

Solving Problems in Science

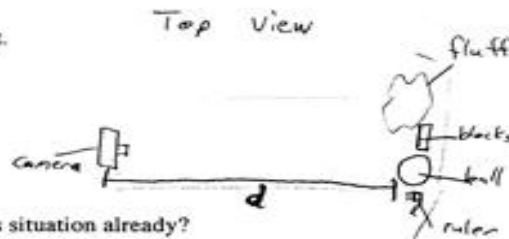
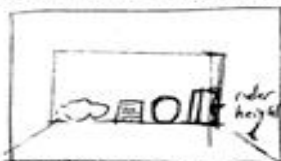
Name: Peter Ashton Date: 8/7/08

Any time you are asked to solve a problem, it may be difficult to decide where to start first. By answering these questions, you will organize your thinking with the goal of understanding how to proceed with a calculation. Never start doing math until you know where you're going!

Question: Write the question as clearly as you can.

What is the linear height of the ruler in the image?

Diagram: Draw a diagram and label it.



Known: What do you know about this situation already?

1 pixel = 7.9×10^{-4} radians
distance to detector = 3 meters

Want: What do you want to find out/ calculate? What particular quantity or quantities are you looking for?

the linear height of the ruler

Relationships to use: What are the mathematical relationships between quantities you want and know? State in words what these equations mean in terms of a physical situation.

$$\left(\begin{array}{c} \text{angular size} \\ \text{in radians} \end{array} \right) = \left(\begin{array}{c} \text{angular size} \\ \text{in pixels} \end{array} \right) \left(\frac{7.9 \times 10^{-4} \text{ radians}}{1 \text{ pixel}} \right)$$

$$\left(\begin{array}{c} \text{linear height} \end{array} \right) = \left(\begin{array}{c} \text{angular height} \end{array} \right) \cdot \left(\begin{array}{c} \text{distance to the detector} \end{array} \right)$$

Is there other information you need to obtain? If so, what? How will you find it?

angular height of the ruler in pixels \rightarrow use "ruler" tool in ds9

Convert units: Do I need to convert any quantities so I'm using consistent units of measurement for my equation? Use factor-label conversion...

angular height = 116 pixels

$$116 \text{ pixels} \cdot \frac{7.9 \times 10^{-4} \text{ radians}}{1 \text{ pixel}} = 1.16 \times 10^2 \cdot 7.9 \times 10^{-4} \text{ radians} = (1.16 \times 7.9) \times 10^{(2-4)}$$

$$= \underline{9.16 \times 10^{-2} \text{ radians}}$$

Now that you know all this, turn over and start calculating...