Scientific Notation Practice

Name: **Solutions**

1. Explain why each of the following are NOT in scientific notation:

   a. 5.95

   Not multipled by a power of 10

   b. 653×10^{35}

   Not a number between 1 and 10

   c. 0.23×10^{-5}

   Not a number between 1 and 10

   d. 5.23×12^3

   Multiplied by a power of 12, not a power of 10

2. Write each of the following in scientific notation:

   a. 456 000

   Moved decimal 5 places left

   $$4.56 \times 10^5$$

   b. 0.000535

   Moved decimal 4 places right

   $$5.35 \times 10^{-4}$$

   c. 1 042 000

   $$1.042 \times 10^6$$

   d. 0.02199

   $$2.199 \times 10^{-2}$$

   e. Five million $= 5\,000\,000 = 5 \times 10^6$

   f. Six trillion $6\,000\,000\,000\,000 = 6 \times 10^{12}$

   billions millions thousands hundreds

3. Write each of the following in standard notation.

a. 4.6×10^3

4.60000

Move decimal 3 places right

4600

b. 2.11×10^4

2.110000

Move decimal 4 places right

21100

c. 1.34×10^{-4}

0000001.34

Move decimal 4 places left

0.000134

d. 2.1×10^5

2.1000000

210000

e. 6.62×10^{-1}

006.62

0.662

f. 5.1×10^{-7}

000000005.1

0.00000051

g. 1.02×10^6

1.02000000

1020000

h. 7.15×10^{-2}

0007.15

0.0715

4. Simplify, *write answer in scientific notation if it is greater than 1000, or less than 0.01 and standard notation otherwise.*

   a. $1.3 \times 10^4 + 2.9 \times 10^6$ Use calculator

   1.3 [Exp] 4 [+] 2.9 [Exp] 6 [=]   2913000

   $\boxed{2.913 \times 10^6}$

   b. $(4.993 \times 10^4)^2$

   [(] 4.993 [Exp] 4 [)] [x²] [=]   2493004900

   $\boxed{2.4930049 \times 10^9}$ ← IF you rounded off to 2 decimal places it would be okay.

   c. $(8.34 \times 10^{-4})(3.62 \times 10^5)$

   8.34 [Exp] −4 [×] 3.62 [Exp] 5 [=] $\boxed{301.908}$

   ↑
   be sure to use the negative button
   not the subtract button

   d. $(4.14 \times 10^{-3}) - (2.62 \times 10^{-4})$

   4.14 [Exp] −3 [−] 2.64 [Exp] −4 [=]   0.003876

   $\boxed{3.876 \times 10^{-3}}$

   e. $(9.4 \times 10^{16}) + (2 \times 10^{15})$

   ← this is how calculator writes scientific notation

   9.4 [Exp] 16 [+] 2 [Exp] 15 [=]   9.6 E 16

   $\boxed{9.6 \times 10^{16}}$

   f. $\dfrac{5 \times 10^{19}}{3 \times 10^4}$

   You can use fraction button or

   5 [Exp] 19 [÷] 3 [Exp] 4 [=]   1.666667 E 15

   $\boxed{1.666667 \times 10^{15}}$

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Name:_____

5. In each line circle the largest number

a. 5.3×10^{24} 5.3×10^{19} 5.3×10^{15}

If exponents are the same biggest number is biggest

If exponents are different biggest exponent is biggest if positive.

