

Tilting Marble Maze

What forces act on a marble as it moves through a maze?

You will need

- A shoebox lid
- Lolly sticks or strips of thick cardboard
- Sticky tape
- Scissors
- A marble



How to do it

- 1) Position the shoebox lid in front of you so that the inner part of the box is facing upwards.
- 2) Begin to arrange the lolly sticks or cardboard strips to create the marble maze ramps and bumpers. You could vary the length of them to add variety to your marble maze.
- 3) Attach the first lolly sticks or cardboard strip using sticky tape. Position each so that it is tilting downwards slightly.
- 4) Continue to attach the marble maze pieces down the length of the shoebox. Vary the angles of each to create different speeds of travel.
- 5) Check how well the marble maze is working as you go and make any adjustments needed to help the marble travel downwards through the ramps.
- 6) Test your marble maze by tilting the shoebox with your hands to navigate the marble around the maze. Does it work?

What are we learning?

Before the marble travels down the maze, it has potential energy from being lifted up to a height. As it rolls along the angled ramps, this converts into kinetic (movement) energy. Gravity is the force pulling the marble to the ground. It would take it straight down if not for the angled runways, which instead guide the marble down and sideways. As the marble rubs against the cardboard it also creates an opposing force called friction. This slows down the marble. Angles are critical to the marble run's success. The greater the angle, the quicker the marble will roll.

Investigate

Now create a marble maze by positioning the maze walls using only vertical and horizontal lines instead of tilting downwards. Is it easier or harder to navigate a maze like this?

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