

I Can Move - Exploring Ramps and Friction

Kids love to send cars down ramps! In this activity, use simple ramps to do some fun hands-on exploration of the physics of angles, speed, friction and textures.

Topic: Ramps – Exploring ramps and friction!

Time: 20 mins

Age group: 4 - 7

What you need

- A step, stack of books or lunch box to make a height to lean the ramps on.
- Something to make a ramp! Can be: cardboard, wooden plank, flat piece of plastic.
- Some different textures to stick to the ramp surfaces to create different friction, use your imagination here, all you want is a difference in texture and friction between the ramps.
 - Hand towel/Clothes/J-cloth
 - Sandpaper
 - Rubber grippy mats
 - Tinfoil
 - Toy cars!
 - Corrugated cardboard
 - Craft sticks to make little ramps
 - Strips of velcro
 - Tape to secure your friction surface
- Stopwatch and measuring tape (good especially for slightly older kids)

What to do

Set up

The set up for this activity is to have ramps at the same height and angles but with different textures! This allows exploration of how different textures produce different amounts of friction and therefore alter how easily objects move down the ramps.

We suggest setting up at least three ramps to investigate. Leave one ramp without a texture as a test ramp to compare the others to. Tape different textures to the other ramps. Get your toy cars ready for some ramp action!

Activity

1. Free exploration: Start with allowing your kids to explore the control ramp with different cars. Which toy cars move faster or slower? Heavier, lighter, longer or shorter cars move at different speeds. You could also get them to put something else on the ramp, like a block, how does it move down the ramp?
2. Move on to the textures ramps – ask the kids to feel the textures and describe them. Introduce the word friction here to link it to the different textures.
3. Experiment time! Test the cars on the different textured ramps. What ramp do the cars move fastest on? What ramp does the car move slowest on? Discuss the results with the kids.
4. What if you are not sure - how could you measure the cars' speeds? Use a stopwatch to test how quick the cars move down the ramps or race cars down the ramps at the same time. You could also use measuring tape to show how far the car travels after it leaves the ramp as an idea of how fast it is going.



The Science

Friction is a force that acts when two objects come in contact with each other. Friction acts in the opposite direction to the direction of the motion of an object, so it slows or stops an object from moving. Think about if you are cycling and pedal hard and then stop pedalling on a flat road your bike will travel for a while but then eventually slow down and stop due to friction between the tyres and the road. When you put cars on a ramp the force of gravity pulls them downwards but the force of friction acts against this. The different textures you tape onto the ramps will change the surface of the ramp and provide different amounts of friction - more friction will slow the cars down, less friction will let them travel faster. Rolling friction (like you get with toy cars!) is much easier to overcome than sliding friction (if you put a cube on the ramps), which is why our bicycle and car tyres are round instead of square!

Science talk

Science talk is a way of giving children the language they need to investigate and explore concepts.

Description words

Use description words like roll, slide, steep, slope, slanted, texture, rough, smooth, bumpy, fast, slow. Model science talk by feeling the ramp textures and describing how they feel and then discussing this with the kids.

Science process words

Use science process words like compare, see, observe, discover, explore, wonder, test, and investigate. 'Let's compare the two ramp textures – this one is smooth, this one is bumpy' 'Let's test the car on this ramp, do you think it will move faster or slower?'

Open ended questions

Questions are the key to thinking scientifically! Open ended questions encourage children expand upon their thoughts. For example: What do you think will happen if we put this block on the ramp? Why do you think this car moves faster on this ramp than the other ramp?

Skills

Children will learn about the concepts of friction and textures as well as the skills of observing, predicting and recording. They will also learn vocabulary around ramps and textures.

Stay Safe

- Be careful if using heavy wood for ramp
- Be careful with children standing on ramps or knocking over objects

Ways to document

You can create a simple chart to document your results with the ramps! Keep adding to the chart as you make ramps with different textures and compare them to your previous results.

Extending the activity

Ask the children where else they have seen ramps – ramps are everywhere! Outside and inside. You can use parts of your body to make ramps, there are ramps in playgrounds. You can also alter the steepness of the ramps you have made and investigate how that affects the movement of the cars.