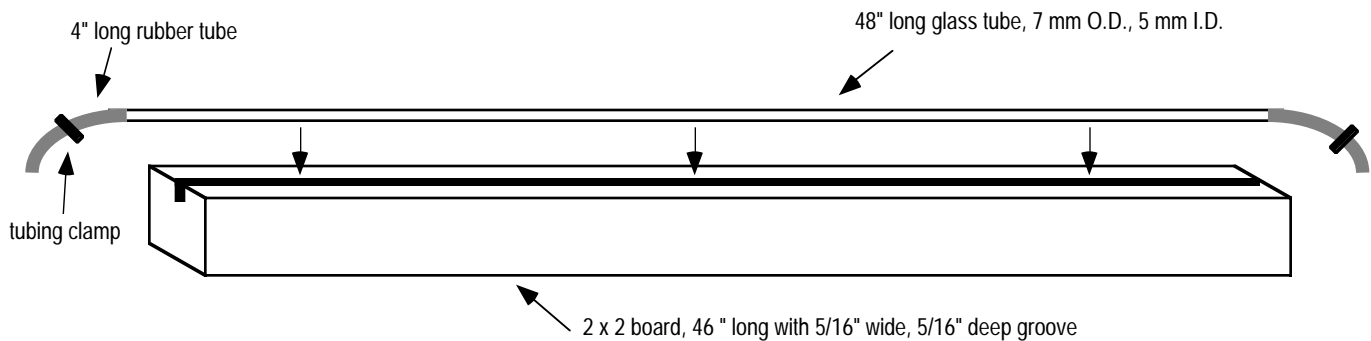


# Directions for Building and Sources for Obtaining Motion Lab Equipment

## BB in a Tube - Uniform Motion Apparatus

### Required Supplies (per lab setup)

- 1 - 46" long, 2 x 2 (1-1/2" x 1-1/2") board preferably with a 5/16" groove
- 1 - 48" long, 7 mm outside diameter, 5 mm inside diameter glass tube
- 2 - 4" long pieces of rubber tubing to fit snugly on glass tube
- 2 - tubing clamps
- 1 - BB



### Directions:

1. Rout a 5/16" wide groove down the center of the 2 x 2. (This is not absolutely necessary, but it protects the glass tubing much better than just laying the glass on the 2 x 2.)
2. Attach a piece of rubber tubing to each end of the tubing.
3. Insert one end of the tube into a beaker of clean water and "suck" clean water into the glass tube until filled.
4. Pinch off the top rubber tube and clamp it.
5. Invert the tube and insert the BB.
6. Clamp off the remaining rubber tube. If you have air bubbles in the tube, let them rise to the top of the tube. Add water with a dropper if necessary, and reclamp the tube.
7. Place the glass tube in the groove and secure it with rubber bands.

## Four Wheel Drive Flip-Over Dune Buggy - Uniform Motion Device

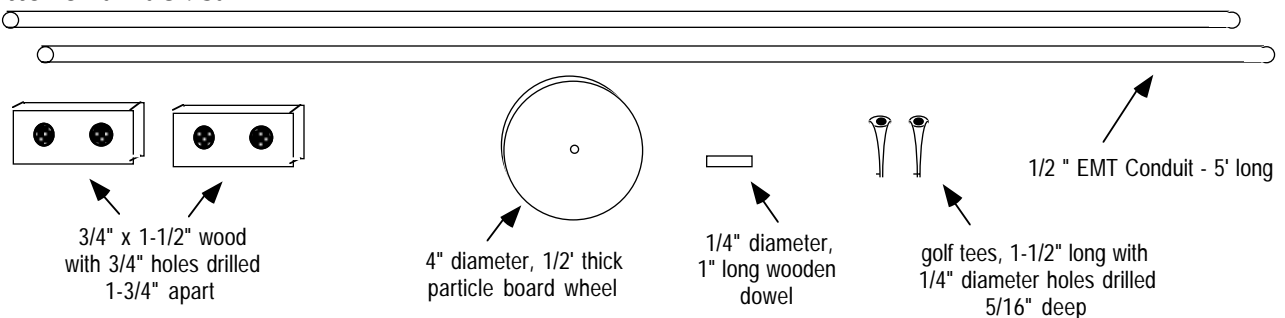
**Available from:** Kipp Brothers, Inc.  
240-242 S. Meridian St.  
P.O. Box 157  
Indianapolis, Indiana 46206  
1-800-428-1153

The flip-over dune buggy costs under \$4.00 from Kipp Brothers. Be sure to call for their catalog. You will find many items, mostly toys, which can be useful in your physics labs at fairly low prices.

