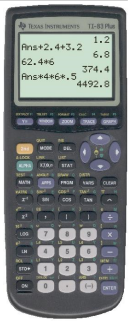
1.2 Scientific Notatin and Significant Digits

STANDARDS

1.3 I can determine the precision of a measurement by identifying and utilizing significant digits.



WARM UP!

Please do these problems in your notes to review.

1. Give the SI base unit of measurement for each of the following quantities.
   a. mass b. length c. time d. temperature

2. Convert the following numbers into scientific notation.
   a. 85,000,000 b. 0.00019

3. Put the following into decimal notation.
   a. 8.72×10^{-8} b. 3×10^{4}

WARM UP!

Please do these problems in your notes to review.

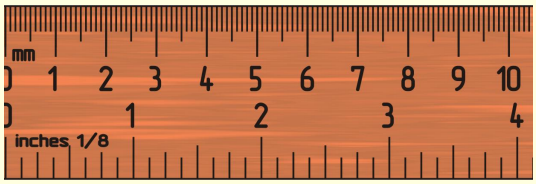
1. Give the SI base unit of measurement for each of the following quantities.
   a. mass kg b. length m c. time s d. temperature K

2. Convert the following numbers into scientific notation.
   a. 85,000,000 8.5×10^{7} b. 0.00019 1.9×10^{-4}

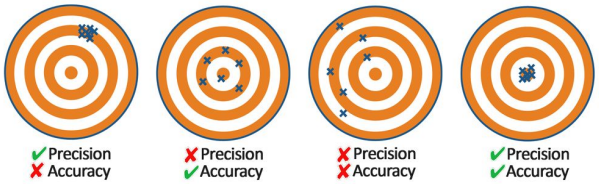
3. Put the following into decimal notation.
   a. 8.72×10^{-8} 0.0000000872 b. 3×10^{4} 30,000

MEASUREMENT

A **measurement** is a comparison between an unknown quantity and a standard.



PRECISION VS ACCURACY



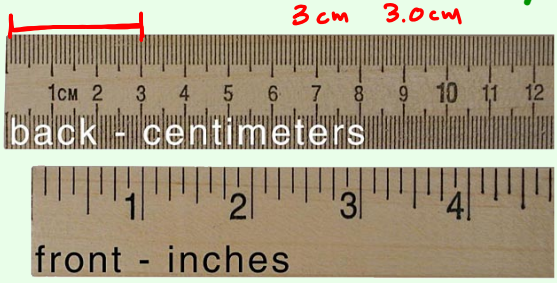
Precision refers to the closeness of two or more measurements to each other.

Accuracy refers to the closeness of a measured value to a standard or known value.

Precision vs. Accuracy

The precision of a measurement is 1/2 the smallest division of the instrument.

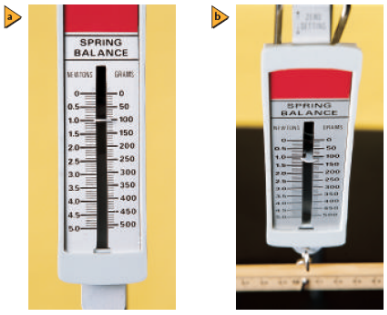
Precision vs. Accuracy



Parallax

Parallax is the apparent shift in the position of an object when it is viewed from different angles.

Parallax



WHY SIGNIFICANT DIGITS?

"A measurement without any knowledge of its uncertainty is meaningless!"

- Walter Lewin, MIT

SIGNIFICANT DIGITS

Two athletes are trying to decide who has a faster time in the 100 m dash. One runner states that his time was 11 s and the other runner's time was 11.0 s. What is the difference between their times?

10.6 – 11.4

10.96 – 11.04

SIGNIFICANT DIGITS

How many significant digits are there in each number?

1) 0.0860 m
2) 172,000 g
3) 1.7200×10^5 g

SIGNIFICANT DIGITS

All non-zero numbers are significant?

SIGNIFICANT DIGITS

Are all zeros significant?

- Leading? NEVER
- Tweeners? ALWAYS
- Trailing? SOMETIMES
  AFTER DEC. → YES
  BEFORE DEC → NO

SIGNIFICANT DIGITS

How many significant digits?

a.) 0.0860 m (3)
b.) 172,000 g (3)
c.) 1.7200×10^5 g (5)

8.34281 s

SIGNIFICANT DIGITS

Adding / Subtracting

The number of decimal places after addition or subtraction is equal to the smallest number of decimal places in any of the individual terms.

SIGNIFICANT DIGITS

Solve the following problem using significant digits.

(2) (1)
3.86 m + 2.4 m = 6.26 m

6.3 m

SIGNIFICANT DIGITS

Multiplying / Dividing

The number of significant figures after multiplication or division is equal to the number of significant figures in the least accurately known quantity.

SIGNIFICANT DIGITS

Solve the following problem using significant digits.

(4) (3)

409.2 km / 11.4 s = 35.89473684

35.9 $\frac{km}{s}$

35.89 $\frac{km}{s}$

HOMEWORK

Unit 1 Problems

(6-7)