Created by Mikayla Taylor
Warmup $1 /(200+43)-(((56+23) \times 2 \div$

1. Draw step 5. How many squares would be in this step?
2. Calculate the number of squares in step 40.

## Simplify:

$$
e^{0} w^{1} u^{-2} h^{3} p^{-5} t^{6} s^{7}
$$

$$
a^{-4}
$$

## Return Midterm Corrections \&

 ExtensionoX = incorrect answer

- $1 / 2=$ so-so/incomplete answer
- Corrections people: take a couple minutes to look over it
- Extension people: Please read the key. This shows the errors I had in mind when I made the quiz.


## Plan:

Rest of this week: Scientific notation
Next week: Calculations \& Story Problems using Scientific notation

Test at the end of next week

## Table of Contents (2 ${ }^{\text {nd }}$ Semester)

p. 1 Exponent Basics (1.2)
p. 2 Multiplying and Dividing Powers (1.3)
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## Scientific Notation

Objectives:

- Review scientific notation
- Understand mathematically WHY scientific notation works the way it does


# POP QUIZ (not graded) 

1. $4 \times 10$
2. $68 \times 100$
3. $3.2 \times 10$
4. $3.2 \times 100$
5. $9.251 \times 10$
6. $97 \div 10$
7. $3 \div 10$
8. $0.2 \div 10$
9. $52.5 \div 10$
10. $7 \div 100$

## Answers

| 1. | $4 \times 10$ | 40 |
| :--- | :--- | :--- |
| 2. | $68 \times 100$ | 6800 |
| 3. | $3.2 \times 10$ | 32 |
| 4. | $3.2 \times 100$ | 320 |
| 5. | $9.251 \times 10$ | 92.51 |
| 6. | $97 \div 10$ | 9.7 |
| 7. | $3 \div 10$ | .3 |
| 8. | $0.2 \div 10$ | .02 |
| 9. | $52.5 \div 10$ | 5.25 |
| 10. | $7 \div 100$ | .07 |

## What is the weight of the earth?

- Let's google "Weight of the earth"


# Some really big numbers... 

Distance from Earth to Pluto (miles)
2,660,000,000
Number of cells in your body (estimate)
37,200,000,000,000
Mass of the earth (kilograms)
5,972,000,000,000,000,000,000,000
A googol
$10,000,000,000,000,000,000,000,000,000,000,000,0$ 00,000,000,000,000,000,000,000,000,000,000,000,0 00,000,000,000,000,000,000,000,000,000

- We don't want to have to always write these big numbers out.
o Shorter way of writing 2,660,000,000?


## Scientific Notation

## $a \times 10^{b}$

- "a" MUST be a number between 1 and 10
- "b" must be an integer (non-decimal)


# Converting from Scientific to Standard Notation 

Scientific Notation $\rightarrow$ Standard Notation

1. $9 \times 10^{4}$
2. $3.45 \times 10^{6}$
3. $9.1234 \times 10^{2}$ 90,000

3,450,000
912.34
4. (leave 2 more blanks for later)
5.

## Writing Numbers in Scientific Notation

Standard Notation $\rightarrow$ Scientific Notation:

1. $8,000,000 \quad 8 \times 10^{6}$
2. 75,000
3. 14005
$7.5 \times 10^{4}$ $1.4005 \times 10^{4}$
4. (leave 2 more blanks for later) 5.

WHY SCIENTIFIC NOTATION WORKS
o $8.2 \times 10^{4}$ means to take 8.2 and multiply it by 10 four times.

- When you multiply anything by ten, you can move the decimal to the right.


## ADVICE FOR UNDERSTANDING THIS:

- Scientific notation is ALL about multiplying and dividing by 10. "Moving the decimal" is only a trick

COMMON MISTAKE ALERT:
0 " $1.27 \times 10^{6 "}$ does not mean to put 6 zeroes.

- How many zeroes will it have?

Which number is bigger...
$9 \times 10^{5} \quad 900,000$

## or

$2 \times 10^{8}$ ?
20,000,000

## Which number is bigger...

## $8.7654321 \times 10^{3} 8,765.4321$

## or

$1.23456 \times 10^{4}$ ?

## 12,345.6

Which number is bigger... $953 \times 10^{4} \quad 9,530,000$ or
$6 \times 10^{5} ? \quad 600,000$

## Which number is bigger... $2.4 \times 10^{3} \quad 2400$

## $8 \times 10^{3}$ ?

 8000- The size of big numbers is largely determined by how many digits it has.
- Every time you multiply by 10 , you add a digit to a number.
- As long as your "a" number is between 1 and 10 , the exponent will always tell you which number is bigger!


# Which number is bigger? 

- 8700000000000000000000000000000000000 000000000000000000000000000000000000 000000000000000000000000000000000000

$$
8.7 \times 10^{107}
$$

- 125000000000000000000000 000000000000000000000000 000000000000000000000000 000000000000000000000000

$$
1.25 \times 10^{95}
$$

