BALANÇA

$M_1 = 41{,}03g$

$M_2 = 41{,}03g$

$M_3 = 41{,}03g$

$M_4 = 41{,}03g$

$M_5 = 41{,}03g$

TEORIA DOS ERROS

$$\overline{M} = \frac{M_1 + M_2 + M_3 + M_4 + M_5}{5}$$

$$\overline{M} = \frac{(41{,}03g)^5}{5}$$

$$\boxed{\overline{M} = 41{,}03g}$$

$\sigma_M = 0{,}1mm$ (incerteza)

desvio padrão = 0

pra massa?

Régua

$\overline{D_R} = 16{,}6mm$

$\overline{H_R} = 18{,}7mm$

$$\sigma_{AD_R} = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

$$= \sqrt{\frac{(15-16{,}6)^2 + (16{,}5-16{,}6)^2 + (16-16{,}6)^2 + (17{,}5-16{,}6)^2 + (18-16{,}6)^2}{5-1}}$$

$$= \sqrt{\frac{2{,}56 + 0{,}01 + 0{,}36 + 0{,}81 + 1{,}96}{4}}$$

$$= \sqrt{1{,}425}$$

$\sigma_{AD_R} = 1{,}1937 \simeq \boxed{1{,}2mm}$

$$\sigma_{AH_R} = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

$$= \sqrt{\frac{(20-18{,}7)^2 + (18-18{,}7)^2 + (19-18{,}7)^2 + (18{,}5-18{,}7)^2 + (18-18{,}7)^2}{5-1}}$$

$$= \sqrt{1{,}69 + 0{,}49 + 0{,}09 + 0{,}04 + 0{,}49}$$

$$= \sqrt{0{,}7}$$

$\sigma_{AH_R} = 0{,}837 \simeq \boxed{0{,}9mm}$

incerteza

$\sigma_D = \sqrt{1{,}2^2 + 0{,}5^2} = \sqrt{1{,}44 + 0{,}25} = 1{,}3mm$

$\sigma_H = \sqrt{0{,}9^2 + 0{,}5^2} = \sqrt{0{,}81 + 0{,}25} = 1{,}03mm$