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WARMUP 1/$(1.4 \times 10^1)(2 \times 10^0)$

EVERYONE NEEDS A WHITEBOARD, MARKER, ERASER!!!

For each problem, fill in your own x and y values to make a table that is:

1) Not a function

x				
y				

2) A function, but nonlinear

x				
y				

3) Linear, but not proportional

x				
y				

4) Proportional

x				
y				

5) Equation for #3:

6) Equation for #4:

REMINDER:

$$(4 \times 10^3)(2 \times 10^4)$$

$$= (4 \times 10 \times 10 \times 10)(2 \times 10 \times 10 \times 10 \times 10)$$

$$= \mathbf{8 \times 10^7}$$

Multiplying in Scientific Notation

- **Multiply the Coefficients**
- **Keep the base (10)**
- **Add the exponents!**

REMINDER:

$$\frac{9 \times 10^5}{3 \times 10^2}$$

$$= \frac{9 \times 10 \times 10 \times 10 \times 10 \times 10}{3 \times 10 \times 10}$$

$$= \mathbf{3 \times 10^3}$$

Dividing in Scientific Notation

- Divide the Coefficients
- Keep the base (10)
- Subtract the exponents!

REMIMNDER:

Adding & Subtracting in Scientific Notation

- No shortcut: convert both to standard notation, then add or subtract

(Exception: When both numbers have the same exponent!)

Adding & Subtracting in Scientific Notation

- No shortcut: convert both to standard notation, then add or subtract
- **IF EXPONENTS ARE THE SAME:**
  - **Add/subtract coefficients**
  - **Keep the base AND keep the exponent**

Overall Main Idea in Math…

- You can multiply or divide anything.
- However, you can only add or subtract things that are **like terms**.

- **Fractions work this way.**
- **Calculating with variables works this way.**
- **Scientific notation also works this way!**

TRY THESE:

WRITE YOUR ANSWER IN SCIENTIFIC NOTATION.

Examples

1. $(7.4 \times 10^{9})(1.2 \times 10^{-3})$
2. $(6.5 \times 10^{3}) + (1.23 \times 10^{5})$
3. $\frac{9.72 \times 10^{81}}{2.7 \times 10^{77}}$
4. $(9 \times 10^{5}) - (2.5 \times 10^{2})$

1. 8.88×10^{6}
2. 1.295×10^{5}
3. 3.6×10^{4}
4. 8.9975×10^{5}

WHO REMEMBERS…

How to turn this into scientific notation?

- 42×10^3
  - 42000
    - 4.2×10^4

- 0.875×10^6
  - 875000
    - 8.75×10^5

THE BOOK'S METHOD OF ADDING/SUBTRACTING:

Strategy 1:
Change both to 4 exponent

$$(4.56 \times 10^6) + (7 \times 10^4)$$
$$(45.6 \times 10^5) + (7 \times 10^4)$$
$$(456 \times 10^4) + (7 \times 10^4)$$
$$= (463 \times 10^4)$$
$$= (4.63 \times 10^6)$$

(This is the one the book teaches - feel free to use it, but I have found students mess it up more)

Strategy 2:
Change both to 6 exponent

$$(4.56 \times 10^6) + (7 \times 10^4)$$
$$(4.56 \times 10^6) + (.7 \times 10^5)$$
$$(4.56 \times 10^6) + (.07 \times 10^6)$$
$$= (4.63 \times 10^6)$$

On a whiteboard, solve both ways:

A) By converting to standard form and using long division

B) By using the shortcut

$$\frac{7.5 \times 10^{8}}{2.5 \times 10^{3}}$$

CAREFUL…

- If your answer gives you a coefficient that is not between 1-10, you need to change your answer! **IT IS NOT IN SCIENTIFIC NOTATION YET!**

$$(2.6 \times 10^5)(7 \times 10^2)$$

$$= 18.2 \times 10^7$$

WHICH ONE WILL IT BE?

A) 1.82×10^6

B) 1.82×10^7

C) 1.82×10^8

2 of these from your homework are like this!!!

TRY THESE…

1. $(8.1 \times 10^3)(6.4 \times 10^2)$
2. $\frac{2 \times 10^9}{2.5 \times 10^6}$

1. $8.1 \cdot 6.4 = 51.84$

   $3 + 2 = 5$

   51.84×10^5

   $=5{,}184{,}000$

   $= 5.184 \times 10^6$

2. $2 \div 2.5 = 0.8$

   $9 - 6 = 3$

   0.8×10^3

   $= 800$

   $= 8 \times 10^2$

HOMEWORK:

- p.63 (1, 2, 4, 8) and
- p.65 (19, 21, 22)

- No calculator allowed!
- **NO WORK SHOWN = NO CREDIT!**

STORY PROBLEMS IN PARTNERS!

- **Take turns being the writer**
- **Take turns using the calculator**
- **If you are not writing, you still need to contribute equally by being present and helping verbally. Communicate with your partner!**

ADD, SUBTRACT, MULTIPLY, OR DIVIDE?

- The population of the United States is about 3×10^8 people and the population of the world is about 7×10^9. **How many times larger** is the population of the world than the population of the US?

$$\frac{7 \times 10^9}{3 \times 10^8}$$

$$\approx 2.3 \times 10^1$$

$$\approx 23$$

(So, 23 USAs equal up to the whole world, population-wise!)

ADD, SUBTRACT, MULTIPLY, OR DIVIDE?

- The population of the United States is about 3×10^8 people and the population of the world is about 7×10^9. How much larger is the population of the world than the population of the US?

$$(7 \times 10^9) - (3 \times 10^8)$$

$$\begin{array}{r} 7,000,000,000 \\ -300,000,000 \\ \hline 6,700,000,000 \end{array} \quad or\ 6.7 \times 10^9$$

Alternate Strategy:

$$(7 \times 10^9) - (3 \times 10^8)$$

$$\downarrow$$

$$(7 \times 10^9) - (0.3 \times 10^9)$$

$$\downarrow$$

$$6.7 \times 10^9$$

FIND THE PERIMETER AND AREA OF THE SQUARE:

7 in

Area = $l \cdot w$

Sides are the same in a square so we usually write:

Area = $s \cdot s$

Area = s^2

A = 7^2

A = $49\ in^2$

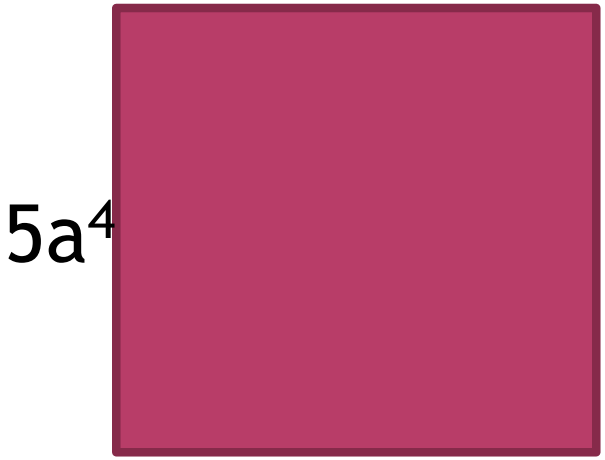
Perimeter = $s + s + s + s$

Perimeter = $4s$

P = $4 \cdot 7$

P = $28\ in$

FIND THE PERIMETER AND AREA OF THE SQUARE:



Area = s^2

A = $(5a^4)^2$

A = $25a^8$

Perimeter = $4s$

P = $4 \cdot 5a^4$

P = $4 \cdot 5 \cdot a \cdot a \cdot a \cdot a$

P = $20a^4$