The Great Table Launch

Car Engineering Challenge

You've been hired by a toy company to test their newest invention — a sleek **car launcher ramp** designed to roll a small car smoothly off a table. The engineers want to know how their design performs: How far does the car travel? How long does it stay in the air? Can we predict exactly where it will land?

Your task is to test, observe, and report back so the company can perfect their design.

Set up a ramp at the edge of a sturdy table. The car rests at the top of the ramp, ready to roll.

1. Mark the exact spot on the ramp where you'll release the car each time.
2. Measure the height of the table from where the car leaves the edge to the floor.
3. Roll the car once and mark the spot where it first touches the ground.
4. Measure how far it travelled horizontally from the edge of the table.

a. Describe the shape of the car's path through the air. Did it fall straight down, arc outward, or move another way?

b. Why does using a ramp make this test more consistent?

Even great engineers double-check their results. You roll the car a second time, from the same release point on the ramp.

1. Launch again from your marked spot.
2. Compare the new landing point to your first one.

a. If they are close, describe how consistent your launcher seems. If they are not, list two possible reasons (for example: spin, uneven floor, or inconsistent release).

b. What does this tell you about how small differences in speed or aim can change the result?

The company wants to be able to predict the landing zone. They want to know if a higher launch changes how far the car travels by a predictable distance.

1. Set up the same ramp on taller surfaces.
2. Measure the new heights carefully.
3. Roll the car and measure how far it travelled horizontally.

a. Build a table of values with at least ten data points (heights and horizontal distances).

b. Draw a graph that shows the data points, distance travelled horizontally vs height.

Later, a designer hands you a note: “Our car landed over a metre away, but we forgot which table we used! Can you figure out how high it was?”

a. Explain in words how you could use your graph to predict the landing distance and the vertical height so that you could hit any target.

1. Place a target on the ground.
2. Before rolling, **predict** exactly where to place the ramp so that the car will hit the target.

a. Show, using your graph, that the car will land exactly where you want it to.
b. Draw a picture of your ramp and label the horizontal and vertical distances required to hit the target.

3. Try one single launch.

c. Did you hit the target, fall short, or overshoot?
d. If you missed, what small change would you make next time — adjust the height or change how far up the ramp you release the car?

The toy company is ready for your final report. In your conclusion:

a. Identify two main factors that affected how far the car travelled.
b. Explain why timing the car’s fall wasn’t necessary for this investigation.
c. Describe one realistic source of uncertainty and how it could make your results different than expected.