Chapter 1 Part 2

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Significant Figures (Sig figs)

- Also called significant digits
- Used to express the precision of a measurement

Significant Figure Rules

- Exact numbers have an infinite number of sig figs
- All nonzero numbers are significant
- Zeros
  - Zeros that trail nonzero numbers without a decimal are insignificant
    - Ex. 4510 (3 sig figs)
  - Zeros that trail nonzero numbers with a decimal are significant
    - Ex. 40. (2 sig figs) 3.10 (3 sig figs)
  - Zeros captive between nonzero numbers are significant
    - Ex. 2604 (4 sig figs) and 3.4093 (5 sig figs)
  - Zeros that lead nonzero numbers are insignificant
    - 0.0045 (2 sig figs)

Significant Figures

How many significant figures are in each of the following numbers?

1. 3.04
2. 942
3. 6700
4. 0.100
5. 0.00408
6. 4500.
7. 5.20×10^7

Significant Figures

Round 29.95 cm to three significant digits.

A. 29.9 cm
B. 30 cm
C. 30.000 cm
D. 29.950 cm
E. 30.0 cm

Adding and Subtracting Numbers

1. Line the numbers up and perform the operation

$$\begin{array}{r} 37.24 \\ +\ 10.3 \\ \hline 47.54 \end{array}$$

2. Round to get the same number of digits after the decimal as the number with the <u>fewest number of digits after the decimal</u>

47.54 becomes 47.5

Adding and Subtracting Numbers

$$\begin{array}{r} 17.34 \\ -\ 0.14 \\ \hline \end{array} \qquad \begin{array}{r} 479.24 \\ +\ 34.4 \\ \hline \end{array} \qquad \begin{array}{r} 3.434 \\ -\ \ 0.05 \\ \hline \end{array} \qquad \begin{array}{r} 145 \\ +\ 0.002 \\ \hline \end{array}$$

Multiplying and Dividing Numbers

- When multiplying or dividing, the answer has the same number of significant figures as the number with the fewest significant figures

Multiplying and Dividing Numbers

A. 657×12
B. $5.200 \div 3.12$
C. 0.006×79
D. $500 \div 4.8$

Significant Figures

- Review
  - Adding and Subtracting deals with the number of **digits after the decimal**
  - Multiplication and Division deals with the total number of **significant figures**

Sig figs in mixed operations

$$\frac{56.16 - 51.1}{6.58}$$

$$(9.1 + 8.6) \times 26.91$$

Some Geometry

If a rectangle has width 5.623 m and length 18.4 m, (A) calculate the perimeter ($2l + 2w$) and (B) calculate the area ($l \times w$).

Significant Figures

Consider the following calculation.

$$\frac{4.010\ \text{g}}{(0.08\ \text{cm})^3}$$

How many significant digits should be in the final answer?

A. 1
B. 2
C. 3
D. 4

Significant Figures

Consider the following calculation.

$$\frac{4.010\ \text{g}}{(0.08\ \text{cm})^3} = \frac{4.010\ \text{g}}{(0.08\ \text{cm})(0.08\ \text{cm})(0.08\ \text{cm})}$$

How many significant digits should be in the final answer?

A. 1
B. 2
C. 3
D. 4