

# Solar Structures

## **Student Worksheet: Design a Passive Solar House**

You are a team of engineers who have been given the challenge to design a solar house. If the activity is being conducted during the cooler months, the goal is to increase and maintain the internal temperature of the house by as much as possible. If this activity is being conducted during the warmer months the object will be to limit temperature increase as much as possible. The house must have 4 walls, at least four windows and 2 functional doors, and a roof. It must be at least 10 cm high, 10 cm wide and 25 cm long. Your design must also include a way to hold the thermometer inside the structure so it can be easily read.

### Planning Stage

Meet as a team and discuss the problem you need to solve. Then develop and agree on a design for your solar house. You'll need to determine what materials you want to use.

Draw your design in the box below, and be sure to indicate the description and number of parts you plan to use. Present your design to the class.

You may choose to revise your teams' plan after you receive feedback from class.

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## Student Worksheet (continued): Design a Passive Solar House

### Construction Phase

Build your solar house. During construction you may decide you need additional materials or that your design needs to change. This is ok – just make a new sketch and revise your materials list.

### Testing Phase

Each team will test their solar house. Place your solar house in the sun at the orientation decided on by the team (use your compass). Use the thermometer to measure the internal temperature of your house every 3 minutes for 12 minutes. Then bring your house into the shade and measure the temperature every 3 minutes for another 12 minutes. Be sure to watch the tests of the other teams and observe how their different designs worked.

### Evaluation Phase

Evaluate your teams' results, complete the evaluation worksheet, and present your findings to the class.

Use this worksheet to evaluate your team's results in the “Solar Structures” Lesson:

1. Did you succeed in creating a solar house that could increase and maintain its temperature or keep cool (depending on the time of year)? If not, why did it fail?
2. Did you decide to revise your original design or request additional materials while in the construction phase? Why?
3. Did you negotiate any material trades with other teams? How did that process work for you?

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## Student Worksheet (continued): Design a Passive Solar House

4. If you could have had access to materials that were different than those provided, what would your team have requested? Why?
  
  
  
  
  
  
  
  
  
  
  
  
  
5. Do you think that engineers have to adapt their original plans during the construction of systems or products? Why might they?
  
  
  
  
  
  
  
  
  
  
  
  
  
6. If you had to do it all over again, how would your planned design change? Why?
  
  
  
  
  
  
  
  
  
  
  
  
  
7. What designs or methods did you see other teams try that you thought worked well?
  
  
  
  
  
  
  
  
  
  
  
  
  
8. Do you think you would have been able to complete this project easier if you were working alone? Explain...
  
  
  
  
  
  
  
  
  
  
  
  
  
9. What advantages does passive solar building design have?
  
  
  
  
  
  
  
  
  
  
  
  
  
10. What drawbacks does passive solar building design have?