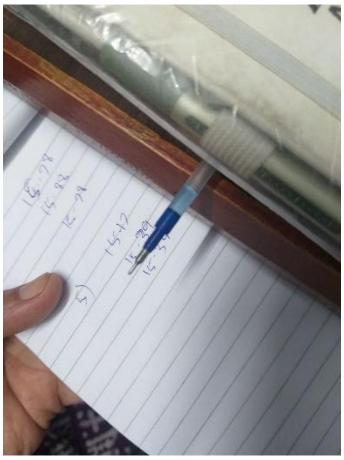
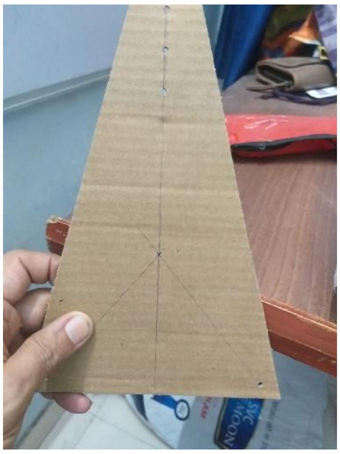
This experiment was conducted at home during the COVID-2019 lockdown with equipment at home. It included a cardboard cut out with paper-cutter from milk carton. Holes were drilled using a screwdriver set tool and needle. The cardboard was suspended using an old ballpoint refill tip, suspended from a table using book as weight. This can be seen in figures.



The last picture indicates the centre of mass of the object. Let h be the length of the triangle from the top most tip to the base and b be the width of the base. A triangle which oscillates around the axis passing through the tip, moment of inertia can be calculated using the formula

$I = \int \rho r^2 dxdy$ where $r^2 = x^2 + y^2$ where x goes from 0 to h and y goes from –xb/2h to xb/2h.

Then $I = \rho \int \int (x^2 + y^2)\, dxdy = \rho \int x^2 [\left(\frac{2bx}{2h}\right) + \frac{1}{3}\left(\frac{bx}{2h}\right)^3]$dx

Upon integrating, I around axis passing through the tip of the triangle is equal to

$I = \rho\{\frac{bh^3}{4} + \frac{b^3 h}{48}\}$ But the density of the material is given by $\rho = \frac{2M}{bh}$

So I around the axis at the tip is $I_t = \frac{M}{24}(12h^2 + b^2)$

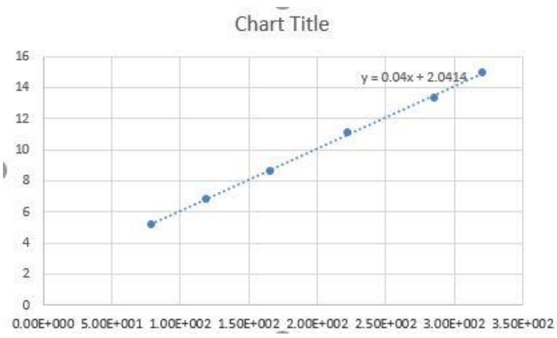
But by parallel axis theorem, $I_t = I_c + mr^2$ where I_c is the moment of inertia around axis passing through the centre of mass and r is the distance between the tip and CM which is $\frac{2h}{3}$ and hence $I_c = I_t - \frac{4}{9}Mh^2$ giving $I_c = \frac{M}{72}\{4h^2 + 3b^2\}$

For the triangle M =10g (assumed as there was no way to measure the mass accurately at home) h= 28.2 cm and b = 15.8 cm, giving **I = 545.8 g-cm^2.**

After you take the data using the oscillations, and plot the graph of hT^2 vs h^2 to get the intercept. The intercept gives the value of K, radius of gyration about the CM and I about the axis of rotation, passing through CM is MK^2.

During the lockdown days of COVID 2019, data was taken for the 6 holes on the cardboard triangle. The data of h (in cm) and t (in seconds) for 20 oscillations is given in the table below.

h	t_1	t_2	t_3	Avg t	T
cm	s	s	s	(for 20 osc)	s
17.9	18.48	18.35	17.97	18.3	0.9
16.9	17.84	17.65	17.77	17.8	0.9
14.9	16.99	17.44	17.23	17.2	0.9
12.9	16.4	16.33	16.33	16.4	0.8
10.9	15.78	15.88	15.78	15.8	0.8
8.9	15.17	15.34	15.39	15.3	0.8



After plotting hT^2 vs h^2 one gets intercept of 2.04 ±.36 (the correct way to write this is 2.0 ±.4). which translates to moment of K^2 = 51±9 cm^2 or moment of Inertia as

I_c = **510 ±90 g-cm^2**.

The value of g calculated from the data is **g = 988±57 cm/s^2**.