

TIPS –Model Solar Homes Design/Build

1. For many designers—students, teachers, architects—it is helpful to use three dimensional objects, such as blocks, while experimenting with a design. So: a. Start with principles and an idea of the climate for which you are designing; b. Experiment with blocks; c. Draw; d. Build the model.
2. A solar home design should be optimized for year round performance: it should not only use the sun to heat the home in the winter, it should also be designed to keep the home cooler in the summer. This is accomplished through shading and eaves. Thermal mass and insulation improve the performance of a home in all four seasons. For example, thermal mass stores warmth for use in the winter evenings and it absorbs excess warmth in the summer to maintain coolness in the summer.
3. Make the model more interesting by using a variety of materials. Glass tubes, stone, tile or clay are nice for representing thermal mass. Solar electric panels can be incorporated into the roof. Some students have even incorporated straw and cob into their structures. Other materials include cardboard, wood, plaster, and clear plastic.
4. Attend to landscaping. A good solar home also makes strategic use of such things as trees, earth, etc to provide for better year round home comfort. Model makers may want to enlarge the base of their model to create room for some representative landscaping features.
5. In the written description of your model note the location and climate that the home is being designed for. Example: Oakland, CA , Latitude = 38 degrees. Climate description: temperate moderate climate, cooling not an issue. For your area try doing a websearch using google.com and key words “climate yourcityname” to find a site that will provide information on yourcityname climate description.
You can find **your latitude** here using your zip code or city name.
<http://www.census.gov/cgi-bin/gazetteer>
6. Scale. We recommend using a scale of anywhere from ¼ inch = one foot to ½ inch = one foot. Note your scale in the write up of your model.
7. Orientation and angle. Note which direction is South on your model. In your write-up you may want to address the summer, spring/fall, and winter solar angles and how your design takes these into account. In the box below is a formula for calculating the Sun Angles, at noon, for this different times of the year. You can also create your own Sun Angle chart to view same information at this University of Oregon website. <http://solar.dat.uoregon.edu/SunChartProgram.html> .
A how-to-read sample chart is posted here. www.solarschoolhouse.org/pdfs/ssh/sun-chart-example_38lat.pdf

Sun Angle at Noon at these times of the year:

$90 - [\text{yourlatitude} - 23] = \text{Summer Solstice (June 21}^{\text{st}}) \text{ Sun Angle}$

$90 - [\text{yourlatitude} + 23] = \text{Winter Solstice (December 21}^{\text{st}}) \text{ Sun Angle}$

$90 - \text{latitude} = \text{Spring/Fall Equinox Sun Angle (March 20 Sep 20)}$

Check these numbers against the Sun Angle chart for your city.

8. In judging your model the judges will use the rubric (attached) as well as noting how interesting and innovative your design is. They will also take note of the materials that go into the model and how neatly the work is executed.

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9. Incorporating Solar Electric features. Use the solar cell, motor and fan/wheel provided within your home design, if possible. Make sure to orient the panel in the best direction.

10. Incorporating Solar Hot water features. Incorporate a batch type, ICS, or other type of solar hot water system for your home. Does not need to be a functioning model.

Check this site for a primer on different types of solar hot water systems.

<http://www.azsolarcenter.com/technology/solarh20.html>