

## Exploring maths through ramp play

Children often enjoy sending objects down ramps. Maybe it's so engaging because of the fast movement, or because a ramp is easy to build. You don't need any special equipment: a few planks, pieces of guttering, or even cardboard will do. Indoors or outdoors, children will quickly get started, experimenting with big and small ramps in their own ways.

What might be less obvious is just how much maths is hidden inside ramp play. By combining the expertise of early years educators and university mathematicians, and using evidence from an early years setting in Sunderland over a number of years, we hope to demonstrate this in a way that is inspiring, practical and insightful.

### The maths in ramp play

As children build and adapt their ramps, they encounter mathematical ideas like shape, angle, speed, distance, and measurement — often without any adult prompting. They can be very motivated to make things roll faster or further, or to understand what will happen if they make a small change to their ramp.



**'It's gone little up the top now when I move the ramp up, the acute angle that's**

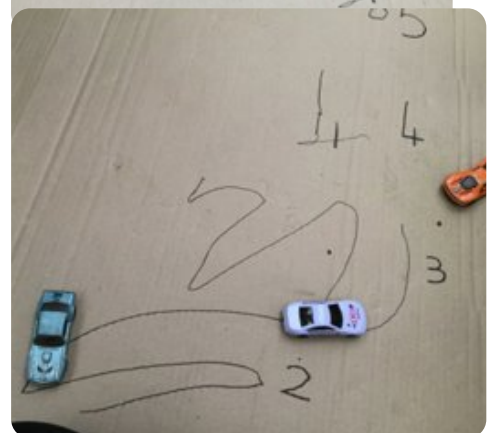
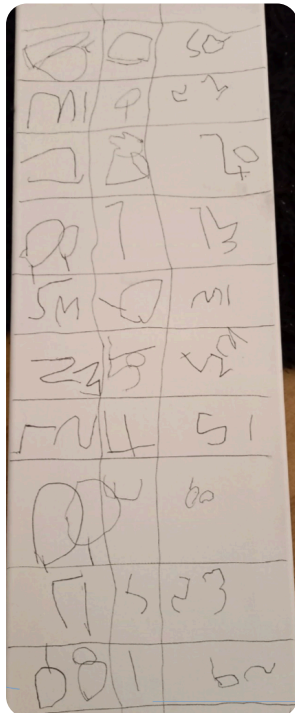


**'The black ramp is high like I did before so that's why they are going fast.'**

After the children had spent some time sending objects down ramps, they started to want to measure and compare. This led to thinking about how to handle data, as they found lots of ways to measure, record and interpret the distances travelled by the objects.

**'Look, 6 and 6 and then 6 and 6 again – that is two times the same!'**

**'Them are all big numbers, aren't they'**



**'This car went far on the shiny ramp – all the way to 4.'**

Throughout the project, we saw children take on new concepts and vocabulary, and make connections among both old and new ideas. With thoughtful support from practitioners, the children were able to pose their own questions, make and test hypotheses and ultimately develop confidence as young mathematicians.

**'The sparkly ones made the cars go fast but the bubble wrap was faster, I thought the bubbles would make it slow.'**



**‘My cuboid is sliding, not rolling – I think I know why – it’s because it is not curved like the sphere, that is like a ball.’**

Many of the children’s discoveries are captured in the Ramp Play booklet, which brings together these observations with practitioner reflections and mathematical insights.

## The Ramp Play booklet

In the Ramp Play booklet we have collected observations of children (all aged 3 or 4) as they play with ramps, together with reflections and insights from early years practitioners and university mathematicians.

### A focus on measuring and recording

During their ramp play the children were rolling many different items and making lots of comparisons when one child asked a question:

**‘How far does the car go?’**

We discussed this question together and the children decided to use long paper to mark the distances. Recording this measurement became a big part of children’s everyday explorations with ramps. This linked ramp play to early data handling skills.



**Practitioner reflections**

Through ramp play children can be encouraged to record their observations, and to interpret and analyse this data. Children can share their findings and interpretations with those around them. This in turn encourages others to conduct their own ramp experiments. All the data they have gathered becomes available for the learning community, leading to rich discussions among the children.

**THE MATHS INSIDE**

**A desire for data**

After a while, the children weren’t satisfied by describing what was happening and making verbal comparisons: they wanted precise measurements.

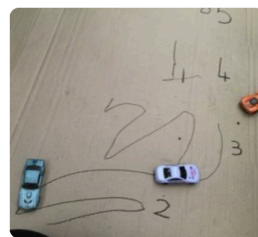
**Data** is the name for observations like this. Often data is numbers (distances, times, counts etc) but it can be other things (colours, type of animal, place). Statisticians use data to answer questions.

