

Practice Problems Set: Significant Figures

Learning Objective: By the end of this practice problems set, students should be able to correctly calculate a quantity based on the different rules of significant figures for different types of mathematical operations.

Online Tutorial: http://chemcollective.org/activities/tutorials/stoich/significant_figures

Online Video (Khan Academy) [Rules on Significant Figures](#)

Are significant figures important? A Fable: <https://www.chemteam.info/SigFigs/SigFigsFable.html>

Why are significant figures important? <https://www.youtube.com/watch?v=daa1Q5nWg2k>

Practice problems set is NOT a homework assignment. The problems set is designed to give students additional practice on learning the concepts and problems solving. This is especially important when preparing for an exam.

Calculate the final answer with the correct number of significant figures for each of the following questions.

1. $39.64 + 1.3$

2. $195.4 - 193$

3. $5.85 \times 10^2 + 1.21 \times 10^4$

4. $900 + 500$

5. $46.8 - 41.4$

6. $(3.84 \times 21.69) \div (2.9 \times 1.63)$

7. $(23.5 - 21.3) \div 1.58$

8. $4.83 \div (2.4 + 9.8)$

9. The following are placed in an empty beaker weighing 39.457g:

2.689 g of NaCl, 1.26 g of sand and 5.0 g water

What is the final mass of the beaker?

10. If the beaker containing a sample of alcohol weighs 49.8767 g and the empty beaker weighs 49.2140 g, what is the net weight of the alcohol?

Answer Key:

1. 40.9

This is an addition problem. The limiting factor is 1.3, with one decimal place.

2. 2

This is a subtraction problem. The limiting factor is 193, with NO decimal place.

3. 1.27×10^4 **OR** 127×10^2 **OR** 12700

You **cannot** perform addition or subtraction if the values have different exponent in scientific notation. This is because scientific exponent will affect the number of decimal places in a number. This is also the reason why one cannot add a value in milliliter (mL) to a value in liter (L). For example, a value of 0.020 can be written as 2.0×10^{-2} or 0.20×10^{-1} . Both values contain the same number of significant figures (i.e. 2 significant figures) as 0.020. However, due to the different exponent, each value has a different number of decimal places! Please always remember that the number of decimal places and the number of significant figures are defined differently in a number.

Therefore, we must rewrite the equation using the same common exponent as $(0.0585 + 1.21) \times 10^4$ **OR** $(5.85 + 121) \times 10^2$. The answer should now be very obvious!

4. 1.4×10^3 **or** 14×10^2 **or** 1400

Note: In the number 1400, we assume the trailing zeros are NOT significant.

5. 5.4

Both numbers in the question has one decimal place, so answer should have one decimal place.

6. 18

This involves only multiplication and division. The limiting factor is 2.9 with 2 sig. fig., so the answer should have 2 sig. fig.

7. 1.4

This equation has a combination of subtraction and division. Since they have different rules, we must do them separately. $23.5 - 21.3 = 2.2$ (2 significant figures with one decimal place) and then dividing 2.2 by 1.58, the answer is 1.4 with 2 significant figures.

8. 0.396

9. 48.4 g

10. 0.6627g