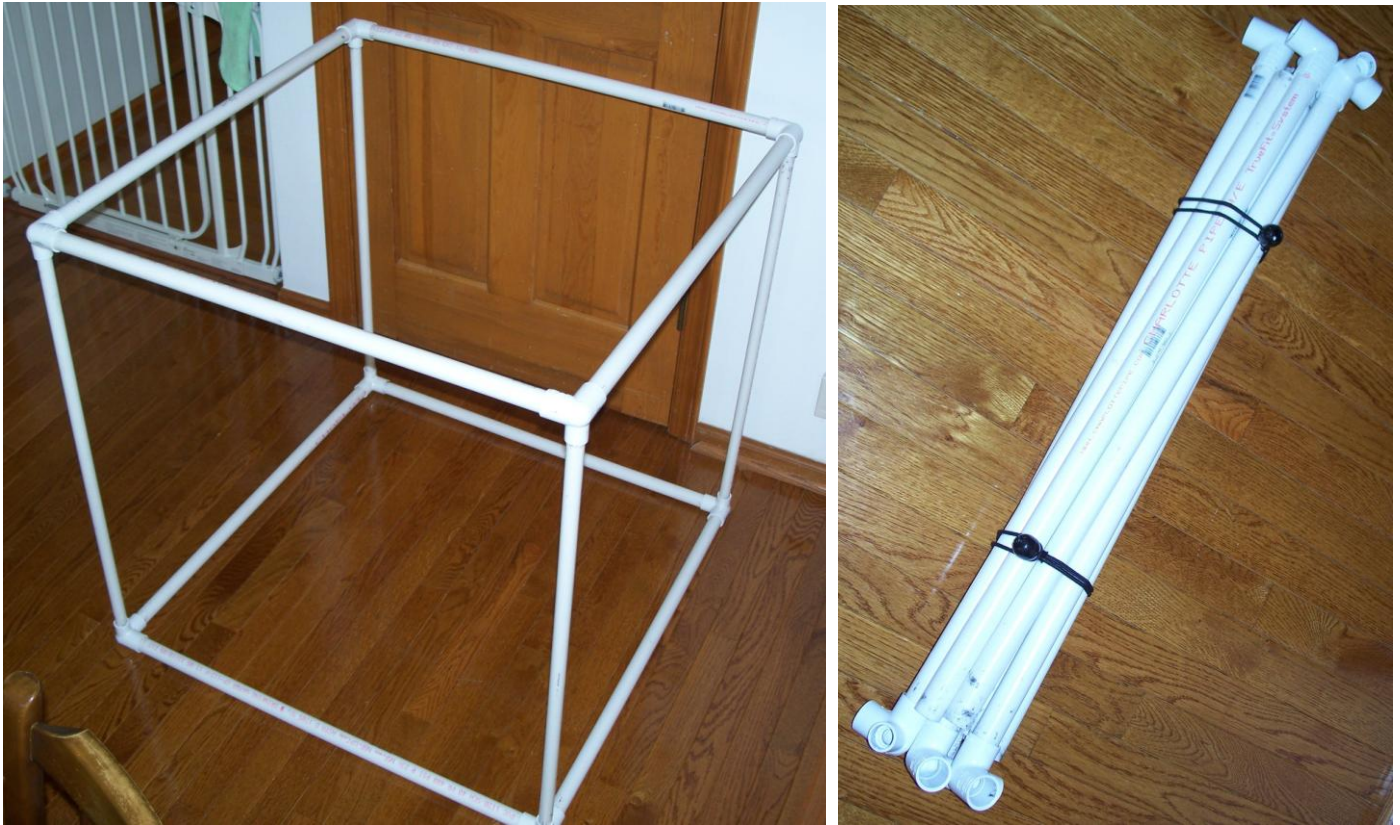


# Making a Measurement Box for Science Olympiad Events

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Many Science Olympiad events require large devices to be built prior to the competition that fit within certain dimensions. During the impound or event check in process Event Supervisors must have a way to check that these devices fit within the required size parameters. PVC pipes and fittings can be used to create a measurement box that is sturdy yet breaks down into a small size for portability, as shown below:



Materials needed (available at most hardware / home improvement stores such as Lowe's, Home Depot, Ace, etc):

- $\frac{3}{4}$ " by 10' S40 PVC pipe (~\$1.75 each, Lowes # 23973), quantity variable (see below)
- $\frac{1}{2}$ " by 10' S40 PVC pipe (~\$1.30 each, Lowes # 23966), quantity variable (see below)
- $\frac{3}{4}$ " x  $\frac{1}{2}$ " S40 Elbows (~\$1.25 each, Lowes # 24085), quantity 8
- $\frac{7}{8}$ " drill bit (~\$4.00, Lowes # 170979), quantity 1



8 of the sides of the box will be composed of  $\frac{3}{4}$ " diameter pipe and the remaining 4 sides will be made of  $\frac{1}{2}$ " diameter pipe. Thus the number of 10' lengths of each size you buy is dependent on the overall size of the box. For example, if the box dimension is a 75cm cube, then you need  $8 \times 75\text{cm} = 6\text{m}$  of  $\frac{3}{4}$ " pipe and  $4 \times 75\text{cm} = 3\text{m}$  of  $\frac{1}{2}$ " pipe. A 10' section of pipe is slightly longer than 3m in length. Thus you would need 2 pieces of  $\frac{3}{4}$ " pipe and 1 piece of  $\frac{1}{2}$ " pipe.

Construction consists of the following steps:

1. Cut the PVC pipes to the required length. Note this will result in the INSIDE dimensions of the box being equal to the required device dimensions, except for near the corner pieces where there will be a small 'lip' from the elbow as seen at right:



2. Use the  $\frac{7}{8}$ " drill bit to drill out the threads in the  $\frac{1}{2}$ " side of each elbow joint, as shown at right. Note the best way to stabilize the elbow during drilling is to insert  $\frac{1}{2}$ " pipe into the other 2 joints and clamp that pipe to your workbench:



3. When done, you should have a total of 20 pieces (8 corners, 8  $\frac{3}{4}$ " sides, and 8  $\frac{1}{2}$ " sides), as shown below:



4. Bind the parts with any available rope or bungee cord, transport to the event and then assemble!