# Intermediate Deliverables 1

Gather several uniformly prefabricated wood structures (Approximately 2’ X 2’ X 2’).



Gather building materials, and decide what structures to building. Some suggested materials include

* Cardboard
* tape
* utility knives
* scales
* micrometers
* digital cameras
* tape measure
* spray-paint (black and white)
* gallon-size containers of water
* foam board insulation
* plexi-glass

Assign groups of students to the following tasks for the first day of the project:

* Assemble Structures
  + Number the base of each structure (i.e. 1-12) and indicate which face will align with North (using duct tape)
  + Record overall dimensions of each box (overall) and assigned building materials
  + Cut and prepare building materials for assembly to each structure
  + Assemble with all faces of the box, except for the front/south face
* Micro-computing
  + Test and Calibrate Micro-computing software and hardware (i.e. Vernier, Pasco, Arduino) before adding to assembled structures
  + Label cables, probes (temperature, illumination) and hardware
  + Calibrate Probes
* Design
  + Sketch (technical) and describe mounting for each box type / confirm probe location and criteria with instructor temperature probes should be:

1. mounted to the top surface to determine roof temperature
2. hung from the top surface and located at the middle of the structure to determine air temperature
3. located under/in/on a thermal mass,
4. light probes should be centered in front of windows angled up at 30o.
   * Note which probes correlate to which surfaces
   * Confirm that devices are appropriately powered and sketch a layout for each structure.

* Data
  + Setup a shared accessible document (i.e. Goodle Docs) and format appropriately any observation or measurements that need to be documented



The instructor should confirm that probes are mounted appropriately, structures are assembled and appropriately aligned, and data collection is functioning correctly.

Students should document the setup in preparation for the experimental section of their technical report.

# Intermediate Deliverables 2

The instruction should assign each student 2-3 different structures for their technical report. In preparation for students to develop their mathematical models, students should:

1) Import collected data into a MATLAB readable format.  Create an appropriately, annotated table of such data.  Plot probe data (Temperatures and Illumination) versus time.  Note uncertainty, units, and significant figures.

2) Import local NOAA weather station data into a MATLAB readable format.  Plot daily average temperature over the course of a previous year.

3) Calculate a MATLAB model for the collected temperature (and light) data.  Note linear regression values.

4) Publish data and plots as \*.pdf files.  Submit these files.