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# Lesson Plan: Popsicle Stick Dream Home

### An Introduction to Architecture, Engineering, and Design for Kborden

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## Materials Needed:

- **Popsicle Sticks:** A large box (at least 200-300 to start).
- **Glue:** Wood glue or a strong craft glue (like Tacky Glue) is best for strong bonds. A hot glue gun can also be used for faster connections, but requires adult supervision.
- **Base:** A sturdy piece of cardboard or a thin piece of wood for the foundation of the house.
- **Design Tools:**
  - Graph paper or plain paper
  - Pencil and eraser
  - Ruler
- **Cutting Tools (Adult Supervision Required):** Strong scissors or craft clippers for trimming popsicle sticks.
- **Optional Decorative Materials:** Craft paint, markers, small pebbles for a walkway, clear plastic from packaging for windows, etc.

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## Lesson Overview

This is a multi-day project designed to be fun and creative. We will break it down into four phases, just like a real construction project. Kborden will take on the role of Architect, Engineer, Builder, and Designer!

## Learning Objectives

By the end of this project, Kborden will be able to:

- Design a simple blueprint (floor plan) for a structure.
- Apply basic engineering concepts, like trusses and bracing, to create a stable building.
- Construct a three-dimensional model from a two-dimensional plan.
- Problem-solve creatively when construction challenges arise.
- Calculate the perimeter and area of the house's foundation.

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## Phase 1: The Architect - Design & Planning (Approx. 45-60 minutes)

*Every great building starts with a great plan! Today, you are the architect.*

1. **Brainstorming:** Let's talk about your dream house. What rooms does it need? A kitchen? A bedroom? Will it be one story or two? Sketch out some rough ideas on plain paper. Don't worry about perfection, just get your ideas down!
2. **Introduction to Blueprints:** Explain that architects use special drawings called blueprints to
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show exactly how a building should be constructed. We are going to create our own!

3. **Creating the Blueprint:**
    - Using graph paper and a ruler, draw the "floor plan" or the top-down view of your house. Decide on a simple shape for the foundation, like a square or rectangle.
    - **Introduce Scale:** Let's decide on a scale. A good starting point is: **one square on the graph paper equals one popsicle stick length.** Use your ruler to draw straight lines for the walls. Remember to leave spaces for doors!
4. **Math Connection - Area & Perimeter:**
    - **Perimeter:** Count the number of popsicle stick lengths around the outside of your house plan. This is the perimeter! It tells us how many sticks we might need for the first layer of our foundation.
    - **Area:** Count the number of squares inside your floor plan. This is the area! It tells us how much "floor space" your house has.

Phase 2: The Engineer - Testing for Strength (Approx. 30 minutes)

An architect designs how a house looks, but an engineer makes sure it doesn't fall down! Let's test some shapes.

1. **The Shape Showdown:**
    - Take four popsicle sticks and glue them together to make a square.
    - Take three popsicle sticks and glue them together to make a triangle.
    - Let them dry for a few minutes.
2. **The Strength Test:** Once the glue is set, gently push on the side of the square. What happens? It probably wobbles and changes shape easily. Now, push on the side of the triangle. It's much stronger and holds its shape!
3. **The Big Idea (Trusses):** Explain that triangles are the strongest shape in engineering. Real-life bridges, roof supports, and cranes are filled with triangles called "trusses." We can use this idea to make our house walls strong. We can add diagonal "cross-braces" to our walls to create triangles.

Phase 3: The Builder - Construction (Multi-day activity)

Now it's time to get building! Put on your hard hat and let's bring your blueprint to life.

1. **Lay the Foundation:** Using your blueprint as a guide, glue the first layer of popsicle sticks directly onto your cardboard base. This will create the outline of your house.
2. **Build the Walls:**
    - There are many ways to build walls. You can stack the sticks flat like logs in a log cabin, or you can create a frame with vertical sticks and add horizontal ones.
    - **Engineering in Action:** Remember our strength test! If a wall feels wobbly, how can we make it stronger? Try adding a diagonal cross-brace (a stick glued from a top corner to a bottom corner) to form triangles.
    - Remember to leave openings for windows and doors according to your blueprint.
3. **Problem-Solving:** If something doesn't work, that's okay! Real builders face problems all the time. We can figure out a new solution together. Is the glue taking too long to dry? Are the walls leaning? Let's troubleshoot!
4. **Build the Roof:** This is the most challenging part. You can create two large, flat rectangles and lean them against each other to form a simple A-frame roof. For more strength, build roof trusses

(large triangles) to support the flat panels.

Phase 4: The Designer - Finishing Touches (Ongoing)

The house is built, but now it's time to make it a home! You are the interior and exterior designer.

- **Add Details:** Use trimmed pieces of popsicle sticks to frame your windows and doors. You can build a small porch or stairs.
- **Add Color:** Use paint or markers to add color to your house. You could paint the roof a different color from the walls.
- **Landscaping:** Use extra materials to add a garden, a walkway, or trees around your house.
- **Furniture (Challenge):** For an extra challenge, try building tiny furniture like a table or chairs out of scrap pieces of popsicle sticks.

Assessment & Reflection ("The Grand Tour")

Once the project is complete, Kborden will give a "Grand Tour" of the new house. During the tour, ask questions to check for understanding:

- "Tell me about your design. Why did you decide to put the door here?"
- "What was the hardest part of building the house?"
- "Can you show me a place where you used triangles to make the wall stronger?"
- "If you were to build another house, what would you do differently?"

The completed house itself is the primary assessment, demonstrating the application of all the skills learned. Celebrate the incredible work and display the masterpiece proudly!

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