Putting Into Practice

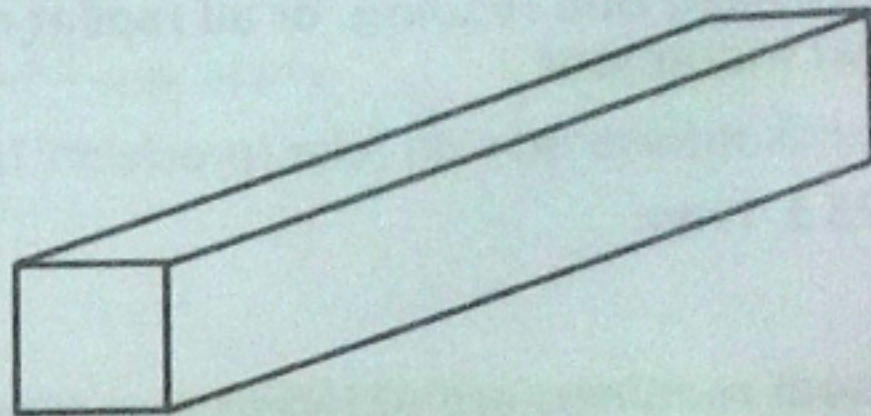Mass on balance - 1g precision:
471g

Length with ruler - 1mm precision:
300mm, 300mm, 300mm

Width with vernier caliper - 0.1mm precision:
14.9mm, 14.6mm, 14.5mm, 14.4mm

1. Calculate the absolute and percentage uncertainty in the mass measurement.

absolute $= \pm 1g$

$\% = \frac{1}{471} \times 100$

$= 0.212\%$

2. Calculate the average length and its absolute and percentage uncertainty.

average $= 300mm$

absolute $= \pm 1mm$

$\% = \frac{1}{300} \times 100$

$= 0.33\%$

3. Calculate the average width and its absolute and percentage uncertainty.

average $= \frac{14.9 + 14.6 + 14.5 + 14.4}{}$

$= 14.6 mm$

absolute $=$ ~~1mm~~ $\frac{0.5}{2} = 0.25mm$

$\% = $ ~~0.5~~ $\frac{0.25}{14.6} \times 100 = 1.71\%$

4. Calculate the cross sectional area of the square face and its percentage uncertainty.

$14.6^2 = 213.16 mm^2$

~~1mm²~~ $1.71 \times 2 = 3.42\%$

5. The formula for the density of the rod is: density = mass / (area x length)
What will be the percentage error in the calculated density? (No need to actually calculate the density.)

~~0.33 + 1.71~~ $0.33 + 3.42 + 0.212$ $= 3.962$

$= 4\%$