A. Express each of the following in scientific notation:

1. 0.058 8. 1234

2. 45,867 9. 0.000092

3. 0.00100 10. 56

4. 1 11. 0.00407

5. 0.000000000027 12. 60,000,000,000

6. 54,389,000 13. 0.0000036546

7. 0.739 14. 619

B. Express each of the following in standard notation:

15. 3.45 x 100 20. 2.3789 x 103

16. 9.8 x 10-4 21. 3.51 x 105

17. 1.0 x 101 22. 8.03451 x 10-3

18. 5.27036 x 10-2 23. 4.938 x 108

19. 6.92 x 10-9 24. 7.42019 x 104

C. Change all numbers to scientific notation BEFORE performing the mathematical operations by following the rules for exponents (see notes):

25. .34 + 12 30. 6785 X 0.023

26. 0.0004 / 0.0067 31. 1200. - 0.03

27. 23,000,000 X 42,309 32. 45.56 / 0.0000107

28. 7600 + 424,000 33. 2300000000 X 0.00000000000000092

29. 0.00000378 - 23.4 34. 0.0038 / 21

D. When adding/subtracting numbers that are more than two multiples of ten from each other, how should one handle the solution (refer to C 26, 28, 29. 31)?

E. How does one know how many decimal places to use in an answer when the numbers involved have different decimal places (refer to C 30, 32, 33, 34)?

ANSWER KEY

A. Express each of the following in scientific notation:

1. 5.8 x 10-2 #↑ E↓ 8. 1.234 x 103

2. 4.5867 x 104 #↓ E↑ 9. 9.2 x 10-5 #↑ E↓

3. 1.00 x 10-3 #↑ E↓ 10. 5.6 x 101 #↓ E↑

4. 1 x 100 11. 4.07 x 10-3 #↑ E↓

5. 2.7 x 10-11 #↑ E↓ 12. 6 x 1010 #↓ E↑

6. 5.4389 x 107 #↓ E↑ 13. 3.6546 x 10-6 #↑ E↓

7. 7.39 x 10-1 #↑ E↓ 14. 6.19 x 102 #↓ E↑

B. Express each of the following in standard notation:

15. 3.45 20. 2,378.9 E↓ #↑

16. 0.00098 E↑ #↓ 21. 351,000 E↓ #↑

17. 10 E↓ #↑ 22. 0.00803451 E↑ #↓

18. 0.0527036 E↑ #↓ 23. 493,800,000 E↓ #↑

19. 0.00000000692 E↑ #↓ 24. 74,201.9 E↓ #↑

C. Change all numbers to scientific notation BEFORE performing the mathematical operations by following the rules for exponents (see notes):

25. 3.4 x 10-1 + 1.2 x 101 … change to a common exponent … 101 (choose the higher exponent)

0.034 x 101 + 1.2 x 101 🡪 **1.2 x 101**… *use the least precise measurement [*1.2 x 101 *is much less precise … round up or down to the nearest tenth].*

26. 0.0004 / 0.0067 … 4 x 10-4 / 6.7 x 10-3 … divide # / # ; subtract superscripts

4 / 6.7 x 10-4 - (-3) … 0.597 x 10-1 🡪 **6 x 10-2**… *use the least # of significant figures*

27. 23,000,000 X 42,309 … 2.3 x 109 X 4.2309 x 104 … multiply # X # … add superscripts

2.3 X 4.2309 x 107+ 4 🡪 **9.7 x 1011** … *use the least # of significant figures*

28. 7600 + 424,000 🡪 **4.316** **x 105**… 7.6 x 103 + 4.24 x 105; change to a common exponent 0.076 x 105 + 4.24 x 105; *the precision is in the hundreds place [“6” of 7600], so the answer should include hundreds.*

29. **-2.34 x 101** … *since the two numbers are more than TWO decimal places apart, ignore the smaller number and use the larger*

30. **1.6 x 102**… 6.785 x 103 X 2.3 x 10-2 *multiply # by #; add superscripts; use the least precise # of significant figures*

31. 1200. - 0.03 becomes 1.200 x 103 - 3 x 10-2 … change to a common exponent … 103 (choose the higher exponent) 1.200 x 103 - 0.00003 x 103 🡪 **1.200 x 103**… *use the least precise # of significant figures which was the original 1200. (the ones place)*

32. **4.25 x 106** … 4.556 x 101 / 1.07 x 10-5 *divide # by #,* *use the least # of significant figures*

33. **2.1 x 10-6** … 2.3 x 109 X 9.2 x 10-16 *Multiply # by #, and add exponents;* *use the least # of significant figures*

34. **1.8 x 10-4** … 3.8 x 10-3 / 2.1 x 101 *divide # by #,* *use the least # of significant figures*

D. When adding/subtracting numbers that are more than two multiples of ten from each other, how should one handle the solution (refer to C 26, 28, 29. 31)?

*Exponents must be the same in order to add or subtract. In this case, if numbers are more than TWO exponents away from each other, choose the larger number. The smaller number is negligible (insignificant).*

E. How does one know how many decimal places to use in an answer when the numbers involved have different decimal places (refer to C 30, 32, 33, 34)?

*The number of decimal places in an answer depends on the amount of significant figures involved which is determined by the accuracy/precision of the measuring tools used.*

* When adding or subtracting using significant figures, use the least ACCURATE measurement
* When multiplying or dividing using significant figures, use the least AMOUNT of significant figures for the answer