base – # used as a factor

exponent – # of times the base is used

$12^1 = 12$

$12^2 = 12 \cdot 12$

$12^3 = 12 \cdot 12 \cdot 12$

$-12^2 = -(12 \cdot 12) = -144$

the opposite of

$-12^3 = -(12 \cdot 12 \cdot 12) = -1728$

$(-12)^2 = -12 \cdot -12 = 144$

$(-12)^3 = -12 \cdot -12 \cdot 12 = -1728$

$12^0 = 1$

$1x$

opposites

$\sqrt{144} = 12$ 12^3

$12^2 = 144$ $\sqrt[3]{1728}$

$(-4n)(-4n)(-4n)(-4n)(-4n)$

$-4n^5$

$-4n \cdot n \cdot n \cdot n \cdot n$

$(-4n)^5$

$(a+1)^3$

$a+1^3$

$$2^3 \cdot 2^4 = 2^{3+4} = 2^7$$

$$a^3 \cdot a^4 = a^{3+4} = a^7$$

$$(2^3)^4 = 2^{3 \cdot 4} = 2^{12}$$

$$(a^3)^4 = a^{3 \cdot 4} = a^{12}$$

$$(2^3 \cdot 2^2)^4 = 2^{3 \cdot 4} \cdot 2^{2 \cdot 4} = 2^{12} \cdot 2^8$$

$$2^{12+8} = 2^{20}$$

~~$(2^{3+2})^4$~~

~~$(2^5)^4 = 2^{5 \cdot 4} = 2^{20}$~~

1. $(-4)^3 = (-64)$

$-4^2 = -16$

$(-2+3)^7$

$1^7 = 1$

$2^3 \cdot 2^0$

$8 \cdot 1 = 8$

$4^1 \cdot 4^3 = 64 \cdot 4 = 256$

$4^4 = 256$

$x \cdot x^2 \cdot x^5$

x^8

$4^2 \times 4^{10}$

$4096 \quad 4^{12}$

$w^2 \cdot w^6 = w^8$

11. $a^3b = (-1)^3(-3) = (-1)(-3) = 3$

12. $abc^0 = (-1)(-3)(2)^0 =$
$(-1)(-3)(1) = 3$

18. $(4c^2 \cdot 4c^3)^2$

$(-2^2)^3 \square 2^5$

$\Rightarrow 2^2 ((-2)^2)^3$ 32

-4^3

-64 $<$

$(6y^3)^4$

$6^4 \cdot y^{3 \cdot 4}$

$1296y^{12}$

Scientific Notation

$\square \times 10^{\square}$

$\square$: ≥ 1 but < 10

$10^{\square}$: which way and how many places to move the decimal

− exponent to the left (smaller)

+ exponent to the right (bigger)

3.54×10^{3}

3540

3.54×10^{-3}

.00354

$10^6 = 1000000$

$10^7 = 10000000$

0.93×10^4

.9300

9300.

3.5 million

3500000

3.5×10^6

299790000

2.9979×10^8

5×10^6

5,000,000

4.7×10^9

4,700,000,000

Multiplying Scientific Notation

$(3.46 \times 10^5)(9.2 \times 10^3)$

1. Multiply the decimals

$$\begin{array}{r} 3.46 \\ \times\ 9.2 \\ \hline 1692 \\ +31140 \\ \hline 31.832 \end{array}$$

2. multiply powers of ten

$10^5 \cdot 10^3 = 10^8$

3. Write product

31.832×10^8

4. Put answer in scientific notation

3.1832×10^9

0.31832×10^8

3.1832×10^7

12. $(3.45 \times 10^6)(1.84 \times 10^2)$

3.45×1.84

$\begin{array}{r} 3.45 \\ \times 1.84 \\ \hline 1380 \\ 27600 \\ +34500 \\ \hline 63480 \end{array}$

$10^6 \times 10^2 = 10^{8}$ (12)

$6+2$

6.3480×10^8

6.348×10^8

13. $(4.32 \times 10^3)(2.4 \times 10^1)$

$\begin{array}{r} 4.32 \\ \times \quad 2.4 \\ \hline 11728 \\ +8640 \\ \hline 10368 \end{array}$

$10^3 \cdot 10^1$

$10368 \cdot 10^4$

$1.0368 \cdot 10^5$

103,680.0

0.52

5.2×10^{-1}

1.5