Activity: Investigating air resistance using an inclined surface

Objectives

- To experiment with air resistance by adding 'air brakes' to free rolling foam vehicles
- To carry out investigations with increasing degree of precision.
- To collect data and make predictions and conclusions from them
- To explore the influence of friction and gravity on moving things

Suggested Time

2-3 hours

Activity Description

Ideally student can use the Race For the Line Foam cars and add card air brakes to them. Alternatively, toy cars or vehicles made from Knex™ or similar could be used. The cars are released and allowed to roll down a long sloping surface such as a long plank or piece of shelving. The students will make accurate records of the time taken and should repeat runs at least twice to capture an average (mean) time for each vehicle.

The students will then modify their cars by adding large flat pieces of card to act as air brakes. They will then investigate the impact of different size airbrakes on the time taken for the vehicle to descend the ramp and make predictions and conclusions from what they learn. They should calculate the area of their airbrakes in cm^2 and record this information.

Is possible. students should make use of a spreadsheet to organise their results and plot simple graphs showing the relationship between time taken to travel down the ramp and the size of the air brake. The students can also investigate other variables.

- What happens if I change the angle of the slope?
- What happens if I change the surface material to carpet?

By the end of the lesson students should have a clear understanding of the aerodynamic principles they need to consider when making a high performing model rocket car for Race For The Line.

Resources

Free rolling foam rocket cars, card sheets, blutac or tape, stopwatch/timer, laptop or tablet with spreadsheet, pens and paper, a long flat surface or plank to act as an incline, carpet or other alternative surface textures (optional)

Taking it further

They can program and use their own stopwatch using a micro:bit or make a timing gate that counts from when the car is released and when it arrives at the bottom. (See the Computing lesson)

They can look at the use of video analysis tools to motion track the car and produce graphs.