

Car Race Gravity Experiment

Description

Use a carpet tube to create a racing ramp for your child's toy cars, then have them experiment with how changing the incline makes the cars speed up or slow down. Gravity pulls harder on the car the higher it goes to get it back down to Earth.

Instructions

1. Grab a carpet tube, wrapping paper tube, or another material for a ramp. You want whatever you use for a ramp to meet the following criteria: it needs to be moveable by your child so they can manipulate the incline, it should be straight, the toy cars should fit in it, and it should have something on each side to form barriers, so the cars are completing the entire run without rolling off the sides.
 - In the days or hours preceding the experiment, casually talk about gravity with your child. Define it as a force that pulls everything on Earth down.
 2. Set up the invitation to play with the ramp (placed flat on the floor) and the cars in the area you want your child to experiment. Bring them over and let them explore independently. They will eventually get the idea to put the cars in the ramp and may even instinctively raise the ramp slightly to make the cars go on their own.
 3. Ask your child if they think they can make the cars go faster and watch them try different things until they figure out that creating a steeper incline will result in a faster car. Only suggest trying an incline if they seem to be getting nowhere near that conclusion after several minutes of experimentation.
 - Remind your child about your earlier conversations about gravity and how it pulls everything down. Talk to them about how gravity was working on their cars to get them back down to the ground, and why it seemed to work a little harder when the incline was steeper.
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Materials Needed

- Carpet tube, wrapping paper tube, or another material for a ramp
- Toy cars
- (Optional) Timer

Why is this a great thing to do?

This activity will teach your child about one of the most fundamental concepts in physics, develop their understanding of cause and effect, learn how to experiment, and exercise their gross motor skills.

Introduces your child to physics.

Gravity is one of the most basic principles of physics, and it is something that everyone experiences first-hand.

Develops their understanding of cause and effect.

Manipulating something to obtain different results in a way that is almost immediately seen is an excellent study in cause and effect.

Practices doing experiments.

Even if your child isn't quite ready for all five steps of the scientific method, doing simple experiments can get them used to the principles of making and testing hypotheses.

Exercises gross motor skills.

Racing cars down long ramps will involve walking (or running), bending, reaching, and other gross motor practice. Working on these skills will help children gain strength and confidence in their bodies while benefitting from exercise, which is essential for a healthy lifestyle. These skills also develop the ability to do more complex skills in the future, such as playing a team sport or dancing.

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Make STEM Connections

Help your child develop a more in-depth understanding of how the force of gravity pulls everything on Earth down. Without it, we would float away into space.

What floats?

Buoyancy is interesting because it seems to work against the force of gravity. However, as with most things when gravity is involved, it's about relative weight. Watch a [video](#) or [experiment](#) to explore the idea more.

Drop it like it's hot.

Rocks and feathers fall at different speeds because they are different weights. However, if you fill a big enough bag of feathers so that it weighs just as much as a rock does, they will fall at the same rate. Get a heavy object and a light object that you have a bunch of (enough to equal the weight of the heavy object if put all together) to test this foundational gravity concept.

Play Jenga or Suspend.

Both these games have you competing against gravity, which is trying to knock your pieces to the ground!

Next Generation Science Standards (NGSS) Correlation

K-PS2-1: Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

By using two ramps (carpet tubes) to race cars against one another and observing which car races through the carpet tube first, your child is observing the pull of gravity and the effects that different angles have on the speed of the race cars. This activity can be extended by having a cereal race. Use a piece of cereal for each player and allow them to choose how they would like to move the cereal to the finish line. One player can use a straw, and another player may blow directly on the cereal. One player might construct a rubber band slingshot while another may fashion a miniature hockey stick from a toothpick or a straw. Allow your child to be creative.

K-PS2-2: Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

By using two ramps (carpet tubes) at two different inclines to race cars against one another and observing which car races through the carpet tube first, your child is observing the effects that different angles have on the speed of the race cars. This activity can be extended by crafting derby cars. Have your child design a derby car (with an inexpensive kit from a local craft store.) Ask your child to think of a solution that would allow the car to reach its highest speed. For example, test the car by "pushing" it across a flat surface, then try "pulling" it down a ramp with a steep incline. Ask your child to determine which solution made the car go faster.

Talking Tips

"How could you make the car go faster?"

"Whoa, it went super fast that time! What made you think of trying to tip the ramp up?"

"Why do you think a steeper ramp makes the cars go faster?"

"What do you think would happen if we didn't have gravity to pull us down to Earth?"

Tips & Extensions

Use two ramps to race cars against one another, though a taller child will have the advantage over their shorter friend as they will be able to lift the ramp higher to create a steeper incline.

Most carpet stores will be happy to give you any tubes they have. Or, this experiment could be done on a much smaller scale using wrapping paper tubes, or even a paper towel tube. If the toy cars don't fit inside these smaller tubes, try cutting them in half lengthwise to form a ramp.