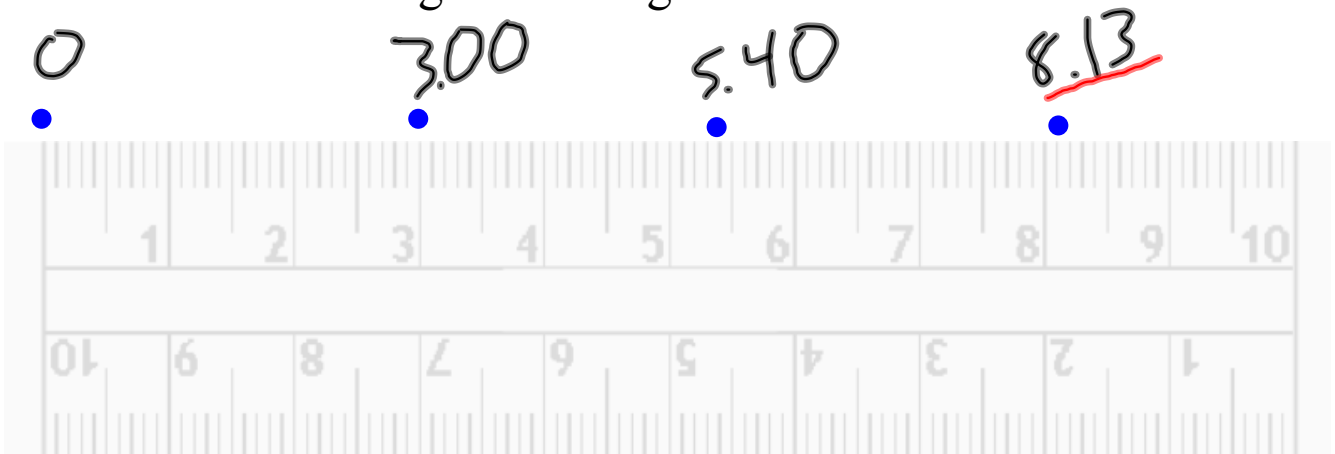


Lab is due tomorrow

*discussion*

# Fizix **Significant Digits** Physics

All of the certain digits, plus one, of a measurement are considered to be significant digits.



You need to communicate how confident you are in your measurements in science. There is an international agreement about the correct way to record measurements and this is using significant digits.

There are certain rules that must be followed when calculating significant digits.

# Significant Figures

## Rules for Counting Sig. Fig.

1. All non-zero digits are significant

1, 2, 3, 5, 6, 7, 8, 9      19      325      3.14

2. Zeroes

a) zeroes between non-zero digits are significant

Ex. 507

3 sig figs Sandwich rule      1001      4 sig fig

b) leading zeroes are not significant

Ex. 0.00004

1 sig fig

c) Trailing zeroes to the right of a number are significant **if the number has a decimal point**. If the number ends in zero and has no decimal point, we assume that the trailing zeroes are not significant.

Ex. 480.0 (4 sig figs)

Ex. 4800 (2 sig figs)

4.000000      7 sig figs

4,000,000.00      9 sig fig

How many significant figures in the following?

- a) 38.4703 mL - 6 sig. figs  
 b) 0.0052 g - 2 sig. figs  
 c) 0.05700 s - 4 sig. figs  
 d) 6.19 x 10<sup>8</sup> years - 3 sig. figs

619,000,000  
 6.19 x 10<sup>8</sup>

# Lets Try a Few

6  
significant  
digits  
(423.230)

2  
significant  
digits  
(0.000081)

8  
significant  
digits  
(34.000000)

3  
significant  
digits  
(687)

6  
significant  
digits  
(800076)

1  
significant  
digit  
(200 000)

## Significant Figures and Calculations

### 1. Multiplication and Division

The result of the operation is reported as having **as many significant figures as the measurement with the fewest significant figures**.

Ex. Find the area of a rectangle with dimensions of 6.221cm and 5.2cm.

$$A = l \times w$$

$$A = (6.221 \text{ cm}) \times (5.2 \text{ cm})$$

$$A =$$

Handwritten calculation showing the result of the multiplication and the application of significant figures:

$$32.352 \text{ cm}^2$$

The result is rounded to two significant figures, indicated by a circled "32" and a "2" above the second digit:

$$32 \text{ cm}^2$$

## 2. Addition and Subtraction

The result of the operation is reported to the **same number of decimal places as that of the term with the least number of decimal places.**

Ex. Find the total distance:

$$D_1 = 106.7\text{km} \quad D_2 = 14\text{km} \quad D_3 = 0.59\text{km}$$

$$\begin{aligned} D_{\text{total}} &= D_1 + D_2 + D_3 \\ D_{\text{total}} &= 106.7\text{km} + 14\text{km} + 0.59\text{km} \\ D_{\text{total}} &= 121.29\text{ km} \end{aligned}$$

121 km

Ex. 20.4  
1.322

+ 83  
-----  
104.722

105

**Determine the correct number of significant figures in each:**

**a) 3427**

**e) 0.000984**

**b) 0.00456**

**f) 0.502**

**c) 123 453**

**g) 3100.0 x 10<sup>2</sup>**

**d) 172**

**Solve. Use the correct number of significant figures for each answer:**

**a) 17.34**

**b) 9.80**

**4.900**

**- 4.762**

**+ 23.1**

**c) 3.9 x 6.05 x 420**

**d) 14.1 / 5 =**