

Algebra I

8-1

Laws of Exponents

Orders of Operations-

- 1) Grouping Symbols parentheses
brackets
absolute value ||
 2) Exponents Fraction bar
Square root
 3) Multiply or Divide : Left to Right
 4) Add or Subtract : Left to Right.

$$\sqrt{9+16}$$

7 or 5

Contrast

$$x^4 = \underbrace{x \cdot x \cdot x \cdot x}_{\text{multiplication}} \qquad 4x = \underbrace{x + x + x + x}_{\text{addition}}$$

Do on your own.

Write each in exponential form.

- | | | | | |
|---|--|--|---|--|
| 1) $x \cdot x \cdot x \cdot x$
x^4 | 2) $a \cdot a \cdot a \cdot a$
a^5 | 3) $n \cdot y \cdot y \cdot n$
$n^2 y^2$ | 4) $c \cdot c \cdot y$
$c^2 y$ | 5) $2 \cdot p \cdot 5 \cdot p$
$10 p^2$ |
| 6) $a \cdot 3 \cdot a \cdot a \cdot 2 \cdot a$
$6 a^4$ | 7) $(-r)(-r)$
r^2 | 8) $-r \cdot r$
$-r^2$ | 9) $(-2) \cdot b \cdot (-4) \cdot b$
$8 b^2$ | |
| 10) $2 \cdot k \cdot k \cdot (-4) \cdot k$
$-8 k^3$ | 11) $a \cdot a \cdot a \cdot 3 \cdot b \cdot b \cdot b$
$3 a^3 b^3$ | 12) $a \cdot a \cdot b \cdot 5 \cdot b \cdot b \cdot a$
$5 a^3 b^3$ | | |

Simplify

- | | | |
|-------------------|---------------------------|---------------------------------|
| 13) 2^5
32 | 14) $5 \cdot 2^3$
40 | 15) $-2^2 = -4$
$(-2)^2 = 4$ |
|-------------------|---------------------------|---------------------------------|

Laws of Exponents

$$(x \cdot x \cdot x \cdot x)(x \cdot x \cdot x \cdot x \cdot x)$$

1) $x^4 \cdot x^5 = x^9$ when multiplying, add the exponents

2) $(x^4)^3 = x^{12} = (x^4)(x^4)(x^4)$ power outside the parentheses, multiply the powers.

3) $(x^3 + x^2)^4 = \text{can't do}$ can't bring a power over a + or - don't match

4) $(2x^3y^2)^3 = 8x^9y^6$

5) $x^3 + x^4 = \text{can't do}$

6) $x^4 \cdot x^4 = 2x^4$

Simplify. Leave answer in exponential form.

answer must have an exponent.

- | | | | |
|-----------------------------|----------------------------------|---------------------------------------|---|
| 1) $3^3 \cdot 3^5$
3^8 | 2) $[(-11)^3]^7$
$(-11)^{21}$ | 3) $(9 \cdot 7)^4$
$9^4 \cdot 7^4$ | 4) $(x+3)^3$
can't do |
|-----------------------------|----------------------------------|---------------------------------------|---|

Simplify.

- | | | |
|-----------------------------|--------------------------|----------------------------------|
| 5) $c^5 \cdot c^2$
c^7 | 6) $(c^2)^5$
c^{10} | 7) $(c^5 d^2)^4$
$c^{20} d^8$ |
|-----------------------------|--------------------------|----------------------------------|

Order of Magnitude - The power of 10 closest to the value of a number.

- 8) Currently, there are $100,000 = 10^5$ people who live in Duluth, MN. There are close to 10^2 times as many people who live in the state of Minnesota. What is the order of magnitude of the number of people in the whole state?

$$10^2 \cdot 10^5 = 10^7$$

Assignment:

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4 - 38 even,

40 - 49 all,

52-58 all.