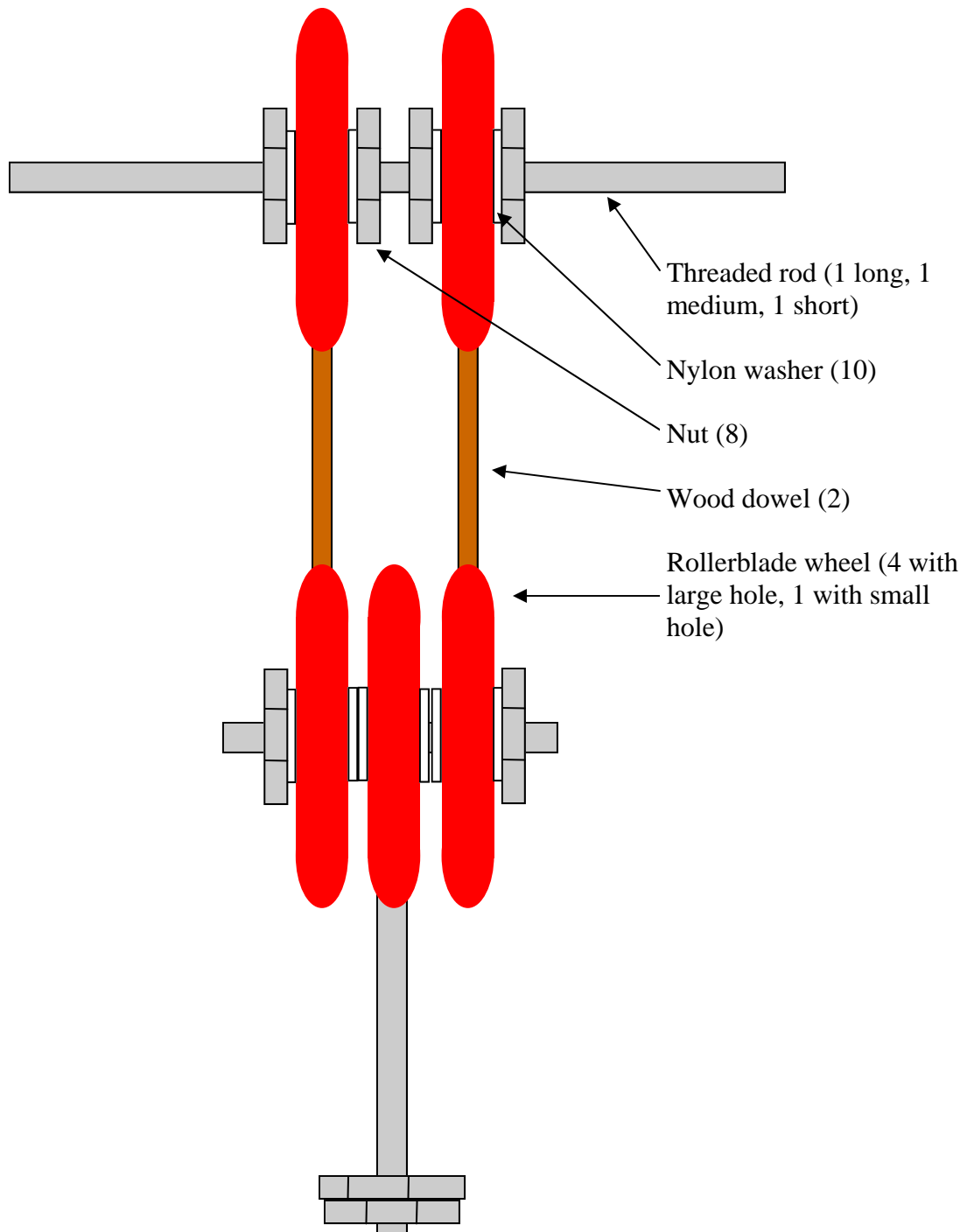


Syracuse University Saturday Morning High School Physics Teacher Workshops
Chaos Pendulum Make-and-Take 5/20/2006

Funds for this workshop are graciously provided by the John Ben Snow Foundation

You will construct two of the double pendulum pictured below. Mount both pendulums on the same main axle, the long threaded rod.



Assemble wheels

1. Insert a bearing on each side of all five wheels.
2. Twist the wood dowels into the holes of the four wheels with the large holes. Two wheels will be connected by a dowel. Make sure each pair is the same length. This is important!
3. Twist the medium threaded rod into the wheel with the small hole.

Assemble axles

4. The long threaded rod is the upper axle. Both pendulums will be mounted from this axle. Mount all four sets of doweled wheels with washers and nuts as shown on page 1. Only hand tighten the nuts at this time. Leave a larger gap between the center two wheels. You will need this gap to secure the axle later.
5. Mount the last remaining wheel between the two free wheels from step 4. Be sure to include two nylon washers between each wheel. Hand tighten the nuts.

Test your double pendulum

6. Carefully swing each pendulum. Look for unstable joints and for smooth operation. Adjust positions of nuts and pendulum lengths until pendulums move smoothly and quietly.

Lock nuts

7. Once you are satisfied with your pendulums, back off one nut. Apply a layer or two of Teflon tape, wrapping the tape in the direction of the threads, and tighten the nut. Repeat this for the remainder of the nuts. This prevents the nuts from loosening with use. If you prefer, you can clean the axle with acetone or alcohol and then use a thread lock compound instead.

Congratulations! In your classroom, support each end and the middle of the main axle with solid lab hardware. Start each pendulum with a small initial amplitude. The motions of each pendulum should look nearly identical. Compare that to the motions when the starting amplitude is large.

This make and take activity was adapted from Tom DeFayette and Gene Clark of the Trinity University Department of Physics. Their version, a single double pendulum, won a prize in the American Association of Physics Teachers 2000 National Summer Meeting Low Cost Apparatus Competition .