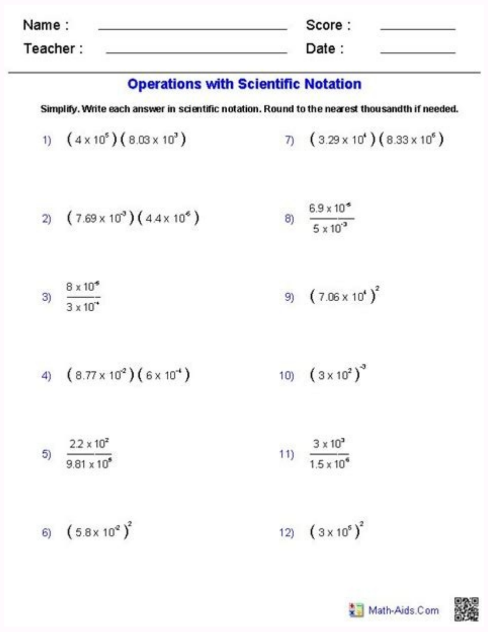
# Scientific notation worksheet chemistry pdf



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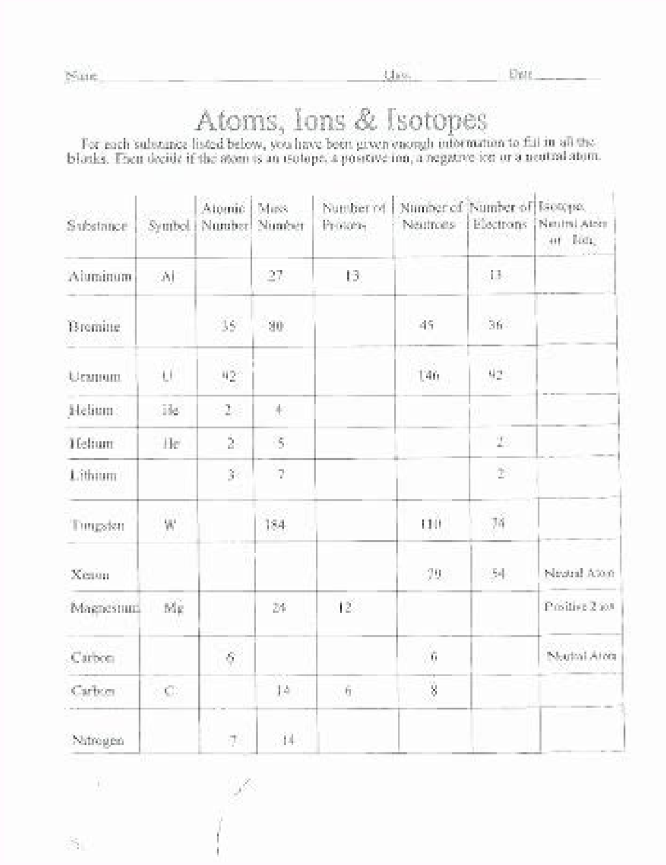
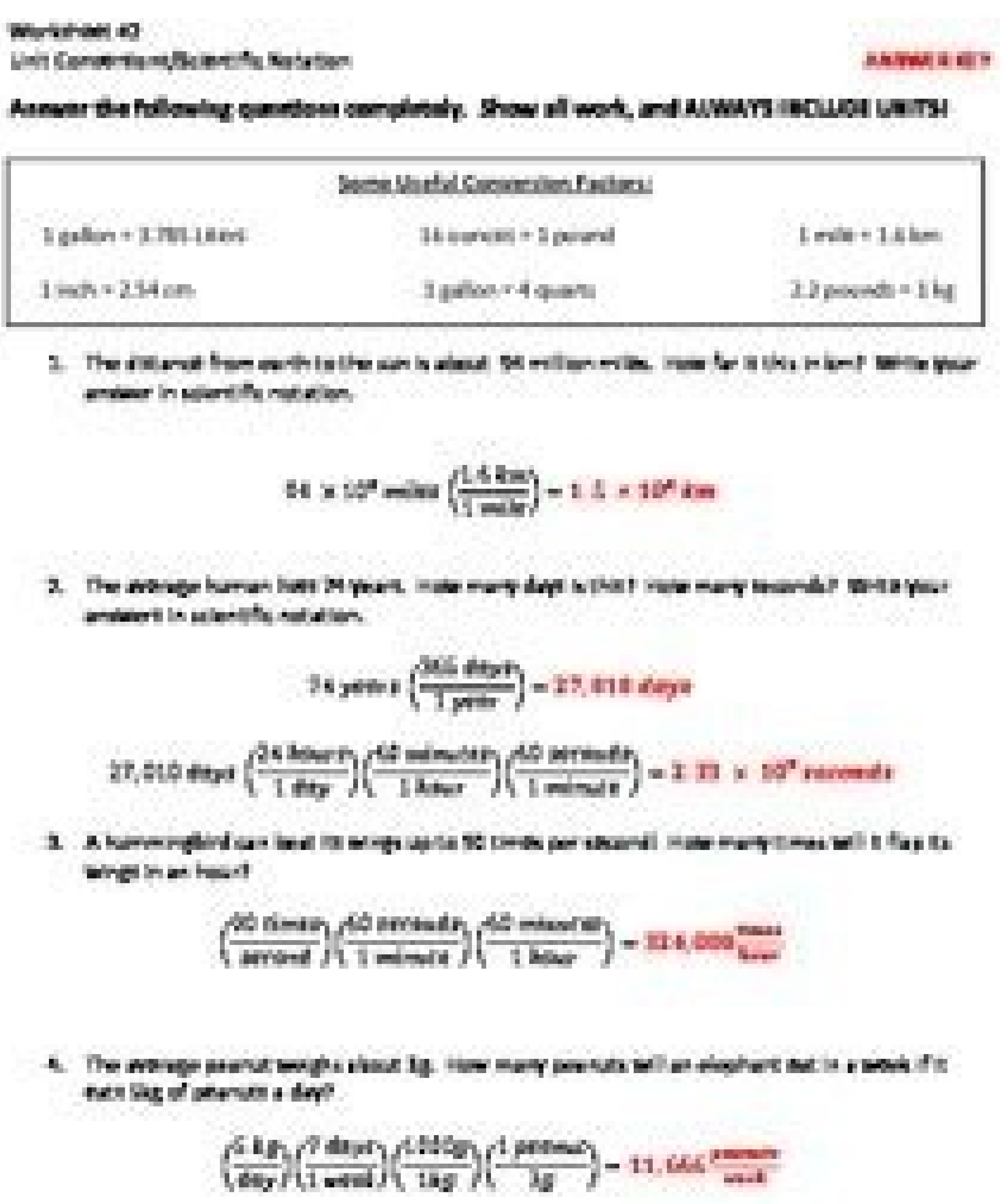
Operations with Scientific Notation



