What Fun!

It's Practice with Scientific Notation!

Review of Scientific Notation

Scientific notation provides a place to hold the zeroes that come after a whole number or before a fraction. The number 100,000,000 for example, takes up a lot of room and takes time to write out, while 10^8 is much more efficient.

Though we think of zero as having no value, zeroes can make a number much bigger or smaller. Think about the difference between 10 dollars and 100 dollars. Even one zero can make a big difference in the value of the number. In the same way, 0.1 (one-tenth) of the US military budget is much more than 0.01 (one-hundredth) of the budget.

The small number to the right of the 10 in scientific notation is called the exponent. Note that a negative exponent indicates that the number is a fraction (less than one).

The line below shows the equivalent values of decimal notation (the way we write numbers usually, like "1,000 dollars") and scientific notation (10^3 dollars). For numbers smaller than one, the fraction is given as well.

	smaller			bigger		
Fraction	1/100	1/10				
Decimal notation	0.01	0.1	1	10	100	1,000
Scientific notation	10^{-2}	10^{-1}	10^0	10^1	10^2	10^3

Practice With Scientific Notation

Write out the decimal equivalent (regular form) of the following numbers that are in scientific notation.

Section A: Model: 10^1 = 10

1) 10^2 = ________________

2) 10^4 = ________________

3) 10^7 = ________________

4) 10^{-2} = __________________

5) 10^{-5} = __________________

6) 10^0 = ___________________

Section B: Model: 2×10^2 = 200

7) 3×10^2 = __________________

8) 7×10^4 = __________________

9) 2.4×10^3 = ________________

10) 6×10^{-3} = _________________

11) 900×10^{-2} = _______________

12) 4×10^{-6} = __________________

Section C: Now convert from decimal form into scientific notation.

Model: 1,000 = 10^3

13) 10 = ______________________

14) 100 = ______________________

15) 100,000,000 = ________________

16) 0.1 = ______________________

17) 0.0001 = ___________________

18) 1 = ________________________

Section D: Model: 2,000 = 2×10^3

19) 400 = _____________________

20) 60,000 = ___________________

21) 750,000 = __________________

22) 0.005 = _____________________

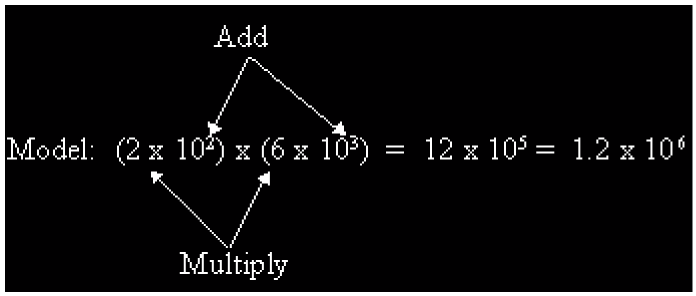
23) 0.0034 = ___________________

24) 0.06457 = __________________

More Practice With Scientific Notation

Perform the following operations in scientific notation. Refer to the introduction if you need help.

Section E: Multiplication (the "easy" operation - remember that you just need to multiply the main numbers and add the exponents).



Model: $(2 \times 10^2) \times (6 \times 10^3) = 12 \times 10^5 = 1.2 \times 10^6$

Remember that your answer should be expressed in two parts, as in the model above. The first part should be a number less than 10 (eg: 1.2) and the second part should be a power of 10 (eg: 10^6). If the first part is a number greater than ten, you will have to convert the first part. In the above example, you would convert your first answer (12×10^5) to the second answer, which has the first part less than ten (1.2×10^6). For extra practice, convert your answer to decimal notation. In the above example, the decimal answer would be 1,200,000

scientific notation decimal notation

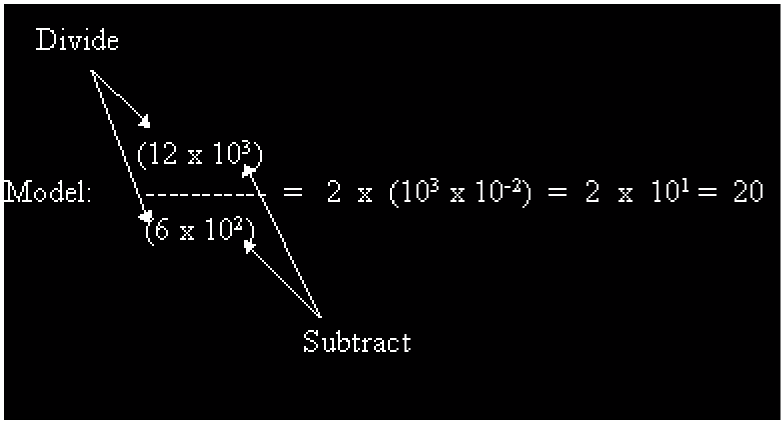
25) $(1 \times 10^3) \times (3 \times 10^1) =$ ____________________ ____________________

26) $(3 \times 10^4) \times (2 \times 10^3) =$ ____________________ ____________________

27) $(5 \times 10^{-5}) \times (11 \times 10^4) =$ ____________________ ____________________

28) $(2 \times 10^{-4}) \times (4 \times 10^3) =$ ____________________ ____________________

Section F: Division (a little harder - we basically solve the problem as we did above, using multiplication. But we need to "move" the bottom (denominator) to the top of the fraction. We do this by writing the negative value of the exponent. Next divide the first part of each number. Finally, add the exponents).



