During Class Invention

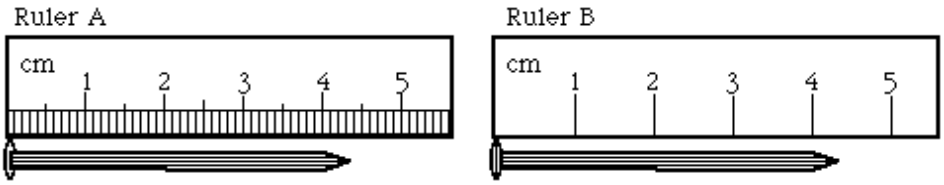
Measurement

Name(s) with Lab section in Group

_____

_____

1) What is the length of the nail according to ruler A and ruler B?



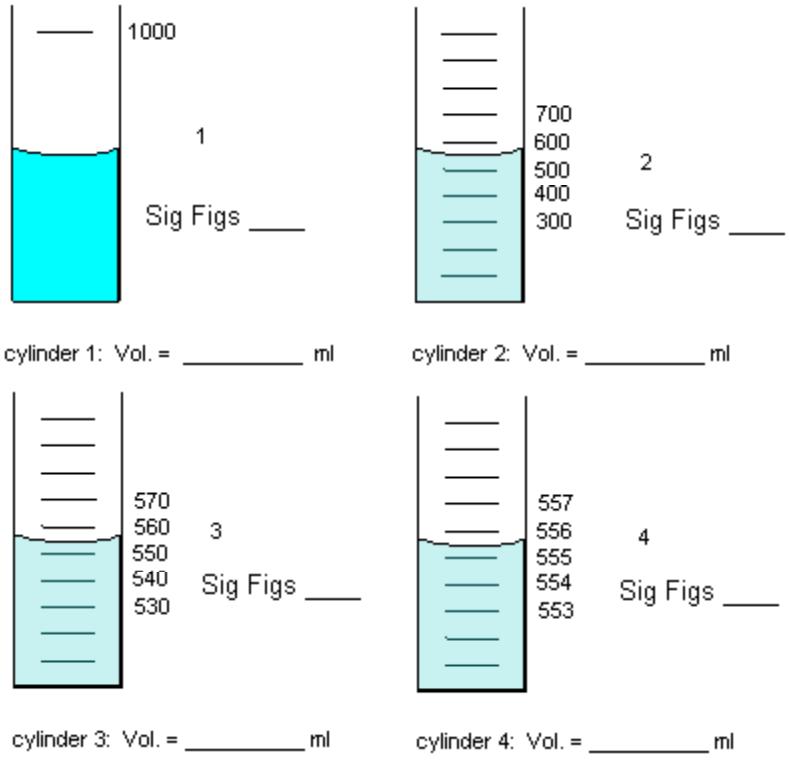
Which one is more precise?

Ruler A is more precise. Because Ruler A is better able to resolve smaller differences in the length of an object.

How many significant figures are in this measurement?

For Ruler A the length is 4.39 – 4.40 so 3 significant figures. For Ruler B the length is 4.3 – 4.4 so only 2 significant figures.

2) What is amount of water in each of these cylinders? Which one is more precise?



Cylinder	Volume	Significant Figures
1	600	1
2	550	2
3	554	3
4	555.5	4

How many significant figures are in each of these measurements?

3. a) The diameter of the sun is 1,390,000 km. In scientific notation this is: _
1.39×10^6 km___

b) What is the surface area of the sun in km^2 and in $mile^2$?
_____

area = $\pi r^2 = 3.1415 * (0.5 * 1.39 \times 10^6 \text{ km})^2 = 1.52 \times 10^{12} \text{ km}^2$

$$1.52 \times 10^{12} \text{ km}^2 \left(\frac{1000 \text{ m}}{1 \text{ km}}\right)^2 \left(\frac{100 \text{ cm}}{1 \text{ m}}\right)^2 \left(\frac{1 \text{ inch}}{2.54 \text{ cm}}\right)^2 \left(\frac{1 \text{ foot}}{12 \text{ in}}\right)^2 \left(\frac{1 \text{ mile}}{5280 \text{ ft}}\right)^2$$
$$= 5.86 \times 10^{11} \text{ mile}^2$$

c) What is the volume of the sun in km^3 and in $mile^3$? _____

$$\text{volume} = \frac{4}{3}\pi r^3 = 1.333 * 3.1415 * (0.5 * 1.39 \times 10^6 \text{ km})^3 = 1.41 \times 10^{18} \text{ km}^3$$

$$1.41 \times 10^{18} \text{ km}^3 \left(\frac{1000 \text{ m}}{1 \text{ km}}\right)^3 \left(\frac{100 \text{ cm}}{1 \text{ m}}\right)^3 \left(\frac{1 \text{ inch}}{2.54 \text{ cm}}\right)^3 \left(\frac{1 \text{ foot}}{12 \text{ in}}\right)^3 \left(\frac{1 \text{ mile}}{5280 \text{ ft}}\right)^3$$
$$= 3.37 \times 10^{17} \text{ mile}^3$$

d) The mass of the sun is 1.989×10^{30} kg. What is the average density of the sun in:

i) kg/km^3 ?

$$\text{density} = \frac{1.989 \times 10^{30} \text{ kg}}{1.41 \times 10^{18} \text{ km}^3} = 1.41 \times 10^{12} \frac{\text{kg}}{\text{km}^3}$$

ii) g/cm^3 ?

$$\text{density} = 1.41 \times 10^{12} \frac{\text{kg}}{\text{km}^3} \left(\frac{1000 \text{ g}}{1 \text{ kg}}\right)\left(\frac{1 \text{ km}}{1000 \text{ m}}\right)^3 \left(\frac{1 \text{ m}}{100 \text{ cm}}\right)^3$$

$$1.41 \times 10^9 \frac{\text{g}}{\text{cm}^3}$$

4. Calculate the volume of a backpack in cm^3, m^3 and in^3 whose dimensions are 22.86 cm x 38.0 cm x 76 cm.

volume = 22.86 cm x 38.0 cm x 76 cm = 6.6×10^4 cm^3

$$\mathbf{6.6 \times 10^4\ cm^3 \left(\frac{1\ m}{100\ cm}\right)^3 = 6.6 \times 10^{-2}\ m^3}$$

$$\mathbf{6.6 \times 10^4\ cm^3 \left(\frac{1\ inch}{2.54\ cm}\right)^3 = 4.0 \times 10^3\ in^3}$$