Pakistan School
Kingdom of Bahrain

ASSESSMENT OF TOTAL UNCERTAINTY IN THE FINAL RESULT

Class 11

Objective

- Students will be able to differentiate:
- Uncertainty for Addition and Subtraction
- Uncertainty for Product and Quotient

Revision

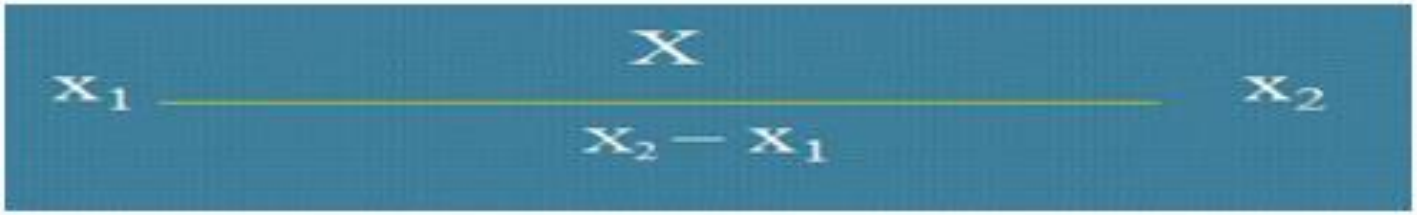
- Physics
- Base Units
- Prefixes
- Scientific form in the power of tens (x 10)
- Error
- Significant Figure
- Precision
- Uncertainty

ASSESSMENT OF TOTAL UNCERTAINTY IN THE FINAL RESULT

- To assess the total uncertainty present in any calculation, it is necessary to find the likely uncertainties in all the factors involved.

For Addition & Subtraction

- Absolute Uncertainties are added.e.g we determine the distance x by measuring the difference $x_1=10.5\pm0.1$cm & $x_2=26.8\pm0.1$cm
  - 10.5+26.8=16.3 0.1+0.1=0.2
    - The distance b/w these points is
      - $X=x_2-x_1=16.3\pm0.2$cm
  - b/w the two separate positions x_1 & x_2 .



Exercise

$x_1 = 10.5 \pm 0.5$cm &

$x_2 = 26.8 \pm 0.4$cm

The distance b/w these points is

$X = x_2 - x_1 = 16.3 \pm 0.9$cm

For Product and Quotient Rule

- Percentage uncertainties are added in multiplication & division e.g in Ohms Law,the uncertainties in voltage V,current I & then in resistance R is found as follows:
  - V=7.3±0.1volts & I=2.73±0.05 Amperes.
  - The %age uncertainty for V= $\frac{0.1}{7.3} X \frac{100}{100}$ =1.37 = 1%
  - & The %age uncertainty for I = $\frac{0.05}{2.73} X \frac{100}{100}$ = 1.83 = 2%
- Hence the total uncertainty in the value of R is (1%+ 2%) =3%.
- The result is calculated as $(R=\frac{V}{I})$ =R $\frac{7.3V}{2.73A}$ = 2.7ohms with a %age uncertainty of 3%.
  - By rounding of this result ,we get as R=6.2 ohms
  - 3% of 2.7 is = $(\frac{2.7}{} X \frac{3}{100})$=(±0.081= ±0.08Ω)
  - R=(2.7 ±0.08Ω)

Plenary: Question

- In Which rule “The uncertainties are added”
- For Addition and Subtraction Rule
- in which rule “The Percentage uncertainties are added.”
- For Product and Quotient Rule

Closure

- For Addition and Subtraction Rule : The uncertainties are added
- For Product and Quotient Rule : The Percentage uncertainties are added.

Home Work

- Apply least 2 Uncertainty in Every day life
- Or
- Make a chart about different uncertainty