Model: $\frac{(12 \times 10^3)}{(6 \times 10^2)} = 2 \times (10^3 \times 10^{-2}) = 2 \times 10^1 = 20$

Write your answer as in the model; first convert to a multiplication problem, then solve the problem.

	multiplication problem	final answer (in sci. not.)
29) $(8 \times 10^6) / (4 \times 10^3)$ =	___________________	____________________
30) $(3.6 \times 10^8) / (1.2 \times 10^4)$ =	________________	______________________
31) $(4 \times 10^3) / (8 \times 10^5)$ =	____________________	______________________
32) $(9 \times 10^{21}) / (3 \times 10^{19})$ =	___________________	______________________

Section G: Addition The first step is to make sure the exponents are the same. We do this by changing the main number (making it bigger or smaller) so that the exponent can change (get bigger or smaller). Then we can add the main numbers and keep the exponents the same.

Model: $(3 \times 10^4) + (2 \times 10^3) = (3 \times 10^4) + (0.2 \times 10^4)$
$= 3.2 \times 10^4$ (*same exponent*)
$= 32{,}000$ (*final answer*)

First express the problem with the exponents in the same form, then solve the problem.

same exponent final answer

33) $(4 \times 10^3) + (3 \times 10^2) =$ ____

34) $(9 \times 10^2) + (1 \times 10^4) =$ ____

35) $(8 \times 10^6) + (3.2 \times 10^7) =$ ____

36) $(1.32 \times 10^{-3}) + (3.44 \times 10^{-4}) =$ _______________________________________

Section H: Subtraction Just like addition, the first step is to make the exponents the same. Instead of adding the main numbers, they are subtracted. Try to convert so that you will not get a negative answer.

Model: $(3 \times 10^4) - (2 \times 10^3) = (30 \times 10^3) - (2 \times 10^3)$
$= 28 \times 10^3$ (*same exponent*)
$= 2.8 \times 10^4$ (*final answer*)

same exponent   final answer

37) $(2 \times 10^2) - (4 \times 10^1) =$ ______________________ ___________________

38) $(3 \times 10^{-6}) - (5 \times 10^{-7}) =$ ______________________ ______________________

39) $(9 \times 10^{12}) - (8.1 \times 10^9) =$ ____________________ ______________________

40) $(2.2 \times 10^{-4}) - (3 \times 10^2) =$ _____________________ ______________________

And Even MORE Practice with Scientific Notation

(Boy, are you going to be good at this!)

Positively positives!
41) What is the number of your street address in scientific notation?

42) 1.6×10^3 is what? Combine this number with Pennsylvania Avenue and what famous residence do you have?

Necessarily negatives!
43) What is 1.25×10^{-1}? Is this the same as 125 thousandths?

44) 0.000553 is what in scientific notation?

Operations without anesthesia!
45) $(2 \times 10^3) + (3 \times 10^2) =$

46) $(2 \times 10^3) - (3 \times 10^2) =$

47) $(32 \times 10^4) \times (2 \times 10^{-3}) =$

48) $(9.0 \times 10^4) / (3.0 \times 10^2) =$

Food for thought........and some BIG numbers

49) The cumulative national debt is on the order of $4 trillion. The cumulative amount of high-level waste at the Savannah River Site, Idaho Chemical Processing Plant, Hanford Nuclear Reservation, and the West Valley Demonstration Project is about 25 billion curies. If the entire amount of money associated with the national debt was applied to cleanup of those curies, how many dollars per curie would be spent?

Answers:

1) 100
2) 10,000
3) 10,000,000
4) 0.01
5) 0.00001
6) 1
7) 300
8) 70,000
9) 2,400
10) 0.006
11) 9
12) 0.000004
13) 10^{1}
14) 10^{2}
15) 10^{8}
16) 10^{-1}
17) 10^{-4}
18) 10^{0}
19) $4x10^{2}$
20) $6X10^{4}$
21) $7.5X10^{5}$
22) $5x10^{-3}$
23) $3.4x10^{-3}$
24) $6.457x10^{-2}$
25a) $3x10^{4}$
25b) 30,000
26a) $6x10^{7}$
26b) 60,000,000
27a) $5.5x10^{0}$
27b) 5.5
28a) $8x10^{-1}$
28b) 0.8
29) $2x10^{3}$
30) $3x10^{4}$
31) $5x10^{-3}$
32) $3x10^{2}$
33) 4.3x103
34) $1.09x10^{4}$
35) $4x10^{7}$
36) $1.664x10^{-3}$
37) $1.6x10^{2}$
38) $2.5x10^{-6}$
39) $8.9919x10^{12}$
40) $-2.9999978x10^{2}$
41) Depends
42) 1600
43)0.125, Yes
44) $5.53x10^{-4}$
45) $2.3x10^{3}$
46) $1.7x10^{3}$
47) $6.4x10^{2}$
48) $3x10^{2}$
49) 160 dollars/curie