

# 30-minute engineering challenges

**FOR FIRST AND SECOND GRADE**





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## FOR FIRST AND SECOND GRADE

Are you looking for a fun and engaging way to introduce STEM concepts to your first or second-grade students? Look no further than these quick, low-prep engineering challenges! These hands-on activities are designed to foster problem-solving skills, creativity, and a love for science and engineering in just 30 minutes.

### What Makes These Challenges Unique?

These engineering challenges stand out for several reasons:

#### 1. Time-Efficient:

With a total duration of only 30 minutes, including setup, activity, and cleanup, these challenges are perfect for busy classrooms or after-school programs.

#### 2. Low-Prep:

Requiring simple, readily available materials, these challenges minimize preparation time for teachers or facilitators.

#### 3. Age-Appropriate:

Tailored specifically for first and second-grade students, these challenges align with their cognitive abilities and attention spans.

#### 4. STEM-Focused:

By incorporating principles of science, technology, engineering, and mathematics, these activities provide a solid foundation for future STEM learning.

#### 5. Quick and Simple Materials:

One of the key advantages of these engineering challenges is the use of simple, everyday materials that can be easily sourced or substituted.

### Timeline:

To ensure a successful and engaging experience, follow these steps:

#### 1. Introduction (5 minutes):

Clearly explain the challenge, materials, and any rules or constraints.

#### 2. Design and Build (15 minutes):

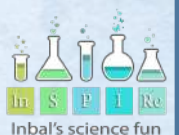
Allow students to work individually or in small groups to design and construct their solutions.

#### 3. Testing and Evaluation (5 minutes):

Have students test their creations and evaluate their performance based on the challenge criteria.

#### 4. Sharing and Reflection (5 minutes):

Encourage students to share their designs, successes, and challenges, fostering collaboration and learning.





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## **1.Popsicle Stick Bridges**

Materials: Popsicle sticks and glue

Instructions: Construct a bridge using popsicle sticks and glue to connect the sticks together. The bridge must span a gap of at least 12 inches and be strong enough to support a toy car or a book rolling across it.

NGSS: K-2-ETS1-1, K-2-ETS1-3



## **2. Foil Boats**

Materials: Aluminum foil, pennies/washers

Instructions: Using only aluminum foil, design and build a small boat that is shaped to be able to float on water. Once built, see how many pennies or washers your boat can hold before sinking.

NGSS: 2-PS1-2, K-2-ETS1-2



## **3.Bubble Wands**

Materials: Pipe cleaners, string, straws

Instructions: Shape pipe cleaners, string and straw into unique bubble wand designs and test which one blows the best bubbles.

NGSS: 2-PS1-2, K-2-ETS1-3



## **4.Straw Kazoos**

Materials: Straws, scissors

Instructions: Cut a simple kazoo instrument using a straw, and scissors that can make different sounds.

NGSS: 1-PS4-1, 1-PS4-4



## **5.Popsicle Stick Puzzles**

Materials: Popsicle sticks, markers

Instructions: Design and create your own puzzle from popsicle sticks by drawing or writing on them.

NGSS: K-2-ETS1-1, K-2-ETS1-2





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## **6. Gumdrops Domes**

Materials: Gumdrops, toothpicks

Instructions: Using only the gumdrops and toothpicks, design and build a freestanding dome structure. See how large and stable you can make the dome before it collapses under its own weight.

NGSS: K-2-ETS1-1, K-2-ETS1-2



## **7. Balloon Stamp Painters**

Materials: Balloons, paint, paper

Instructions: Inflate a balloon and use it as a stamp to create painted shapes and designs on paper. Get creative!

NGSS: K-2-ETS1-3, K-ETS1-2



## **8. Egg Carton Critters**

Materials: Egg cartons, pipe cleaners, pom poms, googly eyes

Instructions: Use egg carton cups and crafty materials to design an insect, animal, or imaginary creature.

NGSS: K-LS1-1, K-2-ETS1-2



## **9. Balloon Basketball**

Materials: Balloons, buckets/boxes, tape

Instructions: Make a basketball hoop using tape and boxes/buckets, then play by batting a balloon through the hoop.

NGSS: K-PS2-1, K-2-ETS1-3



## **10. Mini Greenhouses**

Materials: Plastic bottles, soil, seeds

Instructions: Cut off the bottom of a plastic bottle, fill with soil and seeds to make a mini portable greenhouse.

NGSS: 2-LS2-1, K-LS1-1





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## **11. Paper Plate Spinning Tops**

Materials: small Paper plates, coins, tape

Instructions: Decorate a paper plate, make a hole in the center, stick a coin in it and tape it to make a spinning top.

NGSS: K-PS2-1, K-2-ETS1-3

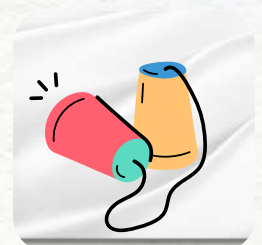


## **12. Paper Cup Telephones**

Materials: Paper cups, string

Instructions: Make a simple "telephone" to transmit sound by connecting two paper cups with a string pulled taut.

NGSS: 1-PS4-4, K-2-ETS1-3



## **13. Paper Airplanes**

Materials: Paper (paper, cardboard, newspaper etc.)