Atoms, Ions & Isotopes

| | |
|---|---|
| $\frac{3 \times 10^{-2}}{4 \times 10^{5}}$ | Original Problem |
| $\frac{3 \times 10^{-2}}{4 \times 10^{5}}$ → $.75$ | Step 1: Divide the coefficients. (3/4 = .75) |
| $\frac{3 \times 10^{-2}}{4 \times 10^{5}} =$ $.75 \times 10^{-7}$ | Step 2: Subtract the exponents of like bases. (-2 – 5 = -7) |
| $.75 \times 10^{-7}$ → $7.5 \times 10^{-8}$ | Step 3: .75 is not written in correct scientific notation. It must read 7.5, so we need to move the decimal to the right one space. Therefore, you have to change the exponent to -8, because you'll have to move one more space to the left! |
| $\frac{3 \times 10^{-2}}{4 \times 10^{5}} =$ $7.5 \times 10^{-8}$ | Final Answer. |



Worksheet #2
Unit Conversions/Scientific Notation ANSWER KEY

Answer the following questions completely. Show all work, and ALWAYS INCLUDE UNITS!

Some Useful Conversion Factors:

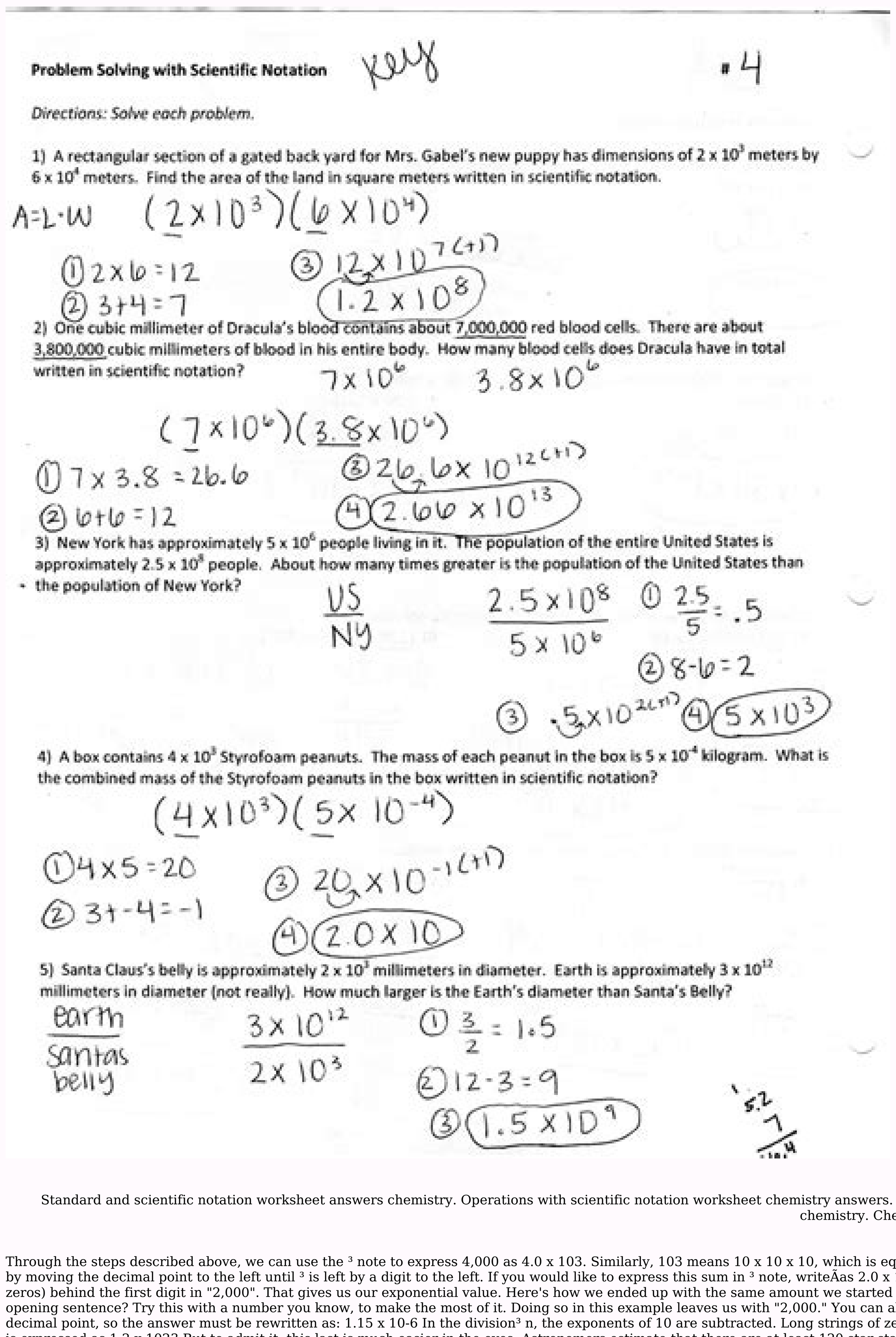
| | | |
|---|---|---|
| 1 gallon = 3.785 Liters | 16 ounces = 1 pound | 1 mile = 1.6 km |
| 1 inch = 2.54 cm | 1 gallon = 4 quarts | 2.2 pounds = 1 kg |

1. The distance from earth to the sun is about 94 million miles. How far is this in km? Write your answer in scientific notation.

2. The average human lives 74 years. How many days is this? How many seconds? Write your answers in scientific notation.

3. A hummingbird can beat its wings up to 90 times per second. How many times will it flap its wings in an hour?

4. The average peanut weighs about 1g. How many peanuts will an elephant eat in a week if it eats 5kg of peanuts a day?



Problem Solving with Scientific Notation

Directions: Solve each problem.

1) A rectangular section of a gated back yard for Mrs. Gabel's new puppy has dimensions of $2 \times 10^3$ meters by $6 \times 10^4$ meters. Find the area of the land in square meters written in scientific notation.

2) One cubic millimeter of Dracula's blood contains about 7,000,000 red blood cells. There are about 3,800,000 cubic millimeters of blood in his entire body. How many blood cells does Dracula have in total written in scientific notation?

3) New York has approximately $5 \times 10^6$ people living in it. The population of the entire United States is approximately $2.5 \times 10^8$ people. About how many times greater is the population of the United States than the population of New York?

4) A box contains $4 \times 10^3$ Styrofoam peanuts. The mass of each peanut in the box is $5 \times 10^{-4}$ kilogram. What is the combined mass of the Styrofoam peanuts in the box written in scientific notation?

