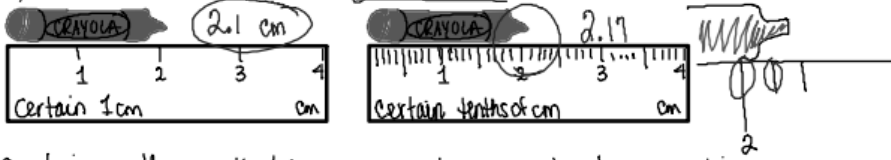


9/20 Communication through numbers

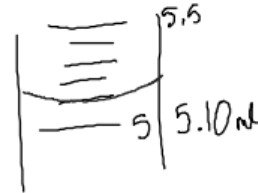
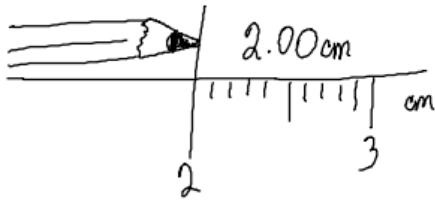


Certain = the smallest measurement represented by a marking

Estimated digit = representation of where the actual reading falls-

"Zero" = reading is exactly on the line

"1-9" = represents how far between the lines the reading falls.



Significant Figures (Digits) sigfig. sf

Recognizing the digits in a measurement that are significant/measured.

Rules

- ① Any non-zero # is significant. (1-9) 542 sf=3 76 sf=2
- ② Any sandwiched zeros are significant. 502 sf=3 700006 sf=6
- ③ Leading zeros are NOT significant. 0.052 sf=2
- ④ trailing zeros with out a decimal are NOT significant. 0.000665 sf=3
720 sf=2 500000000 sf=1
- ⑤ trailing zeros with a decimal ARE significant.
720. sf=3 893.000 sf=6 508.0700 sf=7

Determine the number of significant figures for each of the following.

- | | | | | | | | |
|-----------|----------|-----------|----------|----------------------|----------|--------------|----------|
| 1. 5.432 | <u>4</u> | 6. 40.319 | <u>4</u> | 11. 146 | <u>3</u> | 16. 3.285 | <u>4</u> |
| 2. 0.189 | <u>3</u> | 7. 429.3 | <u>4</u> | 12. 2873.0 | <u>5</u> | 17. 99.9 | <u>3</u> |
| 3. 0.0023 | <u>2</u> | 8. 144 | <u>3</u> | 13. 2500 | <u>2</u> | 18. 2500.0 | <u>6</u> |
| 4. 1.04 | <u>3</u> | 9. 35.08 | <u>4</u> | 14. 8365.6 | <u>6</u> | 19. 48.57193 | <u>7</u> |
| 5. 7.500 | <u>4</u> | 10. 7,500 | <u>3</u> | 15. 0 920 | <u>3</u> | 20. 0.002300 | <u>6</u> |

Significant Figures with Addition and Subtraction

- ① record the problem in a column, be sure to line up the decimals.
- ② Complete the math, and record the answer under the column.
- ③ Determine "weak link". (# with lowest accuracy).
- ④ adjust mathematic answer.

Practice:

$$\begin{array}{r} \textcircled{1} \quad 12 \quad \text{cm} \quad \leftarrow \text{weak link} \\ \quad 0.031 \text{ cm} \\ + \quad 7.969 \text{ cm} \\ \hline \underline{20.000} \text{ cm} \\ \quad \quad \quad \uparrow \end{array}$$

$$\text{ans. } \underline{20. \text{ cm}} \\ 20$$

$$\begin{array}{r} \textcircled{3} \quad 3.419 \quad \text{g} \\ \quad 3.912 \quad \text{g} \\ \quad 7.0518 \quad \text{g} \\ + \quad 0.00013 \text{ g} \\ \hline \underline{14.38293} \text{ g} \\ \quad \quad \quad \uparrow \end{array} \quad \left. \begin{array}{l} \text{g} \\ \text{g} \\ \text{g} \end{array} \right\} \text{weak link}$$

$$\text{ans. } \underline{14.383 \text{ g}}$$

$$\begin{array}{r} \textcircled{5} \quad 143.0 \quad \text{ml} \\ \quad 289.25 \quad \text{ml} \\ + \quad 107.85 \quad \text{ml} \\ \hline \underline{540.10} \quad \text{ml} \\ \quad \quad \quad \uparrow \\ \text{ans. } \underline{540.1 \text{ ml}} \end{array}$$

Significant figures with multiplying and dividing

* counting - not columns *

- ① Determine required formula + complete math.
- ② Evaluate the typed word problem + determine sf for each quantity in the problem.
- ③ Adjust mathematic answer to match lowest sf quantity.

Example:

How many calories are required to heat $\boxed{100.0\text{g}}$ ^{4sf} of water from $\boxed{12}^{\circ\text{C}}$ ² to $\boxed{305.4}^{\circ\text{C}}$ ⁴?

$$\text{cal} = (100.0\text{g})(305.4^{\circ\text{C}} - 12^{\circ\text{C}}) = \underline{29340} \text{ cal.} \rightarrow 29000 \text{ cal.}$$

Practice:

① 2.89cm ₃ \times 4.01cm ₃ = $\boxed{11.5889}$ ^{calculator readout} ans. 11.6 cm²

③ 3.08m ₃ \times 1.2m ₂ = $\boxed{3.696}$ ans. 3.7 m²

⑦ 24789.4 km^2 ₆ \div 43.5 km ₃ = $\boxed{569.8712644}$ ans. 570. or 570 km