

Math Review Worksheet

(Significant Figures / Scientific Notation / Algebra)

SIGNIFICANT FIGURES

Any measurement is inaccurate to some degree. The inaccuracy stems from several factors -- the precision of the measuring device used, errors by the person doing the measurement, a faulty experimental technique, etc. In scientific investigations, communicating our uncertainty in a measurement is equally important as the measurement itself. We convey our uncertainty in measured quantities by abiding by the rules of significant figures.

1. Significant figures in a measurement include all of the digits that are known precisely plus one last digit that is estimated.
2. Non-zero digits are always significant. 103.230002
3. All final zeros after the decimal point are significant. 12.740 ; 0.0420
4. Zeros between two other significant digits are always significant. 10.0 ; 2004 ; 6.000
5. Zeros used only for spacing the decimal point are *not* significant. 100 ; .00000233
6. If you add or subtract, the answer is rounded to the same number of decimal places as the measurement with the least *number* of decimal places.
7. If you multiply or divide two numbers, the answer is rounded off to the number of significant figures in the least precise term used in the calculation (i.e. the number with the fewest sig figs).

Determine the number of significant digits in each of the following:

- | | | | |
|-------------|---------------|---------------|----------------------|
| 1. 23.30 cm | 4. 1,843.02 L | 7. 2.00012 km | 10. 0.0001010450 sec |
| 2. 3.65 kg | 5. 8.701°C | 8. 0.5 mL | |
| 3. 365 kg | 6. 2000.12 mm | 9. 704,000 h | |

Report answers to the following using proper significant figures:

11. $3.414 \text{ s} + 10.02 \text{ s} + 58.325 \text{ s} + 0.00098 \text{ s}$
12. $2.326 \text{ h} - 0.10408 \text{ h}$
13. $10.19 \text{ m} \times 0.013 \text{ m}$
14. $140.01 \text{ cm} \times 26.042 \text{ cm} \times 0.0159 \text{ cm}$
15. $80.23 \text{ m} / 2.4 \text{ s}$
16. $4.301 \text{ kg} / 1.9 \text{ cm}^3$
17. An experiment calls for 16.156 g of substance A, 28.2 g of substance B, 0.0058 g of substance C, and 9.44 g of substance D.
 - a) How many significant digits are there in each measurement?
 - b) What is the total mass of substances in this experiment?
 - c) How many significant digits are there in the answer to part b?
18. Your lab partner has carefully measured out 16.50 mL of water. You accidentally tip over the graduated cylinder and spill some of the water. You stand the cylinder up, and determine that there are 8.0 mL of water left.
 - a) Which measurement is more precise -- your lab partner's or yours? Explain.
 - b) How much water did you lose when you tipped over the graduated cylinder?