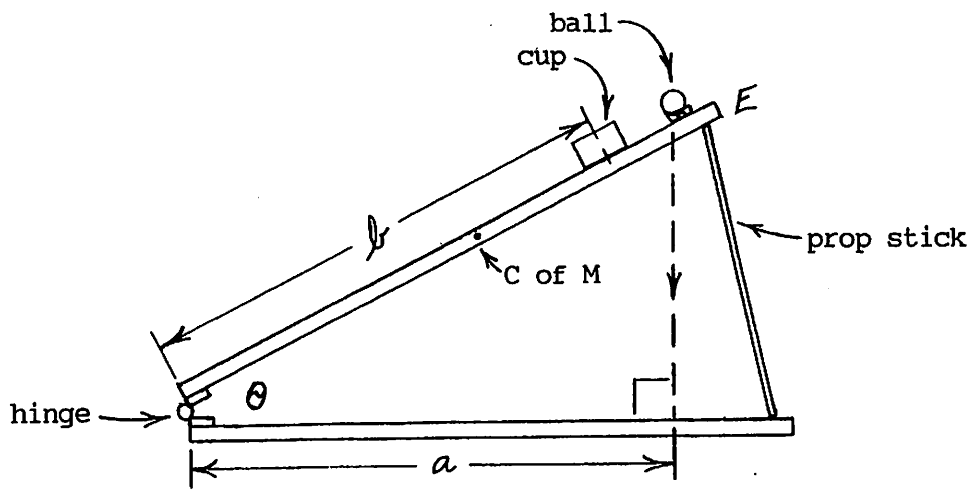
Topic; Freely falling bodies. Accelerations greater than g or 9.8 m/sec^2. Another discrepant event?

The problem: How can you get the ball from one cup to the other without touching the bottom board or the ball, without using any other surface but air, and accomplishing it in one attempt? If you have seen this done before, can you explain how it happens?

Set-up: Take two narrow boards and fasten a hinge at one end (see diagram). Open up the narrow boards and put in a prop stick. Mark the exact contact points of the prop stick on each board with a pencil or pen. Before each experiment, always place the prop stick on these same points or marks. Screw down a small, "shaped" cup to hold the ball. Drop a straight line from the ball's center down to the bottom board and mark with a pencil. Measure the distance "a" to the hinge pin. Now measure that same distance (a = b) on the top board from the hinge pin and mark. Place the center of the "catch" cup on the mark and screw the cup down. Remember, keep θ less than 35°. 25° to 30° works well.



Perform: Put the prop stick in its proper place. When the prop stick is swiped out quickly, the ball will accelerate downward at g . The center of mass of the top narrow board will also accelerate downward at g . However, the outer end E of the narrow board has an acceleration greater than g . Hence, the narrow board and E fall out from under the ball and E arrives on the bottom board sooner than the ball and in place to catch the ball.

(Written up by John B. Johnston, The Faraday Center; ~~RR 1 Box 188~~ 103 Creamery Rd., Livingston Manor, NY 12758 ; phone no. (845) 439 - 4706.)

$$S_L = \frac{1}{2}\text{"}g\text{"}t^2 \qquad S_s = \frac{1}{2} g t^2$$

$$t^2 = \frac{2S_L}{\text{"}g\text{"}} \qquad t^2 = \frac{2S_s}{g}$$

$$\frac{S_L}{\text{"}g\text{"}} = \frac{S_s}{g}$$

$$\text{"}g\text{"} = \frac{S_L g}{S_s}$$

Note: See TPT, Vol. 38, Jan. 2000, p. 54 & 55.