## Wheel & Axle- Uniform Acceleration Apparatus

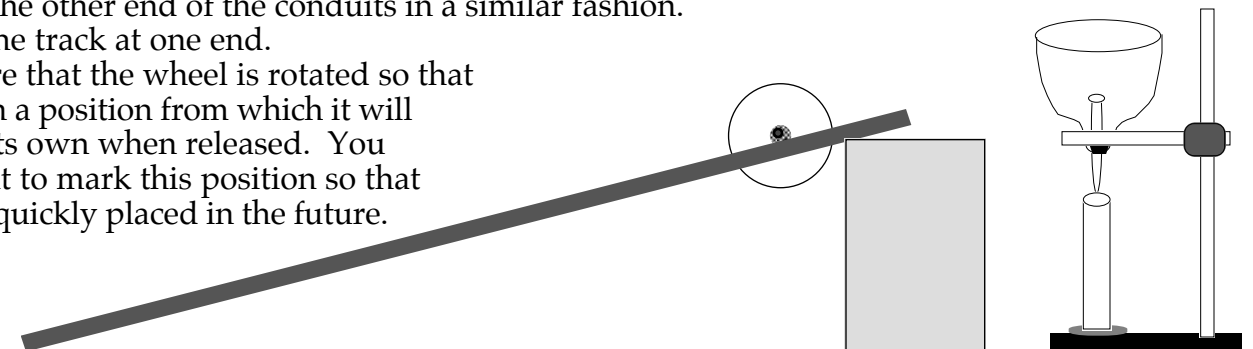
### Required Supplies (per lab setup)

- 1 - 4" diameter wheel cut out of 1/2" thick particle board using a 4" diameter hole saw with a 1/4" pilot drill
- 1 - 1" long, 1/4" diameter dowel
- 2 - golf tees with a 1/4" diameter hole drilled 5/16" deep down the center of the bowl of the tee. Cut the tees to approximately 1-1/2" long
- 2 - 4" long, 1 x 2 (3/4" x 1-1/2") boards. Drill two a 3/4" diameter holes with their centers about 1-3/4" apart.
- 1 - 10' long 1/2" inside diameter EMT conduit. This should be cut in half with a tubing cutter or a hack saw.



### Directions:

1. Glue the dowel in the hole in the wheel using elmer's white glue. Leave 1/4" on each side of the wheel.
2. Put a drop of glue in the hole in the golf tees and insert the ends of the dowel into the holes in the golf tees. Make sure that the golf tees are pushed tightly against the wheel.
3. Place one end of each of the conduits in one of the holes in the wooden block. Attach the other block to the other end of the conduits in a similar fashion.
4. Elevate the track at one end.
5. Make sure that the wheel is rotated so that it starts in a position from which it will start on its own when released. You may want to mark this position so that it can be quickly placed in the future.



## Water Clock

### Required Supplies (per lab setup)

- 1 - 2-liter soda bottle. Cut the top 6" of of the bottle
- 1 - 1-hole rubber stopper to fit in the bottle
- 1 - medicine dropper. Remove the rubber cap and insert the dropper into the rubber stopper.
- 1 - 100 ml graduated cylinder.
- 1 - Ringstand and test tube clamp

### Directions:

1. Plug the top of the dropper with your finger.
  2. Place the graduated cylinder under the dropper.
  3. Fill the reservoir with water.
  4. Remove your finger from the dropper.
- The volume of water collected in the grad cylinder is proportions to the time elapsed.