**MATHEMATICAL DEVELOPMENT**

**How to measure?**

Lots of the ways the children find to record the distances travelled might seem a bit questionable to an adult – using a shoe or handmade ruler as a unit of measurement, or having the number get smaller as the car travels further.

This doesn’t matter at all! The children are thinking mathematically, finding ways to be precise, making their own systems, and working together to gather data so that they can answer their own questions.



**Mathematical language**

Measure, record, track, distance, observe, data, information, variation.

**Recording and measurement**

**MATHEMATICAL DEVELOPMENT**

**Writing numbers**

This is a challenge for the children, but they often take it on. Here, their numbers are recognisable (in the bottom photo the 3 has more curves than the 2) but not quite standard. To help all the children learn the correct form, the practitioner has written the number clearly beside the child’s attempt.

But it’s very important that the child’s attempts are also still on the paper, valued and respected. The practitioner could say **‘This is how I write a 2’**, or **‘The 2 up on the wall there looks like this’**.

← The children write numbers on cardboard, so that they can then record how far each car travelled. **‘This car went far on the shiny ramp – all the way to 4.’**

**Practitioner reflections**

When children are motivated to write things down, they expand their repertoire of communication skills. This is especially valuable learning for the children who wouldn’t readily turn to written communication during their play.

In this context, writing has real meaning and purpose for the children, and they see that it can also be mathematical.

There are four types of box throughout the booklet:

- **Practitioner reflections** (green) – insights from classroom experience.
- **The maths inside** (blue) – explanations of the mathematical ideas children are grappling with.
- **Mathematical development** (yellow) – how children’s mathematical understanding and confidence grow.
- **Mathematical language** (red) – useful words to introduce naturally through play.

We hope these will be helpful to practitioners as they explore ramp play with the children in their care.

## Behind the Booklet: The Young Minds Big Maths Project

The *Ramp Play* booklet is part of a broader initiative called **Young Minds Big Maths**, led by mathematicians from Durham University's Department of Mathematical Sciences and Early Years educators from Houghton Community Nursery. The project began in 2020 when nursery practitioners, hoping to "sharpen the focus of their mathematical lens", reached out to the mathematicians for support.

Twice each school term, the early years educators and university mathematicians meet online to talk about maths relating to the children's play. The educators set the agenda of the meetings according to the interests and activities the children in their setting are currently enjoying. The university team share mathematical ideas that we hope might spark creative thinking and exploration in the nursery. This rich, collaborative partnership, rooted in child-led exploration, lays the foundation for deeper mathematical engagement in early years settings.

Some topics came up just for one meeting, whereas others continued for many months, and returned in subsequent years. Ramp play was one of these – whenever we thought we must have exhausted all the maths 3- and 4-year-olds could do around ramps, we were surprised by another idea!

### Growing the project

In 2022, the project expanded to ten more nursery settings, involving hundreds of children and a range of university volunteers, from staff to postgraduate and undergraduate students. Practitioners told us that Young Minds Big Maths had enthused staff and children about maths, and they too were amazed by how their children could engage with so much more maths than is in the EYFS curriculum. Practitioners felt empowered to think deeply about opportunities for mathematical learning in their provision, and more able to identify ways to further children's mathematical understanding.

It was through this wider project that the idea of creating a Ramp Play resource was born, as (perhaps unsurprisingly) ramps came up often in the new settings as well. We've tried to replicate the sorts of mathematical links we would make, and the discussions we would have, as we discussed all the wonderful things the children had done.

### Practical tips for practitioners

Here are some simple ways to get started with ramp play in your setting.

- **Start small:** Set up a single ramp and see what children do.
- **Use open questions:** Questions like "What do you think will happen if we make it steeper?" have no right-or-wrong answer, and so encourage discussion and reasoning.
- **Provide variety:** A collection of ramp materials of varying size, shape and texture will invite comparisons and experiments.

- **Step back and observe:** Children will often pose their own questions before you ask one.

We've seen first-hand how powerful it can be when we follow children's interests and give them the freedom to explore. With just a few simple materials, ramps can become one of the most valuable resources in an Early Years setting. They spark curiosity, invite collaboration, and open the door to rich conversations and problem-solving. Best of all, ramp play helps children see themselves as capable, creative mathematicians — confident to ask questions, test ideas, and share their discoveries.

👉 You can download the **Ramp Play** booklet for free at [youngmindsbigmaths.co.uk](https://youngmindsbigmaths.co.uk) and share your own experiences using **#YMBMrampplay**.