

**Grade Level:**  
All

**Activity Time:**  
30 minutes

**Preparation Time:**  
10 minutes

*Adapted from  
<http://pbskids.org/zoo/activities/sci/gumdropdome.html>*

**The Challenge:** Imagine you are a structural engineer and you must design and build structure that can hold the most weight using only gumdrops and toothpicks.

### Materials:

- 1) 50 toothpicks
- 2) 30 gumdrops
- 3) 1 paper plate
- 4) Gumdrop Dome handouts (optional)
- 5) Weights to test the strength of the dome structures (weights, books, etc. Something that can hang from the structure)

### Directions:

#### Introduction

1. Explain how forces can act differently on different shapes.
2. Have your child make some simple shapes out of toothpicks and gumdrops and test how strong they are. Have your child make a square and a triangle and then compare each ones' strength. Your child should see that the triangle is the strongest.
3. Explain how and why dome structures are built the way they are. Show some pictures of real domes. Make sure to include pictures of geodesic domes (those built from a network of triangles).

#### Brainstorm/Design

4. Introduce the challenge to your child. Explain to them that they will have 30 gumdrops and 50 toothpicks to build the strongest dome that can hold the most weight.
5. Brainstorm ideas with your child about how they might build their domes.

#### Build and Test

6. Give your child their materials.
7. If your child seems stuck, pass out the Gumdrop Dome handout. Let youth use this handout as a resource guide.
8. Allow 30 minutes for your child to design and build their domes.
9. Once finished, both of you can test the strength of their dome design by adding weights until their structure fails (collapses).

#### Reflection and Discussion

10. Once your child has completed the challenge, spend some time

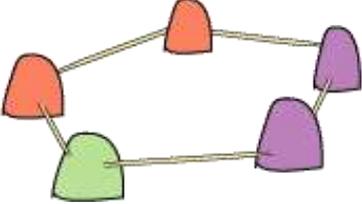
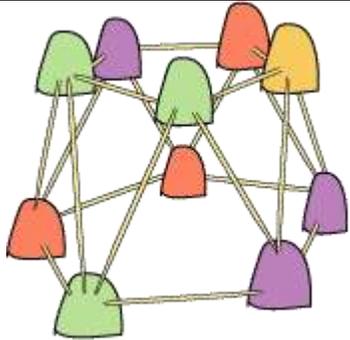
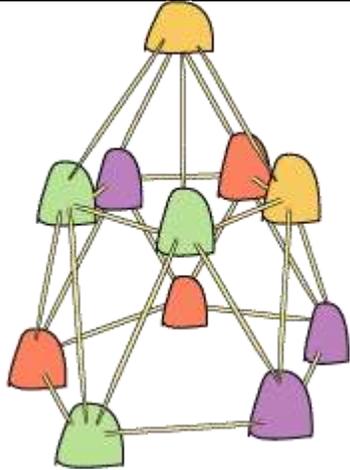


## Activity - Gumdrop Dome

discussing the design process. Some possible discussion questions include:

- How could you improve your design?
- What changes would you make to build the tallest structure using the same materials?

## How to Build a Gumdrop Dome

<p><b>Step 1</b></p> <p>Build a pentagon with 5 gumdrops and 5 toothpicks. Lay it flat on the table.</p>	
<p><b>Step 2</b></p> <p>Build a triangle above each toothpick in the pentagon. The triangles should stick up into the air.</p> <p>Connect the top gumdrops of each triangle all the way around the pentagon.</p>	
<p><b>Step 3</b></p> <p>Stick one toothpick in the top of each triangle. Lean the toothpicks together towards the center and join them with a gumdrop.</p> <p>Test how strong this dome really is!</p>	

Use this basic structure to build an even bigger dome. Just make the base larger and build the same triangle pattern all the way around. You can make it taller by adding another row of triangles, too!