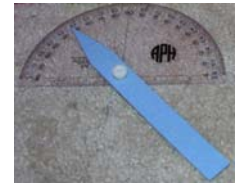


PVC Guide Holder Construction



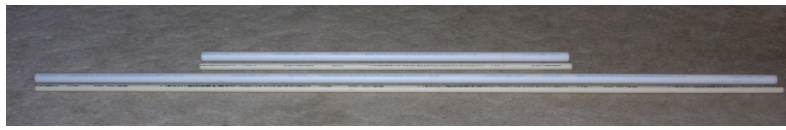
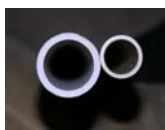
The purpose of the PVC guide holders are to:

- maintain a constant distance between the PVC tubes and impact material
- insure a consistent length and angle of decent each time the impacting object is released
- NOTE: Read all directions before starting.



The materials needed to construct the guides are:

Six 18 inch & four 4 inch 2x2 pieces of wood; one 9 inch 1x2 piece of wood; two 9 inch $\frac{1}{4}$ x $\frac{3}{4}$ inch wood trim; fourteen $1\frac{1}{2}$ inch 90 deg metal braces; two 1 inch 90 deg metal

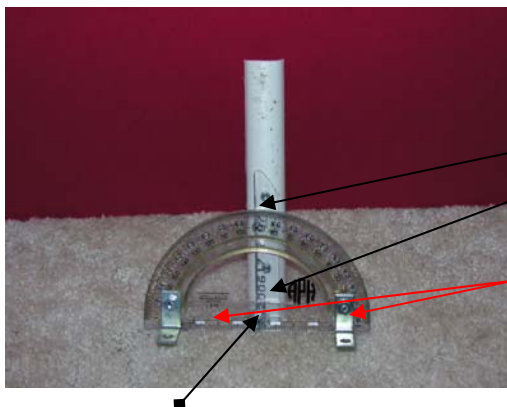


brace; one APH Braille protractor; one heavy plastic protractor the same size as the APH

model; one 7 inch piece of $\frac{1}{2}$ inch dia. PVC; one small C-Clamp; 2 button head M3x8 bolts, 2 3mm 0.50 metric hex nuts and 2 lock washers; 1 button head M4x10 bolt, 1 metric hex 4mm nut & lock washer to go through protractor arm at its pivot point; 2 metric hex 5x8 bolts, 2 metric hex 5x8 nuts and 2 lock washers to secure the 1 inch metal braces to protractors; clear drying epoxy glue; white house paint and different brightly colored tape.

While purchasing the above items you will also need to obtain one 40 inch length and one 79 inch length of $\frac{1}{2}$ inch dia. PVC pipe and the same lengths in 1 inch dia. PVC pipe. Since the piping is only sold in inches, you will have to shorten the pieces to measure one and two meters in length. The metric lengths make the problem calculations much less complicated.

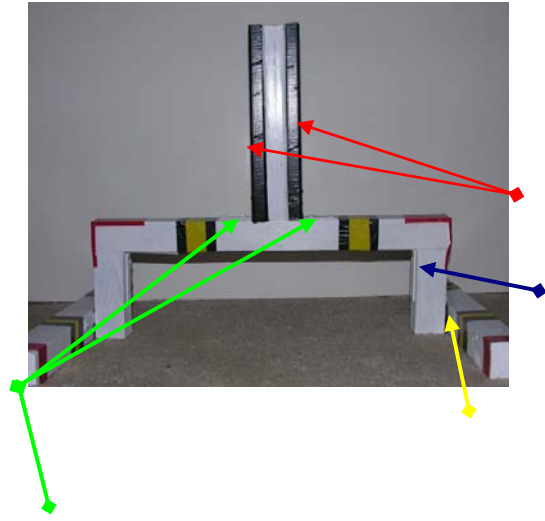
Once you have all of the materials, begin by taking the pointer off the APH protractor and gluing the two protractors together. While the glue is drying, cut the 7 inch piece of $\frac{1}{2}$ inch dia. PVC in half from end to end. When the glue has dried, drill a hole through the pivot point of the pointer and the APH protractor. Secure the button head M4x10 bolt with the 4 mm hex nut and lock washer through both protractors. Do not tighten to the point that the pointer arm doesn't move freely.



Next drill two holes the diameter of the two remaining small bolts through the pointer arm and the half section of PVC pipe as illustrated. Insert the bolts through the pointer arm and PVC securing with nut and lock washer on the PVC side. If the APH protractor is solid and not an arch design you will need to remove the pointer arm to secure the PVC support section.

Get the bolts, washers, and nuts for securing the 90 degree metal braces to the protractors and drill holes through the protractors just the diameter of the bolts. By bolting these through the two protractors, the entire unit becomes more stable.

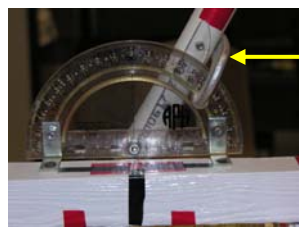
Set the protractor unit aside for now. Cut the wood into the stated lengths found in the material list. Old scrap wood will do just fine as you will be painting it later. Gather up the remaining metal braces and paint. All joints except for the trim wood will be connected using the metal braces. This allows simple disassembling for easy storage. Start by gluing the seven inch pieces of wood trim to the 9 inch 1x2. These pieces will keep the anchored PVC guides stable on the holder assembly. Next attach the 2x2 four inch pieces to each end of two 18 inch sections using the 1½ inch 90 deg metal braces. With this done, attach an 18 inch of 2x2 foot to the outside of the each 4 inch leg you just put on. Putting a 1½ inch 90 deg metal brace on either side of the leg will provide extra strength in the event the holder mechanism is inadvertently kicked. [Braces are not shown on this model]



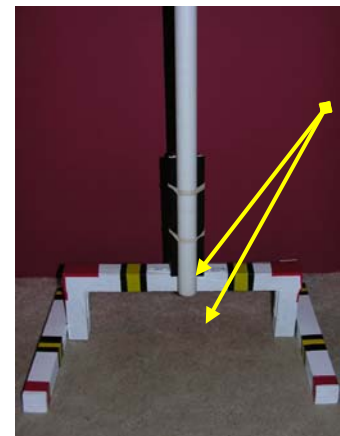
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You are now ready to place the PVC guide support with 1½ inch 90 deg metal braces to the middle of the cross beam section. Make sure that the edge of the 1x2 is flush the edge of the cross beam which will put the trim pieces extending past the cross beam's edge. The second holder assembly will not have the vertical 1x2 support piece. Aside from that the construction steps are the same.

Once you have the holders assembled, paint them white. When they are dry, take the holder without the 1x2 support and screw the protractor support assembly onto the cross beam 3½ inches in from one end. Using the bright tape cover the cross beams and feet of the holders so that they will be easily seen by your low vision students.



The C-Clamp serves two purposes. First it ensures that the same incline is maintained angled desents. Secondly, it provides support for the individual holding the PVC guides. However, the 2 meter PVC tubing should never be left standing by itself on either PVC guide holder.



The PVC pipe can be held firmly in place by large rubber bands placed over guide before putting the pipe in place. Both of these PVC guide supports were able to easily sustain 1½ inch impactor guides. These guidelines for constructing your own PVC guide holders are only a suggested way to go about it. If you have an easier method, by all means go for it. No matter how you construct your guides, have fun and may your students have fun and enjoyment as they learn about cratering!