Instructions: Fold different paper airplanes from various types of paper like regular paper, cardboard, or newspaper.

Once folded, test them for distance, accuracy in hitting a target, and hang time by throwing gently across the room.

NGSS: K-PS2-1, K-2-ETS1-3



## **14. Nature Paintbrushes**

Materials: Paper, paint, nature items (leaves, twigs, flowers)

Instructions: Use items found in nature like leaves, twigs, or flowers as paintbrushes to create nature-inspired artwork.

NGSS: K-2-ETS1-2, 2-LS4-1



## **15. Plastic Egg Rattlers**

Materials: Plastic Easter eggs, spoons, beans/rice, tape

Instructions: Fill plastic Easter eggs with beans or rice and tape them closed to make shakers/rattlers. You can tape spoons as a handle. Decorate the outsides.

NGSS: 1-PS4-1, K-2-ETS1-2





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## **16.Foil Sculptures**

Materials: Aluminum foil, paper clips

Instructions: Use foil and paper clips to sculpt a figure of animal that can pose in different ways.

NGSS: K-2-ETS1-1, 1-PS4-3

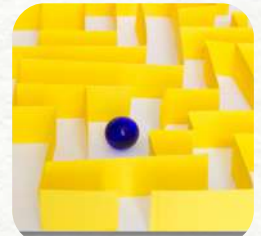


## **17.Marble Maze**

Materials: Cardboard, tape, marbles

Instructions: design and construct a maze or ramp system that can guide a marble or small ball from a starting point to a designated target area.

NGSS: K-PS2-1, K-2-ETS1-3



## **18.Branch Dreamcatchers**

Materials: Sticks/branches, string, beads

Instructions: Use sticks or branches to create a simple dreamcatcher by winding string around and adding beads.

NGSS: K-2-ETS1-2, 2-PS1-1



## **19.Cereal Box Guitars**

Materials: Cereal boxes, rubber bands, craft sticks, paper rolls

Instructions: Make a simple guitar using a cereal box for the body, rubber bands as strings, and a craft stick as the neck.

NGSS: 1-PS4-1, 1-PS4-4



## **20.Aluminum Foil Embossing**

Materials: Thick Aluminum foil, found thin objects

Instructions: Place aluminum foil over various textured objects like coins or bark, and use your fingers to emboss the texture into the foil.

NGSS: K-2-ETS1-2, 2-PS1-1





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## **21.Nature Crowns**

Materials: Card stock, leaves, flowers, tape, hole punch

Instructions: Use card stock, leaves, flowers, and other nature items to design and build a wearable nature crown.

NGSS: 2-LS4-1, K-2-ETS1-2



## **22.Bubble Print Art**

Materials: Bubble solution, straws, paper, food coloring (optional)

Instructions: Blow bubbles onto paper to make print designs. Add food coloring to the solution for color.

NGSS: K-2-ETS1-2, 2-PS1-2



## **23.Paper Plate Tambourines**

Materials: Paper plates, dry beans, tape/glue, crayons

Instructions: Decorate paper plates then seal dry beans between two plates to make a tambourine shaker.

NGSS: 1-PS4-1, K-2-ETS1-3



## **24.Egg carton Planters**

Materials: Egg carton, soil, seeds, crayons/stickers

Instructions: Decorate the egg carton, fill with soil and plant seeds to watch them sprout into plants.

NGSS: K-LS1-1, 2-LS2-1



## **25.Cup Stacking**

Materials: Plastic cups

Instructions: Using only plastic cups, build the tallest freestanding tower or pyramid possible. The structure must be stable enough not to fall over on its own. See whose cup stack is the tallest!

NGSS: K-2-ETS1-1, 2-PS1-1





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## **26.Paper Towel Roll Binoculars**

Materials: Paper towel rolls/ toilet paper rolls, string, tape, crayons

Instructions: Decorate paper towel rolls and attach string to create a wearable pair of binoculars for pretend play.

NGSS: 1-PS4-2, K-2-ETS1-3



## **27.Balloon Tennis**

Materials: Balloons, paper plates, cardboard, tape/glue

Instructions: Make simple paddles from paper plates and tape handles to play a game batting the balloon back and forth.

NGSS: K-PS2-1, K-2-ETS1-3



## **28.Towering Structures**

Materials: paper plates, cups and tape.

Instructions: Build the tallest freestanding tower. It should be sturdy enough to gently move from place to place.

NGSS: K-PS2-1, K-2-ETS1-3

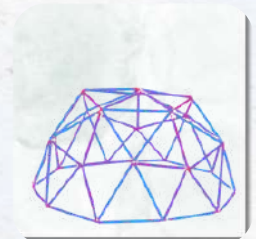


## **29.Straw Geodesic Spheres**

Materials: Straws, marshmallows or playdough

Instructions: Build a geodesic sphere using straws as the struts and marshmallows or playdough to connect the joints.

NGSS: K-2-ETS1-1, K-2-ETS1-3



## **30.Clothespin Critters**

Materials: Clothespins, pipe cleaners, googly eyes, pom poms

Instructions: Create an insect or critter using clothespins, pipe cleaners, googly eyes, and pom poms.

NGSS: 1-LS1-1, K-2-ETS1-2





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