Week 2 8th Grade Math

Mr. Thorburn

General Information regarding the packet:

- The notes are intended as instructional assistance and for reference when doing the worksheets.
- The links provide additional instructional help on the subject matter.
- ***The worksheets are required work that will be graded.*** As usual, it is important to show your work as modeled in the examples in the notes and the videos.
- Work can be turned directly into the school (hand delivered by you) or can be sent digitally to rthorburn@tusd.net . The digital form can simply be a picture of the completed worksheet as long as it is legible**.**

NOTES Section

Scientific Notation

Introduction

200 = 2 x 10 x 10 and 10 x 10 = 10^2

Therefore we can write 200 as 2 x 10^2.

Similarly

0.02 = 2 ÷ 10 ÷ 10

Rewriting it like a fraction gives us $\frac{2}{10x10} = \frac{2}{10^2}$

But remember from last week that $10^{-2} = \frac{1}{10^2}$

So 0.02 = 2 x 10^{-2}

I know what you're thinking "But Mr. T. you told us not to leave an exponent as a negative number!!!

True but not when we're doing scientific notation. :-/

Terms and definitions:

Scientific notation is just a specifi way of writing a number is a way where it is multiplied or divided by 10.

A number is written in scientific notation IF:

1. The number to the left of the decimal place is 1 through 9 ONLY (Note the entire number can be negative or positive).
2. The number is written as being multiplied by a power of 10.

E.g.

Scientific notation	Non-scientific notation
$2.3\ x\ 10^3$	54
$1.456\ x\ 10^{-3}$	$23\ x\ 10^3$ (23 is not 1 through 9)
$-9.9\ x\ 10^0$	$0.345\ x\ 10^3$ (0 is not 1 through 9)

Example questions:

1. **Rewrite 1,450 into scientific notation**

We know it has to have the same digits so, following the rules for writing scientific notation it MUST look like $1.450\ x\ 10^{?}$. The question is ….. what is the exponent value?

Notice that we moved the decimal place, going from 1450 to 1.450, three times. The only way we can make 1.450 equal to 1450 is to mutliply 1.450 by some 10's.

How many 10's? Well, since we move the decimal place 3 times then we multiply by 3 10's.

Therefore:

$1450 = 1.450\ x\ 10\ x\ 10x\ 10 = 1.450\ x\ 10^{3}$ (This is the work you'd show for this quesiton. No need for all the words. ☺)

2. **Rewrite 0.0345 into scientific notation**

It's the same as last time. It has to look like $3.45\ x\ 10^{?}$ To be in scientific notation.

Notice that this time we moved the decimal place twice. Also notice that to make 0.0345 equal to 3.45 we'd have to **DIVIDE** 3.45 by 10 twice.

Therefore:

$0.0345 = \frac{3.45}{10x10} = \frac{3.45}{10^{-2}} = 3.45\ x\ 10^{-2}$ (Again, the only work needed is this line)

Videos to watch (if you can):

Intro to scientific notation: https://www.khanacademy.org/math/pre-algebra/pre-algebra-exponents-radicals/pre-algebra-scientific-notation/v/scientific-notation-old

Scientific notation examples: https://www.khanacademy.org/math/pre-algebra/pre-algebra-exponents-radicals/pre-algebra-scientific-notation/v/scientific-notation

Worksheet section

In all cases convert the given number to scientific notation

1. 23,500
2. 15
3. 0.0034
4. 0.034
5. 187
6. 0.0045
7. 28,000
8. 145
9. -524
10. 27,000,000
11. -0.000343

Week 3 8th Grade Math

Mr. Thorburn

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NOTES Section

Multiplying and Dividing Numbers in Scientific Notation

Multiplying

Lets compare multiplying 0.00011 and 5,300,000 two different ways

Not using scientific notation.

5,300,000

x 0.00011

YUCK!!!!

