

Investigating Model Car Materials

Objective

Students will evaluate materials for suitability to construct a model solar car.

Materials

- 2 - 1" diameter dowels or sticks
- Sheet of plain paper
- Sheet of cardboard (1/16" thick)
- Sheet of corrugated cardboard
- Sheet of foam-core board
- Sheet of lightweight plastic
- Small weights or coins
- Scale

Procedure

Instruct students to follow these steps to test various materials for their suitability in constructing the model solar car:

1. Cut each sheet of material to the same size. Weigh each one and record its weight.
2. Place the dowels about 6" to 8" apart on a flat surface. Maintain the same distance for each of the following tests.
3. Place the sheet of plain paper across the dowels, then place a weight in the middle. Note what happens. Add additional weights one at a time and record how much weight the material can hold before it begins to sag or break.
4. Repeat step 2 with each of the other materials.
5. Try two thicknesses of the same material and repeat the application of weights. Note any difference in how the material responds.
6. Vary the shapes of the materials by folding into a U or a fan (keep the size and weight of the material constant) and repeat the application of weights.
7. Try the corrugated cardboard with ribs running parallel and perpendicular to the dowels. Note what happens in each case.

8. Compare the results for each type of material. Which would be best to use in constructing your solar car? Why?

9. Select the material you think would be best to use in constructing the car.

Place it on the dowels and experiment with placement of the weights by moving the weights to various positions, e.g., halfway point, off to the side, over the dowels. Note any differences in how the material responds. How could this be relevant in the construction of your car?

For Discussion

- At what positions do the weights have the least affect on the shape of the material?
- Would the extra strength of a double thickness of your material be worth the added weight?
- Can you combine materials to achieve the desired performance?
- What effect does folding have?
- Does it matter if the material is placed in a parallel or perpendicular direction with respect to the dowels?
- Why is corrugated cardboard used more frequently for things than the same thickness of simple cardboard?
- Why would the weight of the material you use for your chassis make a difference to the performance of the solar car?

Adapted from materials created by Rick Butchart for the Chimacum School District in Washington; used with permission.