

# 7th Grade

## Lesson 57

- I can simplify numbers with exponents of zero or negative exponents.
- I can use scientific notation to express small numbers.
- I can rewrite small numbers written in scientific notation in standard form.
- I can compare small numbers written in scientific notation.



$$\frac{10^6}{10^3} = \frac{\cancel{10} \cdot \cancel{10} \cdot \cancel{10} \cdot 10 \cdot 10 \cdot 10}{\cancel{10} \cdot \cancel{10} \cdot \cancel{10}} = \frac{10^3}{10^0} = \frac{10^3}{1} = 10^3 = 1000.$$

$$\frac{10^5}{10^3} = \frac{\cancel{10} \cdot \cancel{10} \cdot \cancel{10} \cdot 10 \cdot 10}{\cancel{10} \cdot \cancel{10} \cdot \cancel{10}} = \frac{10^2}{10^0} = \frac{10^2}{1} = 10^2 = 100.$$

$$\frac{10^4}{10^3} = \frac{\cancel{10} \cdot \cancel{10} \cdot \cancel{10} \cdot 10}{\cancel{10} \cdot \cancel{10} \cdot \cancel{10}} = \frac{10^1}{10^0} = \frac{10^1}{1} = 10^1 = 10.$$

$$\rightarrow \frac{10^3}{10^3} = \frac{\cancel{10} \cdot \cancel{10} \cdot \cancel{10}}{\cancel{10} \cdot \cancel{10} \cdot \cancel{10}} = \frac{10^0}{10^0} = \frac{10^0}{1} = 10^0 = 1.$$

$$\frac{10^2}{10^3} = \frac{\cancel{10} \cdot \cancel{10}}{\cancel{10} \cdot \cancel{10} \cdot 10} = \frac{10^0}{10^1} = \frac{1}{10^1} = 10^{-1} = \frac{1}{10} = 0.1$$

$$\frac{10^1}{10^3} = \frac{\cancel{10}}{\cancel{10} \cdot \cancel{10} \cdot 10} = \frac{10^0}{10^2} = \frac{1}{10^2} = 10^{-2} = \frac{1}{100} = 0.01$$

If a number  $a$  is not zero, then

$$a^0 = 1$$

$$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

$$a^{-n} = \frac{1}{a^n}$$

$$2^0 = 1$$

$$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$$

$$10^{-3} = \frac{1}{10^3} = \frac{1}{1000} = 0.001$$

$$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

$$2.54 \times 10^{-2} =$$

$$2.54 \cdot \frac{1}{10^2} = \frac{2.54}{10^2} = 0.0254$$

$$6.32 \times 10^{-7} = 0.000000632$$

$$10^{-7} = \frac{1}{10^7} = \frac{1}{10,000,000}$$

**Scientific Notation** is a way of writing very large or very small numbers.

$$4.63 \cdot 10^{-8}$$

$$0.0000000463$$

**3 Steps for writing in scientific notation.**

1. Place the decimal point just to the right of the first nonzero digit.  $4.63$
2. Count the number of places the decimal point moved.  $8$
3. Multiply the number in step one by  $10^b$  ( $b$  is the number of places the decimal point moved).

for small numbers multiply by  $10^{-b}$

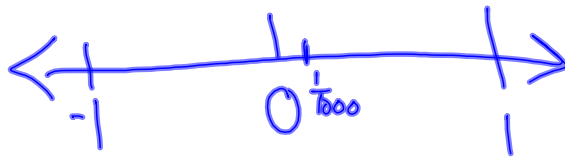
Write 0.0000033 in scientific notation.

$$.0000033 = 3.3 \cdot 10^{-6}$$

**Compare:**

zero  $\leftarrow$   $1 \times 10^{-3}$

0      0.001



*I can simplify numbers with exponents of zero or negative exponents.*

$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$        $3^0 = 1$        $10^{-4} = \frac{1}{10^4} = \frac{1}{10,000}$

*I can use scientific notation to express small numbers.*

$0.00000025$        $0.000000001$        $0.000105$   
 $2.5 \times 10^{-7}$        $1 \times 10^{-9}$        $1.05 \times 10^{-4}$

*I can rewrite small numbers written in scientific notation in standard form.*

$4.5 \times 10^{-7}$        $1 \times 10^{-3}$        $1.25 \times 10^{-5}$   
 $0.00000045$        $0.001$        $0.0000125$

*I can compare small numbers written in scientific notation.*

$1 \times 10^{-3} \leftarrow 1 \times 10^2$        $2.5 \times 10^{-2} \circlearrowright 2.5 \times 10^{-3}$

## Assignment:

Problem Set 57 #1, 2, 5-9, 13, 20-23, 27,  
28, 30

due Friday

**\*\*No items left blank or it's incomplete**

Test #11 tomorrow

Lessons 1-55