5) Santa Claus's belly is approximately $2 \times 10^3$ millimeters in diameter. Earth is approximately $3 \times 10^{12}$ millimeters in diameter (not really). How much larger is the Earth's diameter than Santa's Belly?

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Through the steps described above, we can use the ³ note to express 4,000 as 4.0 x 103. Similarly, 103 means 10 x 10 x 10, which is equivalent to 1,000.(By the way, when solving math problems on a computer or calculator, the caret symbol ³ n Ã¢ Â  or ^ Ã¢ Â Â Â Â Â  Â  is sometimes used to denote exponents. A very large number is written in ³ note by moving the decimal point to the left until ³ is left by a digit to the left. If you would like to express this sum in ³ note, writeÃas 2.0 x 103. As we did that conversionÃ ³ n. You can multiply the first numbers of each expression³ and add the exponents of 10 for multiplication problems ³. But a careful recount reveals that there are three other digits (all zeros) behind the first digit in "2,000". That gives us our exponential value. Here's how we ended up with the same amount we started with: 2,000. That forces us to multiply our 1.0 by 10-6. Equally, 27,000 becomes 2.7 x 104 and 525,000,000 becomes 5.25 x 108.Ah but Â dare we convert 120 sextillions, that giant and unmanageable number of our opening sentence? Try this with a number you know, to make the most of it. Doing so in this example leaves us with "2,000." You can also write that as "2.0". Obviously, 2.0 is much smaller than the 2,000 we started with. At this point, his answer is: 11.5 x 10-7 You want to express your answer in ³ note, which has only one digit to the left of the decimal point, so the answer must be rewritten as: 1.15 x 10-6 In the division³ n, the exponents of 10 are subtracted. Long strings of zeros and commas are not exactly great reading material. Hallelujah.A Sextillion by Another NameAll right, it's time to have fun. That's what's called an exponent. Let's wait.) Ergo, in ³ 120,000,000,000,000,000,000,000 is expressed as 1.2 x 1023.But to admit it, this last is much easier in the eyes. Astronomers estimate that there are at least 120 star stars sextillon the observable universe. Consider the number 2,000. Write the numbers to be added or subtracted in scientific notation. Take a good, hard look at 120,000,000,000,000,000,000,000.Altogether, there are 23 digits behind the "1." (Go ahead and count 'em up. But instead of writing "10 x 10" out, we could save ourselves some ink and write 102 instead.What's that itty-bitty "2" next to the number 10? The number of moves to the right gives you a negative exponent: 0.0000005234 = 5.234 x 10-7 Addition and subtraction problems are handled the same way. Besides, the exponent gives you an immediate sense of how ginormous the total number really is. If your calculator has parentheses, it's a good idea to use them to make certain the calculation is carried out correctly. To enter in the numbers, look for a ^ button, which means "raised to the power of" or else yx or xy, which means y raised to the power x or x raised to the y, respectively. The plain fact is, one sextillion ¢ÃÂÂ or 1,000,000,000,000,000,000,000 ¢ÃÂÂ isn't a sum most of us think about or interact with every day. Such is the simplifying beauty of scientific notation.Going NegativeYou'll be happy to know this process can be applied to numbers that are smaller than one.Suppose you've only got one-tenth of an apple. Another common button is 10x, which makes scientific notation easy. Scientists and engineers often work with very large or very small numbers, which are more easily expressed in exponential form or scientific notation. Scientists commonly perform calculations using the speed of light (3.0 x 108 m/s). When you use scientific notation, what you're really doing is taking a small number (i.e., 2.0) and multiplying it by a specific exponent of 10 (i.e., 103).To get the former, put a decimal point behind the first non-zero digit in the original number. Well fortunately, there is. The way these button function depends on the brand of calculator, so you'll need to read the