

# Make your Own Monitoring Equipment

Adapted from: Utah Stream Team

[https://extension.usu.edu/waterquality/files/uploads/EducatorResources/EquipmentAndSupplies/list/Making\\_equipment.pdf](https://extension.usu.edu/waterquality/files/uploads/EducatorResources/EquipmentAndSupplies/list/Making_equipment.pdf)

## Hester-Dendy Sampler

A Hester-Dendy sampler is a fancy word for “bug hotel.” Aquatic macroinvertebrates will colonize the spaces between the rough-textured plates of the sampler. Anchor the sampler to the bottom of the stream or suspend in the water column (different placements will attract different populations). Allow at least 4 weeks to attract a sizable population. Wrap a fine mesh bag around the sampler when you remove it to investigate. This will catch any macroinvertebrates that float off of the squares. Also, remember to flag your sampler so you remember where it is.

<http://www.rickly.com/as/images/HESTERSQ.JPG>

### Materials

- 4 to 6 large plates (made of wood, cement, unglazed porcelain or anything rough and durable), 3 to 6 in. square and 1/8 in. thick.
- 1 eyebolt, 6 in long
- 15 washers
- 2 nuts
- Drill
- 1 cinder block
- String or rope to tie the sampler to a cinder block



### Directions

1. Drill a hole through the middle of each plate the size of your eye bolt and washers.
2. Stack plates on the eyebolt and separate with washers. Using the washers, vary the space between plates to provide for different habitats.
3. Secure the plates in place with a nut.
4. Using the string or rope, tie the sampler to the cinder block to weigh it down and hold it in place.
5. Remember to flag the sampler to help you relocate it.

## Underwater Viewer

An underwater viewer allows you to see what’s happening under the surface with surprising clarity. In shallow riffle areas the viewer works well for investigating substrate and macroinvertebrate habitat.

[http://www.canadiantreasureseekers.com/index.php?l=product\\_detail&p=1074](http://www.canadiantreasureseekers.com/index.php?l=product_detail&p=1074)

### Materials

- 1 foot section of 4-inch diameter PVC pipe
- 12”x12” piece of clear plastic shower curtain
- 1 (3-5 inch) hose clamp
- 1 flathead screwdriver
- Black paint
- Paint brush
- Duct tape
- Scissors



### Directions

1. Paint the inside of the PVC tube black to reduce glare when viewing.
2. Make handles out of duct tape. Duct tape handles onto the sides of the PVC pipe. Further secure the handles by wrapping extra duct tape around the pipe where the handle and pipe meet.
3. Cover one end of the PVC pipe with the shower curtain piece. Fold this up around the pipe.
4. Secure the shower curtain material against the pipe with the hose clamp.
5. Tighten clamp with screwdriver.
6. Wrap a piece of duct tape around the edges of the viewing end of the PVC pipe to provide a cushion against the user’s face.

## Trundle Wheel

Adapted from:

[http://westfield.sharpschool.net/UserFiles/Servers/Server\\_952612/File/2Departments/Title%201/family%20night%20handouts/trundle%20wheel.pdf](http://westfield.sharpschool.net/UserFiles/Servers/Server_952612/File/2Departments/Title%201/family%20night%20handouts/trundle%20wheel.pdf)

A measuring or trundle wheel is a great tool to use when measuring distances that are longer than a tape measure, yardstick, or meter stick and also for things that aren't straight. A trundle wheel encourages kids to use division, fractions, and other math skills while having fun, indoors or outdoors.

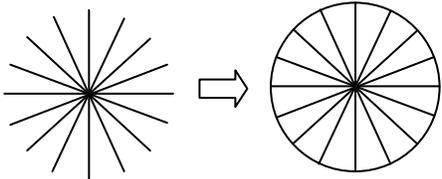
### Materials

- Heavy duty cardboard – at least 13 square inches
- 1 yardstick with a hole at the end
- 1 long bolt that will fit through the hole at the end of the yardstick
- 2 nut that will fit the bolt
- 2 wide washers that will fit the bolt
- Scissors or box-cutter
- Centimeter ruler
- Pencil
- Marker



### Directions

1. Have students figure out how to draw a 1 meter (100 cm) circumference circle on the cardboard. (Hint: use equation  $C = \pi d$ ). (Answer: the diameter (d) is 31.83 cm)
2. Draw intersecting diameters across the face of the piece of cardboard like you are drawing a huge asterisk (\*) always intersecting at one point. Do this many times until the shape of a circle emerges. Draw the outline of a circle that emerges connecting all the end points of the diameter lines.
 


3. Cut out your circle using scissors or a box-cutter.
4. Use a ruler to mark off centimeter marks along the circumference of the wheel and add 1 large mark with the marker along that circumference. Use a protractor to determine measurements according to the angles for another math challenge.
5. Poke a hole through the cardboard at the point in the middle of the wheel where all the diameters intersect.
6. Connect the yard stick to the wheel at this center point using the bolt, nuts, and washers making sure the washers are the hardware pieces touching the cardboard.
7. **Begin measuring!** Turn the wheel so the large mark is at your starting point. Use the yardstick as a handle and roll the wheel along the surface you are measuring. Each time the large mark on the wheel passes your yard stick you have measured 1 meter.