

SCIENCE FAIR CENTRAL

MAKE. CREATE. EXPLORE.



BIG FUN, SMALL SPACE

Families will build four fun giant outdoor games, using many of the same materials, that can all fit into one storage bin and easily be brought outside to a local green space.

Background

While math is a big part of engineering, there's actually a lot more to it. Engineers often work together in teams to solve problems and design or create something new. Every member of the team has an important role. Plans don't always work out the first time around and team members often run into difficulties. Together, the engineering team has to re-think their ideas and figure out how to improve them. It takes a lot of creativity and hard work to think outside of the box, but it's worth it. It's a long process, but especially rewarding in the end when the engineering team gets to share their new product or results.

In this activity, your family will work as a team of engineers to build 4 classic games that won't only be giant in size but giant in fun too! The best part is that you will be able to take them outside and enjoy playing in nice weather anytime. Just like engineers have to work and build efficiently, you will have to as well. Many of the game parts you build will be re-used in more than 1 activity. The amazing thing about these giant games, is that they won't take up much space at all! Just wait until you share your new game products with your friends. You will quickly become the expert engineers!

Plan

Chances are you have played the Parker Brothers Game Jenga. Did you know that the word Jenga comes from the Swahili word, "build"? Get your tape measure ready because you're going to be busy measuring and building. From start to finish, you will get to customize a giant version of classic games with all of your favorite colors.



You'll design and build a giant wooden balancing block tower game with 54 blocks made out of 2X4's that will also double as the domino tiles for the game Dominoes. Next up--why buy a ready-made Ring Toss game, when you can have fun building one yourself with PVC pipes and enjoy playing with it after? The same rings from your Ring Toss game can then be re-used as part of a giant Tic Tac Toe Board made from just a tarp and colorful duct tape.

Create!

Adult supervision required

Decide which family members will serve in each of the necessary roles.

- **"The Brains"** of the group will do most of the measuring, painting, and building.
- **"The Muscles"** of the group will be responsible for cutting anything that requires sharp objects like the retractable blade knife or a saw if you have one.
- **"The Supervisor"** will handle quality control and directing the activities to ensure the project is a success!

Materials

- (1) Large storage bin
- (1) Drop cloth
- (1) Tape measure
- (1) Sharpie Marker



Balancing Block Tower

1. Mark and cut the 2x4 boards into smaller 10.5 inch pieces for a total of 54 pieces. You should have 5 remaining small blocks from the end of the lumber. Make sure you save them because they will be very handy later! There are 2 ways you can approach the cuts.

- Option 1: Check with a Home Depot associate for assistance on cutting your wood into 2x4 pieces. This will also make it easy to get the blocks home.
- Option 2: Transport the lumber home and ask an adult to use a hand saw or circular saw to cut the boards for you.

2. Sand the edges of each of the blocks since they will be very rough after the cuts are made. You can use the small left-over blocks to help prop up your boards as you sand.

3. Spray paint all surfaces of the blocks.

4. Allow the blocks plenty of time to dry completely.

Time to build your tower! Arrange 3 blocks in a row. Then stack the next row of 3 above those in the opposite direction. Stack all of your blocks this way until the tower is 18 rows tall. Good luck keeping it balanced as you remove one block at a time!

Materials

- (5) 2"x4"x10' Lumber cut into 54 10.5" pieces
- (2) Sanding Blocks
- (2) Cans Spray Paint (same color)
- Optional: Hand Saw or Circular Saw



Dominoes

1. Select 28 blocks from your tower game
2. Measure and mark at $5\frac{1}{4}$ inches (the mid-way point) on the blocks
3. Attach the painter's tape in a straight line at the mark on the blocks
4. Using the acrylic paint and foam brush, paint a thin straight line across each board.
5. Using the acrylic paint and stencil brush, paint the dots on the board. It would be helpful to keep a real set of domino tiles outside with you or print out a picture of them from the Internet while you do this to make sure you get all of the dot combinations correct.
6. Allow the blocks enough time to completely dry before removing the tape.

You're now ready to play giant Dominoes!

Materials

28 Blocks sanded and painted
(already from the Tower Game)

- (1) Paint Trim Tray
- (1) Stencil Brush
- (1) Foam Brush
- (1) Painter's Tape
- (1) Acrylic Paint



Tic-Tac-Toe

1. Spread out the 25 feet of rope in a straight line.
2. Using the Sharpie Marker and tape measure, make a mark every 20 inches until you have enough pieces marked off to make 10 rings.
3. Using the retractable blade, cut on each mark so you have 10 pieces of rope 20 inches in length.
4. Attach both ends of each individual 20-inch rope piece together using duct tape. This will make a total of 10 rings.
5. Select 5 rings to put aside that will remain black and yellow in color.

Materials

- (1) Small Tarp
- (1) Duct Tape (bright color)
- Rope (25 Feet)
- (1) Retractable Blade Knife



6. Decide what color you would like to spray paint the remaining 5 rings. The spray color you select should come from the 3 you also have on hand to also be used to build the ring toss game. You do not want to use the spray paint that will be used for the wooden blocks because you may not have enough.

7. Spread out the drop cloth and spray paint the top of 5 rings. Set them aside to dry while you work on other parts of the project.

8. Open and spread out the tarp. Create a square using the duct tape that is approximately 60 inches on each side.

9. Once the outer square is made, measure and mark off every 20 inches on all sides of the tape.

10. Create 9 smaller squares on the board by attaching duct tape across the square in both directions

11. When you are sure the paint on top of your rings is dry, flip them over and spray the other side with the same color spray paint.

Once your rings are dry — it's time to play Tic-Tac-Toe!



Ring Toss

1. Good news! You have already made the rings needed for your ring toss when you built your Tic-Tac-Toe game. Now it's time to make the ring board and pegs.
2. Select from your 3 spray paint colors, the color you would like to paint the base of the ring board. Set aside 4 PVC pipes to be painted this color.
3. Set aside 2 PVC pipes, 2 elbow joints, 2 caps and the PVC cross to paint a different color than the ring board base.
4. Set aside the remaining PVC pipes, elbow joints (there should be 2 of each), and caps to paint in the last of the 3 spray paint colors.
5. Spray paint all PVC items in the predetermined color until they are fully covered.
6. Allow the PVC plenty of time to dry. The PVC items must be completely dry before the ring board can be put together.
7. Once everything is dry, it's time to assemble the ring board and pegs. Start by connecting each of the 4 PVC pipes of the same color to the PVC cross to make the base.
8. At the free end of the PVC pipe, attach an elbow. The matching color elbows should be across from each other.
9. Attach a cap to the remaining 4 PVC pipes. Make sure the cap attaches to a pipe that is a different color!
10. Attach the end of the pipes without the caps to the elbow that matches the cap color.

That's all there is to it! Now it's time to have fun playing game!

Materials

8 rings (already created for the Tic-Tac-Toe game)

- (3) Cans Spray Paint (3 different bright colors)
- (8) Pre Cut PVC Pipe
- (1) PVC Cross $\frac{3}{4}$ "
- (4) PVC Elbow $\frac{3}{4}$ "
- (4) PVC Caps $\frac{3}{4}$ "



Next Steps

- Bring your bin along to sports tournaments. When you're waiting in between games, pull out the bin and let your entire team enjoy playing the games you built.
- Share pictures of your family building and playing the games on social media.
- Take your bin to a local park or neighborhood green space. The kids in the neighborhood won't be able to miss the giant games in the bright colors and will want to join in the fun.