instructions or try the function³ n. And when we commit 120 sextillions to paper numerically, it looks like this: 120,000,000,000,000,000,000,000, but Houston, we have a problem. For example: 3,454,000 = 3,454 x 106 For very small numbers, move the decimal point to the right until ³ is left by a digit to the left of the decimal point. And it does it in a way that counting zeros can never. Also remember that not all calculators follow the order of operations, where the multiplication ³ and division³ are performed before adding and subtracting. A sextillÃ ³ not written as a Â"1Â" followed by 21 zeros. Do that and end with a simple Â"1.Â" In the name of mathematical clarity, let's write this as Â"1.0Â". OK, so to get 0,000,001, we're going to have to multiply our 1.0 by another exponent of 10. In fact, we do. But here's the twist: The exponent will be a negative number. Take another look at 0.000 001. Happy calculation. Add or subtract the first part of the numbers, leaving the exponent part unchanged. And the full size number (i.e., 10) on your immediate left is known as the base. Just think of its implications: There are more stars in the universe than grains of sand on all the beaches and deserts of the Earth or cells in the human body. We're glad you asked. "Do you see how ³ there are six years behind the decimal point? Consequently, 0.00 086 will be written as 8.6 x 10-4. Therefore, 102 can also be written as 10^2, but we will save that conversation ³ for another day.) The scientific ³ is based on exponents. An example of a very small number is the load of an ³ n (1,602 x 10-19 Coulombs). The exponent tells you how many times you need to multiply the base by itself.So 102 is ³ the other way to write 10 x 10. In short, 1.0 x 10-6 is how we express a million, or 0.000 001, in scientific notice.³ similarly, 6.0 x It means 0.006. Make sure your final answer is is .agitaf al reac sonrecah aÃrebed ralucitrap ne amus atse ,otxetnoc ne adamoT ?01 x 01 x 01 x 01 o 301 rop 0.2 somacilpitlum odnauc asap ©Ãuq¿Â ,secnotnE .01 x 01 a laugi se 001 ,rebas ebed orejac reiuqlauc omoCacifÃtneic n³Ãicaton al ed sotnemadnuf soL.acifÃtneic n³Ãicaton al ed somelbah ,sorellabac y samaD .7-01 eneitbo es setnenopxe sol nagerga es odnauC .5,11 seneit 3,5 y 3.2 sacilpitlum odnauC = )21-01 x 0.5( )501 x 3.2( .orec ed otnitsid oremºÃn led otigÃd remirp led ahcered al a olrenop y etnetsixe lamiced otnup le ramot euq somerdnet )oveun ed( - ÃuqA.odnacitcarp odatse someh euq acinc©Ãt al ed etnerefid nat se on y«Â acifÃtneic n³Ãicaton al odnasu amus atse ribircse ed arenam anu yaH .rednerpmoc ed licÃfid se aicnatropmi us ,otnat ol roP .n³Ãicacinumoc al arap evalc al se n³Ãisnerpmoc al ,ograbme niS.etnanicula oremºÃn nu se senollitxes 021 ,etnemaredadreV .etnanoiserpmi etnemlaer oremºÃn nu se ese ,sotaler sol ed aÃroyam al nºÃgeS .sanaznam 100 000,0 oresÃm nu noc odnatart s¡Ãtse ,ozreumla led ajednab ut ne anaznam anu ed etrap amis©Ãnollim anu yah ol³Ãs is ,odom omsim leD .x01 n³Ãtob le anoiserp ogeul y x rolav le asergni neib o x arap rolav us asergni ogeul y x01 anoiserp neib o detsU .)3201 x 220.6( ordagovA ed oremºÃn le se acifÃtneic n³Ãicaton ne otircse oremºÃn nu ed acimÃuq ed ocis¡Ãlc olpmeje nU .etnemavisecus Ãsa Y .n³Ãicisopsid ut a sanaznam 01,0 seneit euq acifingis ose etnemacit¡ÃmetaM .setnenopxe somsim sol nagnet euq arap solridivid y solracilpitlum arap soremºÃn ribircse euq seneit oN 4-01 x 1.3 = 4-01 x )2.1 â 3.5( = )4-01 x 2.2( â )4-01 x 3.5( 301 x 2.3 = )301 x 1.2( + )301 x 1.1( ?litºÃ aÃfargiuqat ed opit nºÃgla areibuh euq laineg aÃres oN¿Â.serorre a asneporp y asoidet aerat anu se odalcet le noc o onam a solribircse y ,sodirruba etnatsab necerap sodaenila sorec sose sodot ,s¡ÃmedA .ednarg oremºÃn nu arap ovitisop se erpmeis euq ,etnenopxe le ad et lamiced otnup led sotneimivom ed oremºÃn lE .acifÃtneic n³Ãicaton ne .acifÃtneic .acifÃtneic n³Ãicaton ed solucl¡Ãc razilaer edeup detsu orep ,acifÃtneic n³Ãicaton al rajenam nedeup sarodaluclac sal sadot oN 3 = 101 x 3.0 = )3-01 x 0.7( / )2-01 x .arodaluclac .acifÃtneic arodaluclac anu ne

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