b. 1.3×10^{24} 6.3×10^{24} 9.3×10^{24}

c. 6.3×10^{-5} 6.3×10^{-9} 6.3×10^{-16}

The "more negative" a negative exponent, the smaller the number

d. 2.9×10^{-3} 2.8×10^{-3} 2.7×10^{-3}

e. 7.9×10^{11} 9.8×10^{12} 5.7×10^{13}

6. Write three different numbers between 5×10^6 and 5×10^7

$$5 \times 10^6 = 5000\,000$$
$$5 \times 10^7 = 5000\,0000$$

So $5,500,000,\; 5,000,001,\; 10,000,000$

$20,000,000,\; 49,999,999$ are all possible

or $5.5 \times 10^6,\; 5.0001 \times 10^6,\; 1 \times 10^7,$

$2 \times 10^7,\; 4.9 \times 10^7$

7. Write in scientific notation
    a. 659×10^3

Move 2 to left, so exponent increases by 2

$$6.59 \times 10^5$$

    b. 0.013×10^{-4}

Move 2 to right so exponent decreases by 2

$$1.3 \times 10^{-6}$$

    c.   520 billion

$520\ 000\ 000\ 006 = 5.2 \times 10^{11}$

    d.   64.25 million

$64\ 250\ 000 = 6.425 \times 10^7$

    e. 659×10^9

Move 2 to left, so exponent increases by 2

$$6.59 \times 10^{11}$$

    f. 0.0013×10^{-4}

Move 3 to right so exponent decreases by 3

$$1.3 \times 10^{-7}$$

    g. 659×10^{-1}

Move 2 to left so exponent increases by 2

$$6.59 \times 10^1$$

Problems 8-10 taken from Janice McGovern at King Phillips Regional Middle School)

Give answers in scientific notation if they are below 0.01 or above 1000 and in standard form otherwise.

8. In June 2016, Snapchat had 1.52×10^8 daily active users. Twitter had 1.41×10^8 daily active users. How many more people were actively using Snapchat than Twitter in June 2016?

Number using snapchat − Number using twitter

$$1.52 \times 10^8 - 1.41 \times 10^8$$

1.52 [Exp] 8 [−] 1.41 [Exp] 8

$$= 11\ 000\ 000 = \boxed{1.1 \times 10^7}$$
people

9. The biggest bowl of mashed potatoes ever made weighed 4.56×10^4 pounds and was created at the Iowa State Fair in 2005. The biggest deep dish pizza ever made was in Chicago in 1998. It weighed a whopping 1.23×10^5 pounds. How many more pounds did the pizza weigh than the bowl of mashed potatoes?

Pounds of za − Pounds of spuds

$$1.23 \times 10^5 - 4.56 \times 10^4$$

1.23 [Exp] 5 [−] 4.56 [Exp] 4 [=] 77400

$$\boxed{7.74 \times 10^4}$$
pounds

10. The state of Colorado covers about 1.04×10^5 square miles. The Indian Ocean covers about 2.808×10^7 square miles. How many times bigger than Colorado is the Indian Ocean?

Here we want to find how many Colorados fit in the Indian Ocean,

$$\frac{\text{Area of Ocean}}{\text{Area of Colorado}}$$

$$= \frac{2.808 \times 10^7}{1.04 \times 10^5} =$$
2.808 [Exp] 7
[÷]
1.404 [Exp] 5

$$= \boxed{270 \text{ times}}$$
bigger

11. The half-life of uranium-238 is 4.5×10^9 years. The half-life of uranium-234 is 2.5×10^5 years. How many times greater is the half-life of uranium-238 than that of uranium-234?

$$\frac{\text{half life of 238}}{\text{half life of 234}} = \frac{4.5 \times 10^9}{2.5 \times 10^5}$$

$$4.5 \boxed{\text{Exp}} 9 \boxed{\div} 2.5 \boxed{\text{Exp}} 5 \boxed{=}$$

18 000 times longer

$\boxed{1.8 \times 10^4 \text{ times longer}}$

12. The mass of a hydrogen atom is approximately 1.67×10^{-24} grams. The mass of an oxygen atom is approximately 2.66×10^{-24} grams. There are 6.69×10^{24} water molecules (which each consist of 2 hydrogen and 1 oxygen atoms) in a glass of water. Based on this, how much will the water in the glass weigh?

Mass of 1 water molecule $= 2 \times 1.67 \times 10^{-24} + 2.66 \times 10^{-24}$

↑ 2 hydrogen* atoms   plus   ↑ 1 oxygen atom*

$= 6 \times 10^{-24}$ grams

Mass of 6.69×10^{24} water molecules

$= 6 \times 10^{-24}$ grams $\times 6.69 \times 10^{24}$

↑ mass of one   ↑ # of molecules

$= \boxed{40.14 \text{ grams}}$

13. The Earth is approximately 4.5 billion years old. There are 3.1536×10^7 seconds in a year. How old is the Earth in seconds?

$$4.5 \text{ billion} = 4.5 \times 10^9$$

$$4.5 \times 10^9 \times 3.1536 \times 10^7$$

      ↑   ↑

    years   seconds per year

4.5 [Exp] 9 [X] 3.1536 [Exp] 7 [=]

$$= 1.41912 \text{E} 17$$

$$= \boxed{1.41912 \times 10^{17} \text{ seconds}}$$