

Intro to SIGNIFICANT DIGITS (sig figs)

SIGNIFICANT DIGITS are measured numbers. When any type of measurement is taken, we read all digits, which are certain, or readable from the measuring INSTRUMENT, plus a last digit which is uncertain (or estimated). SIGNIFICANT DIGITS are the combination of all certain digits plus the one uncertain digit.

Here are some guidelines for determining which digits are significant.

1. Digits other than zero are always significant. (1-9) A digit other than zero is written only as the result of having taken a measurement. Thus, given the example 12.45 mL, all digits are significant.

Guidelines 2 through 4 are used to evaluate ZERO because zeros may be used as a placeholder (to tell where a decimal point should go)---it is not significant OR zeros can be used as a measured number ---it is significant.

2. Zeros used only for placing the decimal point are NOT significant. In this case, "0" is being used only to tell where a decimal point should be: it is a placeholder and not measured. (sig figs are underlined)

11000

24500

0.001555

However, in the first example, suppose that the zeros are measured. (11000) If there were an instrument that was accurate to the whole number, then all the numbers would be significant. 11000. The decimal point is written to indicate that all the zeros are measured.

3. Zeros between two other significant digits are always significant. If the first and last digits written are significant, then all digits between them must also be measured. *It is impossible to measure only the first and last place.*

10.00001

101,000

0.0001001

4. Any final zeros used after the decimal point are significant. These zeros have absolutely nothing to do with the decimal placement. They should not be written down unless their position has been measured and the actual numerical value is zero.

0.000100

0.001010

UNDERLINE THE SIG FIGS

1. 200

7. 20200.

13. 0.05000000

2. 202

8. 200.02

14. 550000

3. 20200

9. 200.0200

15. 5000000.

4. 200.

10. 0.50

16. 5.0005

5. 0.0002

11. 50

17. 50.50

6. 0.00220

12. 0.005055

18. 0.00050000005

What about a number that is in scientific notation (exponential notation)? How many numbers are significant? Hint: You don't need to expand it out.

3.450 x 10⁻⁴

45.6 x 10³

0.000440 x 10⁴