

Final Exam Review #2

Laws of Exponents

Scientific Notation

Law #1	Law #2	Law #3	Law #4	Law #5
$a^0 = 1$	$a^{-n} = \frac{1}{a^n}$	$a^m \cdot a^n = a^{m+n}$	$\frac{a^m}{a^n} = a^{m-n}$	$(a^m)^n = a^{mn}$

Practice Problem Set:

Using the laws of exponents, rewrite each expression as a single power with a positive exponent.

- $11^3 \cdot 11^5$
 11^{3+5}
 11^8
- 7^{-3}
 $\frac{1}{7^3}$
- $\frac{x^4}{x}$
 x^{4-1}
 x^3
- $(8^4)^5$
 $8^{4 \cdot 5}$
 8^{40}
- $\frac{15^{-4}}{15^{-6}}$
 $15^{-4-(-6)}$
 15^{-4+6}
 15^2
- $3^4 \cdot 3^{-9}$
 $3^{4+(-9)}$
 3^{-5}
 $\frac{1}{3^5}$
- y^{-12}
 $\frac{1}{y^{12}}$
- $\frac{(4^2)^{-3}}{4^{10}}$
 $\frac{4^{-6}}{4^{10}}$
 4^{-16}
 $\frac{1}{4^{16}}$

Simplify each expression completely. Evaluate all numbers raised to a power.

- $(-225)^0$
 1
- $(-5)^2$
 $(-5)(-5)$
 25
- $2^{-6} \cdot 2^2$
 2^{-4}
 $\frac{1}{2^4}$
 $\frac{1}{16}$
- $\frac{5^3 \cdot 5^5}{5^6}$
 $\frac{5^8}{5^6}$
 5^2
 25
- $8^{12} \cdot (8^7)^{-2}$
 $8^{12} \cdot 8^{-14}$
 8^{-2}
 $\frac{1}{8^2}$
 $\frac{1}{64}$
- $3^0 + (-2)^3$
 $1 + (-2)(-2)(-2)$
 $1 + -8$
 -7

15. Write each number in **standard form**.

$$5.23 \times 10^4 \quad \mathbf{52300}$$

$$4.16 \times 10^{-6} \quad \mathbf{0.00000416}$$

16. Write each number in **scientific notation**.

$$5,700,000,000 \quad \mathbf{5.7 \times 10^9}$$

$$0.0024 \quad \mathbf{2.4 \times 10^{-3}}$$

Find the product or quotient. Represent your final answer in scientific notation.

17. $(3.1 \times 10^{-5})(2.2 \times 10^{11})$

$$(3.1 \times 2.2)(10^{-5} \times 10^{11})$$

$$\mathbf{6.82 \times 10^6}$$

18. $\frac{2.56 \times 10^{12}}{3.2 \times 10^{-14}}$

$$\frac{2.56}{3.2} \times \frac{10^{12}}{10^{-14}} \quad 10^{12-(-14)}$$

$$0.8 \times 10^{26} \quad \text{not in scientific notation}$$

$$\mathbf{8 \times 10^{25}}$$

19. Which expression below is equivalent to $\frac{4.5 \times 10^{-12}}{3 \times 10^5}$?

A. $\frac{4.5}{3} \times 10^{-12+5}$

B. $\frac{4.5}{3} \times 10^{-12-5}$

C. $(4.5)(3) \times 10^{-12+5}$

D. $(4.5)(3) \times 10^{-12-5}$