Using scientific notation

$0.00011 = 1.1x10^{-4}$ and $5{,}300{,}000 = 5.3\ x\ 10^{6}$

Therefore 11 x 5,300,000 = $1.1x10^{-4}\ x\ 5.3\ x\ 10^{6}$

We can rearrange that to *be* v since the order we multiply things in doesn't matter.

Since $10^{6}x10^{-4} = 10^{2}$ we therefore know that $1.1\ x\ 5.3\ x\ 10^{2}$.

So then we just multiply 1.1 x 5.3 = 5.83

Therefore $0.00011\ x\ 5{,}3000{,}000 = 1.1x10^{-4}\ x\ 5.3\ x\ 10^{6} = 1.1\ x\ 5.3\ x\ 10^{-4+6} = 5.83\ x\ 10^{2}$

Dividing using scientific notation:

Dividing is basically that same exact game

If we had $12{,}000{,}000 \div 0.0003$ we'd go

Using scientific notation it becomes MUCH easier.

$$12{,}000{,}000 = 1.2\ x\ 10^{7}\ \ and\ 0.0003 = 3.0\ x\ 10^{-4}$$

Therefore

$$12{,}000{,}000 \div 0.0003 = \frac{1.2\ x\ 10^{7}}{3.0\ x\ 10^{-4}} = \frac{1.2\ x\ 10^{7} x 10^{4}}{3}$$

$$= \frac{1.2}{3}\ x\ 10^{11} = 0.4\ x\ 10^{11}$$

Wait!!!!! 

$0.4\ x\ 10^{11}$ is NOT in scientific notation since 0 is not 1 through 9. We have to fix that.

$0.4 = 4 \div 10 = 4x10^{-1}$

So: $0.4\ x\ 10^{11} = \ 4x10^{-1} x\ 10^{11} = 4.0\ x\ 10^{-1+11}\ = 4.0\ x\ 10^{10}$

Example questions:

Multiply 4,500,000 x 0.00032

Work:

4,500,000 x 0.00032 = $4.5\ x\ 10^{6}\ x\ 3.2\ x\ 10^{-4}$ = $4.5\ x\ 3.2\ x 10^{6}\ x\ 10^{-4}$

= $14.4\ x\ 10^{6+\ -4}\ = 1.44\ x\ 10^{1} x\ 10^{2} = 1.44\ x\ 10^{3}$

Divide: 0.0000018 by 72,000

Work:

: 0.0000018 by 72,000 $= \frac{1.8\ x\ 10^{-6}}{7.2\ x\ 10^{4}} = \frac{1.8}{7.2}\ x\ 10^{-6-4}$

$= 0.25\ x\ 10^{-10} = 2.5\ x\ 10^{-1}\ x\ 10^{-10} = 2.5\ x\ 10^{-1+\ -10} = 2.5\ x\ 10^{-11}$

Note: It's totally fine to use a calculator to divide 1.8 by 7.2 but you must have the work to show what you did.

Videos you may want to watch:

Multiplying numbers in scientific notation

https://www.khanacademy.org/math/pre-algebra/pre-algebra-exponents-radicals/pre-algebra-computing-scientific-notation/v/scientific-notation-example-2

Multiplying and Dividing numbers in scientific notation

https://www.khanacademy.org/math/pre-algebra/pre-algebra-exponents-radicals/pre-algebra-computing-scientific-notation/v/multiplying-and-dividing-in-scientific-notation

Worksheet section

In all cases make sure your answers are in scientific notation (and of course show your work). In the case of decimals that go on and on go ahead and round to the nearest hundredth for your answer.

1. $23{,}000$ x 0.00034
2. 15 x $8{,}798$
3. $0.000034 \div 57{,}000$
4. $0.023 \div 0.00039$
5. 183 x 0.0003
6. 0.027 x 89
7. $58\ x\ 10^3\ x\ 0.12$
8. $145\ x\ 2{,}800$
9. $-524\ x - 0.24$
10. $27{,}000{,}000 \div 4.5$
11. $-0.00034 \div -0.0017$