



# Force and Motion: Teacher Tips & Helpful Hints

**N.C.S.S:** 5.P.1 Understand force, motion, and the relationship between them.

- The activity is broken up into three different parts:
  - **Part 1: Effect of Height on Speed** focusing on height & speed (5.P.1.1)
  - **Part 2: Effect of Mass on Speed** (5.P.1.4)
  - **Part 3: Friction Forces** (5.P.1.1 and 5.P.1.2)
- The *Math Extension* activity hits 5.P.1.2 and 5.P.1.3
- There is a *Force and Motion: Student Activity Sheet* available.

## Part 1: Effect of Height on Speed

- The meter ruler is in mm too.
- Although there is an example of how to take the average speed, it is encouraged to do an example for the students.
- If the students increase the ramp height too high the weight of the marble will cause the hot wheels track to lift up off the table.

## Part 2: Effect of Mass on Speed

- Make sure students know that they are only working with the Ramp A set-up (40mm).

## Part 3: Friction Forces

- Make sure students know that they are only working with the Ramp A set-up (40mm).
- The foam activity makes for a great **hook** into understanding friction
- Introduce the concept of friction **before** completing the **salt** section of the activity. Students will use the term friction to explain how the salt affects the speed of the marble.
- The salt has the potential to change the direction of the marble allowing for a great discussion about forces and change of direction.

## Math Extension: Distance/Time

- There is a *Math Extension Student Activity Sheet*
- Students can compare the speed of their marbles and discuss possible reasons for differences.
- Students may need assistance in constructing their own graphs based on their data.

## N.C.S.S Clarifying Objectives

5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects.

5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel.

5.P.1.3 Illustrate the motion of an object using a graph to show a change in position over a period of time.

5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object.