



Wheels

Families explore circles at work, in the form of wheels. They experiment with different types of wheels used for different purposes.

What you'll need

For the icebreaker:

- 1 hand-mixer
- 1 hand-cranked pencil sharpener
- 1 hand drill
- 1 hand can opener
- Other simple machines with gears, pulleys, or wheels in them

For the exploration:

- A collection of round, square, and triangular 3-dimensional objects
- A collection of wheels
- 50 thin cardboard circles, approx. 3 inches in diameter, with holes poked in the centers
- 50 thin cardboard squares, approx. 3 inches across, with holes poked in the centers
- 50 thin cardboard triangles, approx. 3 inches from point to point, with holes poked in the centers
- 24 Straws or pencils
- Rubberbands
- Scissors
- 10 Ramps: You can create a ramp using a long piece of cardboard (maybe from a game box top) and a stack of books or blocks.
- Different surfaces to put on the ramp or on the floor at the bottom of the ramp: AstroTurf, carpeting, cotton balls, cardboard with sand glued on, plastic mirrors

Icebreaker

Ask participants to think about the following questions: Have you ever seen a truck with square tires? Can you imagine riding a bicycle with triangle tires? If your car were riding on hexagon rims, would you have a bumpy or smooth ride? Why are wheels always round? What is it about the circle that makes it so useful?

Conceal the simple machines listed above in individual paper bags, and pass them out to groups of four people. Ask the participants to look closely at the simple machines without showing their item to any other group. The goal of the icebreaker is for each group to act out their simple machine for other teams to guess. As they plan their acting, ask them to look closely at the ways that circles are involved in their machines.

Collection

Pass out the collection of wheels and invite children and their parents to experiment with the different ways that wheels spin and connect to their machines. Let them try the smaller ones on the ramps.

Exploration: Re-invent the Wheel

In today's activity, you'll experiment with triangular, square, and circular wheels to find out what wheel shape gives the smoothest ride.

- Start the exploration by inviting families to try rolling different squares, triangles, and spheres down the ramps. What do they notice? Which ones roll best? Which ones slide instead of rolling?
- Using a straw as an axle (or center rod), put a square wheel on either end of the straw. Use rubberbands to hold the wheels in place. Wrap them tightly around the straw in either side of the wheel.
- Try rolling the square wheels down the ramp. How do they work? Do they roll or slide?
- Make an axle with triangle wheels and one with circle wheels. Which one rolls the best? What happens if they try one circular wheel and one square wheel?
- What might happen if the wheels were rolling on different surfaces? Imagine a tractor rolling through bumpy dirt and mud. Are round wheels the best shape or would another shape work best?
- Try putting something soft like cotton balls or carpet on the ramps. Then try something hard and irregular like Lego material or rocks. Which wheel shape works best on the different surfaces?
- What have the families noticed about the different shapes of wheels and why they work best?
- During the last five minutes of the workshops, gather children and parents in a circle and ask them to show their favorite wheel combination and what they like about it.