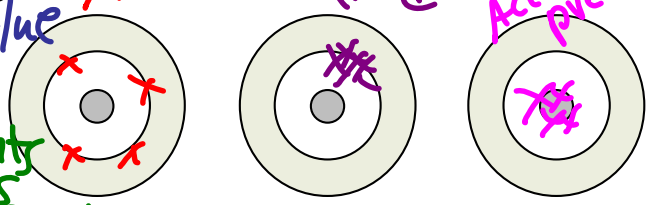
Unit 1: Introduction

3 – Sig Figs

Accurate (average)

Precise (not accurate)

Accurate + precise



Accuracy: is how close a measured value is to the accepted or correct value

Precision: how reproducible your measurements are. Numbers w/ more digits are more precise

- When making a measurement, the last digit is always uncertain
- All recorded data is considered significant, however the last digit is deemed uncertain
- A measuring instrument generally has a precision of... +/- 0.5 of its smallest divison

Ex.

Measure the width of the bench

The Sig Fig Rules

1) All non-zero numbers... are considered significant

Ex: 321 has 3 sig figs

2) Zeroes that occur... between digits are signficant

Ex: 1001 has 4 sig figs

3) In a non-decimal number... zeros to the right of other digits are NOT significant

Ex: 5200 has 2 sig figs

4) Zeroes to the left... of the first digit are not significant

Ex: 0.0085 has 2 sig figs

5) In a decimal number... zeros to the right of the last digit are significant

Ex: 0.2500 has 4 sig figs

Examples: How many sig figs are in each number?

1) 1500 2 2) 2021 4 3) 0.34 2 4) 0.0039 2

5) 50 000 1 6) 0.800 3 7) 0.000360 4 8) 1200.00 6

Multiplying and Dividing

- When multiplying or dividing numbers, our final answer is always ... rounded off to the least number of sig figs.

Ex:

350 x 1.15 = 4.0×10^2 (2, 3)

200.0 x 150 = 3.0×10^5 (4, 2)

0.002695 x 100 = 0.3 (4, 1)

Adding and Subtracting

- When adding or subtracting numbers, our final answer is always ... be expressed to the last digit found in BOTH

Ex:

25 + 57.65 = 83

0.6851 – 0.337 = 0.348

5.024 – 5.01 = 0.01

Worksheet 1.3 – Significant Figures

1) Counting sig figs: write down the number of sig figs each piece of data has:

a) 0.0021 m 2

b) 200,000 m^3 1

c) 21.200 s 5

d) 410 kg 2

e) 0.0002 s 1

f) 91.0001 m^2 6

2) Multiplication with sig figs:

a) 92.45 m · 1.01 m = $93.4 m^2$

b) 0.0024 N · 4.24 s = 0.010 N·s

c) 4000 kg · 2.001 m/s 8000 Kgm/s

e) 0.00698 m^2 · 100 cm = $0.7 cm \cdot m^2$

f) 2001 kg · 12.6 m/s = 25200 Kgm/s

g) 610 N · 4002 s = 2400000 N·s

3) Division with sig figs:

a) 12 m ÷ 31.2 s = 0.38 m/s

b) 69.4 kg ÷ 38.888 s = 1.78 Kg/s

c) 0.012 m^2 ÷ 0.0002 s = 60 m^2/s

d) 1800 kg ÷ 410 s = 4.4 Kg/s

e) 0.102 m ÷ 100 ms = 0.001 s^{-1}

f) 1001 m^3 ÷ 40 ks = 30 m^3/ks

4) Addition and subtraction with sig figs:

a) 14 m + 12.2 m = 2 m

b) 0.012 kg + 1.0046 kg – 0.0064 kg = 1.010 Kg

c) 12.46 kg + 9.82 kg – 6.666 kg = 15.61 Kg

d) 69.45 s + 19.3 s = 88.8 s

e) 200.1 m – 128.28 m = 71.82 m

5) Chain calcs with sig figs: write down the number of sig figs each piece of data has:

a) (0.045 m · 9.92 kg) ÷ 16.86 s = 0.027 mKg/s

0.45 mKg ÷ 16.86 s

b) (9000 m · 4.01 m) · 1.002 m = 40 000 m^3

40 000 × 1.002

c) (0.21 m · 6.23 s) · 1.002 m = 1.3 $m^2 \cdot s$

1.3 × 1.002

d) (18.01 m · 0.41 m) ÷ (14.62 kg · 12 s) = = 0.041 m^2/Kgs

$7.4 m^2$ ÷ 180 Kg·s