Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Lesson 7: Material R-value**

The material R-value of a building is related to insulation. To determine the R-value you must measure the depth of the material and divide it by how well the heat conducts.

**Doing the Science**

1. Start the Sunny Shelter Simulation by clicking on the “Sim” tab.

2. Make the following selections:

* House Size: Small
* Sheltering: Earth Sheltered
* Window Direction: North Facing
* Window Size: Small
* Window Tint: Present
* Thermal Mass: Low
* Material R-value: 10
* Season: Summer

3. Click on the Design House Now button.

4. The Energy Usage Thermometer is to the right of the image. Record the value in Table 1 below.

5. Click the Design Menu button to return to the main screen.

6. Repeat steps 2-5 but change Material R-value to 20 and then 40 until you have measured all three values.

**Table 1.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Material R-value** | 10 | 20 | 40 |
| **Energy Usage** |  |  |  |

**Do You Understand?**

1. How does R-value affect energy efficiency?
2. Poured concrete has an R-value of 0.08, whereas cardboard has an R-value of 4. Which of the following would most likely be the R-value of wood panels?
3. 0
4. 2.5
5. 5
6. 10