

Engineering in the Preschool Classroom

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Children are natural engineers. Engineering is solving problems, designing and creating, and building things. It is about finding out how things work, how they are constructed, and why. Children use these engineering skills when they play with blocks; build things out of sticks, rocks and sand; and take things apart and put them back together.

As budding engineers, children wonder how things work, create solutions to solve problems, test their solutions, and either try again or improve on their ideas. These are the very skills that will help them succeed in school and future careers.

As adults, we can help develop children's beginning engineering skills by giving them things to build with and to take apart (such as blocks or construction toys), asking questions (such as, "How high do you think you can stack these blocks?"), and providing them with safe opportunities and places to test out their ideas.

In this fact sheet we focus on the engineering-related skills of **building and construction**, and **movement and force**.

Building and Construction

When young children are building and constructing things, they are doing more than just having fun. They are practicing basic engineering skills: designing and testing, gaining critical thinking skills and spatial reasoning, practicing motor skills and hand-eye coordination, and increasing their capacity for creative thinking and problem-solving.



Ideas to try:

Blocks. Playing with all types of blocks is one of the best ways for children to practice basic engineering skills. They can build high towers, construct simple bridges, or design complex structures. Provide a well-stocked block area with different types of blocks for children to experiment with—wooden, cardboard, paper, triangle, foam and interlocking blocks. Give them sufficient open space and opportunity to build whatever they can imagine. Also, allow them to tear down their creations—it's part of their learning.



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Bridges. Have children build and test simple bridges. Let them use blocks, empty cereal and other food boxes, empty cans, paper towel rolls, pieces of cardboard, or anything else they can think of to build a bridge. Have them use paper or cardboard to make the bridge and test how much it will hold.

Sand Castles. Start by reading a book on sand castles, such as *The Sand Castle Contest* by Robert Munsch. Then let children build their own sand castles at the sand table or outside sand box. Give them items to help build the castles, such as small bowls and buckets, spoons, cups, and a little water to help keep the sand moist.

Pipe Cleaner Sculptures. Give children several pipe cleaners. Let them design anything they want. For added fun, let them use additional items, such as straws, paper clips, rubber bands or anything else you can think of. Let them use their imaginations to create all kinds of fun things.



Foil Boats. Give children a piece of aluminum foil 5 x 6 inches. Have them fold up the sides of two ends of the boat so it will not sink and it will hold a cargo of pennies or small rocks. Place the boat in a sink or bucket filled with water. Have children begin adding pennies for the boat's cargo. See how many pennies the boat can carry before it sinks. Children can try different ways to distribute the weight of the pennies on the boat so it can carry the most number. Children also can build different styles of boats and see how well they hold the pennies.

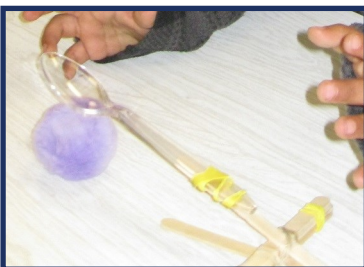
Movement and Force

Many simple engineering activities for young children involve movement and force. Children design something and then see how far, fast or high it moves. When they design and create something, be sure to give them the opportunity to test how it works.

Ideas to try:

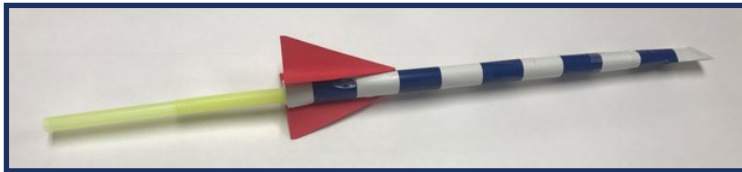
Ramps. Children can create ramps out of paper tubes, cardboard boxes, boards or paper—anything that can be laid at an incline. Let them experiment with a ping-pong ball, toy car, marbles, cotton ball, small block, etc., to see how well each object moves down the ramp.

Pulleys. Pulleys help people lift things. By following these simple steps, children can easily build a pulley using a paper cup and string. Poke a hole into the top of each side of the cup. Take a long piece of string or yarn and thread it through both holes. Tie one end of the string to the long length of the other side of string just above the cup. Hang the string over a chair back or door knob. Place a few small blocks into the cup and have children raise and lower the cup by pulling the string.



Homemade Catapult. Make and test a simple catapult. Homemade catapults can be as simple as a plastic spoon and a small block. Lay the spoon across the block. Have children place a pom-pom or cotton ball in the spoon. Then have them quickly push down the handle to throw the cotton ball out of the spoon. See how high and far the pom-pom flies. Search the internet for other simple homemade catapults for young children.

Homemade Straw Rocket. Help children make a straw rocket and test how far it flies. Take a strip of wrapping paper. Roll it around the end of a drinking straw length wise. Put tape on the edge of the rolled paper to keep it together. Fold down one end of the paper and tape. Place the paper rocket over the straw. Blow the straw and see how far the rocket flies.



Paper Airplanes. Let children create, design and test paper airplanes. They are simple, fast to put together, and only require a sheet of paper. (If you have never built a paper airplane, check out the internet for simple instructions.) Have children test how far, high and fast they fly.

When starting kindergarten, children should be able to:

- build simple objects or structures using common tools and materials (such as blocks, Legos, wood, glue, rulers, pencils, scissors, etc.)
- come up with ideas about “What would happen if...?” and “How does it work?”
- think of ways to solve a problem
- build something that meets their needs (such as sandcastles or cities out of blocks)

(from State of Nevada Department of Education)

Fun Books to Share

Tie engineering to literacy with these fun books:

Ashley Spires, *The Most Magnificent Thing*.

Andrea Beaty and David Roberts, *Rosie Revere, Engineer*.

Kobi Yamada and Mae Besom, *What Do You Do with an Idea?*

Chris Van Dusen, *If I Built a Car*.

Dianne Redmond, *Bob the Builder: Bob’s Big Story Collection*.

Robert Munsch, *The Sand Castle Contest*.

More Engineering Activity Ideas

For more ideas on fun engineering activities for young children, check out these resources:

https://articles.extension.org/child_care

<https://pbskids.org/>

<https://www.naeyc.org/>

<https://www.scholastic.com/teachers/home/>

Conclusion

For preschoolers, engineering is about play. Through their play, young children solve engineering challenges by building with blocks, making straw rockets, and creating sand castles. Adults can give children lots of opportunities to build, explore and discover. They can set out new things to build with and let them discover the best way to build a bridge, a tower or any other challenge you can come up with.

References & Additional Readings

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