A) Create a calibration curve of temperature versus resistance, using the numbers stamped on the apparatus. You need the values ranging from 16 to 27 C°.
Plot T versus R and find the best trendline equation. (exponential or logarithmic)

B) Measure the diameter of the drum using a caliper, and its mass, with errors.

1. Measure the mass of the weight you suspend from the cylinder. (From 5 to 6 kg) with errors.
2. Measure the approximate room temperature by using the **thermistor** and the table stamped on the side of the crank.
3. The heat capacity of Aluminum is 0.215 cal/g°C.
4. Cool the cylinder to about 5 to 7 degrees below room temperature, making use of a plastic bag which you should label with your name, and the ice.
5. Set the DMM to Ohms so that you can measure values between 101 and 200 Ohms. Make sure that the contacts of the leads actually connect to the conducting rings of the drum.
6. Start cranking the handle and record the resistance every 10 cranks. Do this until the resistance corresponds to a temperature approximately eaqual to the same amount above room temperature as you started below. For example: if room temperature is 20 degrees do your cranking between 14 and 26 degrees.
7. Repeat this experiment and record the resistances every ten turns as before.
8. In Excel create a column with the mechanical energy corresponding to about 240 turns, in increments of 10.

$$E = \pi \cdot d \cdot M \cdot g \cdot n \tag{1.1}$$

$$\frac{\Delta E}{E} =$$

C)

1. Create a column with your resistance measurements. Use the adjacent column to calculate the temperature, using the equation from part A.
2. Create another column in which you calculate the **incrimental amounts of heat transferred** per 10 subsequential turns.
3. Create another column, in which you calculate the **cumulative heat transfer**.
4. Use Excel to plot the **cumulative energy in Joules on the y-axis, versus the cumulative heat transfer in cal on the x-axis**.
5. Find the equation of the graph, which is linear. You should get 4.186. (If you invert the axes you get 1/4.186
6. Calculate the difference of the slope in your experiments and the ideal value of 4.186. For each result below 1% you will get up to 1 extra points. (If both your measurements are better than 1%, you get 2 extra points.)