every hour. If you start with one cell, at the end of one hour you would have 2 cells, at the end of two hours you have 4 cells, and so on. The expression  $2 \times 2 \times 2 \times 2 \times 2$  tells you how many cells you would have after five hours. Write this expression in exponential form; then evaluate it.

5. MATH: Write 625 using exponents in as many ways as you can.

6. PREFIXES: Many prefixes are used in mathematics and science. The prefix giga in gigameter represents 1,000,000,000 meters. Write this prefix as a power of ten.

7. Shop: The Shop contains  $9^4$  part trays. How many part trays are in the shop?

8. Parts: The Worker Assembled  $6^3$  parts on the first day. How many parts did he assemble?



Unless otherwise noted, this work by the *Project IMPACT* Nebraska Community College Consortium is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

This product was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.