

Build a Big Wheel



Multiple days



Grades 6–8, 9–12

Make a turning Ferris wheel out of pasta.



Instructions

Students design and build a turning Ferris wheel out of pasta.

Caution: For safety, be sure to inform participants not to taste or eat any of the materials during this activity.

Optional Prep: Pre-glue long pasta strips for extra strength.

1 Talk with students about their experiences with Ferris wheels and wheels in general (such as on bikes). Show students photos of different Ferris wheels and discuss the different ways they are constructed.

2 Give students their challenge; you may require older students to include weights (e.g., the teabags) on their wheels to be like seats. Review axles and how they allow wheels to turn. Divide students into teams and distribute materials.

3 Each team should sketch their design ideas first and consider which shapes of pasta they want to use. Note that their wheels can rotate around a tube from paper towels or toilet paper, or PVC pipe (optional).

4 Students show you (the project manager) their designs and request the types of pasta they need. They can come back and ask for more, or different, pasta, as construction proceeds.



Materials

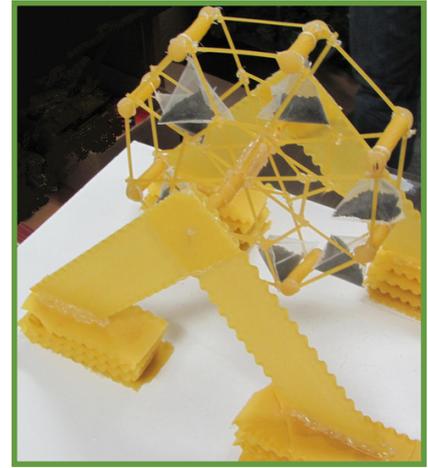
PER CLASS:

- Photos of Ferris wheels that clearly show how they are designed

PER STUDENT OR TEAM:

- Wide range of dry pasta shapes
- Paper and pencil
- Glue
- String
- Paper clips
- Cardboard
- Cardboard tubes (e.g., paper towel or toilet paper tubes)
- PVC pipe sections (optional, instead of cardboard tubes)
- 4–8 dry teabags (optional, as pods or benches)

- 5 Tell students to begin construction. They will likely need to let certain wheel segments dry overnight before they can complete their wheels. They may also need to build and connect certain parts before others.
- 6 Students can rethink their ideas and make changes or start over if their wheels won't turn.
- 7 When Ferris wheels are complete, invite each group to present their wheel to the class.



Engineering & Science Connections

-  The civil engineer George W. G. Ferris, Jr., designed the first Ferris wheel in 1893 for the World's Columbian Exposition in Chicago, Illinois. It could carry 2,160 people at a time and was 26 stories tall. Ferris's original wheel was modeled on a bicycle wheel. It had heavy steel beams that acted as spokes to maintain the wheel's shape and balance.
-  The Singapore Flyer, one of the world's largest observation wheels at 550 feet tall—the same height as a 45-story building—was completed in 2008. It turns 28 capsules for people to ride in; each temperature-controlled capsule can hold 28 people. Precision wind engineering allows it to rotate smoothly under challenging weather conditions.
-  When riding on a Ferris wheel you may feel lighter on the top of the wheel and heavier on the bottom of the wheel. This feeling is intensified if the wheel spins faster. This is due to what is called *centripetal acceleration*: the forces created by the wheel's movement act against or with gravity at different locations on the wheel. You might notice the same effect while swinging on a playground swing.

Guiding Questions ?

How will the length of the pasta spokes affect the wheel's turning capability?

What's the most stable way to attach the spokes to the center tube?

Which real-world Ferris wheel designs are most helpful as you design your wheel?

What designs or methods did you see other teams try that you thought worked well?

Courtesy of TryEngineering.org

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